



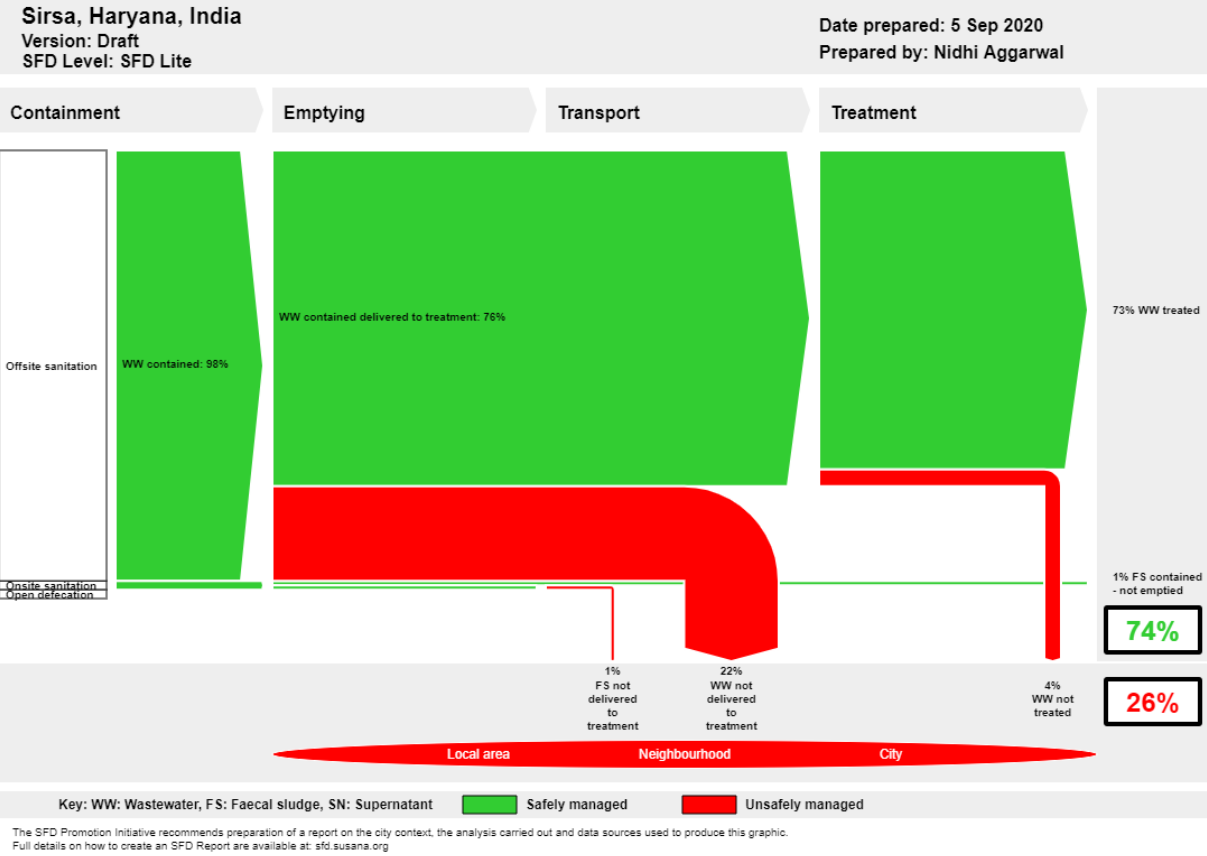
# SFD Lite Report

## Sirsa India

This SFD Lite Report was prepared by  
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Date of production/ last update: 05/09/2020

# 1 The SFD Graphic



## 2 SFD Lite information

### Produced by:

- Nidhi Aggarwal
- This report was compiled as part of the SFD Promotion Initiative project funded by Bill and Melinda Gates Foundation (BMGF). We would like to thank Er. Vijay Kumar, City Team Leader, SBM; Sirsa Municipal Council for providing all the required secondary data and cooperating for Key Informant Interviews (KIIs)
- This report would not have been possible without constant support of Er. Sunil Sihag and Er. Rohtash, Junior Engineer, PHED who helped in conducting sample surveys and FGDs in the field

### Collaborating partners:

- Centre for Science & Environment, New Delhi, India
- Sirsa Municipal Council, Sirsa, Haryana, India

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### 3 General city information

The Sirsa city is a municipal council and the headquarter of Sirsa district in Haryana. It is located at a mean elevation of about 205 msl at 29.53°N 75.02°E. It is about 260 km NW of New Delhi and 240 km from state capital of Chandigarh. The city covers an area of 26 km<sup>2</sup>. It is said to be one of the oldest places of North India and its ancient name was Sairishaka, which finds its mention in Mahabharata.

As per census 2011, the population of the city was 1,82,534 and the number of households was 36191, with an average annual growth rate of 2.3%. The current population of the city is 2,24,494<sup>1</sup> including 2% floating population and total no. of households (HH) is 42705 (SBM, 2020 and KII with ULB & PHED). The municipal boundary and current population is used for preparation of SFD.

| Census Year | Population | Growth Rate (%) | Source      |
|-------------|------------|-----------------|-------------|
| 2001        | 1,60,735   |                 | Census 2001 |
| 2011        | 1,82,534   | 1.4             | Census 2011 |
| 2019        | 2,15,514   | 1.8             | PHED        |
| 2020        | 2,24,494   | 0.4             | SBM         |

**Table 1: Population Growth rate Sirsa City** Source: (Census 2011), (SBM 2020), (SMC 2020)

Sirsa has a dry arid climate with extreme temperatures and scanty rainfall. Sirsa has max. temperature<sup>2</sup> in summers of 34.6° C and min temperature in winter less than 13.3°C. The average annual rainfall lies between 253 – 318 mm<sup>3</sup>. The topology of the city is generally flat with a gentle slope towards south west (CGWB, 2017). The city has sandy loam soil with variable degrees of salinity. The risk of groundwater contamination is low as the depth of groundwater level is more than 80 m<sup>4</sup>. The total water supply in the city is 31 MLD with per capita water supply of 135 LPCD predominantly through canals and ground water with 107 tube wells spread all across the city (KII-9, 2020). Ghaggar river flows in close vicinity to the city.

### 4 Service outcomes

Sirsa, Haryana, India, 5 Sep 2020. SFD Level: SFD Lite

Population: 224494

Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%

| System label   | Pop  | W4a  | W5a  | F3  | F4  | F5  |
|--|--|--|--|---|---|---|
| <b>System description</b>  | Proportion of population using this type of system | Proportion of wastewater in sewer system, which is delivered to centralised treatment plants | Proportion of wastewater delivered to centralised 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 |
| <b>T1A1C2</b><br>Toilet discharges directly to a centralised foul/separate sewer | 98.0   | 78.0   | 95.0   |   |   |   |
| <b>T1A2C5</b><br>Septic tank connected to soak pit                               | 2.0  |  |  | 100.0   | 0.0   | 0.0   |

**Table 2: SFD Matrix for Sirsa**

<sup>1</sup> SBM, 2020

<sup>2</sup> Climate-data.org

<sup>3</sup> Central Ground Water Report, Sirsa, 2013

<sup>4</sup> Central Ground Water Report, Sirsa, 2013

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

### 4.1 Offsite Systems

The sewerage network has been laid all over the city within the administrative boundary of Sirsa which accounts for 98% of city’s population. Rest 2% of city’s population is dependent on onsite-sanitation system (OSS) (Field Observation; KII- 4, 2020; KII-5, 2020; KII-12, 2020). There are 4 functional STPs with an installed treatment capacity of 45 MLD (Field Observation; KII- 4, 2020; KII-5, 2020; KII-8, 2020). Two of them are located at Shamsabad Patti, near Kelniyan having a capacity of 15 MLD and 20 MLD, respectively. The other two are located outside the city in Nattar having a capacity of 5 MLD each. The 20 MLD STP has been functional since March 2020 and is based on SBR technology (KII-5, 2020). Rest of them is based on MBBR technology for wastewater treatment (Field observation; KII- 4, 2020; KII-5, 2020). As per the current scenario, ~78% of the wastewater is reaching to the STPs (W4a) considering that the wastewater from HUDA colonies is not reaching to any treatment plant as it is transported through the sewer network to an open pond near the proposed STP at Vaidwala village. Instances of overflow back on the streets in Housing Board Colony due to blocked sewer network has also been observed (Field observation). The wastewater from the pond is then directly used by the farmers for agriculture purpose without any treatment (Field observation; KII-8, 2020).

Presently, there is ~95% wastewater treatment through STPs as wastewater generation is 27.9 MLD of total water supply which complies with total treatment capacity of 45 MLD (KII-5, 2020; KII-8,2020). The lab report from the STP revealed that the discharge standards, prescribed by Central Pollution Control Board are met by the STPs, hence the wastewater and supernatant treated at the STP is considered 95% (w5a) which is safely used by the farmers for their agriculture purpose (KII-5,2020; CPCB, 2020). The treated wastewater and sludge generated at STP are used by the farmers through nullahs (Field observation; KII-5, 2020; KII-8, 2020). It has been observed that treated wastewater doesn’t reach the canal and is transported via nullahs for the use in farmlands (Field observation).



STP at Kelniyan



Treated wastewater used by farmers at Nattar STP



Sludge drying beds at Kelniyan STP



Untreated wastewater disposed off in open pond at Vaidwala Village

Figure 1: Wastewater Treatment and End-use/ Disposal

## 4.2 On-site Sanitation Systems

**Containment:** Based on sample household survey, KIIs and FGDs with relevant stakeholders, it was concluded that 2% population of the city is dependent on the On-site Sanitation Systems (OSS) (Field Observation; KII-6, 2020; KII-8, 2020). This small fraction of the population belongs to unauthorised residential colonies and institutes. The containment system prevalent in the city are septic tanks connected to soak pit (T1A2C5, 2%) (Field Observation; KII-6, 2020; KII- 8, 2020).



**Figure 2: Septic Tank connected to Soak Pit at JE Colony**

The general size of Septic Tanks varies from 6 ft \* 5 ft–10 ft \* 6 ft, depending upon the household size, income level, community etc. (Field Observation; KII-6, 2020; KII-8, 2020; FGD-2, 2020). The septic tanks are three chambered with proper partition walls including plastered bottom. During field visit, it has been observed that these containment system are no longer constructed in the city and only few remain in the outskirts which are following one standard design which is locally called septic tank (Field Observation; KII-11, 2020; FGD-2, 2020). As per household surveys, it was found that particularly, in low-income areas, unlined pits with open bottoms were used which have been discarded since last 10 years as now direct sewer connection is in place (Field Observation).

**Community Toilets/Public Toilets:** There are 12 Public Toilets, 5 Community Toilets and 5 Mobile toilets under the Swachh Bharat Mission which are directly connected to sewerage network (Field Observation, KII-1, 2020). Though the city has achieved Open Defecation Free (ODF) status in December 2016 and later in 2020 again, it is observed that Open Defecation (OD) is still practised by some 80 LIG households i.e. 0.2% of total population due to non-availability of community or public toilets in their close vicinity (HH Survey; FGD-3, 2020).



**Figure 3: Mobile Toilet located at Fire Station**

**Emptying:** The city is dependent on privately operated mechanised desludging service for emptying of faecal sludge from Septic Tanks (Field Observation; FGD-1, 2020; KII-6, 2020). The emptying frequency varies from 2-3 year (demand based) depending upon the nature and the size of containment system (HH surveys; FGD-1, 2020). There are 12 registered private vacuum tankers plying in nearby villages. Each of these vacuum tractors are equipped with motorised pumps and have a storage capacity varying from 3500 to 6500 litres (KII-6, 2020; FGD-1, 2020). There are five sewer cleaning machines available with PHED (1 Super Sucker Machine, 1 Hydraulic and 3 Bucket type machines) (KII-4, 2020). However, vaccumm tankers are also involved in sewer cleaning (KII-6, 2020; FGD-1, 2020).



**Figure 4: Emptying of sewer by vacuum tanker at Aggarsain Colony**

Emptying service is carried out by 2 workers and charges are varying from INR 1200 to 2000 based on the no.of trips and distance covered (Field observation; KII-6, 2020; FGD-1, 2020). The frequency of

emptying increases in monsoon time due to overflowing sewers (Field observation; FGD-1, 2020). All the vehicles are licensed under PHED (KII-5, 2020). The private emptiers are not provided with Personal Protective Equipments (PPEs) (Field observation; FGD-1, 2020)

There are no instances of manual scavenging found in the city (Field observation). There are around 20 sewer men employed by the PHED for the cleaning of trunk sewers (KII-4, 2020; FGD-1, 2020).

*Transportation:* The emptied faecal sludge is transported through tractor/ truck mounted vacuum tanker. Around 1-2 trips per month are made by each vehicle for the emptying of septic tanks (FGD-1, 2020). While, there are around 15 trips per month by each vehicle for sewer cleaning which is more prevalent in the monsoon due to overflowing sewers (KII-4, 2020; FGD-1, 2020). The emptied faecal sludge (FS) by vacuum tankers is discharged into open plots or fields in vicinity in order to reduce the no. of trips. The average distance covered by vehicles are 10-15 km from village to city but within the city the distance covered by vehicles varies from 5-6 km. About 95% of FS is getting emptied (F3) due to frequent emptying service which is illegally disposed off in nearby open areas. Therefore, variable F4 is considered 0% in SFD matrix



Figure 5: Truck mounted vacuum tankers near PHED

*Treatment/Disposal:* Municipal Council has no designated site and treatment facility for the disposal and treatment of Faecal Sludge (KII-8, 2020). Therefore in the absence of such provision, the private emptiers discharge the faecal sludge in open nullahs, plots/fields. Usually local farmers use the FS on their farm lands as a soil fertiliser (KII-4, 2020; FGD-1, 2020). Since there is no proper treatment of emptied FS, F5 is also considered 0% in SFD matrix.

## 5 Data and assumptions

Census 2011 was considered as the baseline and the data for all the stages of sanitation chain were updated based on the data collected from field through KII, FGDs, observations, secondary data collected from relevant stakeholders. Following assumptions were made for developing the SFD for Sirsa city

- 50% of the contents of Septic tanks and Fully lined tank is Faecal sludge
- Volume of wastewater generated is 80% of water supplied.
- Transportation efficiency assumed to be 78% (variable W4a) based on the wastewater reaching the STP.
- Proportion of OSS emptied is considered as 100% because the city follows prescribed emptying cycle of 3 years.

## 6 List of data sources

### Reports and literature

- District Census Handbook, 2011 for Sirsa (Part A and B)
- Household amenities and assets table HH-08: Percentage of households by availability of the type of latrine facility <https://www.censusindia.gov.in/2011census/Hlo-series/HH08.html>
- Swachh City Plan, SBM data, MoHUA 2020

- Report on aquifer mapping and management plan, Sirsa District, CGWB 2017
- Details of sewer cleaning machines in PHED Sirsa
- Action Plan for river Ghaggar, GOI 2019
- Details of STPs, Sirsa 2020

### Key Informant Interviews (KII)

- KII-1, 2020. Interview with Er. Vijay Kumar, City Team Leader, Sirsa Municipal Council
- KII-2, 2020. Interview with Sh. Rishikesh, Secretary, Sirsa Municipal Council
- KII-3, 2020. Interview with Er. Rajesh Bhambu, JE, Sirsa Municipal Council
- KII-4, 2020. Interview with Er. Divya Middha, JE, PHED
- KII-5, 2020. Interview with Er. Suneel Sihag, JE, PHED
- KII-6, 2020. Interview with Mr. Deep, Private Vacuum Tanker Operator
- KII-7, 2020. Interview with Er. Ramesh Kumar, JE, HUDA
- KII-8, 2020. Interview with Mr. Sukhdev, Supervisor, HUDA – STP
- KII-9, 2020. Interview with Er. Anchal Jain, SDO, PHED
- KII-10, 2020. Interview with Er. Jatin, SDO, Irrigation and Water Supply Department
- KII-11, 2020. Interview with Mr. Rahul, Mason
- KII-12, 2020. Interview with Er. Rohtansh, JE, PHED

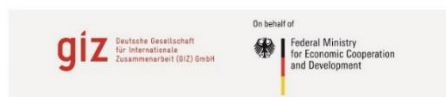
### Focus Group Discussions (FGD)

- FGD-1, 2020; Focus Group Discussion with Emptying Service Providers
- FGD-2, 2020; Focus Group Discussion with Masons
- FGD-3, 2020; Focus Group Discussion with LIG residents of a slum (Chattargarh Patti)

### Field Observations

- Survey of Public toilet (2 nos) and community toilets (2 nos)
- Visit to 2 Sewage Treatment Plant at Kelniya and Nattar
- Visit to approximate 50 households covering Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG) spread throughout the city.
- Visit to proposed STP site at Vaidwala village.

SFD Promotion Initiative



Sirsa, India, 2020

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