SFD Lite Report

Bera Municipality Bangladesh

This SFD Lite Report was prepared by
CWIS-FSM Support Cell, DPHE

Date of production: 17/06/2023
Last update: 15/04/2025

1 The SFD Graphic

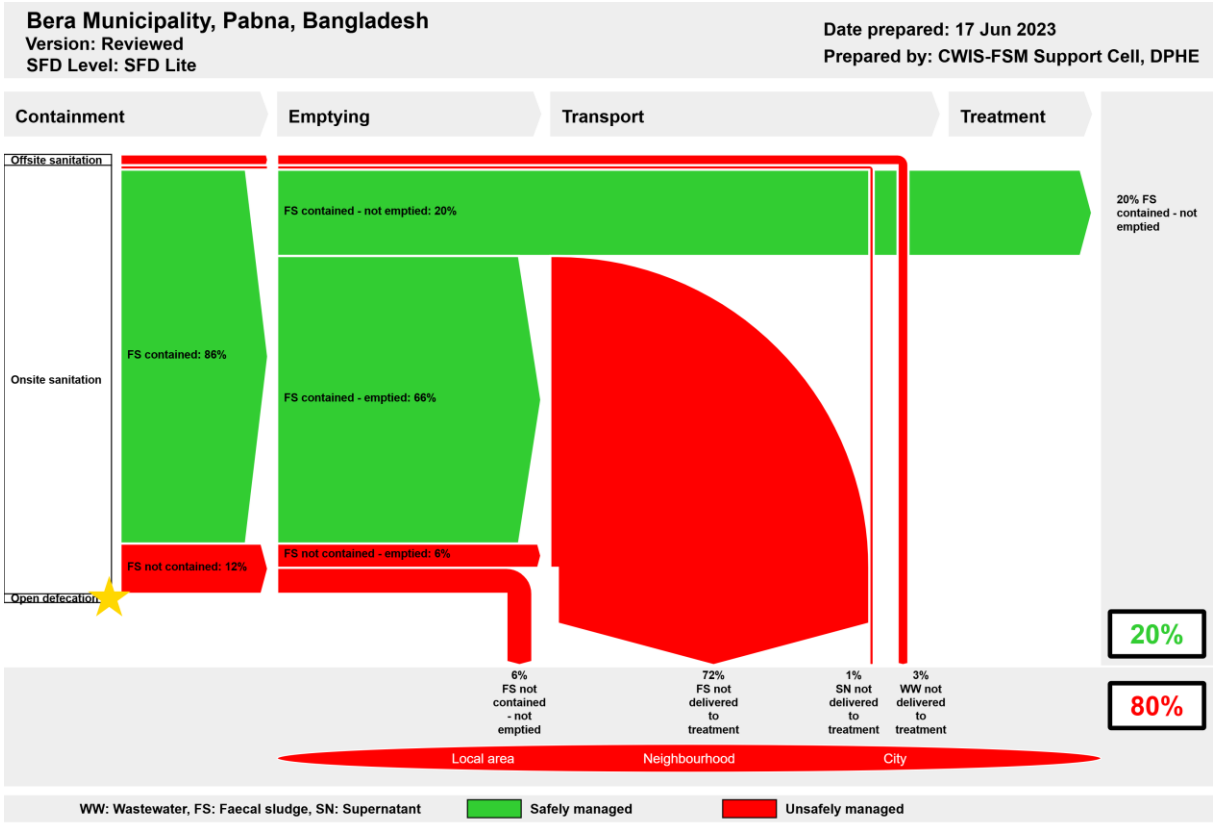

Figure 1: SFD Graphic for Bera Municipality.

2 SFD Lite information

Produced by:

- Dr. Abdullah Al-Muyeed, Chief Operating Officer, CWIS-FSM Support Cell, Department of Public Health Engineering (DPHE); Md. Shafiqul Hassan, Co-Chair, CWIS-FSM Support Cell, DPHE; Md. Tawhidur Rahaman, Technical Expert, CWIS-FSM Support Cell, DPHE; Parimal Kumar Dev, CEO, Municipal Association of Bangladesh; Md. Tahmidul Islam, Technical Lead, WaterAid Bangladesh and Md Zarif Oeishik, Associate Officer, WaterAid Bangladesh.

Collaborating partners:

- WaterAid Bangladesh, Municipal Association of Bangladesh (MAB), Onushandhani Creeds Ltd, and Bera Municipality played vital roles in collecting and sharing data and producing this SFD graphic and SFD lite report.

Date of production: 17/06/2023

3 General city information

Geography: Bera Municipality is located within the Bera Sub-District (Upazila) situated in the Pabna District (Zila) under Rajshahi Division. The geographical coordinates of Bera are 24'35.65"N and 89°37'0.93" E.[1] Chauhali, Daulatpur, and Shivalaya Upazilas on the east, Sujanagar, and Santhia Upazilas on the west, and Shahjadpur and Chauhali Upazilas on the north and south, respectively.[2] (Figure 2)

Categorisation: The Local Government (Municipality) Act of 2009 classifies Municipalities of Bangladesh into A, B, and C classes based on their annual income. The Municipality consists of 10 wards. It was established in on April 17, 1988, and is considered a category A Municipality.[3] (Figure 3)

Demography: According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the Bera city population was 50,068. The urban population growth in Bera is 1.6% per year. Considering 10% floating population, such as farmers and traders coming to the city every day, the present (2023) population is estimated to be around 66,631 (Table 1). The household survey results show that majority of the occupation is business (33%), followed by labourer (26%), private service (12%), and agriculture (9%)[4].

Climate: Located at an elevation of 17.96 meters (58.92 feet) above sea level, Pabna has a Tropical wet and dry or savanna climate (Classification: Aw). [5] The maximum mean temperature observed is around 35°C-39°C between March-August, with the minimum mean temperature of 15°C – 17°C in December-January. The annual average rainfall is about 1,242 mm, according to BMD (2003-2019).

Hydrology: Main rivers near the study area include Padma, Jamuna, Ichamati and Hurasagar; Dhalai beel, Ichar beel and Nandiar beel are notable.[6]

Natural Disasters: Rajshahi Division is known to face droughts due to shortages of rainfall. [7]

Housing: The household survey included the different types of residential structures in the Municipality which are pucca, semi-pucca, tin-shed and kacha/jhupri houses.

- Pucca: (houses single or multi-storied built with substantial materials such as brick, cement, and concrete),
- Semi pucca: houses (either the roof or the walls, but not both, are not made of pucca materials),
- Tin-shed: (roof of the house made of corrugated iron sheets)
- Kacha/Jhupri: roof and walls made of temporary materials like bamboo, paper boards, polyethylene sheets, and the floor made of mud etc. [8]

Water status: The main sources of water for drinking and for household activities include plain tube-well and tube-well with pump. [9]

[1] *http://www.longitude-latitude-maps.com/city/17_54,Bera,Pabna,Bangladesh*
[2] *https://en.banglapedia.org/index.php/Bera_Upazila*
[3] *KII at Bera Municipality*
[4] *KII and field visit during Baseline survey 2023*
[5] *https://tcktcktck.org/bangladesh/rajshahi/pabna*
[6] *https://en.banglapedia.org/index.php/Bera_Upazila*
[7] *https://en.prothomalo.com/environment/drought-like-situation-prevails-in-rajshahi*
[8] *KII and field visit during Baseline survey 2023*
[9] *KII and field visit during Baseline survey 2023*

Table 1: City profile (Source: Bera Municipality Office).

Parameter	Value
Estimated Population, 2023	66,631
Households, 2023	13.461
Area, sq.km	16.42
Total roads, km	105.2
Total drains, km	6.0

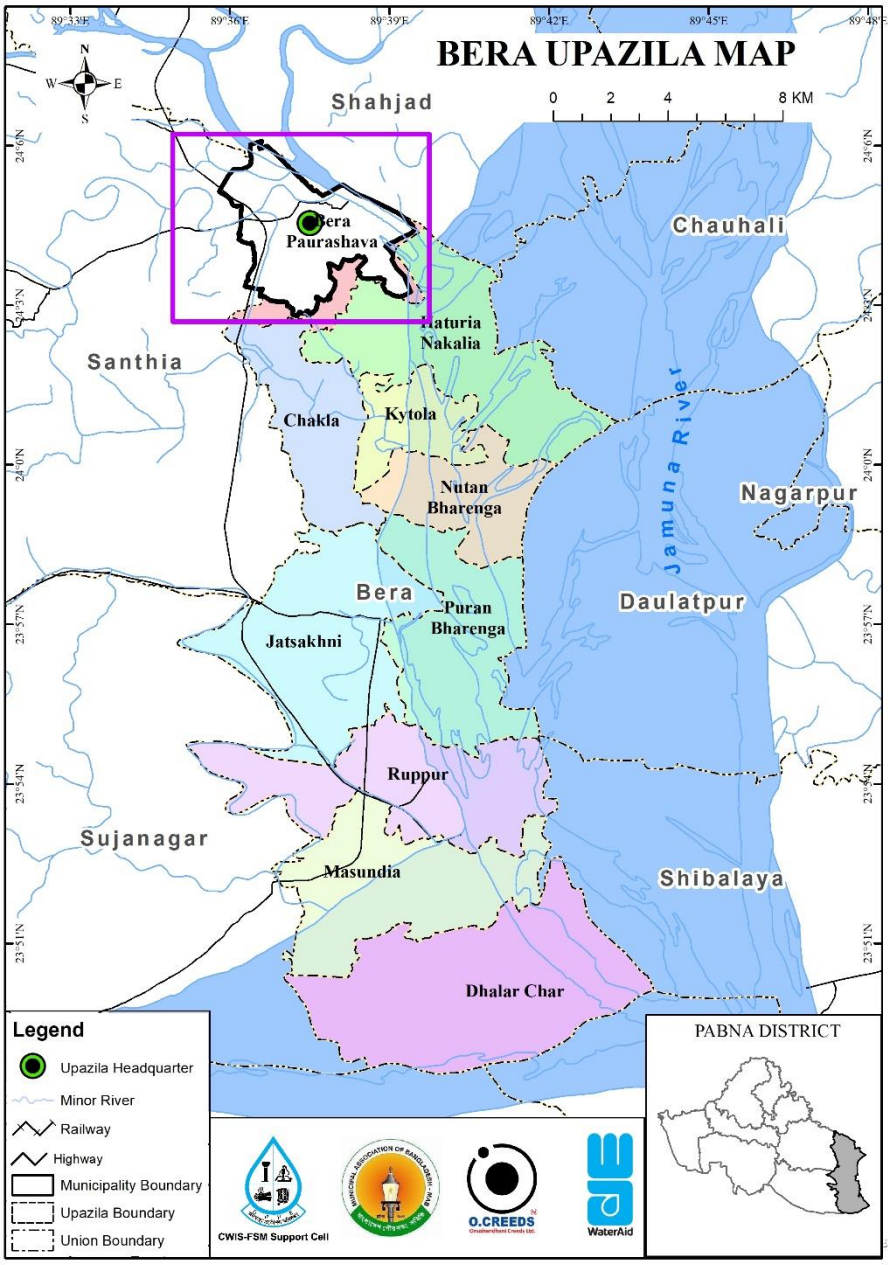

Figure 2: Bera Municipality Location Map.

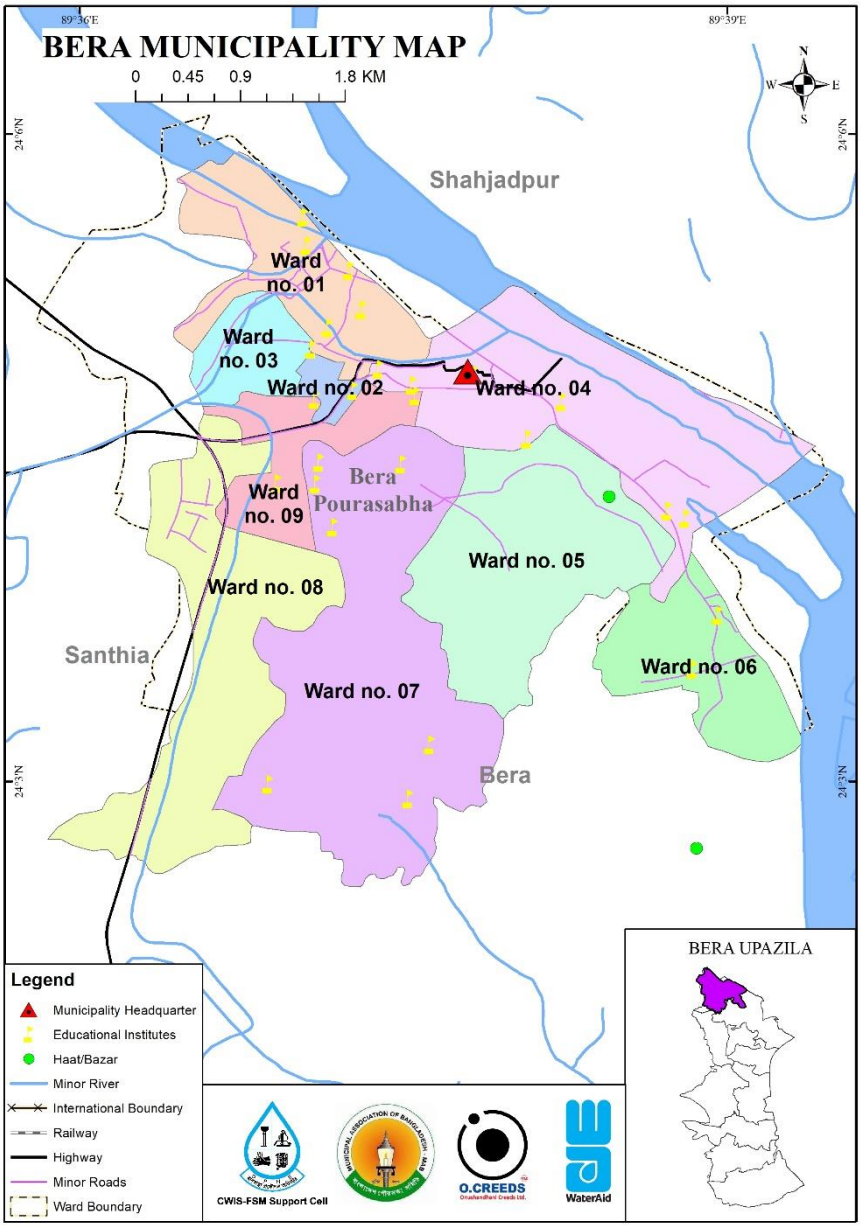

Figure 3: Bera Municipality Ward Boundary Map.

4 Service outcomes

The city does not have a dedicated sewerage system and most sanitation systems available in the town are classified as onsite systems (97.5%). The main types of toilet facilities are septic tanks connected to a soak pit, to an open drain, to a water body or to open ground, and lined tanks or lined pits, with no outlet or overflow.

Table 2 summarizes the sanitation systems in use, as well as estimates of the population connected to each system. For the onsite sanitation systems, it shows the proportions of each from which faecal sludge is then emptied, transported to treatment and treated. For the offsite systems (toilet discharging to open drain), it shows the proportion of wastewater delivered to treatment and treated.

Bera Municipality, Pabna, Bangladesh, 17 Jun 2023. SFD Level: SFD Lite
Population: 66631
Proportion of tanks: septic tanks: 96%, fully lined tanks: 0%, lined, open bottom tanks: 100%

Containment						
System type	Population	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	**F3**	**F4**	**F5**	**S4e**	**S5e**
System label and description	Proportion of population using this type of system (p)	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 open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A1C7 Toilet discharges directly to water body	1.0					
T1A1C8 Toilet discharges directly to open ground	1.5					
T1A2C5 Septic tank connected to soak pit	5.7	87.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	1.5	50.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	9.1	50.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	1.0	50.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	3.5	86.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	76.7	76.0	0.0	0.0		

Table 2: SFD Matrix for Bera Municipality.

The figures shown in Table 2 and elaborated in the following section are derived from information obtained through household surveys (HH), interviews with key informants (KII), and discussions in focus groups (FGD) (as shown in Figure 4).

Overview on technologies and methods used for different sanitation systems through the sanitation service chain is as follows:

4.1 Offsite Systems

The city does not have a dedicated sewerage system. However, during field observation and HH survey, it was found that there is a certain area where toilets are directly connected to open ground, open drain or storm sewer. Therefore, the T1A2C6 is considered as 1.5% of the total population of the city to generate the SFD graphic. In the absence of a sewerage system, the faecal sludge and the supernatant in T1A2C6 are directly discharged into open water body or the environment untreated.

4.2 On-site Sanitation Systems

Figure 4: Household survey and consultations. (Source: *Field Survey, 2023/ O.CREEDS_WaterAid Bangladesh).*

Containment: Almost all the households (97.5%) in the city have their latrine which is connected to single pits, twin pits, septic tanks, or discharged directly into the environment (e.g., open-drain or storm sewer). 17.3% of the city's population utilizes septic tanks as their containment system, 76.7% of the toilets have single pit systems, and 3.5% of people use double pits as the containment system. About 2.5% do not have any type of containment and discharges directly to the environment (KII, FGDs, HH survey, 2023).

According to the type of connectivity and features of containment technologies, the discharging points of the toilets are categorized as: 5.7% of the population uses septic tanks connected to soak pits (T1A2C5), 1.5% of the population uses septic tanks connected to open drain (T1A2C6), 9.1% of the population uses septic tanks connected to water bodies (T1A2C7), 1.0% of the population uses septic tanks connected to open ground (T1A2C8), 3.5% of the population uses lined tanks with impermeable walls and open bottom, no outlet or overflow (T1A4C10) and 76.7% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) (KII, FGDs, HH

survey, 2023). Thus, at the containment stage, the city's excreta of 86% of the population are contained. Figure 6 shows pictures of these technologies in operation.

Groundwater Pollution: The depth to groundwater in the city ranges from 5-10 metres. [10] The most common drinking water production technology is a hand tube- well or a tube-well with a hand pump or motorized pump. Among them, 23% of the households use their own tube- well fitted with electric motor and 70% use their own hand pump tube- well. 4% of the households use the supply water system within the Municipality. The remaining 3% use community or neighbour's tube-well. Lateral separation between sanitation facilities and water sources varies from one area to another. Tube wells of different sizes and depths are generally used to pump water from the subsurface confined aquifers.

During the household visit and FGDs, it was found that around 98% of sanitation facilities are located within 10 metres from the groundwater source. Besides, due to the geographical situation, sanitation facilities are not located uphill of the groundwater sources. According to a survey report on 'Hydrogeological screening, slug test and geophysical logging on observation well units', conducted by the Department of Public Health Engineering (DPHE) on March 2017, drinking water is collected from the confined aquifer (25m – 200m) through pumps. Hence, considering all these factors, it is considered that there is not any significant risk of groundwater contamination in the city. Therefore, a low risk of groundwater contamination is considered in the city.

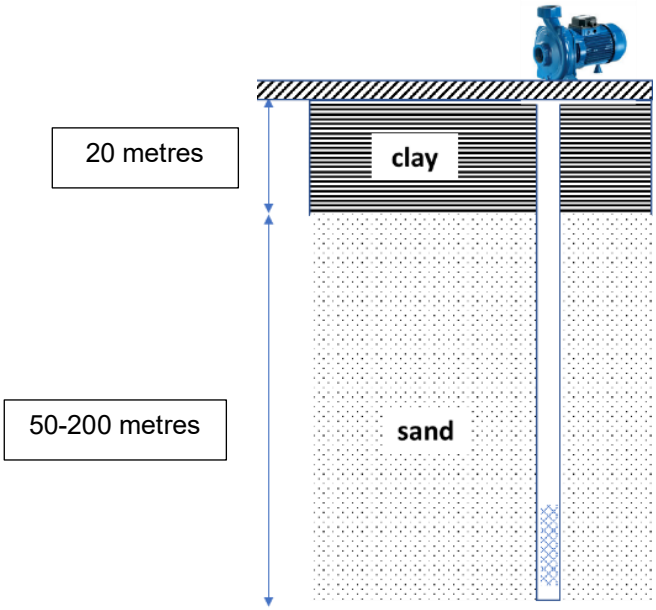

Figure 5: Soil profile in Bera Upazila and location of tubewell screen.

[10] *Survey Report on 'Hydrogeological screening, slug test and geophysical logging on observation well units', conducted by the Department of Public Health Engineering (DPHE)*

Figure 6: ***Containment technologies and their connections in Bera Municipality. (Source: Field Survey 2023/ O.CREEDS_WaterAid Bangladesh).***

Emptying: 77% households relying on septic tanks get service from private sweepers for emptying of the septic tank. It was observed from the survey that 47% septic tanks have been constructed in the last 5 years. According to the survey from 2023, the frequency of emptying of septic tanks or covered pits varies from 1 to 5 years depending upon the size, uses, etc.

However, about 87% of the septic tanks, connected to the soak pit are emptied within 6 years. About 50% of the septic tanks connected to open drains, open ground or water bodies are emptied within last 10 years. Almost 76% of single pit latrines emptied within 1-5 years. Besides the above information, it was also revealed during the discussion in FGDs and household visits that the demand for desludging septic tanks would increase shortly. Desludging of the septic tanks and pit is mostly (96%) done by private sweepers. In few households, desludging is done by municipal sweepers, private agencies or family members. The remaining 2% is done by family members or private agencies. Around 90% of this withdrawal is done manually using a bucket and rope. 4% use manual pump and some (6%) use electric pump– these reflect the use of the higher level of technologies by some of the workers. The Municipality has no Vacutug in operation[11].

Transportation: The sludge withdrawn from the septic tanks and latrine pits by the cleaners is disposed of in various places. Based on the survey from 2023, it was observed that almost 58% of the respondents who use any kind of containment system informed that faecal sludge (sludge from the septic tank or covered pit latrines) is disposed of in open ground covered with soil away from the house. Besides, 42% of the faecal sludge is disposed of in the open environment like a drain, open ground, and water bodies.

Treatment/Disposal: Presently, there are no treatment facilities in the town.

4.3 Open Defecation

From HH surveys, KIIs and FGDs, it was found that 100% of citizens use some kind of toilet in the Municipality. Thus, from the sanitation point of view, the town is considered an open defecation-free town.

[11] KII at Bera Municipality

4.4 SFD Graphic

The outcome of the SFD graphic shows that only twenty one percent (20%) of the excreta flow is classified as safely managed, and the remaining eighty percent (80%) is classified as unsafely managed (Figure 7).

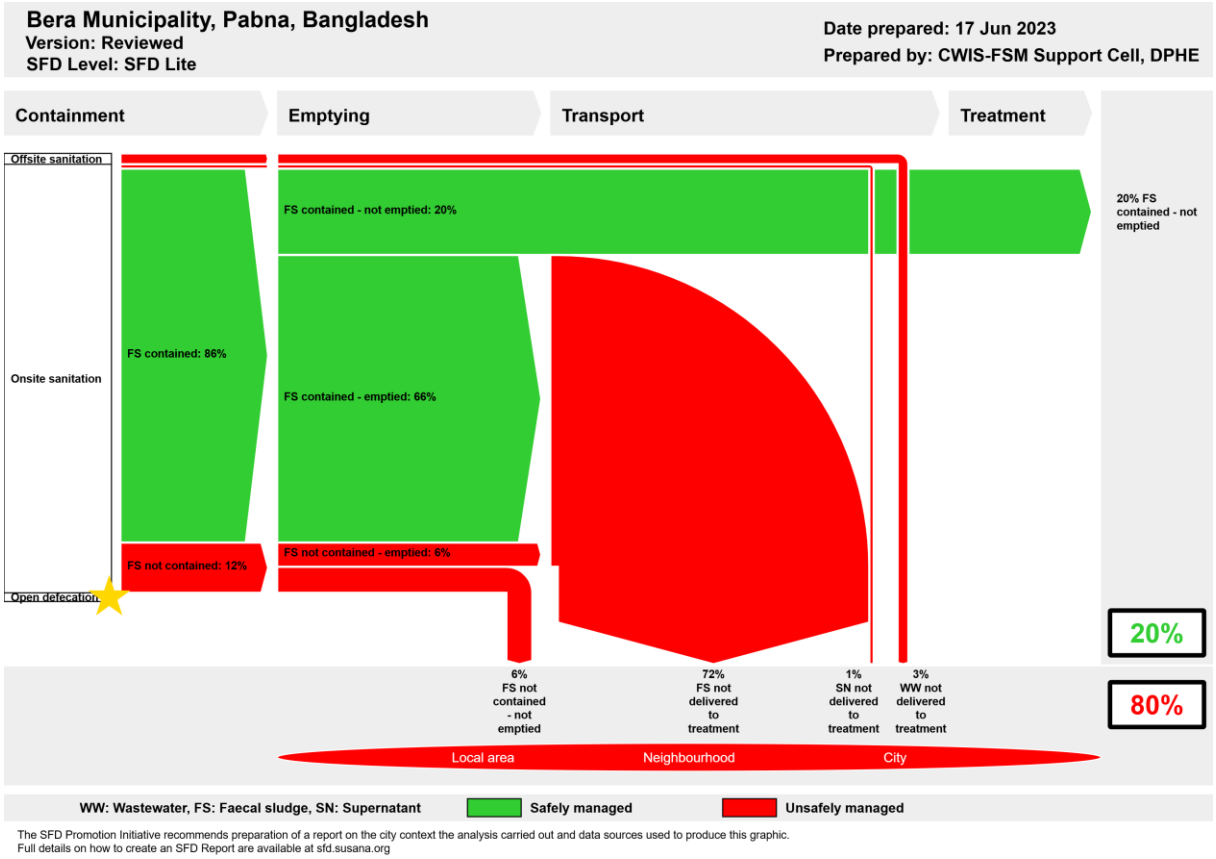

Figure 7: SFD Graphic for Bera Municipality.

The unsafely managed excreta originate from wastewater not delivered to treatment (3%), Faecal Sludge (FS) both contained and not contained - not delivered to treatment (72%), FS not contained - not emptied (6%) and 1% of supernatant not delivered to treatment.

The safely managed excreta originate from FS contained - not emptied (20%). However, the safely managed FS generated by this 20% of the population is temporary since FS from onsite sanitation systems will require emptying services in the short and medium term as they fill up.

5 Data and assumptions

The baseline survey conducted in May 2023 contains detailed data on different stages of the sanitation value chain. The SFD matrix is generated from these data, collected during sample household surveys, along with informal interviews, open-ended consultations, key informant interviews and focus group discussions with the Municipality officials, educational institutions, health complex and general public. The SFD matrix was generated from these data. Finally, data from all these sources were triangulated to produce the SFD matrix, the SFD graphic and the SFD lite report.

The last census was carried out about 12 years ago. So, the actual population, household, and sanitation data are not updated yet. Most of the households with septic tanks do not know the actual type, size, and design desludging periods. Also, a large number of pit users are unaware of the emptying events and frequency of their pit emptying. Due to all these data gaps, some assumptions have been made to produce the SFD graphic. These assumptions were shared with key informants at the Municipality and accepted by them.

Following assumptions were made for developing the SFD graphic for Bera Municipality:

- ✓ The proportion of FS in septic tanks, fully lined tanks, and lined, open bottom tanks are considered 96%, 0%, and 100% respectively as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.
- ✓ According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the Bera city population was 50068. The urban population growth in Bera is 1.6% per year. Considering 10% floating population, such as farmers and traders coming to the city every day, the present (2023) population is estimated to be around 66,631 (Table 1).
- ✓ There are around 3.5% of twin pit latrines in the containment system. So, it is assumed that all these twin pit containment technologies are defined as a lined tank with impermeable walls and open bottom (system T1A4C10, 3.5%). Based on the household survey, variable F3 for system T1A4C10 is set to 86%.
- ✓ There are around 76.7% of single pit latrines in the containment systems. So, it is assumed that all these single pit containment technologies are defined as lined pits with semi-permeable walls and open bottom, no outlet or overflow, where there is no 'significant risk' of groundwater pollution (system T1A5C10, 76.7%). Most of the single pit latrines are found to be emptied within 1-2 years. Based on the household survey, variable F3 for system T1A5C10 was set to 76%.
- ✓ 5.7% of septic tanks are connected to soak pits (system T1A2C5). They are well-constructed as per the field visit observation. The risk of groundwater contamination was deemed low, therefore that option was selected in the SFD Matrix.
- ✓ Around 87% of HHs have emptied their septic tank with a soak pit with a desludging frequency of 2-5 years. Based on the household survey, variable F3 for system T1A2C5 is set to 87%.
- ✓ There are 11.6% of septic tanks connected to the open drain, water bodies and open ground which are emptied within 2-5 years. Based on the household survey, variable F3 for systems T1A2C6, T1A2C7 and T1A2C8 is set to 50%.
- ✓ Supernatant in T1A2C6 is directly discharged into the river or the environment untreated. Therefore, variables S4e and S5e were set to 0%.
- ✓ Since there are no wastewater or faecal sludge treatment facilities in the town and all the collected FS is disposed untreated into the environment, variables F4 and F5 for all systems are considered to be 0%.

6 References

Reports, literature and website

- Population and Housing Census, Bangladesh Bureau of Statistics (BBS), 2011.
- http://www.longitude-latitude-maps.com/city/17_54,Bera,Pabna,Bangladesh
- https://en.banglapedia.org/index.php/Bera_Upazila
- https://tcktcktck.org/bangladesh/rajshahi/pabna
- https://en.prothomalo.com/environment/drought-like-situation-prevails-in-rajshahi
- Bangladesh Meteorological Department, BMD (2003-2019)
- Survey Report on 'Hydrogeological screening, slug test and geophysical logging on observation well units', conducted by the Department of Public Health Engineering (DPHE)

Key Informant Interviews (KIIs) (May 2023)

- KII with Sanitary Inspector, Bera Municipality
- KII with DPHE Official, Bera Municipality.
- KII with Sub-Assistant Engineer, Bera Municipality.

Facilitators: Md. Fazlul Haque (Project Manager), Shariar Seam (Junior Social Officer), O. CREEDS Ltd.

Figure 8: KIIs at Bera Municipality. (Source: *Field study 2023/O.CREEDS_WaterAid Bangladesh).*

Focus Group Discussions (FGDs) (May 2023)

- At Public Place
- At Municipality
- At Educational Institution


Figure 9: Focus Group Discussions at Bera Municipality. (Source: *Field survey 2023/ O.CREEDS_WaterAid Bangladesh).*

Additional information

- To accelerate actions toward CWIS approach, WaterAid launched the project titled 'National and Bilateral WASH Advocacy (NaBWASHA)' funded by Bill and Melinda Gates Foundation (BMGF). WaterAid along with Municipal Association of Bangladesh (MAB) and Citywide Inclusive Sanitation-Faecal Sludge Management (CWIS-FSM) Support Cell of Department of Public Health Engineering (DPHE) commissioned the study 'Assess the flow of waste and develop Excreta Flow Diagram (SFD) and Waste Flow Diagram (WFD) for fifty municipalities of Bangladesh' to analyse the current state of faecal sludge management (FSM) and solid waste management (SWM) practices.

- In-depth information and data were collected for the towns which included project documents, master plans and baseline reports from the municipalities and national levels, statistical data like population and household income expenditure, GIS data and other geospatial data and satellite images, and open street maps (OSM). The Field Survey of the project was conducted from 11th May to 15th May 2023. The field survey includes household surveys, key informant interviews, focus group discussions. A KOBO server has been established to monitor FSM and SWM databases under the project. The results of the study are shared with the municipal authority and are considered as a basis for preparing investment projects by the government and development partners, and sustainable plans for operating and maintaining the systems by the municipal authorities.

- We would like to thank S.M. Asif Shams, Mayor, Bera Municipality; Liaquat Ali, Sanitary Inspector; Md. Abdul Hamid; Sub-Assistant Engineer; Md Nazmul Haque, Sub-Assistant Engineer, DPHE, Bera Municipality for providing all the required primary and secondary data and cooperating for Key Informant Interviews (KIIs) & Focused Group Discussions (FGDs). This report would not have been possible to produce without the constant support of S.M. Asif Shams, Mayor, Bera Municipality, who helped in conducting sample surveys and FGDs in the field.

- We also acknowledge the support of the Centre for Science and Environment, India for the promotion of SFD in Bangladesh.

Bera Municipality, Bangladesh, 2025

Produced by:

Dr. Abdullah Al-Muyeed, Chief Operating Officer, CWIS-FSM Support Cell, Department of Public Health Engineering (DPHE), Bangladesh

Md. Shafiqul Hassan, Co-Chair, CWIS-FSM Support Cell, DPHE

Parimal Kumar Dev, CEO, Municipal Association of Bangladesh

Md. Tawhidur Rahaman, Technical Expert, CWIS-FSM Support Cell, Department of Public Health Engineering (DPHE), Bangladesh

Md. Tahmidul Islam, Technical Lead, WaterAid Bangladesh

Md Zarif Oeishik, Associate Officer- Technical, WaterAid Bangladesh

This SFD lite report is available from:

www.sfd.susana.org

SFD Promotion Initiative