

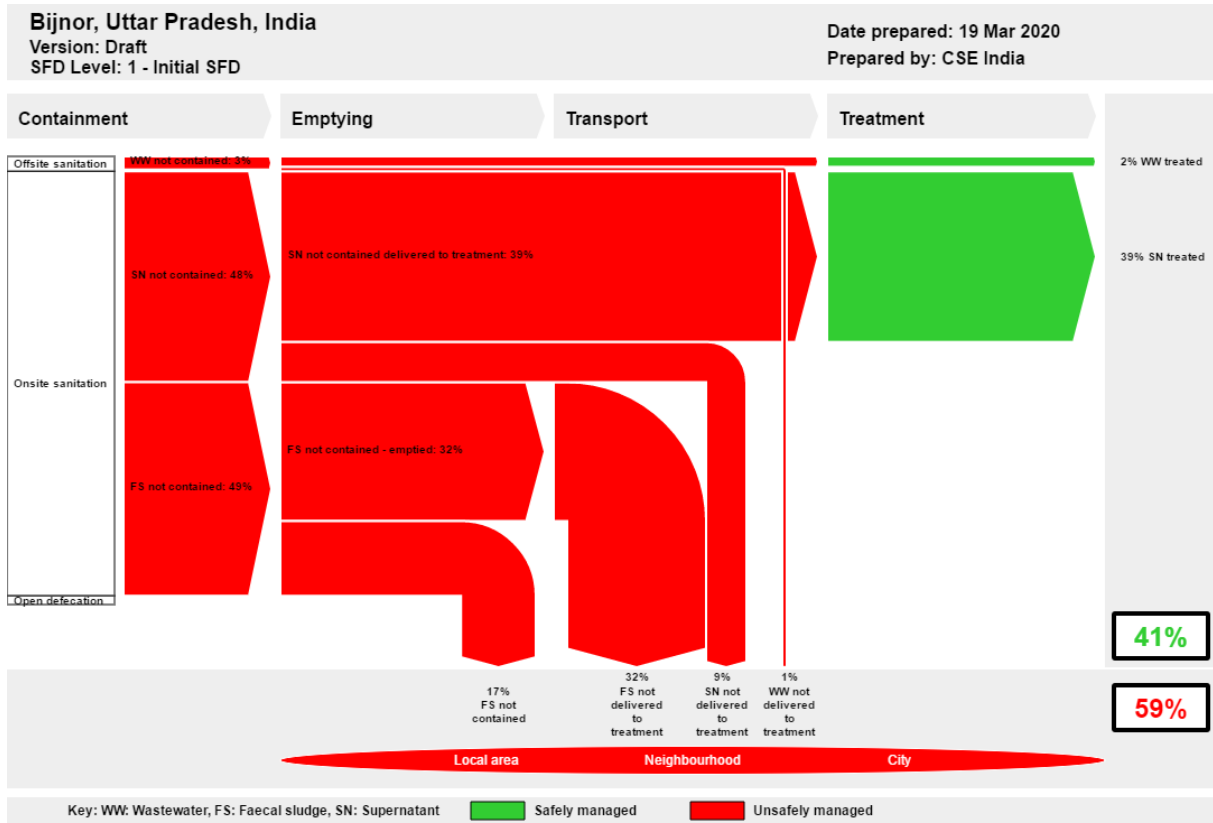
# Draft SFD Lite Report

## Bijnor India

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

Date of production/ last update: 19/03/2020

# 1 The SFD Graphic



The SFD Promotion Initiative recommends preparation of a report on the city context, the analysis carried out and data sources used to produce this graphic. Full details on how to create an SFD Report are available at: [sfd.susana.org](http://sfd.susana.org)

Figure 1: SFD graphic for Bijnor

## 2 SFD Lite information

### Produced by:

- Centre for Science and Environment, New Delhi
- 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 Mr Durgeshwar Tripathi, Executive officer, Harish Gangwar, DPM (SBM), Mr Amit Gautam, Junior Engineer, Jal Kal, Mr Yashwant Kumar, Junior Engineer (Civil, NPP), Mr Jaidev and Mr Rohit, VA Tech WABAG for providing all the required secondary data and cooperating for Key Informant Interviews (KIIs) & Focussed Group Discussions (FGDs).
- This report would not have been possible without constant support of Mr Dilshad, Computer Operator BNPP, Mr Saeed UI Rehman, Lipik, Mr Kapil, *Safai* Incharge and Mr. Vinit, *Safai* Supervisor who helped in conducting sample surveys and FGDs in the field.

### Collaborating partners:

- Bijnor Nagar Palika Parishad, Bijnor, Uttar Pradesh

Date of production: 19/03/2020

### 3 General city information

Bijnor city is located 12 km west to the bank of River Ganga and 460 km from Lucknow, the state capital of Uttar Pradesh. Bijnor is the district headquarter of Bijnor district. As per Census 2011, Bijnor has a population of 93,297 residing in 17,715 households. The population of the city as per *Swachh Survekshan* (Country wide annual ranking mechanism for cities with respect to sanitation) conducted in 2019 is 1,17,001 corresponding to 23,401 households.<sup>1</sup> This population is used for preparation of SFD. The urban local body governing the town is Bijnor Nagar Palika Parishad (BNPP) or Bijnor Municipal Council. BNPP has an administrative area of 3.6 sq.km which is divided into 25 wards. The density of the city is 32,500 people per sq.km which is very high in comparison to state density of 828 people per sq.km.<sup>2</sup>

The geographical coordinates of Bijnor are 29° 9' 0" North and 78° 16' 0" East. The topography of Bijnor district is majorly plain. It is elevated 225 metres above sea level.<sup>3</sup> The average rainfall is 999.4 mm. Temperature rises to 46°C and drops to 6°C. The soil type is clayey and sandy with occasional gravel and boulder.<sup>4</sup> Table 1 shows the population growth in Bijnor in past two decades.

**Table 1: Population Growth rate Bijnor City**

Census Year	Population	Growth Rate (%)	Source
2001	79,346	-	Census 2001
2011	93,297	18	Census 2011
2016	105,827	13	BNPP
2020	117,001	10	Survekshan

(Source: BNPP, 2020, Census, 2011)

### 4 Service outcomes

**Table 2: SFD Matrix for Bijnor**

Bijnor, Uttar Pradesh, India, 19 Mar 2020. SFD Level: 1 - Initial SFD Population: 117001 Proportion of tanks: septic tanks: 51%, fully lined tanks: 50%, lined, open bottom tanks: 50%								
System label	Pop	W4c	W5c	F3	F4	F5	S4e	S5e
System description	Proportion of population using this type of system	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
<b>T1A1C6</b> User interface discharges directly to open drain or storm sewer	3.0	80.0	100.0					
<b>T1A2C6</b> Septic tank connected to open drain or storm sewer	31.0			65.0	0.0	0.0	83.0	100.0
<b>T1A3C6</b> Fully lined tank (sealed) connected to an open drain or storm sewer	66.0			65.0	0.0	0.0	80.0	100.0

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

<sup>1</sup> KII with District Project Manager, Swachh Bharat Mission

<sup>2</sup> District Census Handbook 2011 for Bijnor (Houses and household amenities and assets table HH-08: percentage of households by availability of the type of Latrine Facility; <http://censusindia.gov.in/DigitalLibrary/MFTTableSeries.aspx>

<sup>3,4</sup> BNPP, 2018, City Sanitation Plan. Draft Report. Bijnor: Bijnor Nagar Palika Parishad

## 4.1 Offsite Systems

The sewerage network has been laid all over the city within the administrative boundary of Bijnor but household connections are pending. In the sample household survey, it was found that in few wards (1, 2 and 15) the households have connected their toilets directly to open drains.<sup>5</sup> It was concluded that such households correspond to 3% population of Bijnor.

For commissioning of the 24 MLD Sewage Treatment Plant (STP), constructed in 2019, the open drains of Bijnor are being tapped.<sup>6</sup> The wastewater discharged in open drains was either ending into open farm lands or reaching River Ganga until these drains were intercepted and diverted for conveying wastewater to STP. Now the treated wastewater is discharged in the canal passing through Hemraj Colony. It is also evident from field observation that the effectiveness of drains are reduced due to indiscriminate dumping of solid waste at different locations of the city(field observation). Another issue with the flow of open drains was the diversion cuts done by the local farmers to divert city wastewater in to farm lands.<sup>7</sup> It was reported that inflow at the STP is sometimes affected by these diversions.<sup>8</sup> Taking the leakage and diversions into account it was estimated that 80% of wastewater (W4c) and Supernatant (S4e) is delivered to the STP.

At present the STP receives a peak inflow of 13 MLD.<sup>9</sup> There are seasonal variations that are observed in the inflow water like in monsoon the inflow of wastewater reaches to 18 MLD. The lab report from the STP revealed that the discharge standards, prescribed by Central Pollution Control Board (CPCB), are met by the plant hence the wastewater and supernatant treated at the STP is considered 100% (W5c & S4e).

## 4.2 On-site Sanitation Systems



Figure 2: Open Drain tapped at Barrage Road (Harsh/CSE, 2020)

*Containment:* Based on sample household survey, KIIs and FGDs with relevant stakeholders it is estimated that 97% population is dependent on the On-site Sanitation Systems (OSS).<sup>10,11,12</sup> The two most prevalent OSS in Bijnor are Fully lined tank (FLT) connected to open drain (T1A3C6, 66%) and Septic tank (ST) connected to open drains (T1A2C6, 31%).<sup>13,14</sup>

<sup>5</sup> Sample household survey, 2020

<sup>6</sup> KII with Junior Engineer Jalkal, Bijnor and Assistant Engineer, UP Jal Nigam

<sup>7</sup> FGD with staff at Sewage Treatment Plant

<sup>8</sup> KII with STP In-Charge

<sup>9</sup> Log book of Sewage Treatment Plant

<sup>10</sup> Field Observations and.

<sup>11</sup> KIIs with sanitary inspector and executive officer

<sup>12</sup> FGDs with sanitation staff

<sup>13</sup> Sample Household survey in lower and middle income groups

<sup>14</sup> FGD with masons



**Figure 3: FLT under-construction, ward 8 and Septic Tank in a HH, Ward 4 (Harsh & Shrutaswinee, CSE 2020)**

FLTs are either square or rectangular in shape whereas septic tanks are 2-3 chambered tanks. According to the District Project Manager (DPM), Swachh Bharat Mission (SBM), 1118 Individual Household Latrines (IHHL) have been provided to households having no toilets or to households with insanitary toilets as of February 2020, under SBM. Most of the septic tanks observed in sample household survey do not adhere to the standards prescribed by the Bureau of India Standards (BIS). The size of the tanks is generally decided by the factors like space availability and economic status of household. The average size of the containment system as observed on ground and discussed in FGD-1, FGD-2 varied from 3 cubic meter to 11 cubic meters. The minimum and maximum depth of the tanks is ranging from 1.5 to 3.5 meters.



**Figure 4: Septic Tank of a Community Toilet at Harijan Basti (Harsh/CSE, 2020)**

*Community Toilets/Public Toilets:* There are four community toilets and 11 public toilets in Bijnor which have STOD.<sup>15</sup> The average size of septic tanks in community toilet is 8 x 4 x 4 m which are desludged every 2-3 years. The average size of septic tanks in public toilet is 4 x 3 x 3.5 m which are desludged in 0.5-1 years' time. The BNPP owns two mobile Bio Toilets which are put up in the Exhibition ground during public gatherings in addition to the existing public toilets.

<sup>15</sup> Field observations from visits to different Community & Public Toilet, 2020

Even though Bijnor has been declared as an Open Defecation Free city the instances of open defecation can still be observed.<sup>16</sup> According to BNPP, the rare case of open defecation can be attributed to behaviour issue but field observation suggests that the poor condition of the public/community toilets also contribute to open defecation in the city.

*Emptying:* The city is dependent on private desludging service providers for emptying faecal sludge (FS) as BNPP does not own any FS desludging machine.<sup>17</sup> Due to narrow and congested roads, manual emptying is also prevalent in a few wards (wards 2, 10 & 13) but its effect is not considered while generating the graphic due to insufficient data. There are 6 operators with 8 vacuum tankers plying in the city<sup>18</sup>. The vacuum tankers are equipped with a motorised pump, storage tank of 2500 to 5000 L capacity and a 200 ft long hose pipe to access containment systems in narrow roads and congested areas.



**Figure 5: Mobile Toilet Used for public events in Bijnor (Harsh/CSE,2020)**

Desludging is usually carried out by 3 people (1 Driver + 2 Helpers) and a fee of INR 1200 – 1500 (15-20 USD) per trip is charged. The variation in fees depends upon the size of the containment system and the extent of solidification of sludge at the bottom. Most of private emptiers operate from Akhondha Village, which is nearly 20 kilometres from the city. Emptying in Bijnor is done on demand and on an average 1.5 trips are done per day.<sup>19</sup> Advertisements of emptiers could be seen on electric poles, wall paintings, etc.

Most of the people get their tanks emptied, but not in a scheduled manner, the frequency of emptying varies from 10 to 20 years. Hence it was assumed that households that are taking too long to get their tanks emptied are rather using their systems without emptying hence the population using their systems with emptying (F3) is estimated to be 65%.



**Figure 6: Emptying process captured near Palika Chowk in a common septic tank tank of 8 households. (Harsh/CSE, 2020)**

<sup>16</sup> Field observation, 2020

<sup>17</sup> KII with Sanitary and Food Inspector (SFI), Bijnor Nagar Palika Parishad

<sup>18,19</sup> FGD with private desludging operators

*Transportation:* The emptied faecal sludge is transported using a tractor mounted vacuum tanker. These vehicles cover a distance of 3-5 km per trip on an average.<sup>20</sup> In the group discussion with the private emptiers it was revealed that time taken for emptying and discharge of FS is one hour on an average with exceptions of households in congested areas where it may take as long as four hours. Since none of the FS getting emptied is delivered to the treatment facility F4 is considered to be zero



**Figure 7: Tractor Mounted Vacuum Emptying Tanker (Harsh/CSE,2020)**

*Treatment/Disposal:* BNPP has no designated site for the disposal of FS<sup>21</sup>. Therefore in the absence of such provision the private emptiers discharge the faecal sludge in low lying area and farms<sup>22</sup>. In the discussion with private desludgers it was reported that, at present there are six locations out of the administrative boundary of BNPP in Bijnor where they generally discharge the FS. Usually local farmers allow them to discharge the FS on their farm lands, which is later used by farmers as a soil fertiliser. Sometimes farmers tip them on discharging FS regularly in times of need. Since there is no proper treatment of emptied FS, F5 is also considered to be zero.



**Figure 8: FS Discharged at Kotwali Road (Harsh/CSE, 2020)**

## 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, s<sup>23</sup>econdary data collected from relevant stakeholders. Following assumptions were made for developing the SFD for Bijnor.

- 80% of water supplied is wastewater generated
- 50% of the contents of tanks and pits is Faecal sludge
- Proportion of wastewater conveyed to treatment plant in open drain is estimated to be 80% considering leakage and diversions into account
- Proportion of OSS emptied is considered as 65% assuming 11 years as the threshold, based on the size of the tank and no. of people dependent on that system. So, households getting their systems emptied in less than 11 years are considered to be using their system with emptying and those who are taking more than 11 years are considered as good as not emptying their systems

<sup>20,23</sup> FGD with private emptying operators

<sup>21</sup> KII with sanitation and food Inspector, BNPP

<sup>22</sup> Field observation, 2020

## 6 Context adapted SFD Graphic

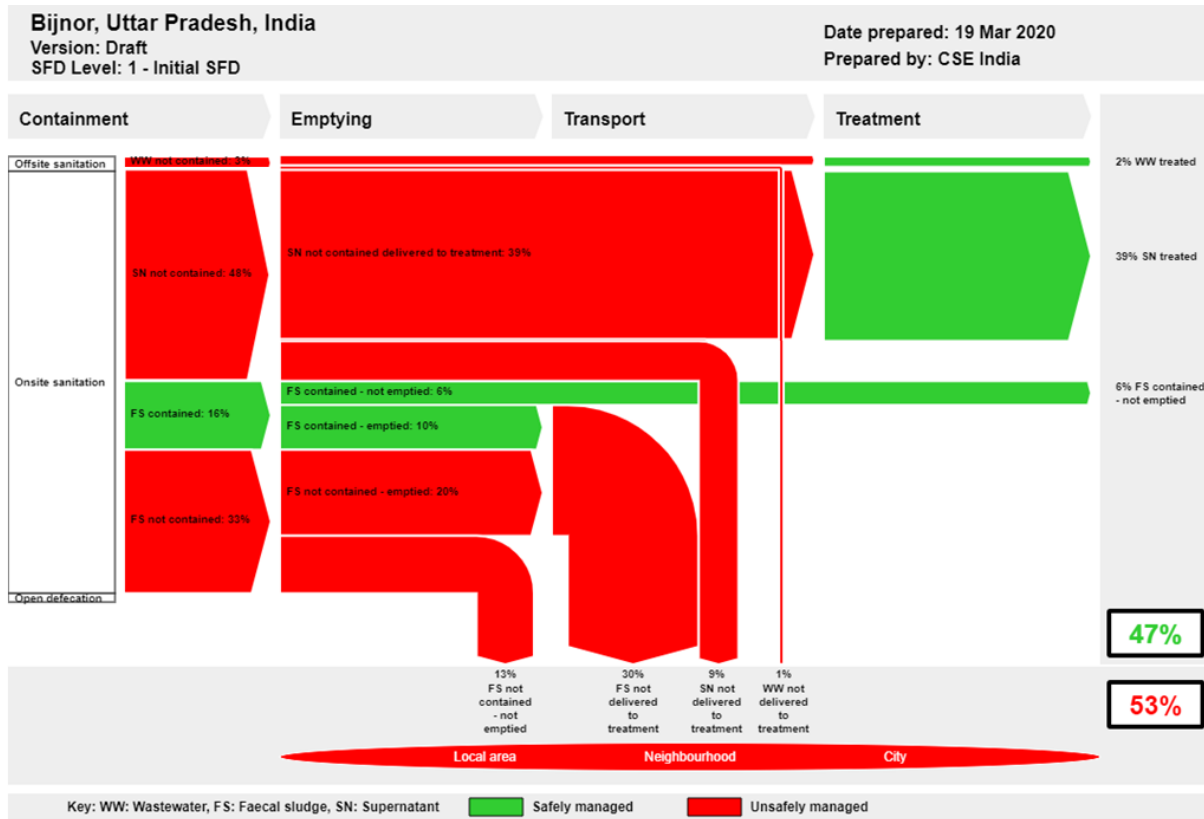


Figure 9: Context adapted SFD Graphic for Bijnor

The only difference suggested in the context adapted SFD is at containment stage for correctly designed septic tanks, though connected to open drains. With an earlier assumption of 50% of the proportion of the content of the septic tank which is solid FS, generated and collected inside the septic tanks. 50% of the content is supernatant which attributes to be 15% of the population flows through open drains. The solid FS collected in the septic tank is considered to be contained and hence 16% of FS is contained (represented green in colour at containment stage). Followed by this, 10% FS contained is emptied, remaining 6% is FS remains in the tank which is contained and never emptied. The supernatant generated from the septic tank connected to open drain is not contained and hence considered to be unsafely managed (represented red in colour). Overall, excreta of 53% population is not managed according to the context adapted SFD.

## 7 List of data sources

### Reports and literature

- District Census Handbook 2011 for Bijnor (Houses and household amenities and assets table HH-08: percentage of households by availability of the type of Latrine Facility <http://censusindia.gov.in/DigitalLibrary/MFTTableSeries.aspx>)
- District Census Handbook 2011 (Population Census Abstract Data Table (India & State/UTs-Town/Village/WardLevel) [http://censusindia.gov.in/2011census/population\\_enumeration.html](http://censusindia.gov.in/2011census/population_enumeration.html))
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- NMCG. 2011a. National Mission for Clean Ganga. [Online] [Accessed 15 February 2020] Available at: [http://nmcg.nic.in/about\\_nmcg.aspx](http://nmcg.nic.in/about_nmcg.aspx)
- SFD Report, Bijnor (2018)

**Key Informant Interviews (KII)**

- DPM Swachh Bharat Mission, Bijnor
- Junior Engineer, Jalkal Vibhag
- Junior Engineer Civil, Bijnor Nagar palika Parishad (BNPP)
- STP In-charge & Site Engineer, VA Tech Wabag Limited
- Sanitation & Food Inspector, BNPP
- Executive Officer, BNPP
- Assistant Engineer, UPJal Nigam Bijnor

**Focus Group Discussions (FGD)**

- Masons
- Private desludging operators
- Ward members
- STP Staff, VA Tech Wabag Limited.

**Field Visits**

- Public and community toilets
- Nullah tapping locations
- Sewage Treatment Plant
- Random household survey
- Faecal sludge discharge sites

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