



SFD Lite Report

Jaitpur Village India

This SFD Lite Report was prepared by
Centre for Science and Environment (CSE).

Date of production/ last update: 22/10/2021

1 The SFD Graphic

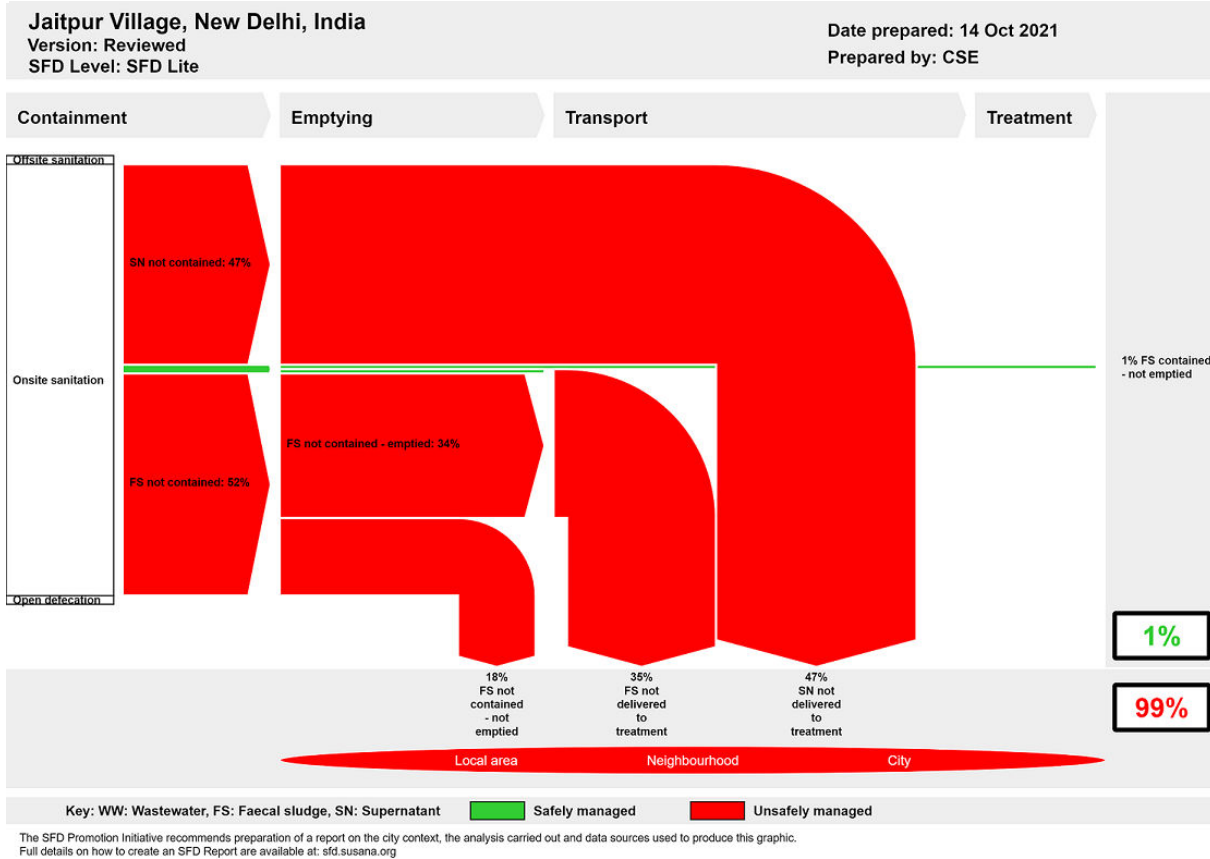


Figure 1: SFD Graphic for Jaitpur Village.

2 SFD Lite information

Produced by:

- Centre for Science and Environment (CSE), New Delhi.
- This report was compiled as part of the SFD Promotion Initiative (SFD-PI) phase 3 project funded by the Bill and Melinda Gates Foundation (BMGF). We would like to thank Mr. Awanish Kumar, Deputy Commissioner, SDMC, Govind Kaur, JE (Junior Engineer), Delhi Jal Board South East Division, Sunny Kumar, JE, SDMC and Sanitation Worker for supporting and providing the data required and cooperating for Key Informant Interviews (KIIs) & Focussed Group Discussions (FGDs).
- Special thanks to Mr. Dhruv Pasricha, Programme Officer, CSE, Mr. Harsh Yadava, Senior Research Associate, CSE for their valuable inputs.

Collaborating partners:

- South Delhi Municipal Corporation (SDMC).

Date of production: 14/10/2021

3 General city information

Jaitpur Village (Figure 2) 28°30'25.0"N 77°19'48.7"E is located in the Urban Limits of National Capital Region (NCR) Area near “NTPC’s Eco Park”. It comes under the Badarpur Constituency Ward No. 98-S (Figure 2) where an overall population of 125,000 resides in an area of 3.76 sq.km¹ giving a population density of 15,775 person/sq.km¹. The Village lies in a mid-gap of Yamuna River and Agra Canal which made alluvial soil deposit available in the vicinity, with an annual average rainfall (mm) of 617 and with temperature variance of 40.9°C in summers¹ and 8.9°C in winters¹. Floating population has adversely affected this area as cheap rented house place, illegal water boring (24/7 running water) and other political benefits, making Jaitpur Village a sweet spot to live in whereas on other hand various parts of New Delhi are facing water sensitive issues. In a Key Informant Interview (KII)² it was told the area got densely populated over the past decade as active voters in the area also got increased to 90,000 conveyed by the ward chairman, giving to a population ranging between 100,000 to 150,000. As many migrant workers have shifted to this part of NCR in search for better livelihood, no track record was maintained by the local authority and hence, an average value was considered for the preparation of the SFD graphic by following the decadal regime which gave a population of 125,000.

Table 1: Population growth of Jaitpur Village. 1991 - 2011 (Source: District Census Handbook, 2011: Key Informant Interview with SDMC Officials and Ward Chairman).

Census Year	Population	Decadal Growth
1991	1,455	
2001	24,711	1,598%
2011	59,330	140%
2021	125,000	110%

Jaitpur Village is dependent on Delhi Jal Board (DJB) for its drinking water usage with an overall demand of 600KLD (Kilo Litres per Day). In this regards, DJB supplies only 20KLD via piped water supply extracted from a surface source (Yamuna River) present at Sonia Vihar Water Treatment Plant for only two days a week at timing of 5:00 pm to 6:30 pm (variable) which only covers certain blocks³. The remaining demand is fulfilled by sub-surface sources (i.e. bore wells) located in the ward region itself as DJB⁴ have 278 bore wells⁵ operating in the region. The water table varies in range of 10-20 mbgl⁵ (metres below ground level) as heavy extraction is responsible due to illegal bore wells presently operating. On demand of certain blocks, water tankers are also operated by DJB at no cost. No cost is also charged for water connection as per Delhi Government Water Supply Scheme, but service charge of INR 1,5005 (US\$ 20.08) is charged for installation and water charges applicable for limit crossing 20,000 litres/connection for usage.

¹ District Census Handbook of New Delhi, Census of India, 2011.

² KII, JE South Delhi Municipal Corporation (SDMC).

³ A, B, C & R, and Z Blocks (Source: Office of the Executive Engineer (South)-IV).

⁴ KII, Public Relation Office, Junior Engineer South Zone IV Delhi Jal Board, Okhla, New Delhi.

⁵ Central Ground Water Report (CGWB), New Delhi 20-2021.

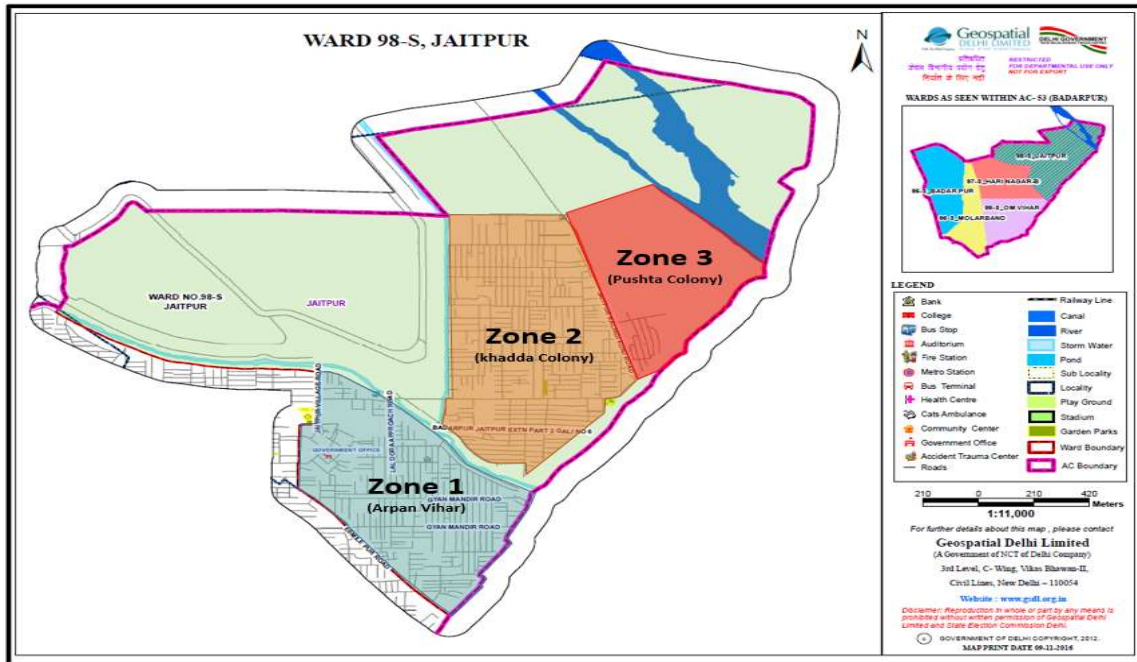


Figure 2: Jaitpur Village Ward 98-S Map (Source: SDMC/2016).

4 Service outcomes

Jaitpur Village, New Delhi, India, 14 Oct 2021. SFD Level: SFD Lite

Population: 125000

Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, 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
T1A2C6 Septic tank connected to open drain or storm sewer	57.0	80.0	0.0	0.0	0.0	0.0
T1A2C8 Septic tank connected to open ground	3.0	80.0	0.0	0.0		
T1A3C10 Fully lined tank (sealed), no outlet or overflow	2.0	50.0	0.0	0.0		
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	36.0	50.0	0.0	0.0	0.0	0.0
T1A3C8 Fully lined tank (sealed) connected to open ground	2.0	50.0	0.0	0.0		

Table 2: SFD Matrix for Jaitpur Village, New Delhi (Source: Sachin Sahani & Urja Vashishth/CSE/2021).

The outcome of the SFD graphic shows that 1% of the excreta flow is classified as ‘Safely Managed’ and the remaining 99% is classified as unsafely managed (Figure 1). The unsafely managed excreta originate from Supernatant (SN) not delivered to treatment (47%), Faecal Sludge (FS) not contained – not emptied (18%) and FS emptied but not delivered to treatment (35%). The safely managed part originates from FS contained – not emptied 1%.

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

4.1 Off-site Systems

There is no underground sewerage system/network present in the entire village area. Certain unclassified drains were noticed but cannot be categorised under sewerage system as no official data were available in this perspective even though Census Data claimed to have sewer presence (Figure 7). This unauthorised region⁶ does not have any inclusion for extension of sewerage for the upcoming development. There is one major drain to which all the outlets from the ward blocks discharge the wastewater, which eventually ends up into Yamuna River.

Community Toilets (CTs)/Public Toilets (PTs): According to SDMC official², for the entire ward only a single public toilet which is not operational⁷ (Figure 3) is placed but used as a store house (Figure 4) for SDMC workers hired on contract basis to maintain solid waste in the ward. Figure 5 shows a KII with JE, SDMC.



Figure 3: Public toilet, Jaitpur Village (Source: Urja Vashishth/CSE/2021).

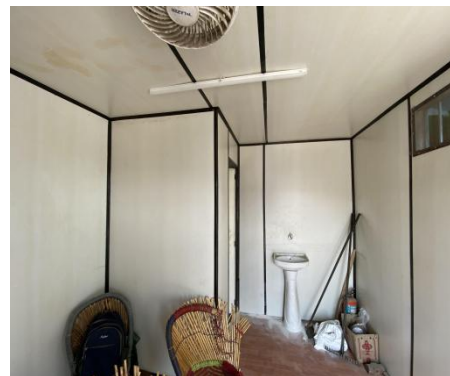


Figure 4: Non-operational public toilet (Source: Sachin Sahani/CSE/2021).



Figure 5: KII with JE, SDMC (Source: Urja Vashith/CSE/2021).

⁶ Master Plan 2021, 2041, Delhi Development Authority (DDA), Sewerage Master Plan 2031 Delhi Jal Board.

⁷ Field Surveys of Public Toilets, FGD with Municipal Workers.

4.2 On-Site Sanitation Systems

As per the Census 2011 data, 97.5% of HouseHolds (HHs) had accessibility to latrine facility (Figure 6) which included sanitation systems (Figure 7) such as piped sewer system, septic tank, other systems, pit latrine, night soil disposed into open drains and utilizing public toilet, whereas 2.5% did not had latrine facility at the premises. After conducting Key Informant Interviews (KIIs), Focussed Group Discussions (FGDs) with relevant stakeholders and HHs Surveys, the containments identified were: septic tanks majorly located in the Zone 1 “Arpan Vihar”, fully lined tanks which were found at many construction sites in Zone 2 “Khadda Colony”, fully lined tanks in sealed condition as drainage and water logging is an issue in Zone 3 “Pushta Colony” and few septic tanks connected to open ground noticed in few places.

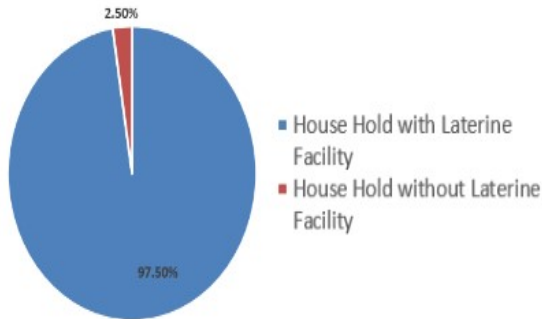


Figure 6: Latrine facility coverage (Source: Census /2011).

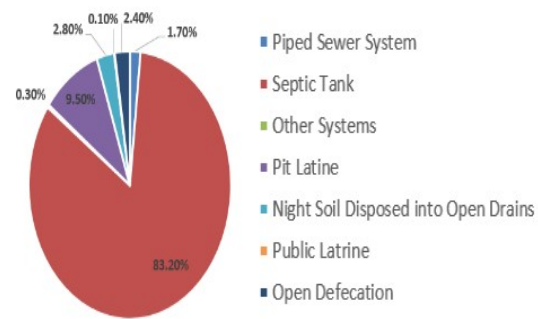


Figure 7: Sanitation systems (Source: Census/2011).

Containment: Based on sample household surveys, KIIs and FGDs, it was found that tanks in Zone 1 are majorly septic tanks which are connected to open drains or storm water drains (T1A2C6, 57%), followed by septic tanks which are connected to open ground (Figure 10) (T1A2C8, 3%) in Zone 3. Whereas in Zone 2, the main systems found are fully lined tanks (sealed) connected to an open drain or storm sewer (Figure 8) (T1A3C6, 36%), fully lined tanks (sealed) no outlet or overflow (Figure 9) (T1A3C10, 2%). Finally, fully lined tanks (sealed) connected to open ground are also found in Zone 3 (Figure 11) (T1A3C8, 2%).



Figure 8: Fully lined tank with outlet In Zone 2, Jaitpur Village (Source: Sachin Sahani/CSE/2021).



Figure 9: Fully lined tank with no outlet in Zone 2, Jaitpur Village (Source: Urja Vashishth/CSE/ 2021).



Figure 10: Septic tank connected to open ground, Zone 3 (Source: Urja Vashishth/CSE/2021).



Figure 11: Fully lined tank connected to open ground, Zone 3 (Source: Urja Vashishth/CSE/2021).

Ground Water Risk Assessment: As per the risk assessment done on the groundwater pollution risk estimation tool provided by the Graphic Generator⁸, the rock type in the unsaturated zone is fine sand with silt and clay deposits⁸ with the ground water depth³ being more than 10m. There are hardly any sanitation facility located in a radius less than 10m from groundwater sources with no sanitation facility located uphill, which gave a less risk as per the tool. But there is a loop hole in this factor as 278 bore wells⁵ are utilized to supply water, in cases of water logging issue. There were found some bores which are a decade old and their protecting covering were found in rusted condition, so chances of contamination can be present, but till now no health hazard was found in the vicinity due to poor water quality.

Emptying/Transportation/Treatment: FGDs concluded that there is regular emptying of properly designed septic tanks and it occurs within 1-2 years whereas fully lined tanks either new or old were constructed to last more than 10 years without emptying in order to reduce the emptying cost and poor drainage⁹. There is no emptying service provided by SDMC² as private players operate at the peak capacity with a daily frequency of 1-2 trips⁹ and having tractor-mounted tank capacity ranging from 2,000-4,000 litres in all the zones at a cost ranging between INR 400-600 (US\$ 5.32-7.98) per trip.

As properly designed septic tanks get filled up early than fully lined tanks, emptying percentage for septic tanks which are connected to open drains or storm water drains (T1A2C6) and septic tanks which are connected to open ground (T1A2C8) was considered 80% (variable F3 = 80%) based upon the assumptions¹⁰ made, whereas for transport and treatment as no Faecal Sludge Treatment Plant (FSTP) or STP (Sewage Treatment Plant) is present, the emptied faecal sludge is dumped into an open drain (Figure 12) passing through the midst of the village area, ending up into Yamuna River untreated (Figure.13). Therefore, variables F4, F5, S4e, S5e were all set to 0%.

⁸ Groundwater pollution risk estimation (<https://www.sleigh-munoz.co.uk/sfd/database/gw-helper.html>).

⁹ FGD Private Desludgers, KII with Masons and Skilled Builders.

¹⁰ HHs Surveys, emptying frequency from the year of function.



Figure 12: Private desludgers desludging faecal sludge into an open drain (Source: Sachin Sahani/CSE/2021).



Figure 13: Open drain ending up into Yamuna River (Source: Sachin Sahani/CSE/2021).

In case of fully lined tanks (sealed) connected to an open drain or storm sewer (T1A3C6), fully lined tanks (sealed) connected to open ground (T1A3C8) and fully lined tanks (sealed) with no outlet or overflow, the percentage of faecal sludge emptied for all systems was estimated at 50% as that was considered as the benchmark for emptying (variable F3 = 50%). The rest of the variables, F4, F5, S4e and S5e, were set to 0% for these systems since there is no FSTP or STP as mentioned before.



Figure 14: FGDs with private desludgers (Source: Urja Vashishth/CSE/2021).



Figure 15: FGDs with masons (Source: Urja Vashishth/CSE/2021).

Open Defecation: As per the South Delhi Municipal Corporation (SDMC) Data² all the wards in the Badarpur Constituency including Jaitpur Ward (98-S) are declared Open Defecation Free (ODF) under Swachh Bharat Mission (SBM) and no instance of open defecation was found in field surveys or the household survey.

5 Data and assumptions

District Census Handbook 2011 for Jaitpur Village and Master Plan Delhi 2021, 2041 (Draft) Report of New Delhi were considered as the baseline and the data for all the stages of sanitation chain were updated based on the data collected from field through KIIs, FGDs, observations and secondary data collected from relevant stakeholders. Following assumptions were made for developing the SFD graphic for Jaitpur Village:

- Volume of wastewater generated was estimated as 80% of volume of water supplied.
- As per the guidance given in the frequently asked questions (FAQs) in the Sustainable Sanitation Alliance (Susana) Webpage, it was considered that 50% of the contents of septic tanks and fully lined tanks is faecal sludge and 100% for open bottom tanks.
- No accurate details on water supply provided as it is a politically influenced area.
- Less than 25% of the sanitation facilities are located <10 metres away from groundwater sources.
- More than 25% of drinking water is produced from groundwater resources.
- The on-site sanitation system proportion for emptying (variable F3) of septic tanks (T1A2C6 and T1A2C8) was considered as 80% as there are several private operators for emptying septic tanks, assuming a benchmark of 3 years in which emptying has to be done. So, HHs present in Zone 1 "Arpan Vihar" empty their septic tanks on regular basis. Whereas for fully lined tanks (T1A3C10, T1A3C6 and T1A3C8), irregular built of these containments took more time for emptying so the benchmark set was 10 years and variable F3 was set to 50% for these systems.

6 Context-adapted SFD Graphic

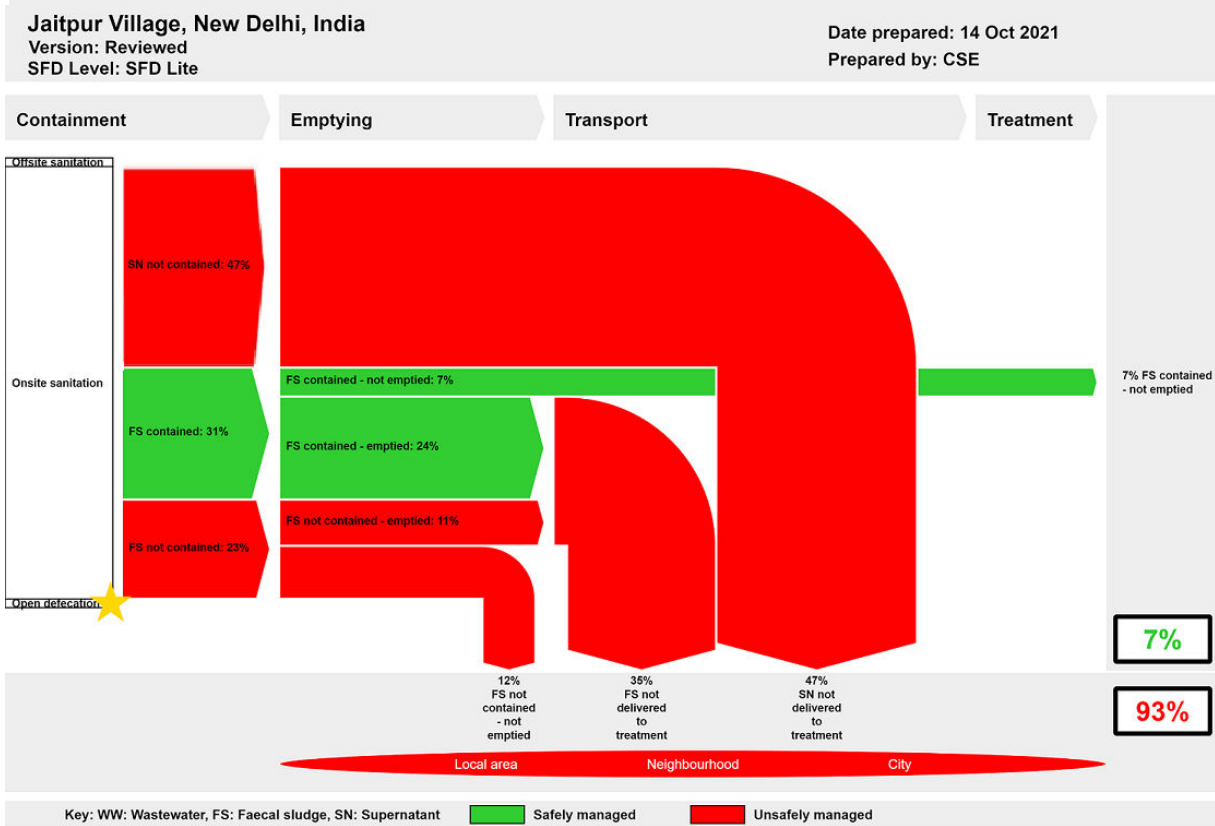


Figure 16: Context-adapted SFD Graphic for Jaitpur Village, New Delhi (Source: CSE/2021).

The only difference suggested in the context-adapted SFD is at containment stage for correctly designed septic tanks, now connected to a centralized combined sewer. According to the assumptions, 50% of the proportion of the content of the septic tank is solid faecal sludge, which is generated and collected inside the septic tanks. The remaining 50% of the content is supernatant which attributes to be 47% of the excreta flow through open drains. The FS collected in the septic tanks but not emptied is considered to be contained and hence 7% of FS is contained but not emptied (represented green in colour). Overall, excreta of 93% of the population is not safely managed according to the context-adapted SFD graphic.

7 List of data sources

Reports and Literature

- District Census Handbook of New Delhi, Census of India, 2011.
- Ground Water Year Book of New Delhi, CGWB, 2020-2021.
- Master Plan 2021, 2041 (Draft), Delhi Development Authority, DDA.
- Sewerage Master Plan 2031, New Delhi.

Key Informant Interviews (KIIs)

- KII-1, 2021; Interview with Mr. Awanish Kumar, IAS, DC, SDMC.
- KII-2, 2021; Interview with Mr. Amit Kumar, Junior Engineer, Desludging Department, SDMC.
- KII-3, 2021; Interview with Mr. Sunny Kumar, Junior Engineer, Sanitation Department, SDMC.
- KII-4, 2021; Interview with Mr. R.P Singh, CE, South Delhi, Delhi Jal Board.
- KII-5, 2021; Interview with Mr. Rihan Khan, Public Relation Officer, Delhi Jal Board
- KII-6, 2021; Interview with Mr. Govind Kaur, Junior Engineer, South East Division, Delhi Jal Board.
- KII-7, 2021; Interview with Mr. K.K Shukla, Chairman, Jaitpur Village Ward 98-S.

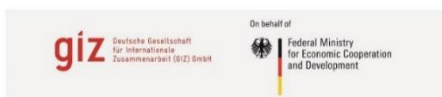
Focus Group Discussions (FGDs)

- FGD-1, 2021; Focus Group Discussion with Sanitation Workers.
- FGD-2, 2021; Focus Group Discussion with Local Peoples, Masons (Figure 14).

Field Observations

- Visit to approximate 30 households, covering Slums, Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG) spread throughout the city.
- Survey of Public Toilet (1 No.).
- Survey of Yamuna River front where open drain ends up.

SFD Promotion Initiative



Jaitpur Village, India, 2021.

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