



SFD Lite Report

Jhenaidah Municipality Bangladesh

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

Date of production/ last update: 16/04/2023

1 The SFD Graphic

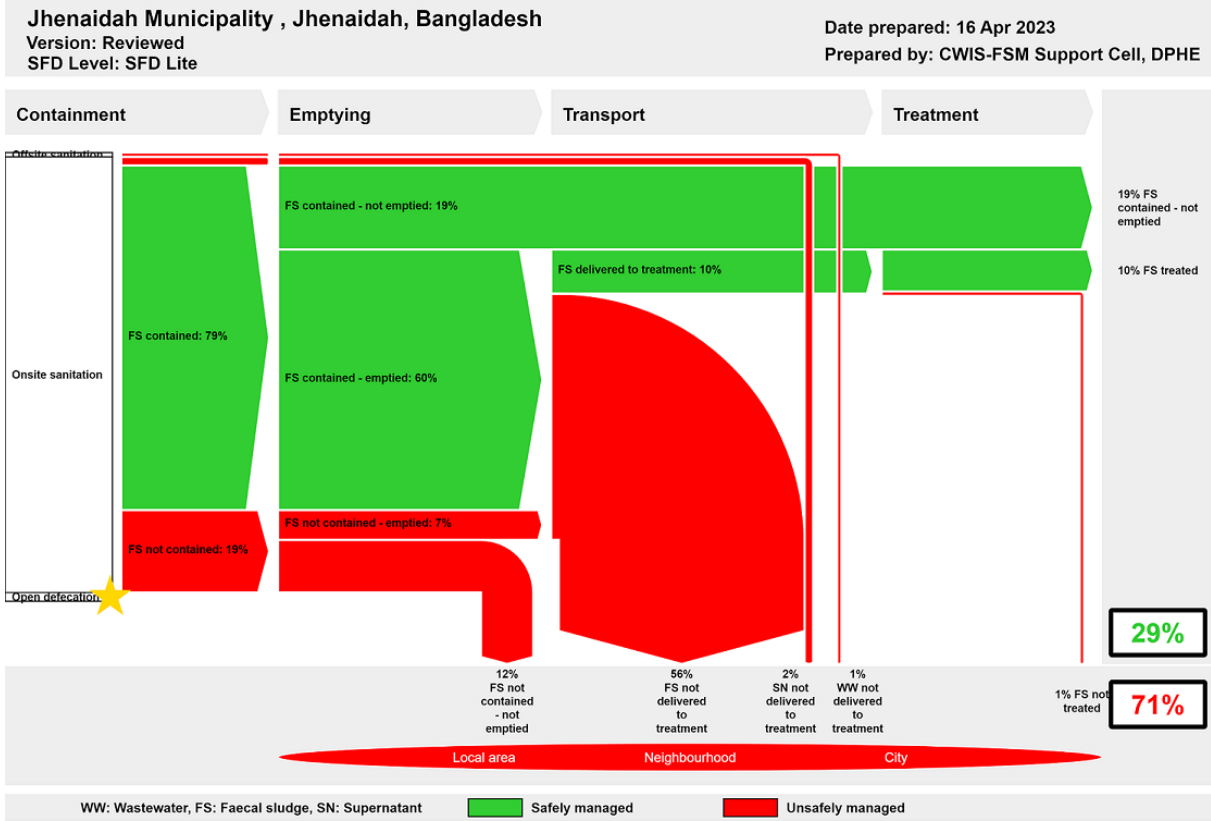


Figure 1: SFD Graphic for Jhenaidah Municipality.

2 SFD Lite information

Produced by:

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Collaborating partners:

- DevCon, Tiller and Jhenaidah Municipality played vital roles in collecting and sharing data, and producing this SFD graphic and SFD lite report.

Date of production: 16/04/2023

3 General city information

Jhenaidah is a fast-growing city, which is 174 km away from the Dhaka city. It is beside the Naboganga River and it is well connected with road and water. It is one of the oldest towns in the sub-continent and was declared municipality in 1958. Jhenaidah is one of the 53 district level municipality in the country (Figure2).



Figure 2: Jhenaidah Municipality Location Map (BBS/ GIS report 2017).

According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the Jhenaidah Municipality population was 107,834. The urban population growth in Jhenaidah is 2% per year. Considering 10% floating population, the present (2020) population is estimated to be around 141,759 (Table 1).

Table 1: City profile (Source: Kil with the Executive Engineer, Jhenaidah Municipality).

Population parameters	
Estimated population, 2020	141,759
Households, 2020	31,432
Area, sq.km	40.86
Total roads, km	248
Total drains, km	102

The municipality covers an area of 40.86 square kilometres. At present, Jhenaidah Municipality has 248 km of road network and 102 km of drain network¹. The geographical coordinates of Jhenaidah are 23°33'10.15" N, 89°10'31.3"E². In the context of Bangladesh, the municipality area is predominantly highland and medium highland (Figure 3).

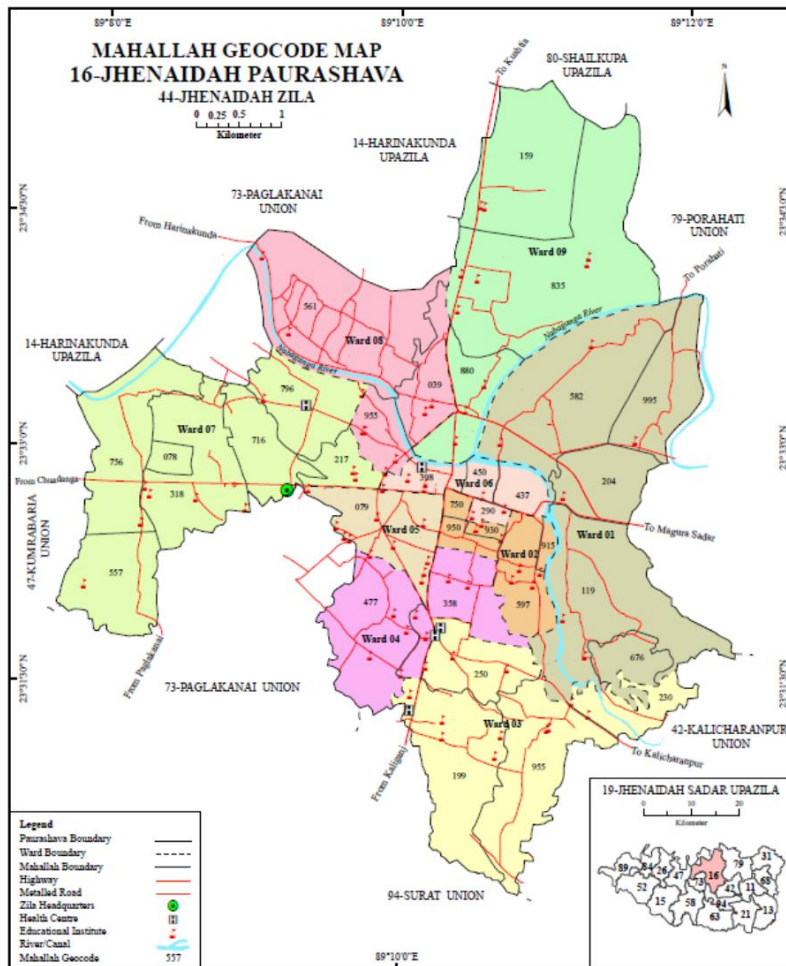


Figure 3: Jhenaidah Municipality Ward Boundary Map (BBS/ GIS report 2017).

According to the Bangladesh Meteorological Department (1981-2017)³, the city area and surrounding area have a tropical monsoon climate. It is characterized by warm, humid summers and cool, and dry winters. There is no climatological station within the municipality. The closest station is located in Chuadanga which is about 32 km away from the municipality. Weather data from this station are collected from 1981 to 2017. About 90% of the total annual rainfall occurs in the period from May through October and the driest months of the year are November to March. The maximum mean temperature observed is 32.7-36.3°C between April-August, with the minimum mean temperatures ranging between 10.6-12.5°C in January. The annual average rainfall is about 1,496 mm, according to BMD (1981-2017).

Naboganga River passes through the municipality. According to the flood zoning map of Bangladesh, the city is in a flood-free zone (in the last 12 years no flooding event happened). However, the drainage network of the city is not adequate. Every year, many city areas face water logging during monsoon for drainage congestion. There are some secondary drains carrying stormwater and domestic wastewater to the outfalls the rivers and canals. The density is high in the north, ranging from 16,001 to 18,390 per

1 Source: 'At a Glance: Jhenaidah Municipality', by municipal office

2 <https://www.latlong.net/place/jhenaidah-district-bangladesh-25894.html>

3 <http://bmd.gov.bd/p/Rainfall-Situation>

sq km. The population density in the North-East, South and West is lower, ranging from 1,662 to 4,000 per sq km⁴.

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, 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.

Jhenaidah Municipality , Jhenaidah, Bangladesh, 16 Apr 2023. SFD Level: SFD Lite								
Population: 141759								
Proportion of tanks: septic tanks: 84%, 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	0.5	0.0	0.0					
T1A2C5 Septic tank connected to soak pit	17.9			55.0	35.0	95.0		
T1A2C6 Septic tank connected to open drain or storm sewer	12.4			39.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	6.1			39.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	2.3			39.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	13.6			75.0	10.0	95.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	47.2			87.0	15.0	95.0		

Table 2: SFD Matrix for Jhenaidah Municipality.

The percentages presented in Table 2 and discussed in the next section are based on data collected through household (HH) surveys, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) (Figure 4).

⁴KII and field visit during Baseline survey 2020

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, T1A1C6 system is considered as 0.5% of the total population of the city to generate the SFD graphic. Similarly, the T1A2C6 system is considered as 12.4% of the total population of the city to generate the SFD graphic. In the absence of a sewerage system, the wastewater in T1A1C6 and the supernatant in T1A2C6 are directly discharged into the river or the environment untreated.

4.2 On-site Sanitation Systems



Figure 4: Household survey and consultations (Source: Feasibility study 2020-21/DPHE).

Containment: Almost all the households (99.0%) in the city have their own latrine which is connected to single pits, twin pits, septic tanks, or discharged directly into the environment (e.g., open-drain or storm sewer). The rest of the households use community latrines (0.25%), and neighbour's toilet (0.75%). From the household survey, it was found that 38.7% of the city population uses septic tanks as the containment system, 47.2% of the toilets have single pit systems and 13.6% of people use double pits (KII, FGDs, HH survey, 2020).

According to the type of connectivity and features of containment technologies, the discharging points of the toilets are categorized as: 17.9% of the population uses septic tanks connected to soak pits (T1A2C5), 12.4% of the population uses septic tanks connected to open drain (T1A2C6), 6.1% of the population uses septic tanks connected to water bodies (T1A2C7), 2.3% of the population uses septic tanks connected to open ground (T1A2C8), 13.6% of the population uses lined tanks with impermeable walls and open bottom, no outlet or overflow (T1A4C10) and 47.2% of the population relies on lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) (KII, FGDs, HH survey, 2020). Thus, at the containment stage, the city's excreta of only 79% 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 4-12 m. There are various drinking water sources used in the city. Among them, 40% of the population use tubewell fitted with electric motor, 45% use own hand pump tube well and 15% use supply water. 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 (Figure 5).

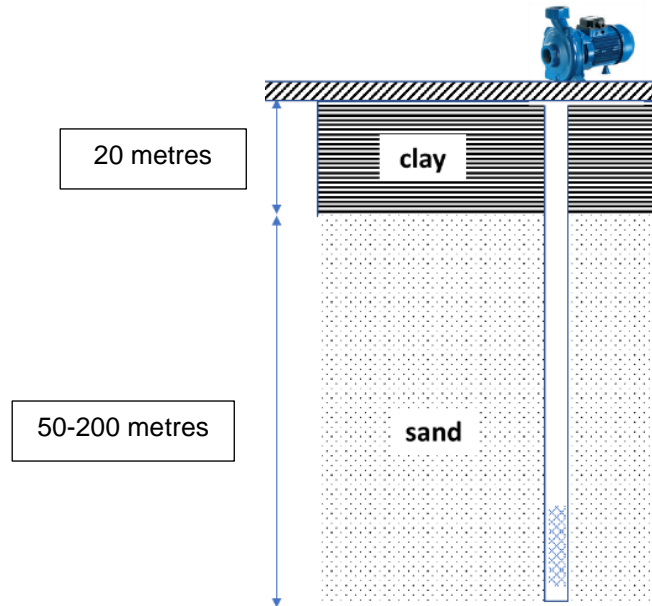


Figure 5: Soil profile in Jhenaidah district and location of tube well screen.

During the household visit and FGDs, it was found that less than 20% 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 6: Containment technologies and their connections in Jhenaidah. Left: Septic tank connected to nearby water body, Right: Toilet pipe connected to open environment (Source: *Feasibility study 2020-21/DPHE*).

Emptying: Households relying on septic tanks have to arrange themselves for emptying of the septic tank. It was observed from the baseline survey that most of the septic tanks have been constructed in the last 3-5 years. According to the survey from 2020, the frequency of emptying of septic tanks or covered pits varies from 1 to 10 years depending upon the size, uses, etc.

However, about 17.9% of the septic tanks, connected to a soak pit are emptied within 2-5 years. About 20.8% of the septic tanks connected to open drains, open ground or water bodies are emptied within 4-5 years. Almost 47.2% of single pit latrines are 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 or pits is mostly (67%) done by private sweepers, more than one-quarter (28%) households desludging is done by municipal sweepers or family members (5%).

Less than three-quarter (71%) of the withdrawal is done manually using bucket and rope. This method highly risks the health and safety of the workers. A few number (17%) use electric pumps and some use vacutugs – these does not reflect the use of the higher level of technologies by some of the workers. The Municipality has two vacutug available⁵.

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 2020, it was observed that about 78.7% of the respondents who use any kind of containment system informed that faecal sludge (sludge from the septic tanks or covered pit latrines) is disposed of in a dug hole covered with soil away from the house. Besides, 21.3% of the faecal sludge is disposed of in the open environment like a drain, open ground, and water bodies.

Treatment/Disposal: There is one Faecal Sludge (FS) treatment plant in Jhenaidah Municipality (Figure 7). The design treatment capacity of the plant is 36 m³/day. This treatment plant follows gravitational

⁵ In the last few years, mechanical vacuum trucks have been provided to several municipal authorities from different government and non-government sources. But municipal authorities have shortage of expert manpower and service delivery mechanism to operate the vehicles. Recent years, the situation is improving. Institutional Regulatory Framework (IRF) and National Action Plan (NAP) have been approved by government. Different service delivery and business models have been developed in few cities. Capacity building program of local government institutions are conducting by govt. institutions and development partners. A significant improvement in FSM will be found within few years.

flow system with planted drying bed, unplanted drying bed and constructed wetland. The wastewater is treated through horizontal planted filter with natural pond.

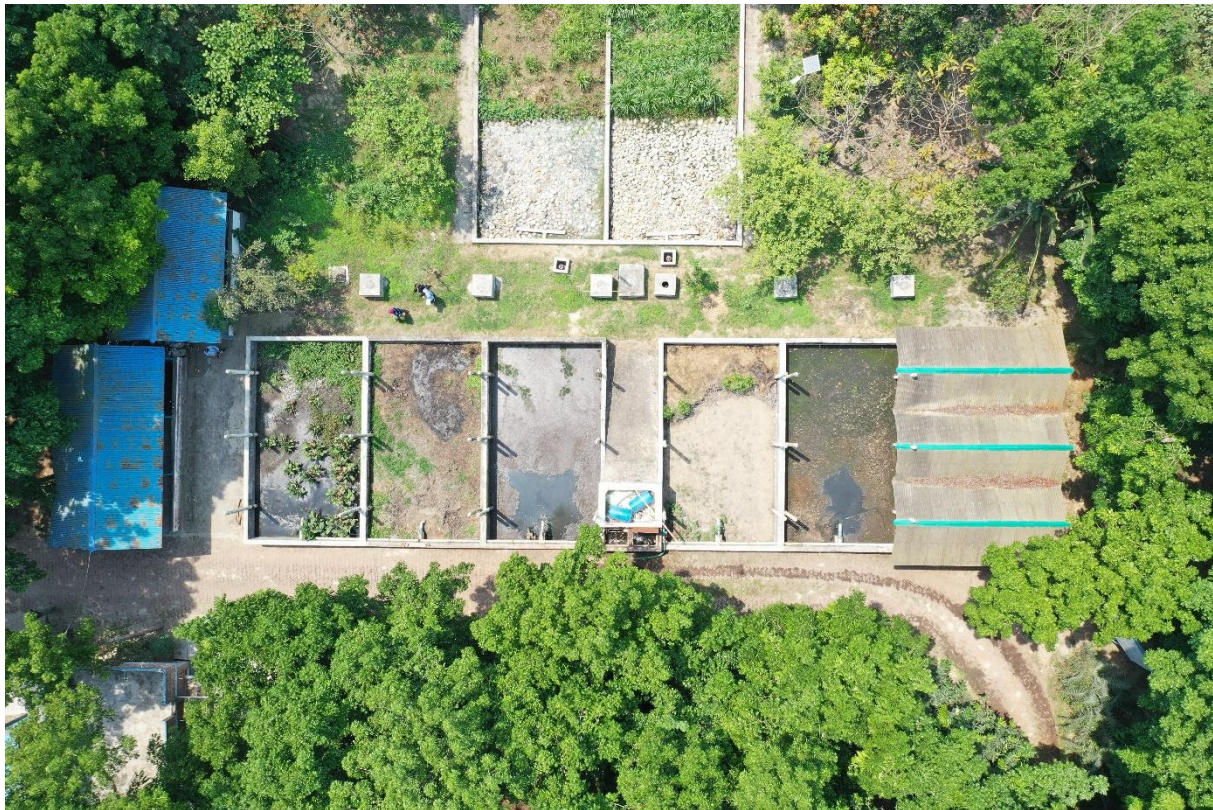


Figure 7: Operational FSTP plant at Jhenaidah Municipality.

4.3 Open Defecation

From HH surveys, KIs 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 nine percent (29%) of the excreta flow is classified as safely managed, and the remaining seventy one percent (71%) is classified as unsafely managed (Figure 8).

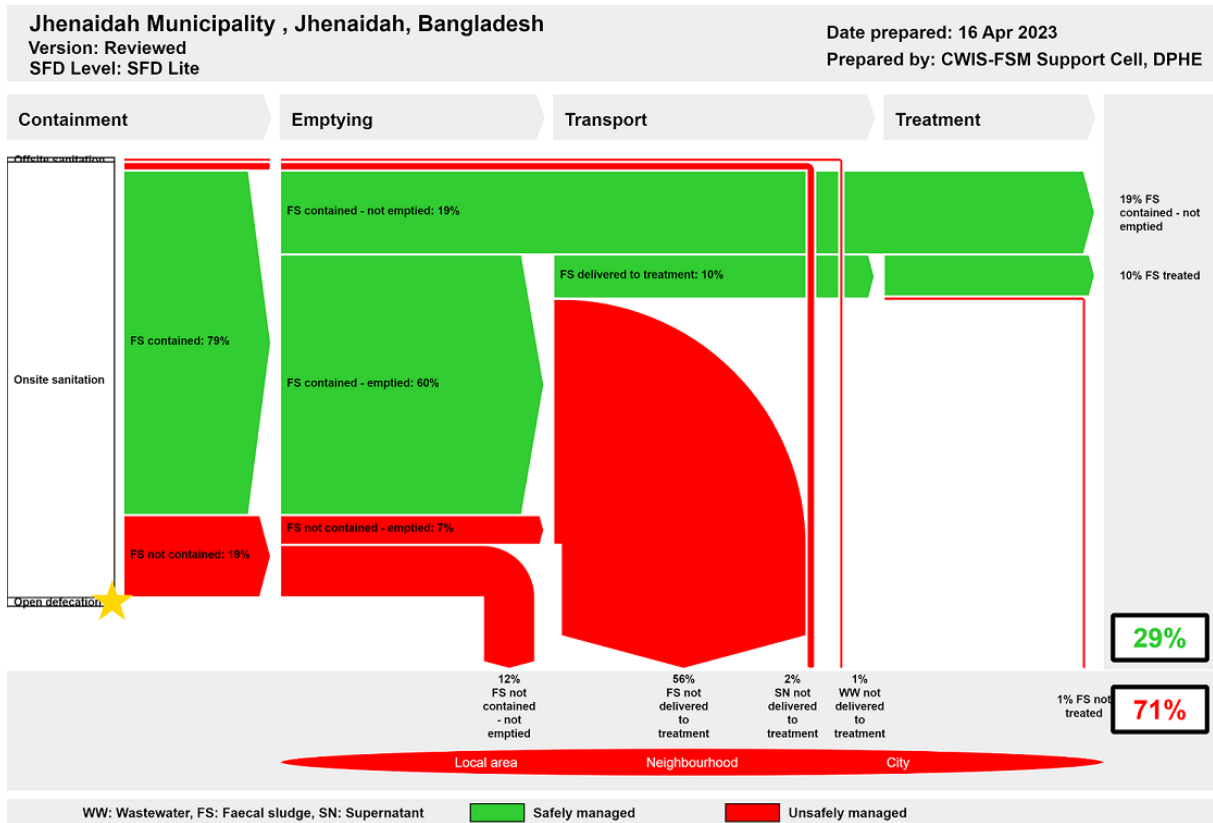


Figure 8: SFD Graphic for Jhenaidah Municipality.

The unsafely managed excreta originate from wastewater not delivered to treatment (1%), Faecal Sludge (FS) both contained and not contained - not delivered to treatment (56%), FS not contained - not emptied (12%), 2% of supernatant not delivered to treatment and 1% of FS delivered to treatment but not treated.

The safely managed excreta originate from FS delivered to treatment (10%), and FS contained - not emptied (19%). Importantly, this latter proportion is only temporarily safe, as when these containments fill up they will require emptying and the faecal sludge transporting to a treatment plant for treatment and reuse or disposal.

5 Data and assumptions

The baseline survey conducted in September 2020 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, 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. 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 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 pit users are unaware of the emptying events and frequency of emptying of their pits. 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 Jhenaidah Municipality:

- ✓ The proportion of FS in septic tanks, fully line tanks, and line, open bottom tanks are considered 84%, 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 Jhenaidah Municipality was 107,834. The urban population growth in Jhenaidah is 2 % per year. Considering 10% floating population, such as farmers and traders, comes to the city every day, the present (2020) population is estimated to be around 141,759.
- ✓ There are around 13.6% 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, 13.6%). Based on the household survey, variable F3 for system T1A4C10 is set to 75% and variable F4 for system T1A4C10 is set to 10%.
- ✓ There are around 47.2% 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, 47.2%). 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 87% and variable F4 for system T1A4C10 is set to 15%.
- ✓ 17.9% 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 55% of HHs have emptied their septic tanks 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 55% and variable F4 for the system T1A2C5 is set to 35%.
- ✓ There are 20.8% 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 39%.
- ✓ 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%.
- ✓ The treatment plant is fully functional. It can treat 95% of faecal sludge that gets delivered there. Thus, variable F5 for systems T1A2C5, T1A4C10 and T1A5C10 is set to 95%.

6 List of Sources

Reports, literature and website

- Bangladesh Bureau of Statistics (BBS), 2011.
- Population and Housing Census, 2011.
- Baseline Survey of the project "Feasibility for Implementing of Solid Waste and Faecal Sludge Management System in 53 District Level Municipalities and 8 City Corporations", Department of Public Health Engineering (DPHE), Dhaka, Bangladesh (December 2020).
- 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) (March 2017)

- The revised 'National Strategy for Water Supply and Sanitation, 2021'
- 'At a Glance: Jhenaidah Municipality', by municipal office.
- <https://www.gps-latitude-longitude.com/gps-coordinateshttp://bmd.gov.bd/p/Rainfall-Situation>

Key Informant Interviews (KIIs) (September 2020 to December 2020)

- KII with Mayor, Jhenaidah Municipality.
- KII with Conservancy Inspector, Jhenaidah Municipality.
- KII with Sanitary inspector, Jhenaidah Municipality.
- KII with Engineer, Jhenaidah Municipality.
- Facilitators: Md. Mynul Islam Hemel, Field Coordinator, Tiller.



Figure 9: KIIs with different stakeholders in Jhenaidah. (Source: *Feasibility study 2020-21/DPHE*).

Focus Group Discussions (FGDs) (September 2020 to December 2021)

- FSM Sweepers and Service Providers.
- First Stage Solid Waste Collector.
- Slum Dwellers.



Figure 10: Focus Group Discussions in Jhenaidah (Source: *Feasibility study 2020-21/DPHE*).

Additional information

- This report was compiled as part of the Baseline Survey of the project, ***“Feasibility for Implementing of Solid Waste and Faecal Sludge Management System in 53 District Level Municipalities and 8 City Corporations”***, (December 2020).
- The project was implemented under the supervision of the Department of Public Health Engineering (DPHE). In-depth information and data were collected for the towns which included project documents, master plans and baseline reports from the municipality 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 01 January 2020 to 24 March 2020 and from 04 July 2020 to 30 November 2020. The field survey includes household surveys, key informant interviews, focus group discussions, and physical feature surveys. A central 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 Mr. Saidul Karim Mintu, Mayor, Jhenaidah Municipality, Mr. Md. Kamal Uddin, Executive Engineer; Mr. Md. Badar Uddin, Slum Development Officer, Jhenaidah 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 Mr. Saidul Karim Mintu, Mayor, Jhenaidah Municipality, who helped in conducting sample surveys and FGDs in the field.

Jhenaidah Municipality, Bangladesh, 2023

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