SFD Lite Report

Paikgachha Municipality Bangladesh

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

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1 The SFD Graphic

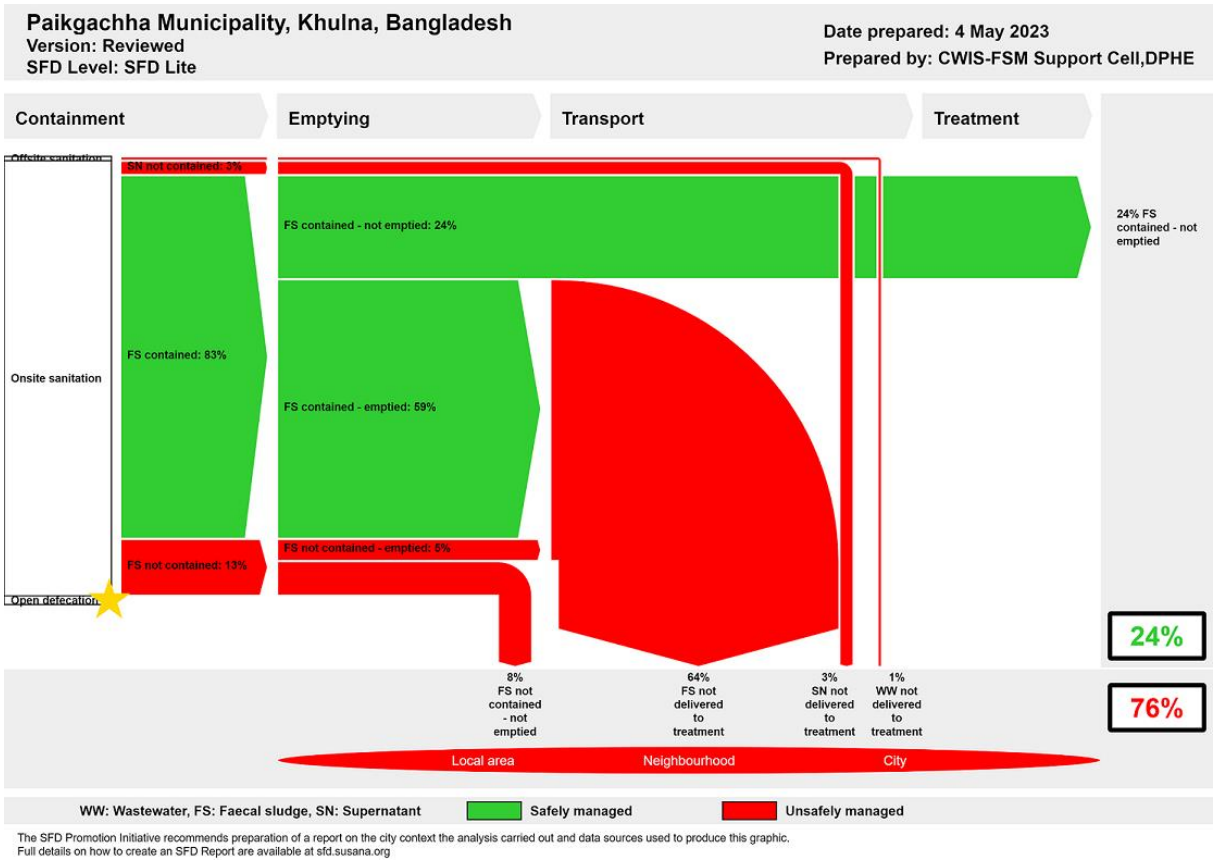

Figure 1: SFD Graphic for Paikgachha Municipality.

2 SFD Lite information

Produced by:

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Collaborating partners:

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

Date of production: 04/05/2023

3 General city information

Geography: Paikgachha Municipality is situated within the Paikgachha Upazila of the Khulna District in the Division of Khulna. The geographical coordinates of Paikgachha are 22°35'20.04"N and 89°20'9.96"E[1]. Paikgachha Municipality is situated in the Khulna District. Its northern and southern boundaries are Tala and Dumuria Upazilas, its southern and eastern boundaries are Batiaghata and Dacope Upazilas, and its western boundary is Tala and Assasuni Upazilas[2] (Figure 2).

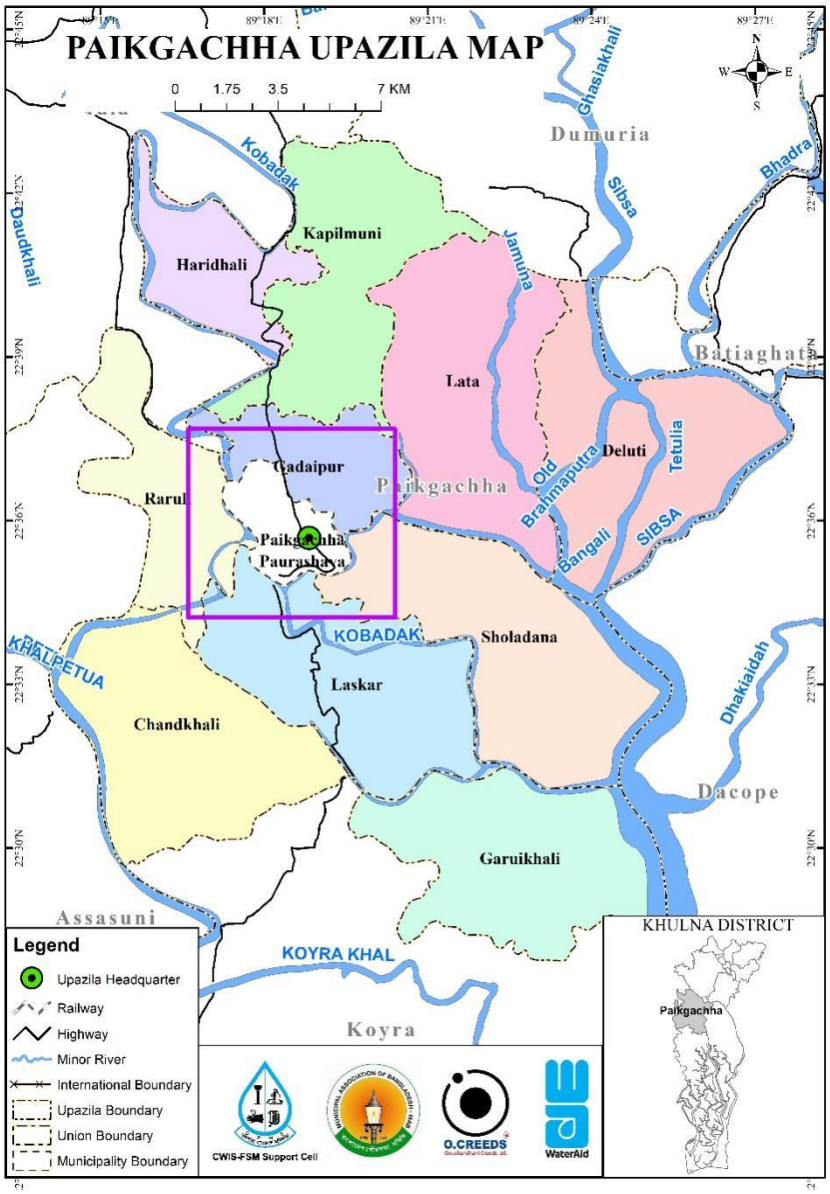

Figure 2: Paikgachha Municipality Location Map.

Categorisation: The Local Government (Municipality) Act of 2009 classifies Municipalities of Bangladesh into A, B, and C classes based on their annual income. Paikgachha Municipality was established in February 1st, 1997. The Municipality is split up into 5 *mahallas* and 9 wards. It is a category A Municipality (Figure 3).

[1] *https://latitude.to/articles-by-country/bd/bangladesh/290660/paikgachha-upazila*
[2] *https://en.banglapedia.org/index.php/Paikgachha_Upazila*

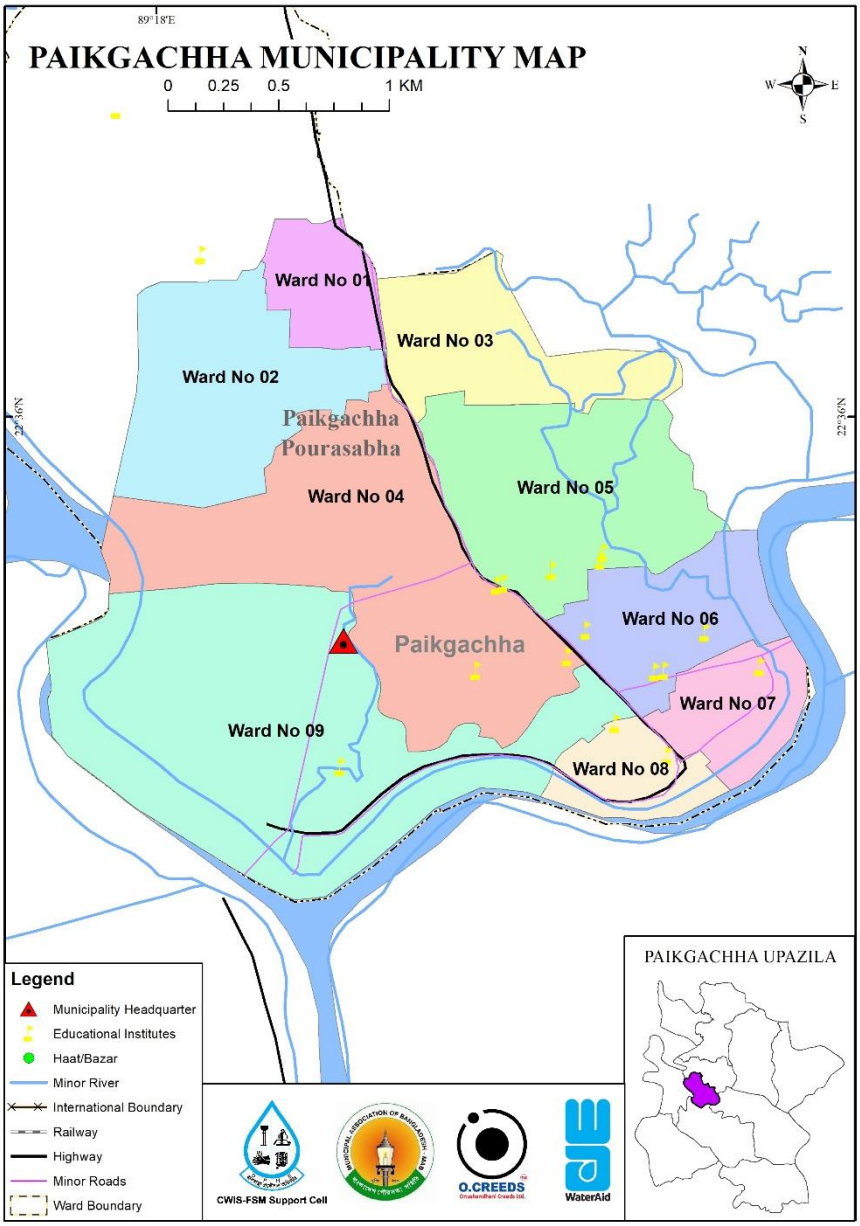

Figure 3: Paikgachha Municipality Ward Boundary Map.

Demography: According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the population of Paikgachha Municipality was 16,017. The urban population growth in Paikgachha is 1.2% per year. As per information obtained from a Key Informant Interview (KII) at the municipality, the present population is around 19,551 (Table 1). The household survey results show that majority of the occupation is business (41%), followed by private service (22%), government job (8%) and agriculture (5%)[3].

Climate: Located at an elevation of 4.88 metres (16.01 feet) above sea level, Paikgachha has a Tropical wet and dry or savanna climate (Classification: Aw)[4]. The maximum mean temperature observed is around 36.5 – 40.6°C between March-August, with the minimum mean temperature of 15.94°C – 17.28°C in December-January. The annual average rainfall is about 1,795 mm, according to BMD (2003-2019).

[3] *KII and field visit during Baseline survey 2023.*

[4] *https://tcktcktck.org/bangladesh/khulna/paikgacha*

Table 1: City profile (Source: Paikgachha Municipality).

Population parameters	Value
Total population, 2022	19,551
Households, 2022	4,210
Area, sq.km	6.98
Total roads, km	48
Total drains, km	10

Hydrology: Main water bodies are Kobadak, Shibsa, Marichap, Haria and Shengrail; Mora Bhadar Gang is notable[5].

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[6].

Water status: The main sources of water for drinking and for household activities include supply water, plain tube well and tube well with pump[7].

[5] *https://en.banglapedia.org/index.php/Paikgachha_Upazila*
[6] *KII and field visit during Baseline survey 2023.*
[7] *KII and field visit during Baseline survey 2023.*

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 (99.5%). The main types of toilet facilities are septic tanks connected to a soak pit, to an open drain, or to a water body, 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.

Paikgachha Municipality, Khulna, Bangladesh, 4 May 2023. SFD Level: SFD Lite
Population: 19551
Proportion of tanks: septic tanks: 76%, 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
T1A1C8 Toilet discharges directly to open ground	0.5					
T1A2C5 Septic tank connected to soak pit	12.8	75.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	13.7	41.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	2.6	41.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	11.6	90.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	46.8	89.0	0.0	0.0		
T1A6C10 Unlined pit, no outlet or overflow	12.0	0.0	0.0	0.0		

Table 2: SFD Matrix for Paikgachha Municipality.

The figures shown in Table 2 and elaborated in the following section are derived from information obtained through household (HH) survey, Key Informant Interviews (KIIs), and Focus Group Discussions (FGDs) (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 drains or storm sewer. Similarly, a portion of septic tanks is directly connected to open drains or storm sewer. Therefore, T1A2C6 system is considered as 13.7% 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 at Paikgachha Municipality. (Source: *Field Survey, 2023/ O.CREEDS_WaterAid Bangladesh).*

Containment: Almost all the households (99.5%) 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). From the household survey, it was found that 29.1% of the city population uses septic tanks as the containment system, 46.8% of the toilets have single pit systems, and 11.6% of people use double pits in the city, 12.0% of the people use dug hole as the containment system. 0.5% 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: 12.8% of the population uses septic tanks connected to soak pits (T1A2C5), 13.7% of the population uses septic tanks connected to open drain (T1A2C6), 2.6% of the population uses septic tanks connected to water bodies (T1A2C7), 11.6% of the population uses lined tanks with impermeable walls and open bottom, no outlet or overflow (T1A4C10), 46.8% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) and 12.0% of the population uses unlined pits, no outlet or overflow (T1A6C10) (KII, FGDs, HH survey, 2023). Thus, at the containment stage, the city's excreta of only 83% 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 1-4 metres[8]. The most common drinking water production technology is the municipal supply water, or a tube well with a hand pump. Among them, 2% of the households use their own tube well fitted with electric motor, 30% use their own hand pump tube well, 1.6% use nearby water bodies, 2% use neighbour's tube well, 43% of the population get supply water from the Municipality and 21% use water from gallons/supplied by NGOs. 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 12% 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

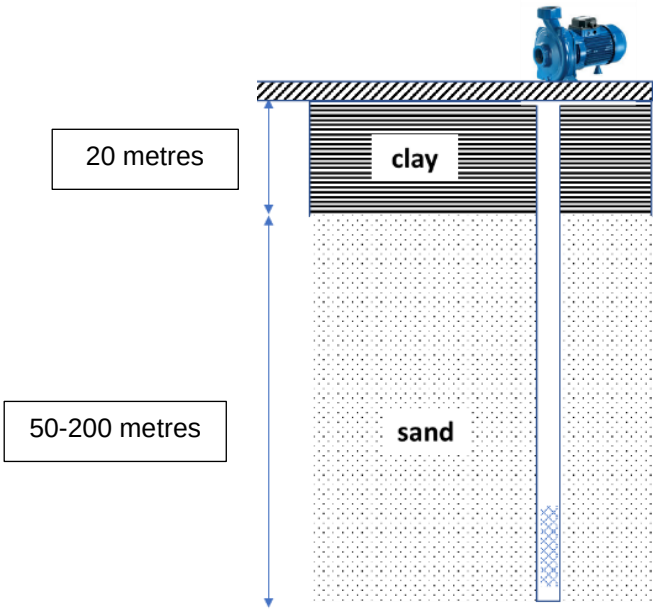

Figure: 5 Soil profile in Paikgachha Upazila and location of tube well screen.

[4] *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 Paikgachha Municipality. ***(Toilet outlets connected to open drains) (Source: Field Survey 2023/ O.CREEDS_WaterAid Bangladesh).***

Emptying: 35% households relying on septic tanks get service from private sweepers for emptying of the septic tank. It was observed from the survey that 40% 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 7 years depending upon the size, uses, etc.

However, about 75% of the septic tanks, connected to the soak pit are emptied within 2-5 years. About 41% of the septic tanks connected to open drains or water bodies are emptied within the last 2-5 years. Almost 89% of single pit latrines emptied within 1-2 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 (91%) done by private sweepers. In few households, desludging is done by municipal sweepers (9%). Around 98% of this withdrawal is done manually using a bucket and rope. 0.5% use electric pumps and some use (1.5%) manual pump– these reflect the use of the higher level of technologies by some of the workers. The Municipality no vacutug in operation[9].

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 78% 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, 22% 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.

[9] KII with Mayor and Conservancy Inspector.

4.4 SFD Graphic

The outcome of the SFD graphic shows that only twenty four percent (24%) of the excreta flow is classified as safely managed, and the remaining seventy six percent (76%) is classified as unsafely managed (Figure 7).

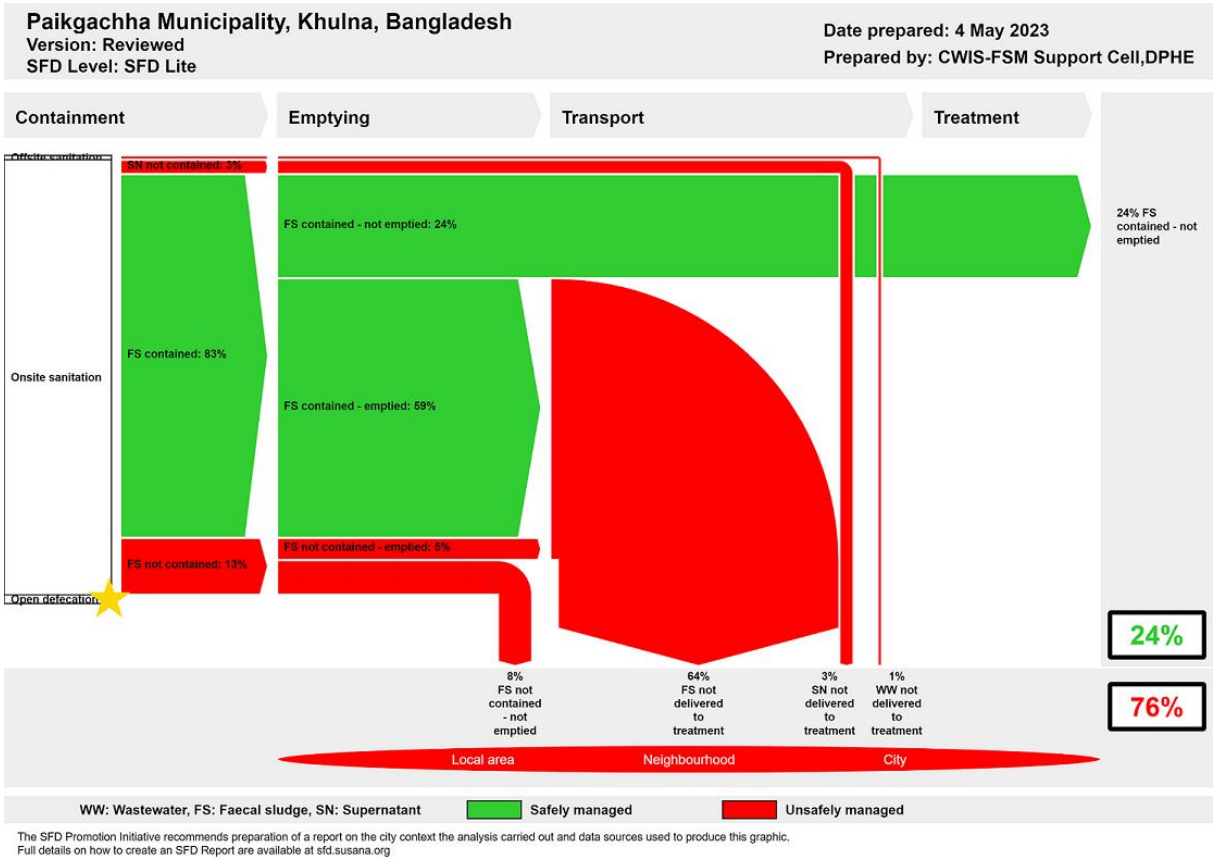

Figure 7: SFD Graphic for Paikgachha Municipality.

The unsafely managed excreta originated from wastewater not delivered to treatment (1%), Faecal Sludge (FS) both contained and not contained - not delivered to treatment (64%), FS not contained - not emptied (8%) and 3% of supernatant not delivered to treatment.

The safely managed excreta originate from FS contained - not emptied (24%). This 24% resembles the FS stored in containments without significant risk to groundwater pollution. Thus, the safely managed percentage of FS generated by this 24% of the population is temporary until the FS from the containments is emptied. Therefore, these systems will require emptying services in the short and medium term as they fill up.

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 Paikgachha Municipality:

- ✓ The proportion of FS in septic tanks, fully lined tanks, and lined, open bottom tanks are considered 76%, 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 population of Paikgachha Municipality was 16,017. The urban population growth in Paikgachha is 1.2% per year. As per information obtained from KII at the Municipality, the present population is around 19,551 (Table 1).
- ✓ There are around 11.6% 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, 11.6%). Based on the household survey, variable F3 for system T1A4C10 is set to 90%.
- ✓ There are around 46.8% 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, 46.8%). 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 is set to 89%.
- ✓ 12.8% 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 75% 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 75%.
- ✓ There are 16.3% of septic tanks connected to the open drain and water bodies, 41% of which are emptied within 2-5 years. Based on the household survey, variable F3 for systems T1A2C6 and T1A2C7 is set to 41%.
- ✓ 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, BBS 2011.
- https://tcktcktck.org/bangladesh/khulna/paikgacha
- https://latitude.to/articles-by-country/bd/bangladesh/290660/paikgachha-Upazila
- At a Glance: Paikgachha Municipality, by Municipality office.
- 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) (March-April, 2023)

- KII with Sanitary Inspector, Paickgachha Municipality
- KII with Conservancy Inspector, Paickgachha Municipality.
- KII with Executive Engineer, Paickgachha Municipality.

Facilitators: Md. Hasibur Rahman (Team leader), Sheikh Habib (Surveyor), O. CREEDS Ltd.

Figure 8: KIIs with Executive Engineer and Sanitary & Conservancy Inspector at Paikgachha Municipality. (Source: *Field study 2023/O.CREEDS_WaterAid Bangladesh).*

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

- At Public Place
- At Municipality


Figure 9: Focus Group Discussions at With Mayor (left) and at Public Place, Paikgachha 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 30th March to 06th 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 Selim Jahangir, Mayor, Paikgachha Municipality; Bikash Chandra Ghosh, Sanitary & Conservancy Inspector; Kabita Das, Councillor, M.M. Nur Ahmed, Executive Engineer; Md. Litu Sheikh, Paikgachha 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 Selim Jahangir, Mayor, Paikgachha 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.

Paikgachha Municipality, Bangladesh, 2023

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