



# SFD Lite Report

## Jhansi India

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

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### 1. The SFD Graphic

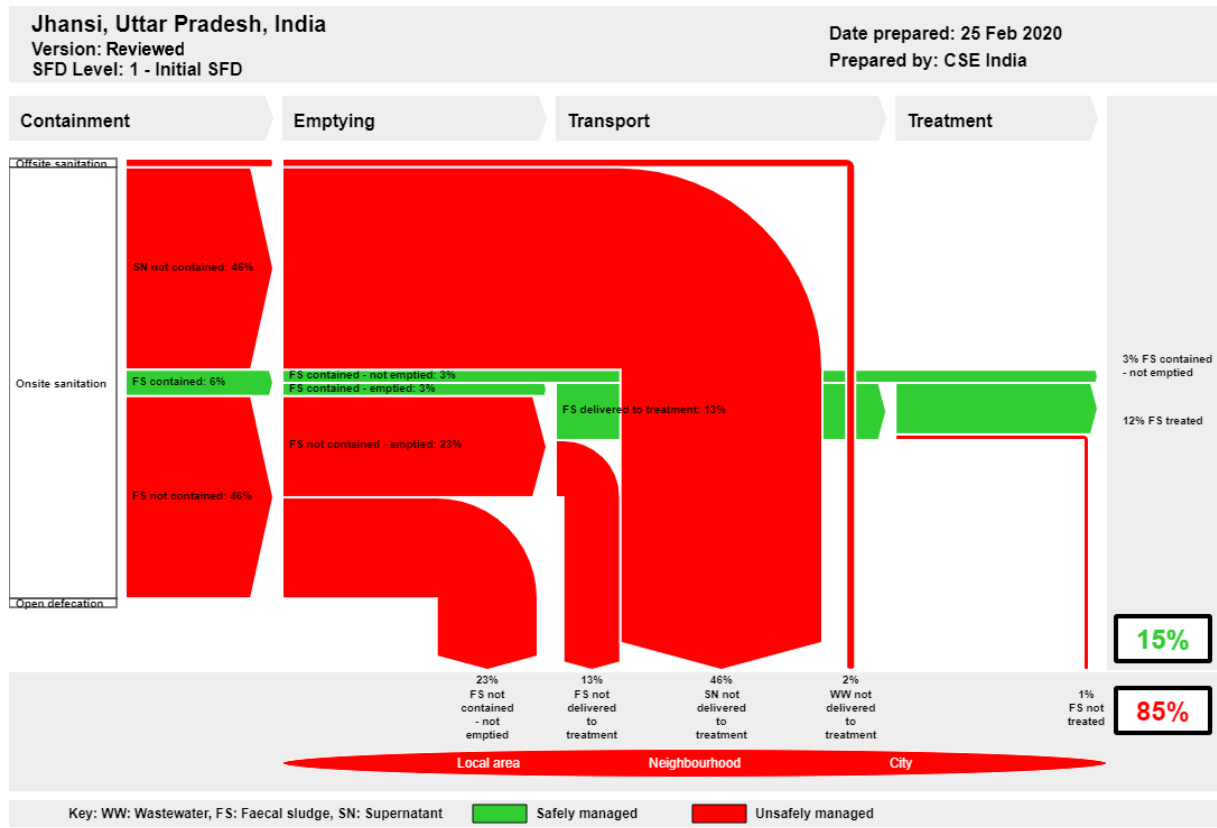


Figure 1: SFD Graphic for Bijnor

### 2. SFD Lite information

**Produced by:**

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**Acknowledgement:**

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. Sadaf Aslam, Additional Municipal Commissioner, Mr. Lal Bahadur, Sanitary Inspector, Mr. Narendra Verma, Executive Engineer, Jal Nigam, Mr. Manvinder Singh, Team Lead, Smart City Jhansi, for providing all the required secondary data and cooperating for KII & FGDs.

**Collaborating partners:**

- Jhansi Nagar Nigam or (Jhansi Municipal Corporation)

**Date of production:** 24/02/2020



### 3. General city information

The city of Jhansi is called as the Gateway to Bundelkhand, situated between the rivers Pahuj and Betwa at an average elevation of 285 metres (935 feet). It is about 415 kilometres from New Delhi and 99 kilometres south of Gwalior. Jhansi is a major commercial, tourist and educational centre in the Bundelkhand region of Uttar Pradesh state. In addition, there is a major industrial area at Bijauli<sup>1</sup>.

Jhansi city is governed by Jhansi Municipal Corporation or Jhansi Nagar Nigam (JNN). It covers an area of 150 sq. kms and is divided into 60 wards. According to 2011 Census, Jhansi city has a population of 505,693 and density of 3372 people per sq.km<sup>2</sup>. It has 91,150 households (Census 2011). As per departmental data 2020, the population of Jhansi has increased to 622180 in 2020 and total number of households is 124436 which is used for preparation of SFD 2020<sup>3</sup>.

**Table 1: Population growth for Jhansi city**

Census year	Population	Growth rate (%)
1991	3,00,850	
2001	4,26,198	41.66%
2011	5,05,693	18.65%

Jhansi is located at 25.4333 N 78.5833 E. It has an average elevation of 284 metres (935 feet). Jhansi lies on the plateau of central India, an area dominated by rocky relief and minerals underneath the soil. The climate is sub-humid, and it is characterized by a hot dry summer and cold winter. The average annual normal rainfall is 885 mm. About 91% of rainfall takes place for June to September<sup>4</sup>.

### 4. Service outcomes

**Table 2 SFD Matrix for Jhansi**

Jhansi, Uttar Pradesh, India, 25 Feb 2020. SFD Level: 1 - Initial SFD Population: 622180 Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 100%								
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	2.0	0.0	0.0					
<b>T1A2C6</b> Septic tank connected to open drain or storm sewer	38.0			50.0	50.0	90.0	0.0	0.0
<b>T1A3C6</b> Fully lined tank (sealed) connected to an open drain or storm sewer	54.0			50.0	50.0	90.0	0.0	0.0
<b>T1A4C10</b> Lined tank with impermeable walls and open bottom, no outlet or overflow	6.0			50.0	50.0	90.0		

<sup>1</sup> Study report "Mapping of Informal settlements in Jhansi, Uttar Pradesh" by PRIA.

<sup>2</sup> District Census Handbook 2011 for Jhansi (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</sup> Departmental data received through KII with Mr. Avinash (IT department head) from Jhansi Nagar Nigam.

<sup>4</sup> Central Ground Water Board, Jhansi, 2017

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

#### 4.1. Offsite systems

As per interview with KII-1 and KII-5 there are no sewerage network in Jhansi city<sup>5</sup>. However, in field observation and HH survey it was found that there are certain wards in central Jhansi area where household toilets are directly connected to open drains (ward 15, 9 and 12). There are some gated societies in the city which are connected to Decentralize Wastewater Treatment systems. However, the population dependent on these system is very less and hence not considered in this SFD<sup>6</sup>.



Figure 2: NSOD in Datiya gate (bahar) (Source: Shrutaswinee/CSE, 2020)

#### 4.2. On-site Sanitation Systems (OSS)

**Containments:** In Jhansi, the excreta generated is collected in onsite containment systems which are connected to open drains. As per field observation, Key Informative Interviews (KIIs) and Focus group discussions (FGDs) with relevant stakeholders such as ULB officials, masons, desludging service providers and ward members, 98% of the population is dependent on Onsite Sanitation Systems (OSS)<sup>7</sup>. The two most prevalent OSS in Jhansi are Fully Lined tank connected to open drain (FLTOD) and Septic tanks connected to open drains (STOD) (field observation,<sup>8</sup>



Figure 3: Septic tank under construction (Source: Harsh/CSE 2020)



Figure 4: Toilets in LIG HHs (Source: Harsh/CSE, 2020)



Figure 5: Fully Lined tank under construction (Source: Harsh/CSE 2020)

Out of this 98% population dependent on OSS, 54% have fully lined tanks (FLTOD) (figure- 3). Mostly these tanks were either in square shape or rectangular shape. 38% of the population are dependent on septic tanks (STOD) which were 2-3 chambered tanks. It could be observed from field survey and HH survey that the septic tanks cannot be called as contained systems as they are connected to open drains (field observations). Since there is no monitoring or standardization being followed in the construction of containment system by ULB, the usual practice is to construct very large capacity

<sup>5</sup> As per KII with Additional Municipal Commissioner, Team lead, Smart City Jhansi- city of Jhansi never had a sewerage network, the percentage of sewerage network described in Census 2011 were in reality, households connected directly to open drains.

<sup>6</sup> The 5% of system T1A1C6 is considered after triangulating the information given by masons, government empties, and sanitary staff.

<sup>7</sup> KII with Sanitary Inspector, Zone East and Sanitary Inspector, Zone West.

<sup>8</sup> FGD with masons and KII with Sanitary Inspector, Zone East and Sanitary Inspector, Zone West.



tanks with 2-3 chambers so that cleaning or emptying of tanks is required after a period of 8-10 years<sup>9</sup>.

The third type of OSS seen in the economically weaker section of Jhansi city is Lined tank Impermeable walls and open bottom (LIO) which constituted 6% of the total population (field observation).

According Individual House Hold Latrine-SBM (IHHL-SBM) data, 10079 toilets have been provided to households having no toilets or to households with insanitary toilets<sup>10</sup>. Each beneficiary household receives Rs 8000 (two instalments of Rs 4000) for the construction of toilet and containment system<sup>11</sup>. Based on our field visit and our understanding from household survey, it was observed that 80% of people practicing open defecation are given IHHL under SBM. This population have toilets with containment systems which can be equally divided between septic tank connected to open bottom, fully lined tanks connected to open drains and lined tank with impermeable walls and open bottom. The remaining 20% of population who were practicing open defecation have started using public toilets (PT) or community toilets (CT)<sup>12</sup>. It was observed that PT/CT have containment systems septic tanks connected to open drains and fully lined tanks connected to open drains (Field observation). The real cost of building a toilet is highly variable and often exceeds the monetary help given under SBM. Size/type of containment system is majorly decided by factors like financial capability, space availability and size of household (figure- 5) (field observations).

**Community Toilets (CT) / Public Toilets (PT):** In Jhansi, there are 133 public toilets (PT) / community toilets (CT) and urinals. Out of the total 133 operational blocks, 91 are toilet blocks, while 42 are standalone urinals<sup>13</sup>. It was observed during field survey that ward no. 1, 7, 16, 22, 33, 35, 36, 43, 48, 58, 59, 60 have no community toilets (field observation). CT/PT toilets are connected to septic tanks with outlet connected to open drains<sup>14</sup>. The average size of septic tanks in community toilet is 10 x 8 x 8 ft (which were desludged for the first time in 10-12 years). The average size of public toilet is 8 x 4 x 6 ft which are desludged in 0.5-1 years' time. The community toilets are well maintained and aesthetically beautiful, but the Public toilets are not very well serviced especially near bus stands (field observations). People were seen urinating on the walls of urinals/public toilets (figure- 6). All the CT were emptied this year before Swachhata Survekshan 2020 and as per the care takers it was done for the first time in 10-12 years (FGD-3, 2020). Even though Jhansi has been declared as an Open Defecation Free city the practice of defecating and urinating in the open continues<sup>15</sup>.

**Emptying:** The city is dependent on private desludging service providers for emptying faecal sludge (FS) from household containment systems which are registered under JNN<sup>16</sup>. JNN is managing the entire emptying, transport and treatment of faecal sludge on Public Private Partnership basis<sup>17</sup>. The contract is given to a private company Poorna-Pro Pvt. Ltd. which responsible carrying emptying operations in the city. Emptying is usually carried out by 3 people (1 Driver + 2 Helpers) and the operators charge a fee of INR 1500 per trip, depending upon the size of the containment system and the level of solidification. It was observed that the emptying operators use necessary Private Protective Equipment while carrying the emptying operations (figure-7). The common practice of desludging is demand based and average frequency is 15-30 years' time depending on the size of containment unit. Household requests the municipality by putting in application for the service (they can either come in person or put up a telephonic request).

<sup>9</sup> Field observation and as informed in KII with Mr. Ram Chandra (FSTP Supervisor)

<sup>10</sup> Data obtained from Jhansi Nagar Nigam extracted from SBM website

<sup>11</sup> As informed by Shri Sadaf Aslam (Additional Municipal Commissioner)

<sup>12</sup> As observed on field and informed by Mr. Raghuraj Singh and Mr. Lal Bahadur (Sanitary Inspector)

<sup>13</sup> Data obtained by Jhansi Nagar Nigam, KII with Mr. Raghuraj Singh (Sanitary Inspector)

<sup>14</sup> As observed on field and household survey

<sup>15</sup> During field visit it was observed that people urinated in the open to avoid paying user fee. Also, the community toilets were not located within accessible distance from each household.

<sup>16</sup> KII with Mr. Ram Chandra (FSTP supervisor) and Mr. Avinash (IT department head)

<sup>17</sup> KII with Shri Sadaf Aslam (Additional Municipal Commissioner)



The Municipality then sets a date for the desludging and sends the vacuum truck to the household and transports the sludge to the FSTP. The details of desludging service is advertised outside the main gate of JNN office.

Due to narrow and congested roads in central Jhansi, it was observed that manual emptying is still prevalent (old city). Manual emptiers usually work in a group of 3-4 and charges INR 600 to INR 1000 per feet depth of the tank (FGD-3, 2020). Considering all the prevalent condition of the city and the resources available for providing emptying services, it is assumed that 50% of households are emptying their containment systems on time for the preparation of the SFD graphic (F3 in SFD Matrix)



Figure 8: Advertisement done for emptying & transport of Faecal Sludge services by Private Partner (Harsh/CSE, 2020)



Figure 6: Public Toilet Bus Stand- Person Urinating in Public (Source: Harsh/CSE, 2020)



Figure 7: Emptying operation in Process by Poorna Pro Operator. (Source:Harsh/CSE, 2020)

**Transportation:** JNN has two functional vacuum trucks of capacity 6000L and 1500L which are operated and maintained by private partner. The desludging vehicles or vacuum trucks are equipped with a motorized pump, storage tank and a 200 ft. long hose to access narrow roads and congested areas (figure- 9). These vehicles cover a distance of 9-11 km per trip and the average time taken for removal and discharge of FS is 1 hour (field observation). As per the views of JNN official, two vacuum trucks are enough to meet the emptying requirement of Jhansi city<sup>18</sup>. Faecal sludge being emptied by a vacuum truck is transported to the FSTP which is located 11 km from the city centre (JNN office). In KII with vacuum truck driver, it was told that the average time taken for removal and discharge of FS takes about 1.5 hours to 2 hours with exceptions of HH in congested area where it can take as long as 4 hours (KII-7, 2020).

<sup>18</sup> As informed in KII with Shri Sadaf Aslam (Additional Municipal Commissioner), Shri Raghuraj Singh (Sanitary Inspector) and Mr. Ram Chandra (FSTP supervisor)



Figure 9: Vacuum Trucks 1500 L and 600 L owned by JNN (Source: Shrutaswinee/CSE, 2020)

As mentioned before, there is no functional sewerage system in Jhansi. The supernatant from onsite sanitation systems and grey water generated from households is transported by open drains and discharged into agricultural fields or laxmi talab<sup>19</sup>. There are also instances reported of faecal sludge emptied by manual emptiers and discretely dumped into any nearby open drain<sup>20</sup>.

**Treatment:** Jhansi has a dedicated faecal sludge treatment plant (FSTP) located in Bijoli area. The plant is of 6 KLD capacity and is running at full capacity. The FSTP is designed on nature based technology. There is no sewage treatment plant currently working in Jhansi, hence the wastewater in open drains or storm water drains goes untreated to city lakes like laxmi tal or to the agricultural fields in the city boundaries<sup>21</sup>. An expansion of this FSTP is under proposal by Jhansi Municipal Corporation. There is also another 32 KLD FSTP planned by Uttar Pradesh Jal Nigam.

The Faecal Sludge generation in the city is 338 KLD. The wastewater generated in the city 75 MLD.



Figure 3: Emptied FS is disposed at FSTP Bijoli, Jhansi (Harsh/CSE, 2020)

There is no sewage treatment plant in the city. The untreated wastewater is discharged into open drains and which ultimately lead to Pahuj river.

## 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.

<sup>19</sup> KII with Shri Sadaf Aslam (Additional Municipal Corporation) and Mr. Manvinder Singh (Team lead, Smart City Jhansi)

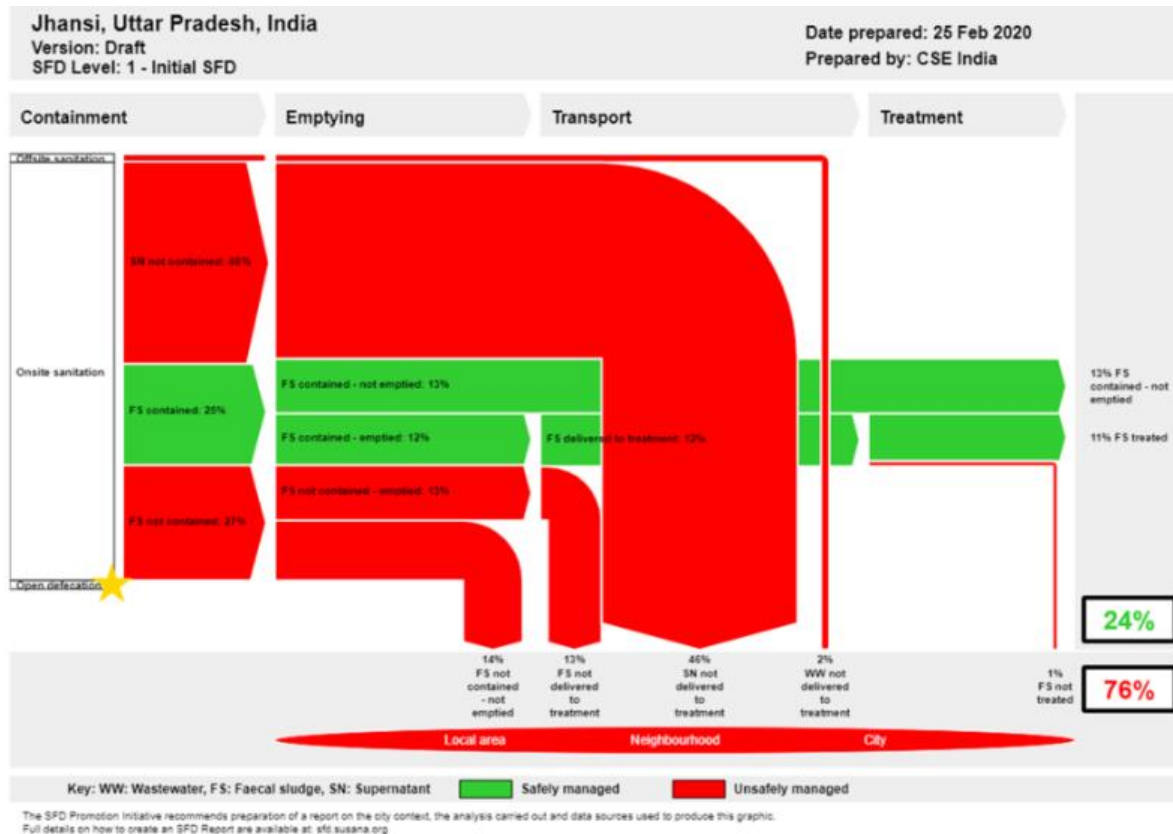
<sup>20</sup> FGD with Care takers of CT-PT, it was reported the sludge emptied HH in the east end of Jhansi is not always disposed to FSTP. More distance brings losses to private vendor.

<sup>21</sup> KII with Mr. Narendra Yadav (Executive Engineer, Uttar Pradesh Jal Nigam)

Assumptions followed for preparing SFDs:

- 50% of the contents in septic tanks and fully lined tanks is FS.

## 6. Context adapted SFD Graphic



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 19% of the population flows through open drains. The solid FS collected in the septic tank is considered to be contained and hence 19% of FS is contained (represented green in colour at containment stage). Followed by this, 9% FS contained is emptied from septic tanks, remaining 9% 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 76% population is not managed according to the context adapted SFD.

## 7. List of data sources

Below is the list of all data sources and assumption used for the production of the SFD Lite report:

### Reports and literature

- District Census Handbook 2011 for Jhansi (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/MFTableSeries.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))



- Swachhata Survekshan Report, Jhansi, U.P (2018-2019).
- Sanitation for all, An assessment of sanitation services Jhansi by PRIA 2018
- City Sanitation Plan (CSP), Jhansi, 2014.
- Service Level Improvement Plan (SLIP), Jhansi, 2015
- Faecal Sludge Treatment Plant (FSTP), Detailed Project Report (DPR), Jhansi, 2018.
- Service Level Benchmarking under 14<sup>th</sup> Finance Commission (2018) - Agra

**Key Informant Interviews (KII)**

- KII-1, 2020; Interview with Shri Shadab Aslam (Additional Municipal Commissioner, Jhansi Nagar Nigam)
- KII-2, 2020; Interview with Shri Raghu Raj Singh (Sanitary Inspector (Zone East), Jhansi Nagar Nigam)
- KII-3, 2020; Interview with Mr. Lal Bahadur (Sanitary Inspector (Zone West), Jhansi Nagar Nigam)
- KII-4, 2020; Interview with Mr. Narendra Verma (Executive Engineer, Uttar Pradesh Jal Nigam)
- KII-5, 2020; Interview with Mr. Manvinder Singh (Team Lead, Smart city Jhansi)
- KII-6, 2020; Interview with Mr. Shivam Kumar (Engineer, Smart city Jhansi)
- KII-7, 2020; Interview with Mr. Ram Chandra (FSTP Supervisor, Purna Pro Enviro Engineers, Pvt. Ltd.)
- KII-8, 2020; Interview with Mr. CP Singh (Supervisor, Pink Toilets, A.K Upadhyay Pvt. Ltd.)
- KII-9, 2020; Interview with Mr. Rakesh Sahu (IT Head, Jhansi Nagar Nigam)

**Focussed Group Discussions (FGDs)**

- FGD-1, 2020; Focussed Group Discussion with Mr. Ramu & Mr. Narendra Yadav (FSTP Operators, PurnaPro Pvt. Ltd.)
- FGD- 2, 2020; Focussed Group Discussion with Masons (NOS-3).
- FGD- 3, 2020; Focussed Group Discussion with Care Takers Community toilets and Public Toilets.

**Field Observations**

- Survey of Public toilet and community toilets
- Visit to STP under construction at Laxmi Tal lake
- Visit to HH with Govt. toilets
- Visit to approximate 100 households covering LIG, MIG and HIG spread throughout the city.
- Visit to Faecal Sludge Treatment Plant, Bijoli, Jhansi

Jhansi, India, 2020

Produced by:

CSE, Harsh Yadava

CSE, Shrutaswinee Hazarika

Editing:

CSE, Dr Suresh Kumar Rohilla

CSE, Rahul Mankotia

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