SFD Lite Report

Kamalganj Municipality Bangladesh

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

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1 The SFD Graphic

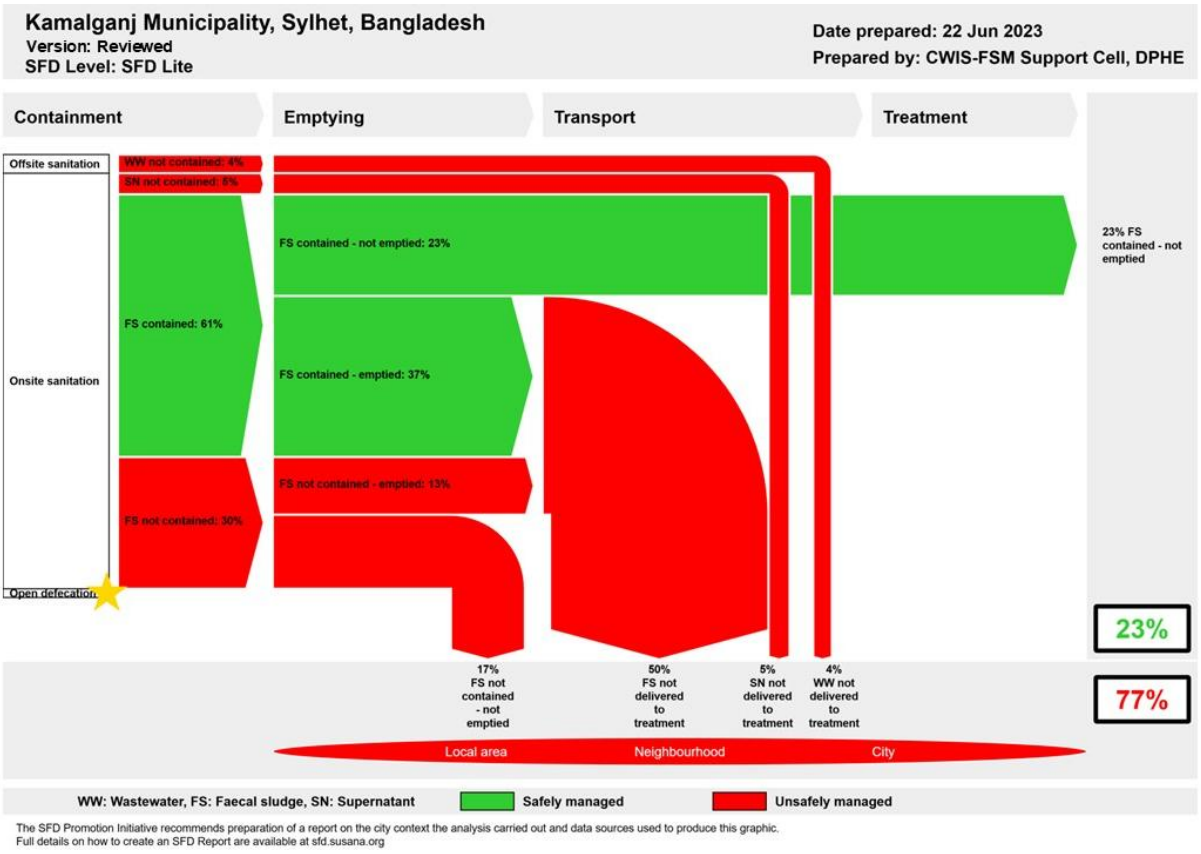

Figure 1: SFD Graphic for Kamalganj Municipality.

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 Kamalganj Municipality played vital roles in collecting and sharing data and producing this SFD graphic and SFD lite report.

Date of production: 22/06/2023

3 General city information

Geography: Kamalganj Municipality is situated within the Kamalganj Sub-District (Upazila) in Maulvibazar District (Zila), which is under Sylhet Division. The geographical coordinates of Kamalganj (upazila) are between 24°08' and 24°27' north latitudes and between 91°46' and 91°50' east longitudes. It is bounded by Rajnagar upazila on the north, Tripura state of India on the south, Kulaura upazila and Assam state of India on the east, Sreemangal and Maulvibazar sadar upazilas on the west.[1] (Figure 2)

Categorisation: Kamalganj Municipality was established on October 7, 1999. The Local Government (Municipality) Act of 2009 classifies Municipalities of Bangladesh into high income (A-Class, above BDT 6 million), medium income (B-Class, BDT 2.5–6 million), and low income (C-Class, BDT 1–2.5 million) based on their annual own-source revenue.[2] Kamalganj is considered a class B Municipality.[3] The Municipality consists of 9 wards (Figure 3).

Demography: According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the Kamalganj city population was 16,878. The population growth in Kamalganj is 1.25% per year. Considering 10% floating population, such as farmers and traders coming to the city every day, the present (2023) population is estimated at 21,550 (Table 1). The household survey results show that the majority of the occupation is business (26%), followed by agriculture (17%) and labourer (14%)[4].

Table 1: Demographic profile (Source: Kamalganj Municipality Office).

Parameter	Value
Estimated Population (2023)	21,550
Households (2023)	3,918
Area, sq.km	9.83
Total roads, km	70
Total drains, km	14

Climate: In Moulvibazar, the wet season is hot, oppressive, and mostly cloudy and the dry season is warm and mostly clear.[5] The maximum mean temperature observed is around 27°C-30°C between March-August, with the minimum mean temperature of 11°C – 15°C in December-January. The annual average rainfall is about 2081 mm, according to BMD (2003-2019).

Hydrology: Dhalai River is the main water body around the study area. The Dhalai River flows through Kamalganj Upazila in the Moulvibazar district of Bangladesh. It originates in the hills of Tripura, India, and enters Bangladesh through Kamalganj Upazila [6]

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 (27%): (houses single or multi-storied built with substantial materials such as brick, cement, and concrete),
- Semi pucca (49%) : houses (either the roof or the walls, but not both, are not made of pucca materials),
- Tin-shed (18%): (roof of the house made of corrugated iron sheets)

[1] *https://en.banglapedia.org/index.php/Kamalganj_Upazila*
[2] *Urban Local Government Finance in Bangladesh,2021 (https://doi.org/10.1007/978-3-319-31816-5_4361-1)*
[3] *KII at Municipality*
[4] *KII and field visit during Baseline survey 2023*
[5] *https://weatherspark.com/y/111978/Average-Weather-in-Maulavi-B%C4%81z%C4%81r-Bangladesh-Year-Round*
[6] *https://en.banglapedia.org/index.php/Kamalganj_Upazila*

- Kacha/Jhupri (6%): roof and walls made of temporary materials like bamboo, paper boards, polyethene sheets, and the floor made of mud, etc.[7]

Water: The main sources of water for drinking and for household activities include plain tube well and tube well with pump.[8]

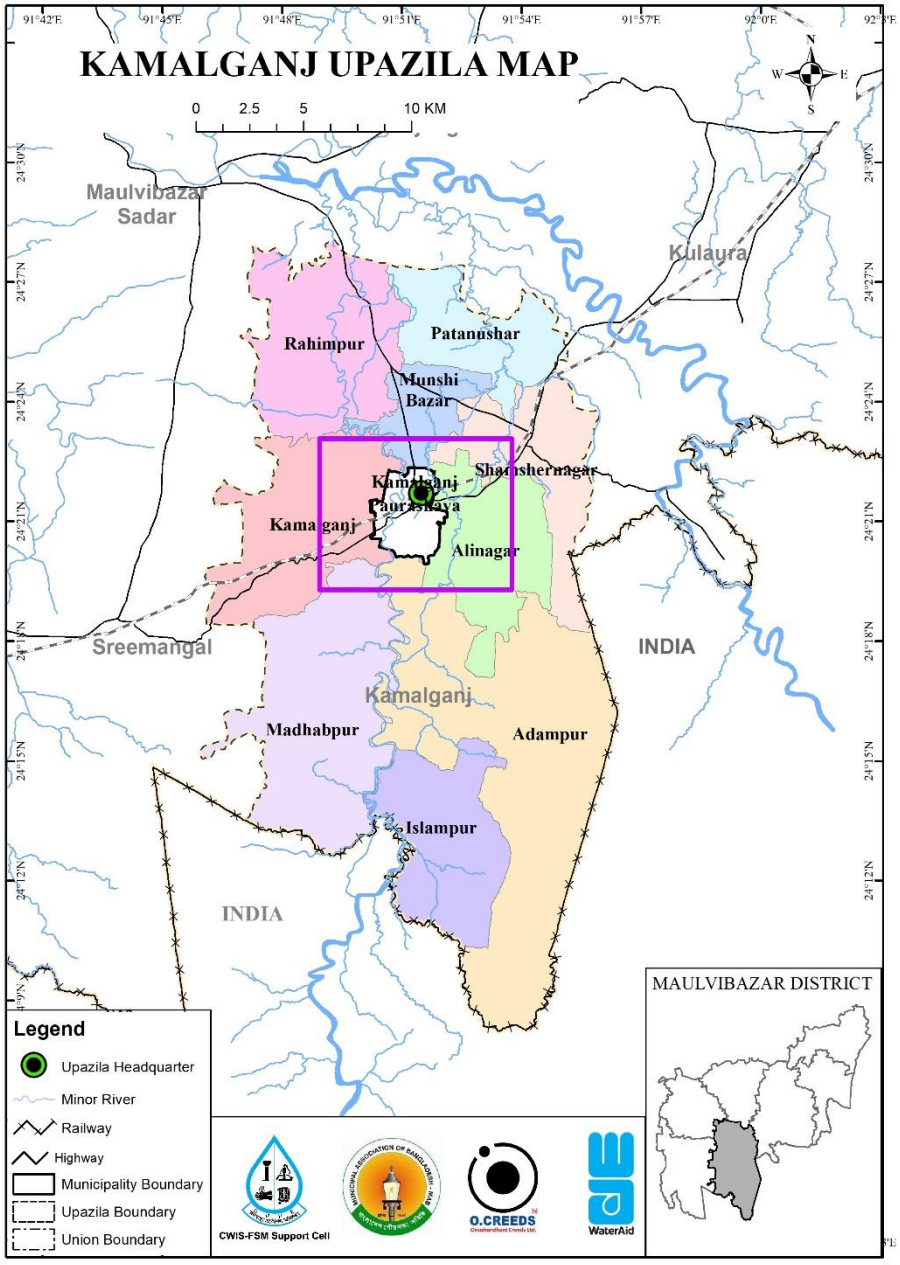

Figure 2: Kamalganj Municipality Location Map.

[7] *KII and field visit during Baseline survey 2023*
[8] *KII and field visit during Baseline survey 2023*

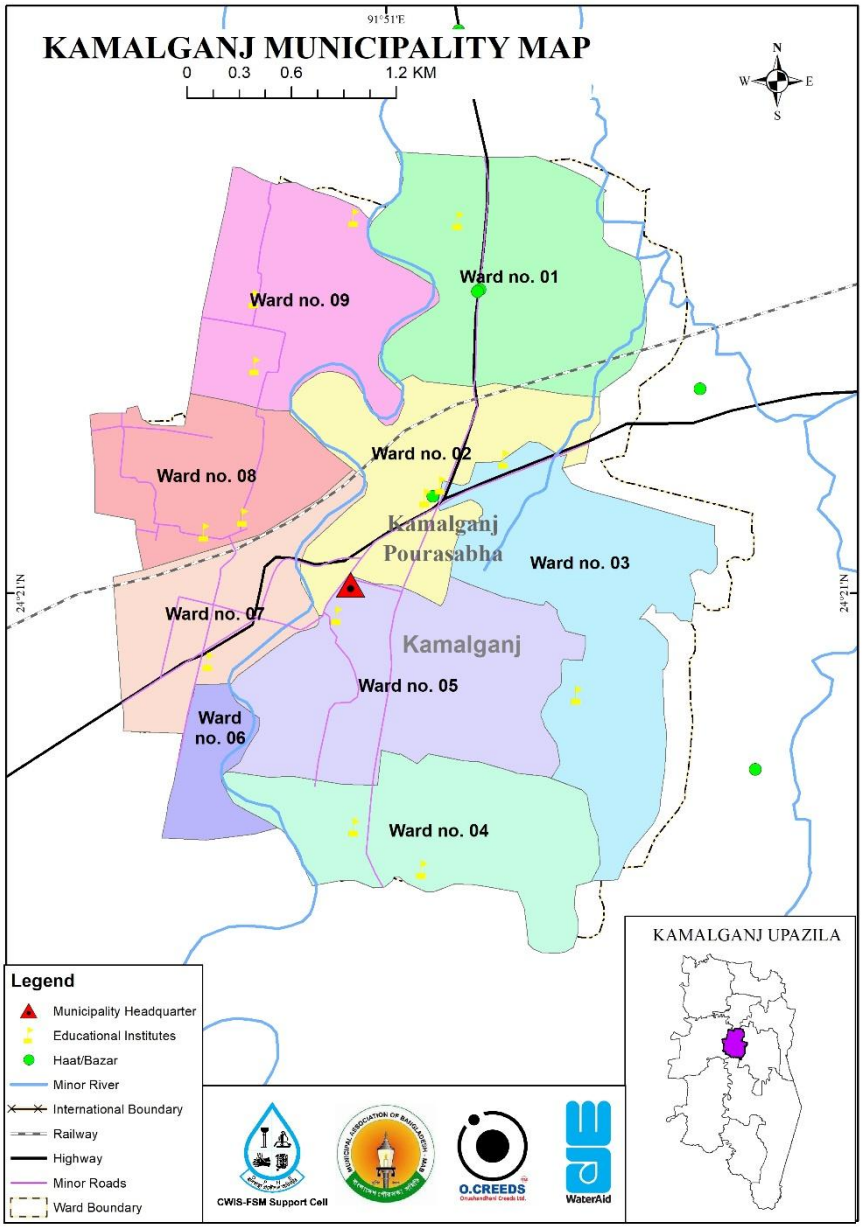

Figure 3: Kamalganj Municipality Ward Boundary Map.

4 Service outcomes

The city does not have a sewerage system and most sanitation systems available in the town are classified as onsite sanitation systems (OSSs) (95.7%). The main types of OSS facilities are septic tanks connected to a soak pit or an open drain or a water body or to open ground; lined tanks or lined pits with no outlet or overflow, and unlined pits. 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.

Kamalganj Municipality, Sylhet, Bangladesh, 22 Jun 2023. SFD Level: SFD Lite
Population: 21550
Proportion of tanks: septic tanks: 77%, fully lined tanks: 0%, lined, open bottom tanks: 100%

Containment								
System type	Population	WW transport	WW treatment	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	W4c	W5c	F3	F4	F5	S4e	S5e
System label and description	Proportion of population using this type of system (p)	Proportion of wastewater in open sewer or storm drain system, which is delivered to treatment plants	Proportion of wastewater delivered to 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 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
T1A1C6 Toilet discharges directly to open drain or storm sewer	0.7	0.0	0.0					
T1A1C7 Toilet discharges directly to water body	2.9							
T1A1C8 Toilet discharges directly to open ground	0.7							
T1A2C5 Septic tank connected to soak pit	11.7			50.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	21.1			49.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	7.3			49.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	6.8			49.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	1.9			13.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	46.2			70.0	0.0	0.0		
T1A6C10 Unlined pit, no outlet or overflow	0.7			0.0	0.0	0.0		

Table 2: SFD Matrix for Kamalganj Municipality.

The numbers shown in Table 2 and elaborated in the following section are derived from the 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 sewerage system. However, during field observation and HH survey, it was found that there are certain pockets where toilets are directly connected to open ground, open drain or storm sewer. Therefore, the T1A1C6 of system is considered as 0.7% and the T1A2C6 is considered as 21.1% of the total population of the city to generate the SFD graphic. In the absence of a sewerage system, the supernatant from 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 (95.7%) in the city have their latrines connected to single pits or twin pits or septic tanks or directly discharge wastewater into the environment (e.g., open-drain or storm sewer). 46.9% of the city's population utilises septic tanks as their containment system, 46.2% of the toilets have single pit systems, and 1.9% of people use twin pits in the city, 0.7% of the people use dug hole as the containment system. About 4.3% 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 categorised as: 11.7% of the population uses septic tanks connected to soak pits (T1A2C5), 21.1% of the population uses septic tanks connected to open drain (T1A2C6), 7.3% of the population uses septic tanks connected to water bodies (T1A2C7), 6.8% of the population uses septic tanks connected to open ground (T1A2C8), 1.9% of the population uses lined tanks with impermeable walls and open bottom, no outlet or overflow (T1A4C10), 46.2% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) and 0.7% of the population uses unlined pit, no outlet (T1A6C10) (KII, FGDs, HH survey, 2023). Thus, at the containment stage, excreta of only 61% of the city's population are contained. Figure 6 shows these technologies in operation.

Groundwater Pollution: There is no piped water supply system in the Municipality. The most common drinking water production technology is a tube- well with a hand pump or motorized pump. The depth to groundwater in the city ranges from 4-17 meter.[9] 40% of the households use their own tube-well fitted

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

with an electric motor, and 50% use their own hand pump tube-well. 10% use a neighbour's or community tube well/tap. Tube wells of different sizes and depths (18 meters to 200 meters) are generally used to pump water from confined subsurface aquifers.

Lateral separation between sanitation facilities and water sources varies from one area to another. During the household visit and FGDs, it was found that around 87% 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) in March 2017, drinking water is collected from the confined aquifer (25m – 200m) through pumps. Taking into account all these factors, it can be assumed that the risk of groundwater contamination in the city is not significant. Therefore, a low risk of groundwater contamination is considered in the city.

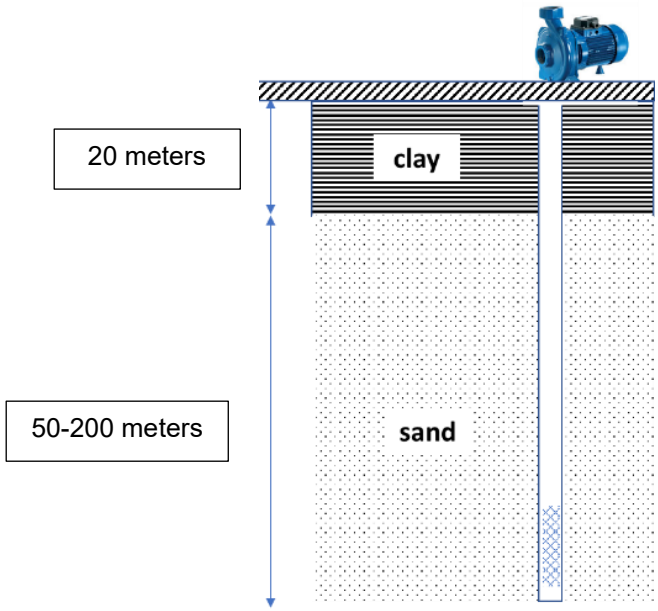

Figure 5: Soil profile in Kamalganj Upazila and location of tubewell screen


Figure 6: ***Containment technologies (single pit with direct connection with drain and waterbody) in Kamalganj Municipality. (Source: Field Survey 2023/ O.CREEDS_WaterAid Bangladesh).***

Emptying: Desludging of the septic tanks and pit is mostly (95%) done by private sweepers. In few households, desludging is done by municipal sweepers (1%) and family members (4%). Around 65% of this withdrawal is done manually using a bucket and rope. 21% use manual pump and some use (14%) electric pump– these reflect the use of the higher level of technologies by only a few workers. The Municipality or private emptiers do not operate any emptying vehicle like Vacutug.[10]

60% 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, number of users, etc. However, about 50% of the septic tanks, connected to the soak pit are emptied within 6 years. About 49% of the septic tanks connected to open drains, open ground or water bodies are emptied within last 10 years. Almost 70% 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 shortlyas households are becoming increasingly aware of the health and environmental risks of delayed desludging, particularly contamination of drains, open ground, and nearby water bodies.

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 69% 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, 31% 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. All the faecal sludge thus returns to the environment without any treatment and no reuse of the biosolids is practiced.

4.3 Open Defecation

From HH surveys, KIIs and FGDs, it was found that 100% of the city's population use some kind of toilet. Thus, from the access to sanitation point of view, the town is considered an open defecation-free town.

[10] KII at Municipality

4.4 SFD Graphic

The outcome of the SFD graphic shows that only twenty three percent (23%) of the excreta flow is classified as safely managed, and the remaining seventy seven percent (77%) is classified as unsafely managed (Figure 7).

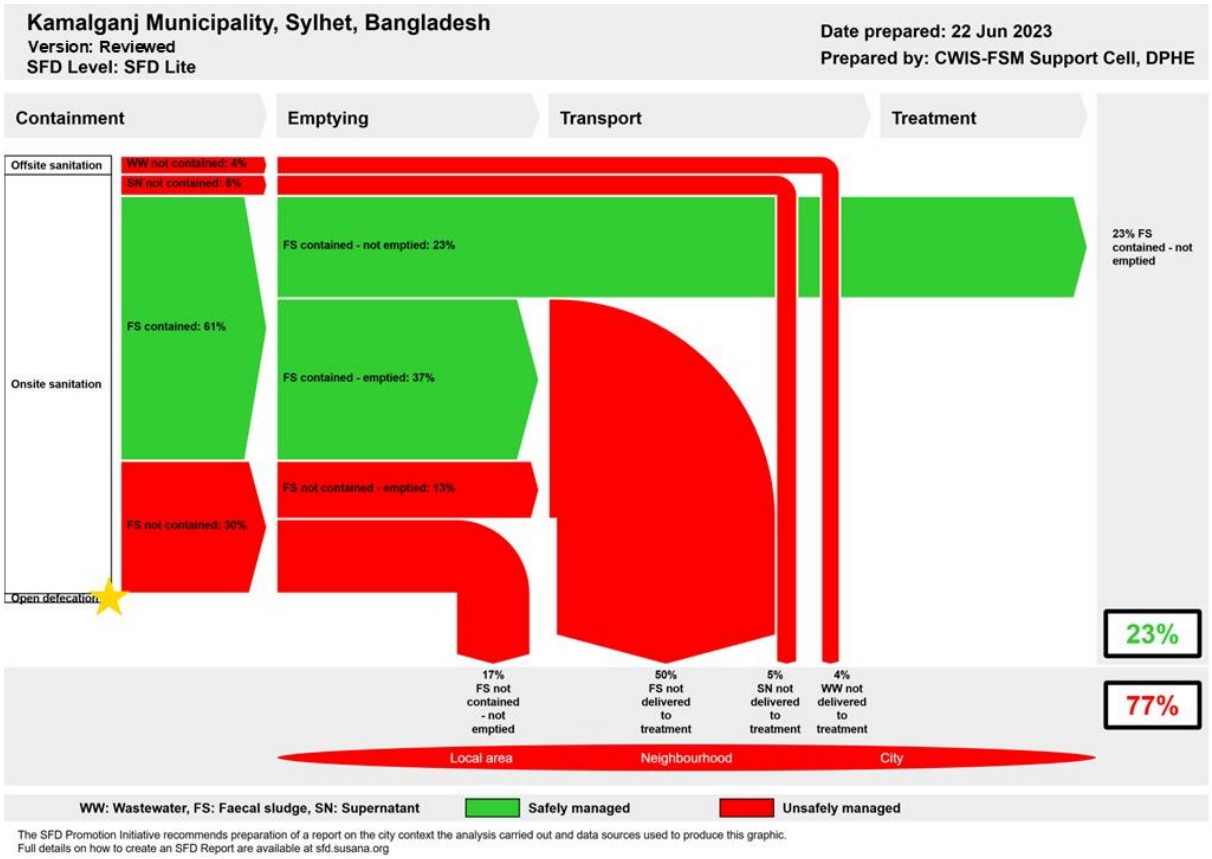

Figure 7: SFD Graphic for Kamalganj Municipality.

The unsafely managed excreta originates from wastewater and not delivered to treatment (4%), faecal sludge (FS) both contained and not contained - not delivered to treatment is fifty percent (50%), FS not contained - not emptied is 17% and 5% of supernatant is not delivered to treatment. The safely managed excreta originate from FS contained - not emptied and the quantity is 23%. However, this currently safely managed FS is temporary since FS from these 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–June 2023 contains detailed data on different stages of the sanitation value chain. A total of 412 households were surveyed using the Cochran method for sample selection with a 95% confidence level. The survey was carried out by trained field surveyors using KoboToolbox, which enabled real-time monitoring of data quality through a dedicated dashboard. Data were collected through sample household surveys, informal interviews, open-ended consultations, key informant interviews, and focus group discussions with municipality officials, educational institutions, health complex operators, and the general public. Data from all sources were carefully triangulated to ensure accuracy and consistency, resulting in the generation of the SFD matrix, the SFD graphic, and the SFD Lite report.

The last census was conducted about 12 years ago. So, the city's population, number of households, and sanitation data are not updated. 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 Kamalganj Municipality:

- ✓ The proportion of FS in septic tanks, fully lined tanks, and lined, open bottom tanks are considered 77%, 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 Kamalganj city population was 16,878. The urban population growth in Kamalganj is 1.25% 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 21,550 (Table 1).
- ✓ There are around 1.9% 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, 1.9%). Based on the household survey, variable F3 for system T1A4C10 is set to 13.0%.
- ✓ There are around 46.2% 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, 46.2%). 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 70.0%.
- ✓ 11.7% of septic tanks are connected to soak pits (system T1A2C5). As observed during the field visits, they are typically well-constructed The risk of groundwater contamination was deemed low, therefore that option was selected in the SFD Matrix.
- ✓ Around 50.0% 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 50.0%.
- ✓ There are 35.2% 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 49.0%.
- ✓ Wastewater in T1A1C6 and Supernatant in T1A2C6 are directly discharged into the river or the environment untreated. Therefore, variables W4c, W5c, 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.
- 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-June 2023)

- KII with DPHE Official, Kamalganj Municipality.
- KII with Assistant Engineer, Kamalganj Municipality.

Facilitators: Md. Fazlul Haque (Project Manager), Jawadul Kabir Showdha (Enumerator) O. CREEDS Ltd.



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

Focus Group Discussions (FGDs) (May-June 2023)

- At Health Complex
- At Public Place
- At Municipality
- At Educational Institution

Figure 9: Focus Group Discussions at Kamalganj 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 28th May to 2nd June 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 Md. Jewel Ahmed, Mayor, Kamalganj Municipality; Md. Belal Chowdhury, Assistant Engineer; and Md. Golam Kabir, Resident Engineer (DPHE) Kamalganj 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 ABM Golam Kabir, Mayor, Kamalganj 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.

Kamalganj Municipality, Bangladesh, 2026

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

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