SFD Lite Report

Tarabo Municipality, Narayanganj Bangladesh

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

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1 The SFD Graphic

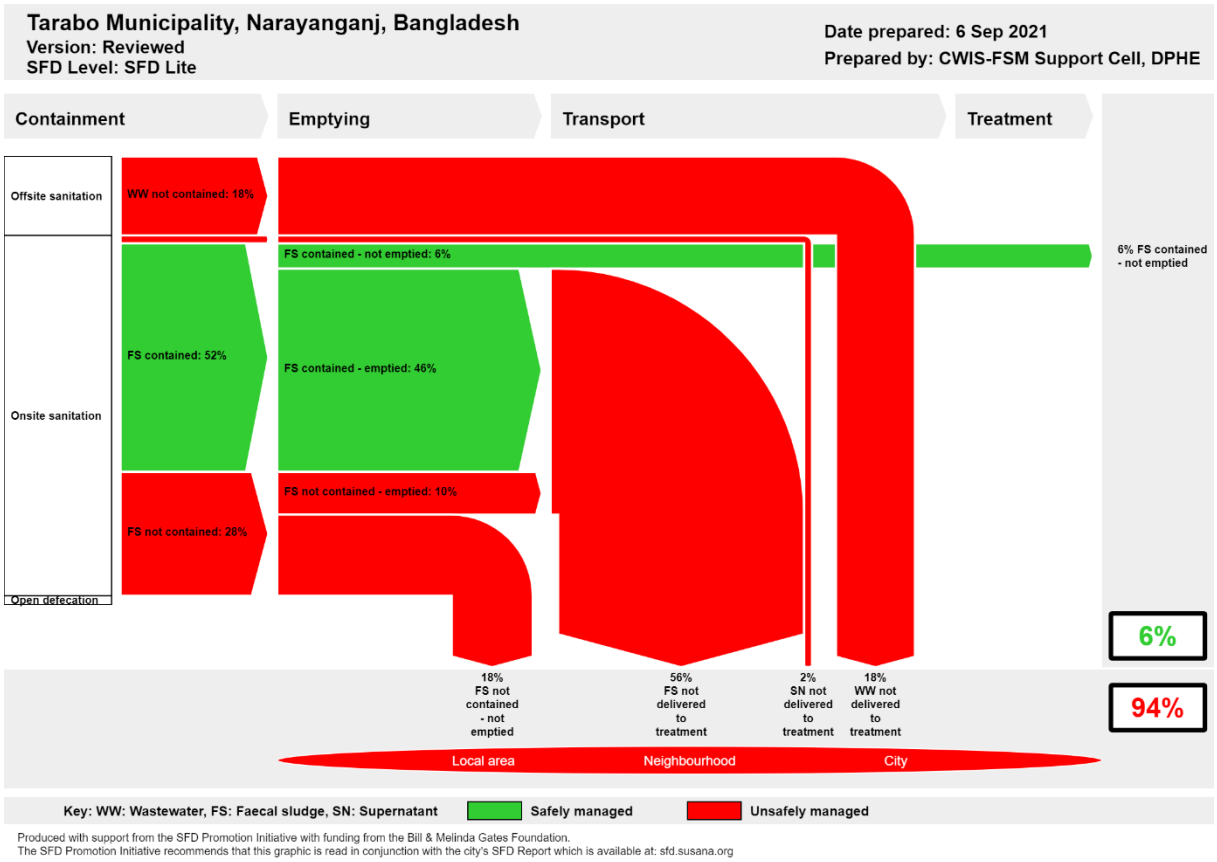

Figure 1: SFD Graphic for Tarabo municipality.

2 SFD Lite information

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- This report was compiled as part of the field survey under the project GoB-UNICEF supported WASH Project, DPHE. We would like to thank Mrs. Hasina Gazi, honorable mayor, Tarabo Municipality; Md. Nazrul Islam, Chief Executive Officer, Tarabo Municipality, Z.M Zaman, Executive Engineer, Tarabo Municipality, Md. Tajul Islam, Secretary, Tarabo Municipality, Md. Ataur Rahman, Assistant Engineer (Water), Tarabo Municipality, Mollah Safayet Hossain, Business Development Executive, SWEEP Project, WSUP, Md. Abdul Motin, Sanitary Inspector, Tarabo Municipality and Md. Firojul Islam, Conservancy Inspector, Tarabo Municipality for providing all the required primary and secondary data and cooperating for Key Informant Interviews (KIIs) & Focussed Group Discussions (FGDs). This report would not have been possible to produce without the constant support of Md. Amir Hossain Bhuiyan, Panel Mayor including all Councillors, and Community Mobilizers 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.

Collaborating partners:

- GoB-UNICEF Supported WASH Project and Tarabo 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

The Tarabo Municipality is 14 km away from Dhaka, the capital of Bangladesh. This sub-district town is recognized as the *"Intangible Cultural Heritage of Humanity"* by UNESCO. Tarabo Municipality is adjacent to the Shitalakkha river and the Dhaka-Sylhet highway has passed through the town. Within the last few decades, the sub-district town has been turned into an industrial zone of more than 300 medium to large scale businesses.

Table 1: City profile (Source: Tarabo municipality, GoB-UNICEF supported WASH Project, DPHE)

Population Parameters	
Estimated population, 2021	253,900
Area, sq. Km	24.60
Total roads, km	82.45
Total drains, km	90

According to the population census of 2011 by the Bangladesh Bureau of Statistics (BBS), the Tarabo city population was 150,709. The urban population growth in Bangladesh is 3.5% per year. Considering 20% floating population, such as industrial workers, businessmen, suppliers and traders, comes to the city every day, the present (2020) population is estimated to be around 253,900 (Table 1).

The municipality covers an area of 24.6 square kilometers. At present the municipality has 82.45 km of roads of which 13.5 km are bituminous roads, 8.35 km are Herring-Bone-Bond (HBB) roads, 34.8 km Brick Flat Soling (BFS) roads, and 25.8 km earthen roads. The city has about 90 km of drains which includes 15 km of Reinforced Cement Concrete (RCC) and 75 km of earthen drains.

Figure 2: Tarabo municipality Location Map (GIS project, BBS 204)

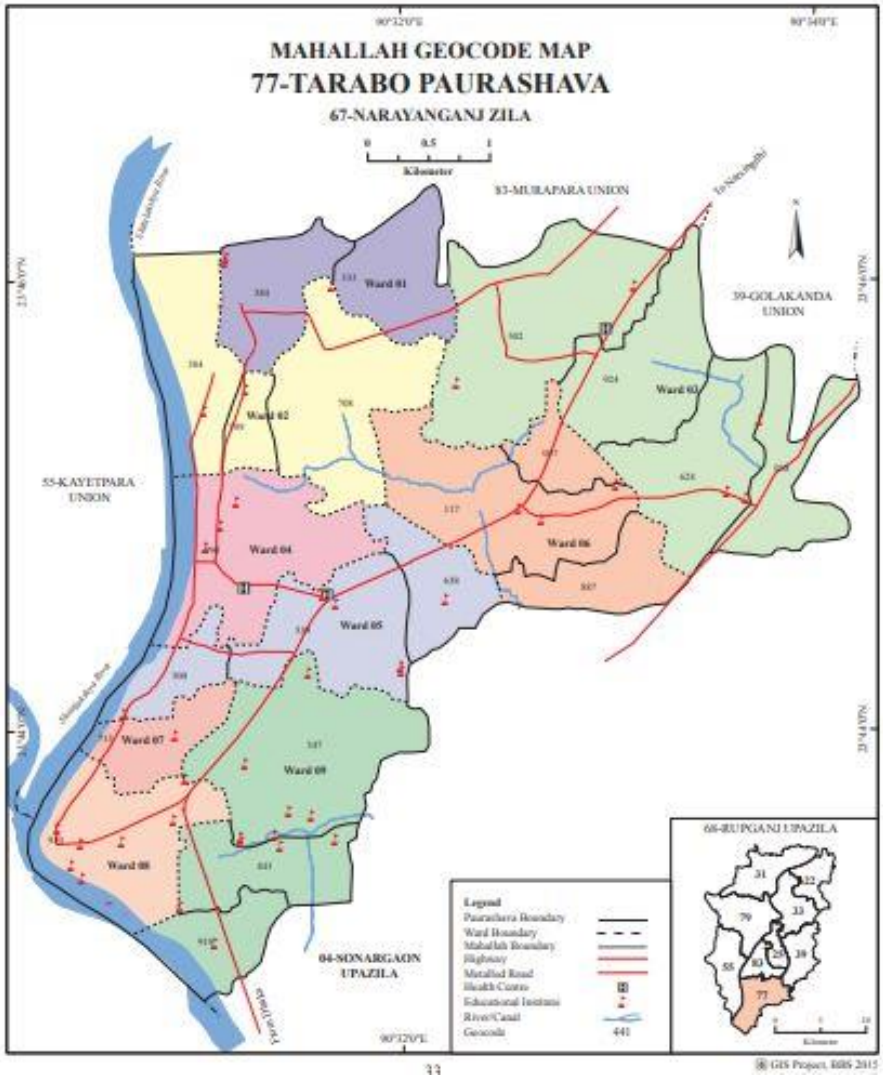

Figure 3: Tarabo municipality Ward Boundary Map (GIS Project, BBS 2016)

According to the municipal authority, within the topography of Bangladesh, the municipality area is made of low and medium high land. Shitalakshya Rive passed adjacent to the town.

According to the Bangladesh Meteorological Department (BMD), the city area and surrounding area are experiencing a tropical monsoon climate. It is characterized by warm, humid summers and cool, and dry winters. There is no climatological station within the town. The closest meteorological station of Bangladesh Meteorological Department is located in Dhaka which is about 28 km away from the

municipality area. Weather data from this station is collected from 1981 to 2017. About 90% of the total annual rainfall occurs in the period from May through October & the driest months of the years are November to March. The maximum mean temperature observed is 31.4-33.7°C between April-August, with the minimum mean temperatures of 12.7-14.1°C in December-January. The annual average rainfall is about 2148 mm, according to BMD (1981-2017). The monthly precipitation records clearly show a distinct dry and rainy season.

Several canals flowed through the city. A significant portion of these water bodies and wetlands has been filled up due to rapid industrialization. Hence, the area remains underwater for most of the year. According to the flood zoning map of Bangladesh shown [BMD, 2012], the city is in a flood-prone zone (in the last 12 years flooding event happens). However, the drainage network of the city is not adequate.

Every year, many city areas face water logging during the monsoon for drainage congestion. There are some secondary drains caring stormwater and domestic wastewater to the outfalls of rivers and canals.

Figure 4: Tarabo Municipality waterlogging

4 Service outcome

Tarabo Municipality, Narayanganj, Bangladesh, 6 Sep 2021. SFD Level: SFD Lite
Population: 253900
Proportion of tanks: septic tanks: 80%, 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	9.0	0.0	0.0					
T1A1C7 Toilet discharges directly to water body	4.0							
T1A1C8 Toilet discharges directly to open ground	5.0							
T1A2C5 Septic tank connected to soak pit	3.0			67.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	9.0			64.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	4.0			64.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	3.0			64.0	0.0	0.0		
T1A2C9 Septic tank connected to 'don't know where'	3.0			64.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	1.0			0.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	48.0			93.0	0.0	0.0		
T1B10 C7 TO C9 Containment (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - connected to water bodies, or open ground or 'don't know where'	5.0			0.0	0.0	0.0		
T1B8C10 Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil, no outlet or overflow	6.0							

Table 2: SFD Matrix for Tarabo municipality

The outcome of the SFD graphic shows that only six percent (6%) of the excreta flow is classified as safely managed, and the remaining ninety-four (94%) percent is classified as unsafely managed (Figure 1). The unsafely managed excreta originate from wastewater not delivered to treatment (18%), Faecal Sludge (FS) not contained - emptied but not delivered to treatment (56%), FS not contained - not emptied (6%) and 2% of supernatant not delivered to treatment. 6% FS contained - not emptied is considered as safely managed.

The percentages presented in Table 2 and discussed in the next section are based on data collected through rapid assessments, household surveys, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) (Figure 5 and 6).

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 sewers. Similarly, a portion of septic tanks is directly connected to open drains or storm sewers. Therefore, T1A1C6 system is considered as 9% of the total population of the city to generate the SFD graphic. Similarly, the T1A2C6 system is considered as 9% of the total population of the city to generate the SFD graphic. In the absence of a sewerage system, the faecal sludge in T1A1C6 and the supernatant in T1A2C6 are directly discharged into the river or the environment untreated.

4.2 On-site Sanitation Systems

Containment: 100% of the households in the city have their latrine which is connected to single pits, twin pits, or septic tanks or discharged directly into the environment (e.g., open ground, open drain, waterbody, etc. From the household survey (June 2021), it is found that 22% of the city population uses septic tanks as the containment system, 48% of the toilets have single pit systems, and 1% of people use double pits in the city. About 5% of people have containments (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded and connected to water bodies, or open ground or 'don't know where', 6% people have pit (all types), never emptied, abandoned when full but not adequately covered with soil, no outlet or overflow and 18% do not have any type of containment and discharges directly to the environment (KII, FGDs, HH survey, 2021).

Figure 5 : Household survey and consultations. Left: Household survey. Right: Consultation meeting

According to the type of connectivity and features of containment technologies, the discharging points of the toilets are categorized as 3% population uses septic tanks connected to soak pits (T1A2C5), 9% population uses septic tanks connected to open drain (T1A2C6), 3% population uses septic tanks connected to open ground (T1A2C8), 4% population uses septic tanks connected to water bodies

(T1A2C7), 3% population uses septic tanks connected to ‘don’t know where’ (T1A2C9), 1% population uses lined tanks with impermeable walls and open bottom (T1A4C10), 48% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10), 5% of people have containments (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded and connected to water bodies, or open ground or 'don't know where' (T1B10 C7 TO C9) and 6% people have pit (all types), never emptied, abandoned when full but not adequately covered with soil, no outlet or overflow (T1B8C10). Thus, at the containment stage, the city’s excreta of only 52% of the population are contained. Figure 6 shows some of these sanitation technologies in operation.

Left: Toilet Pit open to the nearby water body

Right: Toilet pipe connected to open ground

Left: Latrine delivery pipe connected with open drain

Right: Latrine delivery pipe connected with covered drain

Left: Latrine delivery pipe connected with open ground

Right: Soak pit from septic tank

Figure 6 : Containment technologies and their connections in Tarabo municipality

Groundwater Pollution: The groundwater level below the ground surface is 15-25 meters. The most common drinking water production technology is tubewell with a hand pump or motorized pump. Nearly 85% of the households use their own submersible pump fitted with the electric motor and only 15% of households use supply water through a piped network.

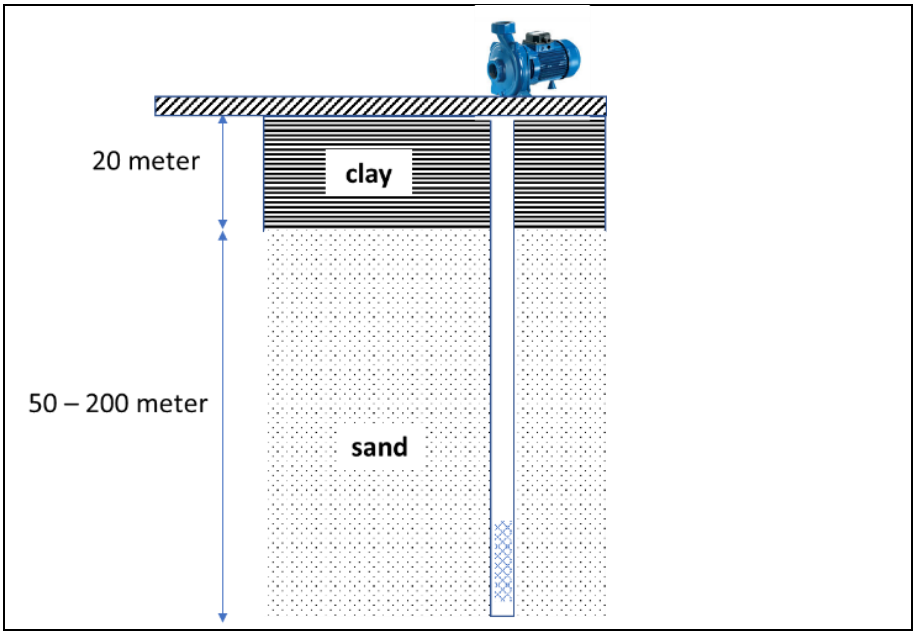

Fig 6 Soil profile in Narayanganj district and location of tubewell screen

Lateral separation between sanitation facilities and water sources varies from one area to another. The main source of drinking water is tube well. Tube wells of different sizes and depths are generally used to pump water from the confined aquifers. During the household visit and FGDs, it is found that less than 25% of sanitation facilities are located within 10 meters 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), drinking water is collected from the confined aquifer (20 m – 200 m) through pumps. Therefore, a low risk of groundwater contamination is considered in the city.

Emptying: Households relying on septic tanks have to arrange themselves for emptying of the septic tank. It is observed from the rapid assessment that most of the septic tanks have been constructed in the last 4-6 years. According to the rapid assessment, the frequency of emptying of septic tanks or covered pits varies from 1 to 10 years depending upon the size, uses, etc.

However, about 67% of the septic tanks, connected to the soak pit are emptied within 2-5 years. About 64% of the septic tanks connected to open drains, open ground or water bodies are emptied within 4-5 years. Almost 93% of single pit latrines are emptied within 1-2 years. Besides the above information, it is also revealed during the discussion in FGDs and household visits, the demand for desludging septic tanks would increase shortly. Desludging of the septic tanks or pit is mostly done by private sweepers (92%). Only in a few households, desludging is done by municipal sweepers (6) and family members (2%).

70% of the sludge withdrawal is done manually using a bucket and rope for several reasons. This manual method has high risks for the health and safety of the workers. 20% and 10% of the withdrawal is done by using manual pumps and mechanical pumps respectively. These reflect the absence of safe and improved technologies for sludge emptying. The municipal authority does not operate any emptying service with mechanical vacuum trucks in this municipality. There is the only private sludge emptying company who provides mechanical sludge emptying service.

Transportation: The sludge withdrawn from the septic tanks and latrine pits by the cleaners is disposed of in various places. A substantial portion of sludge is disposed of in the open environment like a drain (34%) , water bodies (46%) open ground (8%). A small portion (12%) is disposed of in a dug hole covered with soil away from the house.

Treatment/Disposal: Presently, there are no facilities for excreta treatment in the town. There is currently no re-use of the faecal sludge.

4.3 Open Defecation:

From the Household visit, rapid assessments, KIIs and FGDs, it was found that 100% of citizens use any kind of toilet in the Municipality. Thus, the town is considered an open defecation-free town.

5 Data and assumptions

The baseline survey conducted in May 2020 contains detailed data on different stages of the sanitation value chain. It included sample household surveys, along with informal interviews, open-ended consultations, key informant interviews and focus group discussions with the municipality officials, town level coordination committee, households, social workers, business persons, pit emptiers and the citizens including women in all the wards of the municipality. The SFD matrix was generated from these data. 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 10 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 latrine users are unaware of the emptying event and frequency of their tank or pits. Due to all these data gaps, some assumptions have been made to produce the SFD graphic.

Following assumptions were made for developing the SFD graphic for Tarabo municipality-

- The proportion of FS in septic tanks, fully line tanks and line, open bottom tanks are considered 80%, 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 Census 2011, conducted by the Bangladesh Bureau of Statistics (BBS), the Tarabo city population was 150,709. The urban population growth in Bangladesh is 3.5% per year. Considering 20% floating population, such as industrial workers, businessmen, suppliers and traders, comes to the city every day, the present (2020) population is estimated to be around 253,900.

- There are around 1% of twin pit latrines as containment systems. 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%). Thus, variable F3 for system T1A4C10 is set to 0%.

- There are around 48% of single pit latrines as containment systems. So, it is assumed that all these single pit containment technologies are defined as a lined tank with semi-impermeable walls and open bottom, no outlet or overflow (system T2A5C10, 48%). Almost 93% of single pit latrines are emptied within 1-2 years. Thus, variable F3 for system T2A5C10 is set to 93%.

- 3% of septic tanks are connected to soak pits (system T1A2C5). They are well-constructed as per the field visit observation. The risk of goundwater contamination was deemed low, therefore that option was selected in the SFD Matrix.
- Around 67% of HHs have emptied their pits of septic tanks with a desludging frequency of 2-5 years. Thus, variable F3 for system T1A2C5 is set to 67%.

- There are 64 % of septic tanks connected to the open drain, water bodies and ‘don’t know where which are empties within 2-5 years. Thus, variable F3 for systems T1A2C6, T1A2C7, T1A2C8, and T1A2C9 is set to 64%.

- There are 5% of containments (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) which are failed, damaged, collapsed or flooded and connected to water bodies, or open ground or 'don't know where' (T1B10 C7 TO C9). These systems are never emptied (variable F3 set to 0% and hence variables F4 and F5 are also both set to 0%)

- There are 6% pits which are never emptied, abandoned when full but not adequately covered with soil, no outlet or overflow (T1B8C10).

- Supernatant in T1A2C6 is 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 List of Sources

Reports, literature and website

- Bangladesh Bureau of Statistics (BBS), 2011.
- Population and Housing Census, 2011.
- Baseline Survey Report (June 2021) – 'GoB-UNICEF supported WASH Project', Department of Public Health Engineering (DPHE), Dhaka, Bangladesh.
- Report on 'Hydrogeological Screening, Slug Test And Geophysical Logging on Observation Well Units' under *Bangladesh Rural Water Supply And Sanitation Project (BRWSSP),* Arsenic Management Division, Department Of Public Health Engineering (DPHE)

Key Informant Interviews during March-May 2021 (KII)

- KII with honorable Mayor, Tarabo Municipality.
- KII with Secretary, Tarabo Municipality.

Focus Group Discussions during March-May 20214 (FGD)

- FGD with Municipality Councilors, Tarabo municipality.
- A group of conservancy staff who are responsible for sanitation, solid waste management and drainage system
- A group of private sweepers and waste collectors, some of them provide service privately for excreta emptying.
- Participants from local NGOs

Left: KII with Executive Engineer

Right: Sharing meeting with Mayor, Councilors and TLCC members

Left: FGD with local councilors

Right: KII with Assist Eng.

Figure 6: Focus Group Discussions, KII and community consultation in Tarabo Municipality

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