



SFD Lite Report

Laksham Municipality Bangladesh

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

Date of production/ last update: 19/02/2025

1 The SFD Graphic

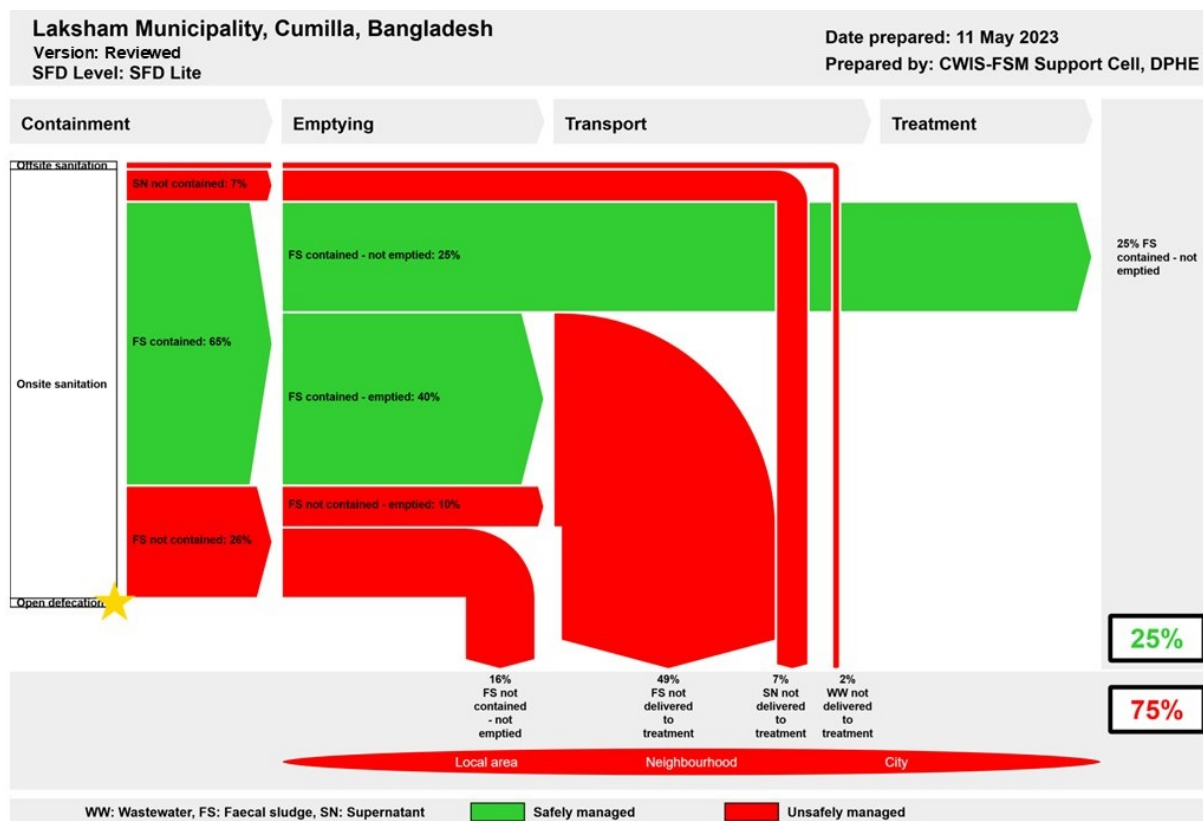


Figure 1: SFD Graphic for Laksham Municipality.

2 SFD Lite information

Produced by:

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Collaborating partners:

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

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3 General city information

Geography: Laksham Municipality is situated within the Laksham Sub-District (Upazila) in Cumilla District (Zila), which is under Chittagong Division. The geographical coordinates of Laksham are 22°09'50.04" N and 90° 25' 50.16" E.¹ It is bordered on the north by the upazilas of Cumilla Sadar Dakshin and Barura, on the south by the upazilas of Nangalkot and Manoharganj, on the east by the upazilas of Barura and Shahrasti.² (Figure 2)

Categorisation: The Local Government (Paurashava) Act of 2009 classifies Paurashavas of Bangladesh into A, B, and C classes based on their annual income. Laksham Municipality is a Category A Municipality. The Paurashava was formed in 1984 and consists of 9 wards and 31 mahallas.³ (Figure 3)

Demography: According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the population of Laksham Municipality was 70,632. The population growth in Laksham is 2.7% 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 106,964 (Table 1). The household survey results show that majority of the occupation is business (42%), followed by private service (25%), self-employment (7%) and agriculture (5%). Around 9% of the household heads were found to be unemployed.⁴

Table 1: Demographic profile (Source: Laksham Municipality Office; Laksham Municipality Master Plan 2020-2040).

Population parameters	Value
Estimated population, 2023	106,964
Households, 2023	16,950
Area, sq.km	19.63
Total roads, km	182.72
Total drains, km	27.50

Climate: In Laksham, the dry season is warm, humid, and mainly clear whereas the wet season is oppressively hot and cloudy.⁵ The maximum mean temperature observed is around 32°C-39°C between March-August, with the minimum mean temperature of 13°C – 15°C in December-January. The annual average rainfall is about 2010 mm, according to BMD (2003-2019).

Hydrology: The main water body around the study area is Dakatia River which flows through Raipur Upazila. Karzan Canal is notable.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 (39%): (houses single or multi-storied built with substantial materials such as brick, cement, and concrete),
- Semi pucca (29%): houses (either the roof or the walls, but not both, are not made of pucca materials),
- Tin-shed (29%): (roof of the house made of corrugated iron sheets)
- Kacha/Jhupri (3%): roof and walls made of temporary materials like bamboo, paper boards, polyethylene sheets, and the floor made of mud etc. ⁷

¹ <https://latitude.to/map/bd/bangladesh/cities/laksham>

² https://en.banglapedia.org/index.php/Laksham_Upazila

³ KII at Laksham Municipality

⁴ KII at Laksham Municipality

⁵ <https://weatherspark.com/y/111963/Average-Weather-in-L%C4%81ksh%C4%81m-Bangladesh-Year-Round>

⁶ https://en.banglapedia.org/index.php/Laksham_Upazila

⁷ KII and field visit during Baseline survey 2023

Water Status: The main sources of water for drinking and for household activities include piped supply water, plain tube well and tube well with pump.⁸

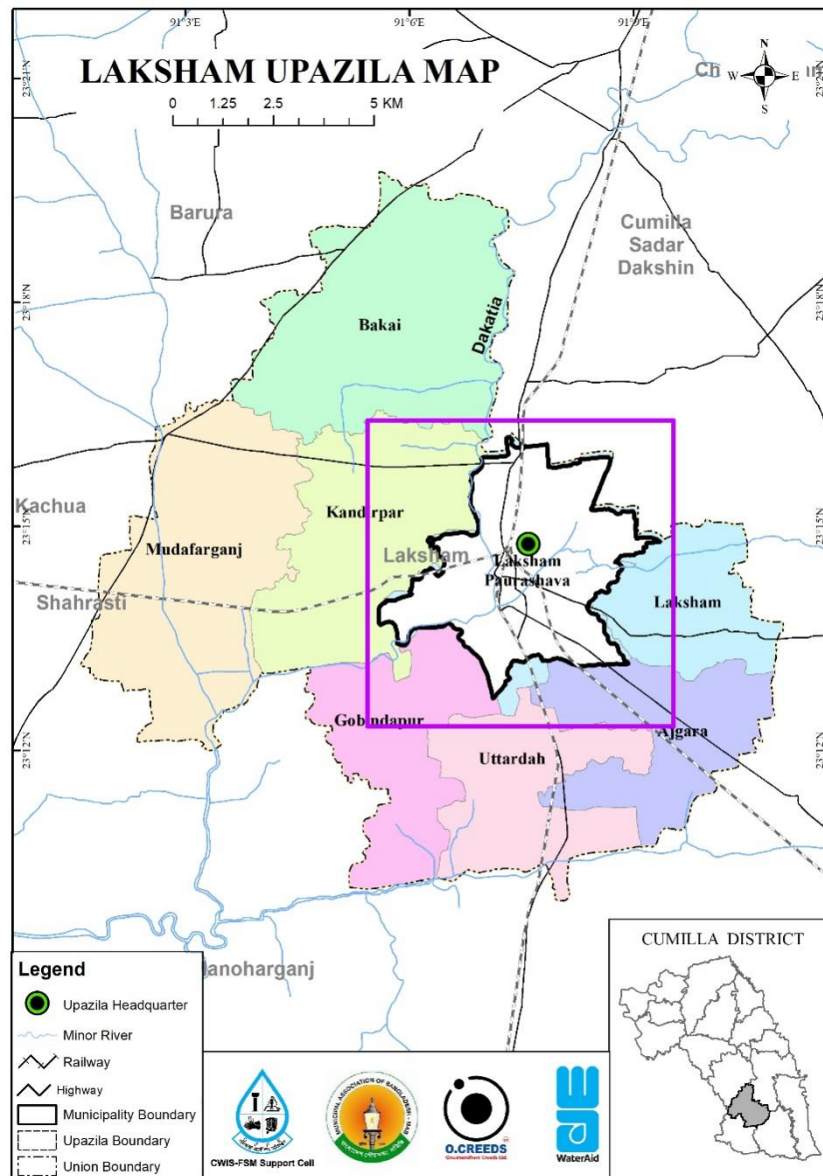


Figure 2: Laksham Municipality Location Map.

⁸KII and field visit during Baseline survey 2023

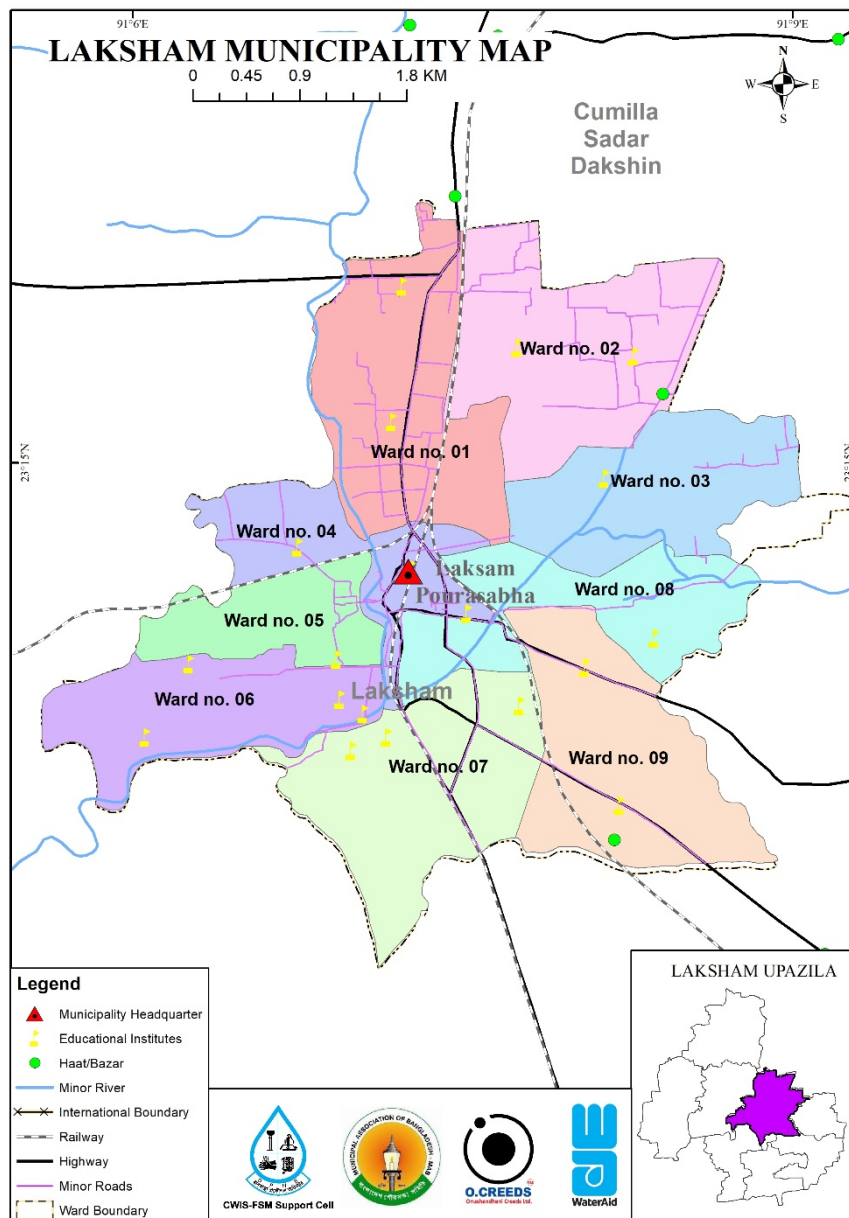


Figure 3: Laksham Municipality Ward Boundary Map.

4 Service outcomes

The city does not have a sewerage system and most sanitation systems available in the town are classified as onsite systems (98.2%). The main types of OSSs are septic tanks connected to soak pits, or an open drains, 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.

Laksham Municipality, Cumilla, Bangladesh, 11 May 2023. SFD Level: SFD Lite Population: 106964 Proportion of tanks: septic tanks: 79%, 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	0.8	0.0	0.0					
T1A1C7 Toilet discharges directly to water body	0.5							
T1A1C8 Toilet discharges directly to open ground	0.5							
T1A2C5 Septic tank connected to soak pit	34.9			76.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	27.7			37.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	1.8			37.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	0.5			37.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	1.0			75.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	31.8			65.0	0.0	0.0		
T1A6C10 Unlined pit, no outlet or overflow	0.5			0.0	0.0	0.0		

Table 2: SFD Matrix for Laksham 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 sewerage system. However, during field observation and HH survey, it was found certain pockets where toilets are directly connected to open drains or stormwater sewer. Similarly, a portion of septic tanks are directly connected to open drains, storm sewer or open ground. Therefore, the T1A1C6 system is considered as 0.8% and the T1A2C6 system is considered as 27.7% of the total population of the city to generate the SFD graphic. The faecal sludge and the supernatant from T1A2C6 are directly discharged into water body or the environment without any treated.

4.2 On-site Sanitation Systems



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

Containment: Almost all the households (98.2%) 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). From the household survey, it was found that 64.9% of the city's population uses septic tanks as the containment system, 31.8% of the toilets have single pit systems, and 1.0% of people use double pits, 0.5% use dug holes as containment systems. About 1.8% do not have any type of containment structure and discharge 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: 34.9% of the population uses septic tanks connected to soak pits (T1A2C5), 27.7% of the population uses septic tanks connected to open drain (T1A2C6), 1.8% of the population uses septic tanks connected to water bodies (T1A2C7), 0.5% of the population uses septic tanks connected to open ground (T1A2C8), 1.0% of the population uses lined tanks with impermeable walls and open bottom, no outlet or overflow (T1A4C10), 31.8% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) and 0.5% of the population uses unlined pit, no outlet (T1A6C10) (KII, FGDs, HH survey, 2023). Thus, at the containment stage, excreta of only 68% of the city's population are contained. Figure 6 shows pictures of these technologies in operation.

Groundwater Pollution: The most common drinking water production technology is tube-well with an electric motor. 55% of the households use their own tube-well fitted with electric motor and 23% use their own tube-well with a hand pump, 17% of the population get supply water from the municipality. The remaining 5% use neighbour's tube-well/tap or water gallons provided by NGOs or other agencies. The depth to groundwater in the city ranges from 3-6 metres.⁹ 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 71% 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. Moreover, adequate lateral separation between the groundwater sources and the on-site sanitation systems has been observed, indicating a minimal risk of contamination. 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. Considering all these factors, low risk of groundwater contamination is considered in the city.

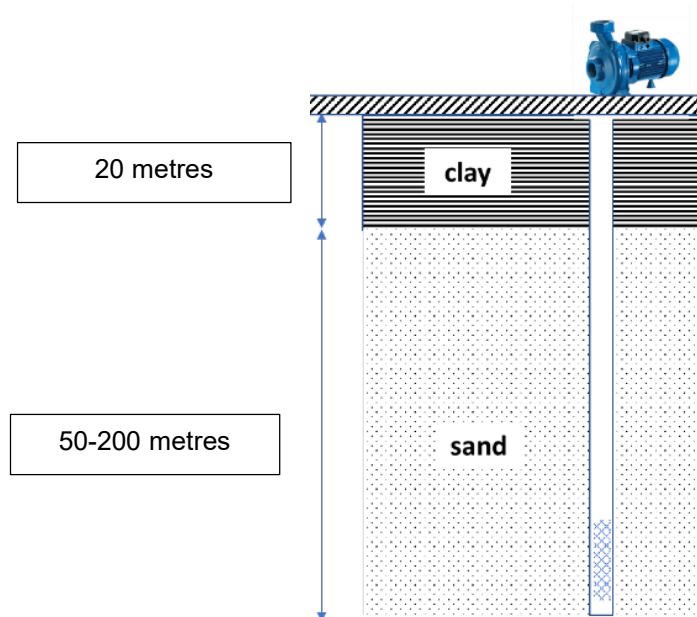


Figure 5: Soil profile in Laksham Upazila and location of tubewell screen

⁹Survey 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 Laksham Municipality. The left picture shows a single pit latrine, while the right picture shows a septic tank system.
(Source: Field Survey 2023/ O.CREEDS_ WaterAid Bangladesh).

Emptying: Desludging of the septic tanks and pit is mostly (83%) done by private sweepers. In few households, desludging is done by municipal sweepers (17%). Around 48% of this withdrawal is done manually using a bucket and rope. 18% use electric pumps and some use (24%) manual pump– these reflect the use of the higher level of technologies by some of the workers. 10% of the households reported desludging using a vacutug.

38% households relying on septic tanks get service from private sweepers for emptying. The survey found 37% septic tanks to 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 7 years depending upon the size, number of users, etc. However, about 76% of the septic tanks, connected to the soak pit are emptied within 6 years. About 37% of the septic tanks connected to open drains, open ground or water bodies are emptied within last 10 years. Almost 65% 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 likely increase after the local government's plan to implement integrated waste management and mechanical emptying services are implemented.

Transportation: The sludge withdrawn from the septic tanks and latrine pits by the cleaners is disposed of in various places without any treatment. Based on the survey from 2023, it was observed that almost 61% 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, 28% of the faecal sludge is disposed of in the open environment like a drain, open ground, and water bodies. 11% of the households reported the sludge being carried away with the desludger.

Treatment/Disposal: Presently, there are no treatment facilities in the town. All the faecal sludge thus returns to the environment without any treatment. No reuse of untreated faecal sludge was observed during the study, and there is no evidence of its application for agricultural or other purposes.

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.

4.4 SFD Graphic

The outcome of the SFD graphic shows that only twenty six percent (26%) of the excreta flow is classified as safely managed, and the remaining seventy four percent (74%) is classified as unsafely managed (Figure 7).

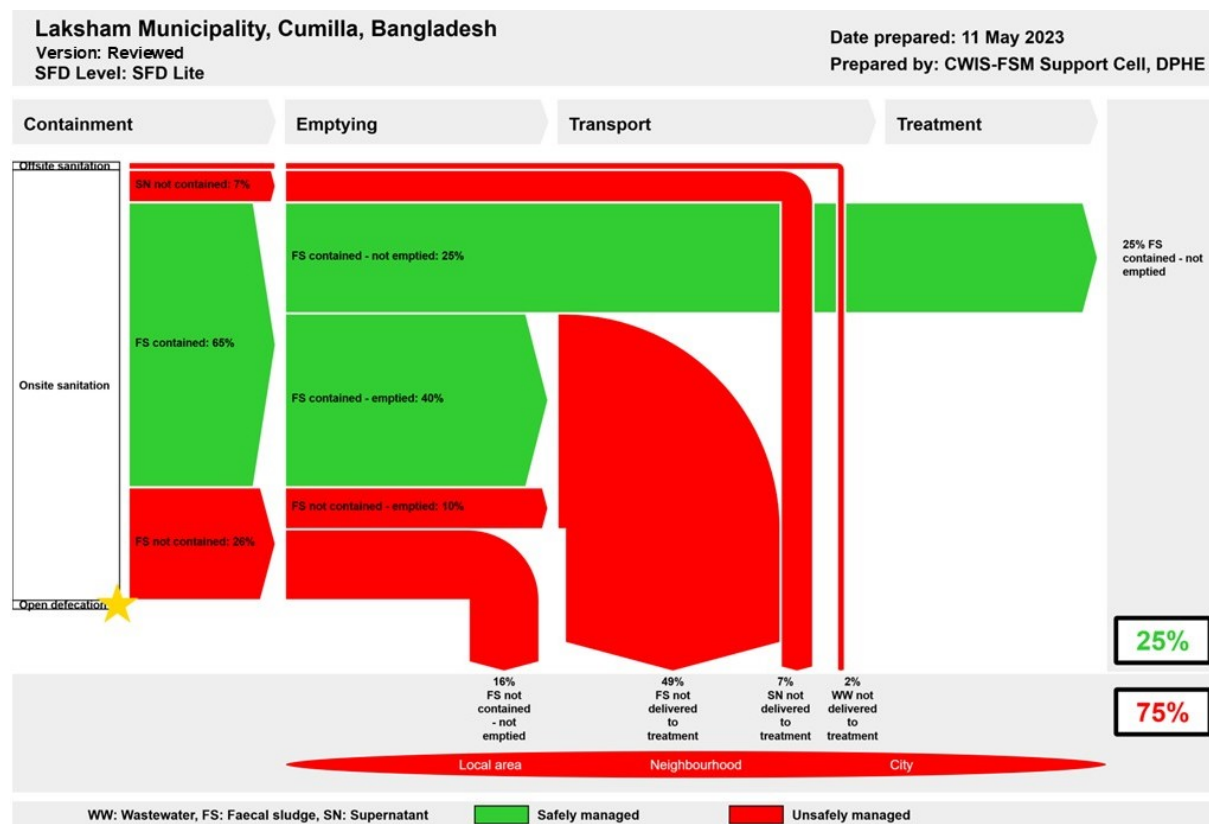


Figure 7: SFD Graphic for Laksham Municipality.

The unsafely managed excreta originated from wastewater and not delivered to treatment (6%), Faecal Sludge (FS) both contained and not contained - not delivered to treatment (51%), FS not contained - not emptied (15%) and 6% of supernatant not delivered to treatment. Thus, the safely managed excreta originate from FS contained - not emptied (26%).

5 Data and assumptions

The baseline survey conducted in March-April 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 Laksham Municipality:

- ✓ The proportion of FS in septic tanks, fully lined tanks, and lined, open bottom tanks are considered 79%, 0%, and 100% respectively as per the guidance given in the Frequently Asked Questions (FAQs) on the Sustainable Sanitation Alliance (SuSanA) website.
- ✓ According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the population of Laksham Municipality was 70,632. The urban population growth in Laksham is 2.7% 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 106,964 (Table 1).
- ✓ There are around 1% of twin pit latrines as containment system. 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%). Based on the household survey, variable F3 for system T1A4C10 is set to 75%.
- ✓ There are around 31.8% 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, 31.8%). 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 65%.
- ✓ 34.9% 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 76% of HHs using septic tank with a soak pit have a desludging frequency of 2-5 years. Based on the household survey, variable F3 for system T1A2C5 is set to 76%.
- ✓ 30% of septic tanks are connected to the open drains, water bodies and open ground, 37% of which are emptied within 2-5 years. Based on the household survey, variable F3 for systems T1A2C6, T1A2C7 and T1A2C8 is set to 37%.
- ✓ 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.
- https://en.wikipedia.org/wiki/Laksam_Upazila
- <https://latitude.to/map/bd/bangladesh/cities/laksham>
- 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)
- <https://latitude.to/map/bd/bangladesh/cities/laksham>
- https://en.banglapedia.org/index.php/Laksham_Upazila
- <https://weatherspark.com/y/111963/Average-Weather-in-L%C4%81ksh%C4%81m-Bangladesh-Year-Round>

Key Informant Interviews (KIIs) (March-April 2023)

- KII with Sanitary Inspector, Laksham Municipality.
- KII with Conservancy Inspector, Laksham Municipality.
- KII with DPHE Official, Laksham Municipality.
- KII with Town Planner, Laksham Municipality.

Facilitators: Md. Fazlul Haque (Project Manager), Shariar Seam (Research Assistant), O. CREEDS Ltd.



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

Focus Group Discussions (FGDs) (March-April 2023)

- Educational Institute
- Public Place
- Municipality
- Health Complex



Figure 9: Focus Group Discussions at School and Health Complex at Laksham 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 March to 1st April, 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 Mohammad Abul Khair, Mayor, Laksham Municipality; Mohammed Saiful Islam, Town Planner; Md. Jalal Ahmed, Conservancy Inspector; Md. Shamsul Alam, Sanitary Inspector; Kamal Hossain, Sub-Assistant Engineer, DPHE, Laksham 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 Mohammad Abul Khair, Laksham 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.

Laksham Municipality, Bangladesh, 2026

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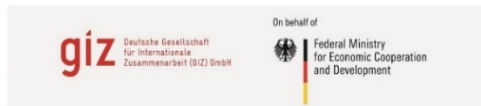
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