SFD Lite Report

Ishwardi Municipality, Pabna Bangladesh

This SFD Lite Report was prepared by

CWIS-FSM Support Cell, DPHE

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1 The SFD Graphic

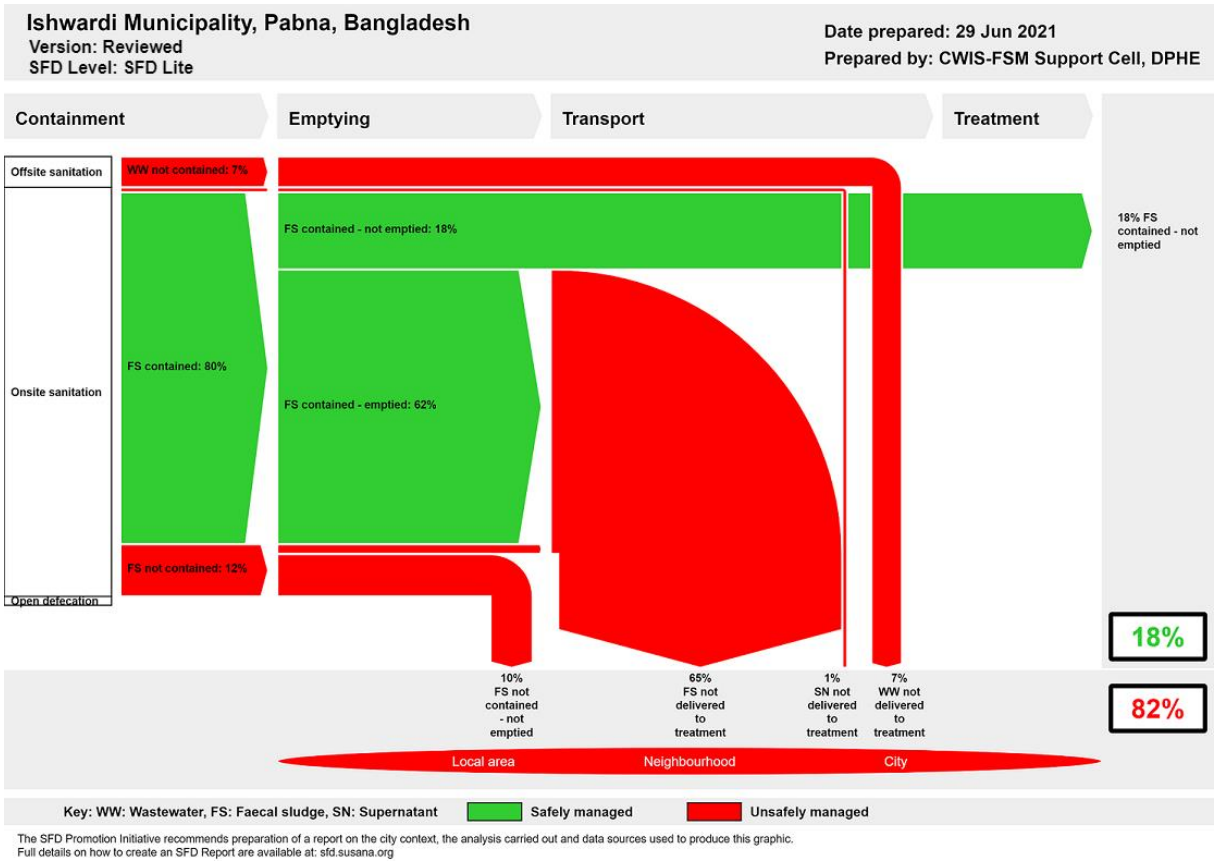

Figure 1: SFD Graphic for Ishwardi municipality, Pabna.

2 SFD Lite information

Produced by:

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- This report was compiled as a part of the Baseline Survey of Urban Infrastructure Improvement Preparatory Facilities (UIIPF) project of DPHE. We would like to thank Mr.Ishaq Ali Malitha, Mayor, Ishwardi Municipality, Abdul Awal, Executive Engineer, Khan Muhammad Mustafizur Rahman, Assistant Engineer, Abdul Aziz, Sub-Assistant Engineer, Abul Kaiser Suza, Sanitary Inspector, Md. Aliuzzaman, Conservancy Inspector and Md. Masudul Alam Store Keeper of Ishwardi Municipality, Local Mason, Emptier of Ishwardi 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 Mr.Abdul Awal, Executive Engineer, Ishwardi Municipality, who helped in conducting sample surveys and FGDs in the field.

Collaborating partners:

- AQUA Consultant and Associates Limited, Dhaka, Bangladesh.
- Ishwardi Municipality, Pabna District, Rajshahi Division, Bangladesh.
- Centre for Science and Environment (CSE), New Delhi, India.

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3 General city information

Ishwardi municipality is a sub-district town of Pabna District under Rajshahi Division, Bangladesh, which is 282 km away from Dhaka City. The municipality was established in 1974. The city is located in the plain area of Bangladesh, situated on the bank of the Padma River. It consists of 9 wards and 27 *Mahallahs* (small cluster based area of population). It is also the headquarters of the western zone of Bangladesh Railway. It is the site of the Ruppur Nuclear Power Plant. Ishwardi Airport is a domestic airport in Ishwardi Upazila, Pabna, Bangladesh.

Table 1: City Profile (Source: FIEE, Ishwardi, UGIIP-III, LGED/2015).

Population parameters	
Estimated population, 2021	76,665
Households, 2021 (Estimated)	17,746
Area, sq.km	31.18
Total roads, km	132.38
Total drains, km	29.05

According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the municipality population was 66,255. The urban population growth in Ishwardi is considered 1.47% per year. Considering 10% floating population, such as farmers and traders, comes to the city every day, the present (2021) population is estimated to be around 76,665 (Table 1 and Table 2).

The municipality covers an area of 31.18 square kilometres (19.59 sq. km in Census 2011). At present, the municipality has 132.38 km of road out of which 76.76 km is the Bituminous Carpeting (BC) road, 33.30 km is Herring-Bone-Bond (HBB) road, 3.75 km is Reinforced Cement Concrete (RCC) road, 2.07 km is Water Bound Macadam (WBM) road and 18.50 km is earthen road. The city has about 29.05 km of drain which includes 15.05 km of RCC drain and 14.00 km of Brick drain (Table 1).

The geographical coordinates of Ishwardi are 24° 8' 30" North, 89° 4' 0" East (Figure 2). In the context of Bangladesh, the municipality area is relatively plain land. The Padma River passes through the municipality. The topography of Ishwardi is naturally plain and elevation is 18m (59ft.) above mean sea level. According to the Bangladesh Geological Survey map, Ishwardi is located within a young gravely sand formation of the western part of the Padma River. The Padma River contains fine sand with a high quantity of silt. The formation is mainly sandy clay nature; the core area is high and generally not flooded during monsoon season

The groundwater level below ground surface is 6m-10m (KII: Executive Engineer, Ishwardi). Majority of the households are dependent on groundwater supply. There are around 4,305 number of deep hand tube wells in Ishwardi. On the other hand, the pipe water supply rate from the municipality is around 2.448 -2.66 Million Litres per Day (MLD) (KII: Water Super, Ishwardi). However, the present water demand is 10 MLD in Ishwardi municipality.

According to the flood zoning map of Bangladesh (BMD, 2012), the city is in a flood-free zone. 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 carrying stormwater and domestic wastewater to the outfalls of the rivers and canals.

The population density in the 9 wards of the city is shown in Figure 3. The population density is 2,130.38 persons per sq. km, and the average household size is 4.34 persons. The rate of population increase is 1.21%. The density is high both in the wards no 4 and 7, ranging from 7,841 to 10,718 per sq. km. The population density is lower both in ward no. 3 and 6, ranging from 1,435 to 1,841 per sq. km.

Table 1: Population Growth Rate for Ishwardi municipality (Source: BBS/Compiled by UIIPF/2021).

Census Year	Population	Growth Rate (%)	Ward	Source
2011	66,255	1.47	9	Census 2011
2021	76,665	1.47	9	Estimated UIIPF/2021

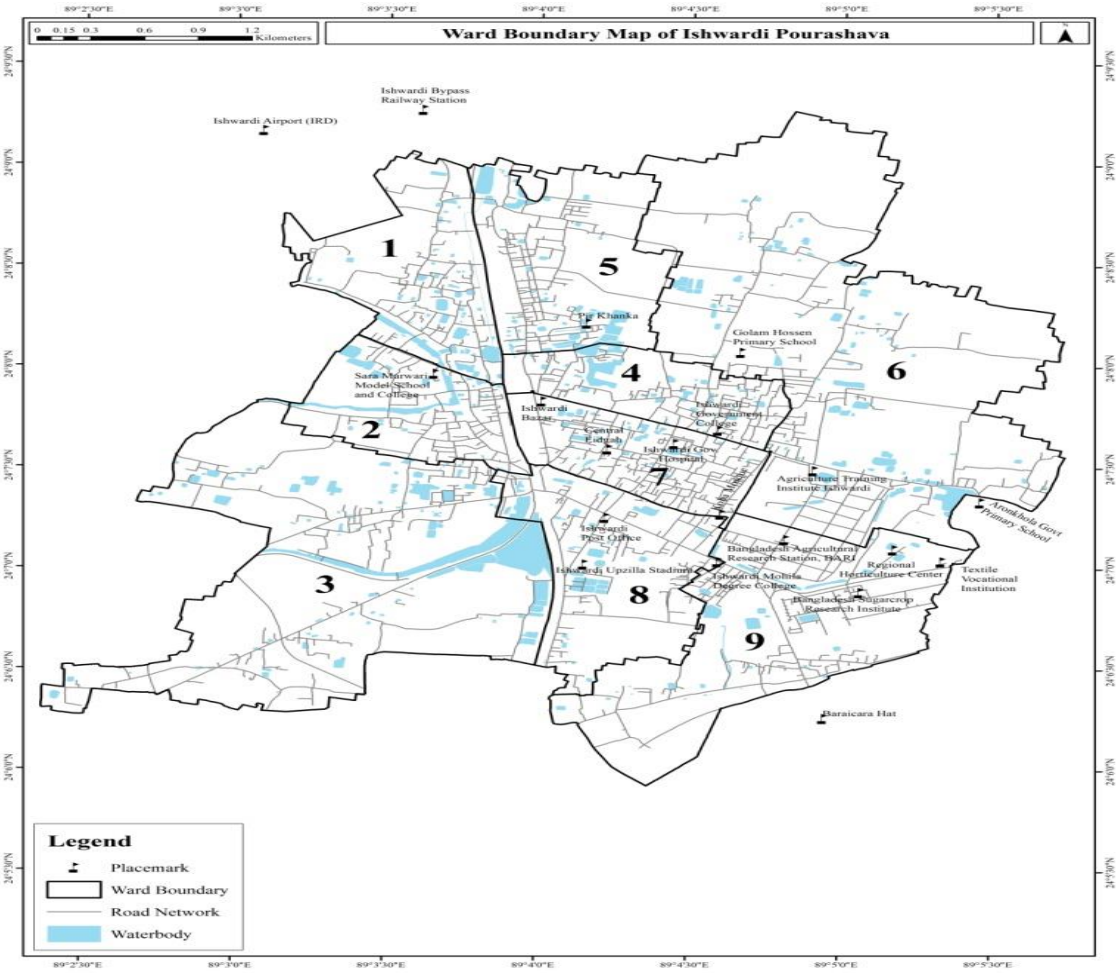

Figure 2: Map showing ward boundary area in Ishwardi municipality (Source: Mezan & Nazmul/UIIPF/ 2021).

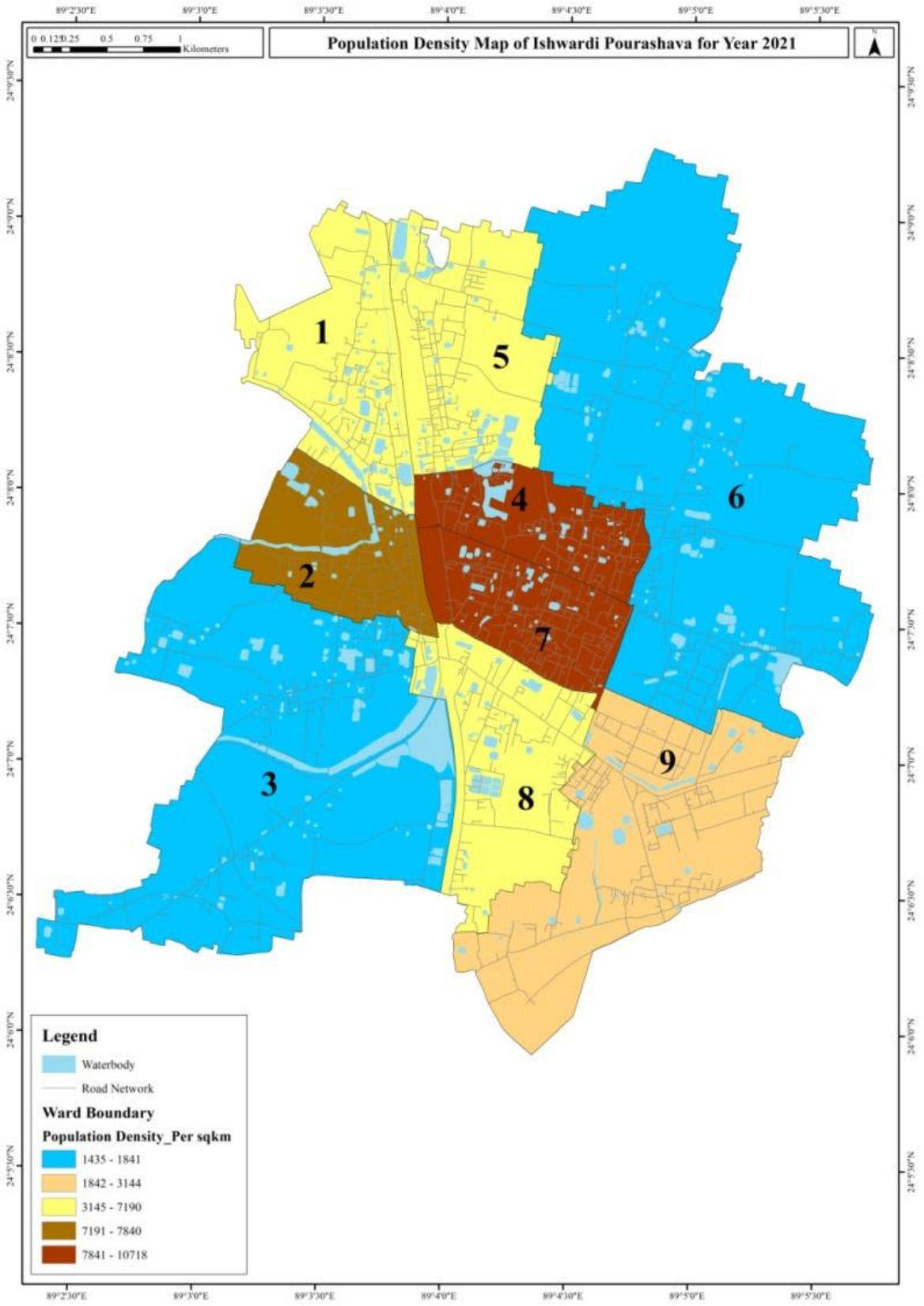

Figure 3: Map showing population density in Ishwardi municipality.

4 Service outcomes

Ishwardi Municipality, Pabna, Bangladesh, 29 Jun 2021. SFD Level: SFD Lite
Population: 76665
Proportion of tanks: septic tanks: 86%, 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	7.0					
T1A2C5 Septic tank connected to soak pit	15.0	50.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	8.0	20.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	3.0	20.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	1.0	20.0	0.0	0.0		
T1A2C9 Septic tank connected to 'don't know where'	1.0	20.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	8.0	0.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	56.0	100.0	0.0	0.0		
T1A6C10 Unlined pit, no outlet or overflow	1.0	0.0	0.0	0.0		

Table 2: SFD Matrix for Ishwardi municipality.

The outcome of the SFD graphic shows that 18% of the excreta flow is classified as 'Safely Managed' and the remaining percentage is classified as unsafely managed (Figure 1). The unsafely managed excreta originates from wastewater not delivered to treatment (7%), Faecal Sludge (FS) emptied but not delivered to the treatment (65%), FS not contained - not emptied (10%) and 1% of Superatant (SN) not delivered to treatment.The safely managed excreta originate from FS contained - not emptied (18%).

Overview on technologies and methods used for different sanitation systems through the sanitation service chain is as follows:

4.1 Offsite Systems

Ishwardi city does not have a dedicated sewerage system. However, during field observation and Household (HH) survey, it was found that there are certain areas where a portion of toilets are directly connected to open ground.Therefore, the T1A1C8 system is considered as 7% of the total population of the city to generate the SFD graphic. Since no containment system is available here, then it is considered as an offsite system.

4.2 Onsite Sanitation Systems (OSS)

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

Figure 4: Household survey and consultations (Source: SE HH Survey, UIIPF/DPHE, 2020).

Containment: Almost all the households (96%) in the city have their own latrines, however, the latrines are either connected to single pits, twin pits, septic tanks, or discharged directly into the environment (e.g. open ground, open drain, water body, etc.). From the household survey, it was found that around 28% of the city population use septic tanks as the containment system, further these septic tanks are connected to a soak pit (T1A2C5) in 15% of the population, open drains (T1A2C6) in 8% of the population, open ground (T1A2C8) in 1% of the population, 'don't know where' (T1A2C9) in 1% of the population and to open water body (T1A2C7) in 3% of the population; 56% of the population use single pit systems, and only 8% of the population use twin pit system in the city. Nearly, 1% of the population uses the unlined pit (T1A6C10), which has a ‘low risk’ of groundwater pollution (KII, FGDs, HH survey, 2020). Figure 5 shows pictures of some of these technologies in use.

Figure 5: Open as well as covered ring pits and outlet of the septic tank connected to open drain (Source: Field Observation, UIIPF/DPHE, 2020).

Emptying: Households relying on septic tanks have to arrange themselves for emptying of the septic tank. It is observed from the baseline survey that most of the septic tanks have been constructed in the last 4-6 years. Manual scavenging practice is carried out for emptying of septic tank in Ishwardi. Charges for cleaning the single pit latrines vary from BDT 1,000 to BDT 2,000 (US$12-US$23), for twin pit latrines vary from BDT 3,000 to BDT 4,000 (US$35-US$47) and for septic tanks vary from BDT 5,000 to BDT 8,000 (US$58-US$93) depending upon the accessibility, size of the tank, and disposal location. 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 50% of the septic tanks, connected to the soak pit are emptied within 2-5 years. About 20% of the septic tanks connected to open drain, open ground, water bodies or 'don't know where' are emptied within 2-5 years. Almost 100% of single pit latrines are emptied within 1-2 years. Besides the above information, it is also expected that the demand for desludging septic tanks would increase shortly.

About 77% of the emptying is done by private sweepers. Only 23% of the emptying is carried out by the family member. Most of the emptying is practised manually using a bucket and rope for several reasons. However, this method is highly risky for the health and safety of the workers. A few households use motorized (mud) pumps. The municipal authority has only one mechanical emptying truck with a capacity of 1,500 litres for providing the services. It was observed that the vehicle is not being used for faecal sludge collection and disposal yet.

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 is observed that about 58% of the respondents who use septic tanks informed that faecal sludge (sludge from the septic tank or covered pit latrines) is disposed of by digging a dug hole close to the septic tanks.

Besides, the sludge disposed into the canal and river is 10%, into the drain is 25%, into roadside is 2% whereas 5% of respondents did not have any idea about sludge disposal.

Treatment/Disposal: There is no Faecal Sludge Treatment Plant (FSTP) in Ishwardi municipality. For solid waste management, the municipality has acquired a land of 2.98 acres (12,059.6 m^2) in 2015-2016. The landfill area is situated around 3.5 km away from the city at Fothe Mohammadpur in Ward no. 6. The solid waste treatment plant (sanitary landfill) is under construction, under the UGIIP-III project. For collecting the faecal sludge, recently the municipality has arranged a 1,500 litre capacity Vacuum Tank from the UGIIP-III project. The collected sludge will be disposed of besides the solid waste treatment plant in Fothe Mohammadpur dumping station. Finally, a co-composting plant will be developed in the landfill area which is shown in Figure 6.

Figure 6: Sanitary Landfill of 2.98 acres (12,059.6 m^2) at Fothe Mohammadpur, Ward 6, Ishwardi municipality (Source: Field Observation, UIIPF/DPHE, 2020).

4.3 Open Defecation (OD)

From HH surveys, KIIs and FGDs, though it was found that there are 1% of unlined pits (hanging latrines) in the municipality, this is considered as open defecation from the sanitation point of view (but finally shown as unlined pits in the SFD graphic, not as open defecation).

5 Data and assumptions

This baseline survey conducted in December 2020 contains detailed data on different stages of the sanitation value chain. A total of 400 households were interviewed at 9 wards of Ishwardi municipality during the baseline survey. 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. 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 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 Ishwardi municipality:

- The proportion of FS in septic tanks, fully lined tanks and lined tanks with open bottom are considered 86%, 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 Ishwardi city population was 66,255. The urban population growth in Ishwardi is considered as 1.47% and the present (2021) population is estimated to be around 76,665.

- There are around 8% 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, 8%).

- There are around 56% of single pit latrines as containment systems. So, it is assumed that all these single pit containment technologies are defined as a lined pit with semi-permeable walls and open bottom, no outlet or overflow (system T1A5C10, 56%).

- 15% of septic tanks are connected to soak pits (system T1A2C5). Since they are well-constructed as per the field visit observation, they were considered to be located in areas of low risk of groundwater contamination.

- Around 50% of HHs have emptied their septic tanks with a desludging frequency of 2-5 years. Thus, variable F3 for system T1A2C5 is set to 50%.

- A lined pit with semi-permeable walls and open bottom, no outlet or overflow, is considered a single pit latrine. Almost 100% of single pit latrines are emptied within 1-2 years. Thus, variable F3 for system T1A5C10 is set to 100%.

- There are about 13% of the septic tanks connected to open drain, open ground, water bodies or ‘don’t know where’ which are emptied within 2-5 years. Thus, variable F3 for systems T1A2C6, T1A2C7, T1A2C8, and T1A2C9 is set to 20%. Moreover, variables S4e and S5e related to the discharge of supernatant for system T1A2C6 are set to 0%.

- A lined tank with impermeable walls and open bottom, no outlet or overflow, is considered as twin pits. Thus, variable F3 for system T1A4C10 is set to 0%.
- 1% of containments are found to be unlined pits with no outlet or overflow, where there is a low risk of groundwater pollution. After observations, these containments are

considered as open defecation (but finally shown as unlined pits in the SFD graphic, not as open defecation).

- Since there are no wastewater or faecal sludge treatment facilities in the town, variables F4 and F5 for all systems are set to 0%.

6 Context-adapted SFD Graphic

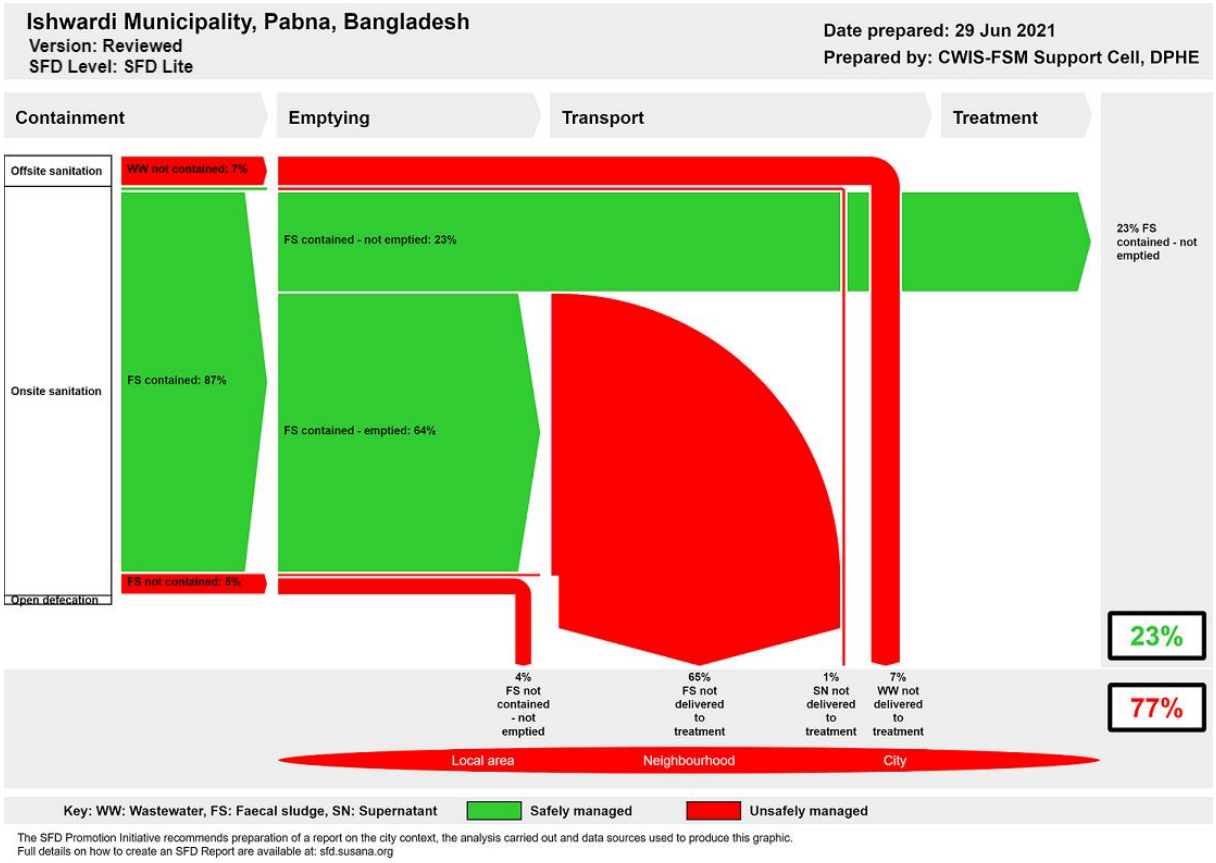

Figure 8: Context-adapted SFD Graphic for Ishwardi municipality.

The only difference suggested in the context-adapted SFD is at the containment stage for correctly designed septic tanks, though connected to open drains. Based on the assumptions, 86% of the proportion of the content of the septic tank is solid FS, which is generated and collected inside the septic tanks. The remaining 14% of the content is supernatant, which attributes to be ~1% of the population flows through open drains. The solid FS collected in the septic tank is considered to be contained and hence 87% of FS is contained (represented green in colour at containment stage). Followed by this, 64% of FS contained is emptied, and 23% is FS remaining in the tank which is contained and never emptied. The supernatant generated from the septic tank connected to the open drain is not contained and hence is considered to be unsafely managed (represented in red). Overall, excreta of 77% of the population is not safely managed according to the context-adapted SFD graphic.

7 List of data sources

Reports, literature and website

- Bangladesh Bureau of Statistics (BBS), 2011.
- Population and Housing Census, 2011.
- Socio-economic HH study on Ishwardi Municipality (2020): Urban Infrastructure Improvement Preparatory Facility Project (UIIPF), Department of Public Health Engineering (DPHE), Dhaka, Bangladesh.
- Field Visit Report of Ishwardi Municipality (2020): Urban Infrastructure Improvement Preparatory Facility Project (UIIPF), Department of Public Health Engineering (DPHE), Dhaka, Bangladesh.
- Final Initial Environmental Examination (2015): Third Urban Governance and Infrastructure Improvement (Sector) Project-Ishwardi Road and Drain Package 1UGIIP-III-I/ISHW/UT+DR/01/2014/Lot1 (UT)&Lot2(DR), Local Government Engineering Department (LGED), Asian Development Bank (ADB), Bangladesh.
- https://elevation.maplogs.com/poi/ishwardi_upazila_bangladesh.381978.html

Online Key Informant Interviews (KIIs) during COVID-19 pandemic situation

- KII with Mayor, Ishwardi Municipality.
- KII with Executive Engineer, Ishwardi Municipality
- KII with DPHE Engineer, Ishwardi Municipality.
- KII with Women Affair Officer, Ishwardi Municipality.
- KII with Restaurant Owner, Ishwardi Municipality.
- KII with Ward Commissioner, Ishwardi Municipality.
- KII with Water Super, Ishwardi Municipality.
- Facilitators: Nasima Akter, Social Safeguard Specialist and Ajmal Hossain Gazi, Field Engineer UIIPF, DPHE.

Focus Group Discussions (FGD)

- A group of the representative from house owners.
- Sweepers/emptiers and waste collectors.
- Conservancy inspector, sanitary inspector.
- Store Keeper of Ishwardi Municipality.
- A group of representatives from educational institutions.
- Masons Association (septic tank builders).
- Participants from local NGOs.

Figure 9: Focus group discussion with the house owners in Ishwardi municipality (Source: SE HH Survey, UIIPF/DPHE, 2020).

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SFD Promotion Initiative

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