



SFD Report

Gangaghat India

Final Report

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SFD Report Gangaghat, India 2017

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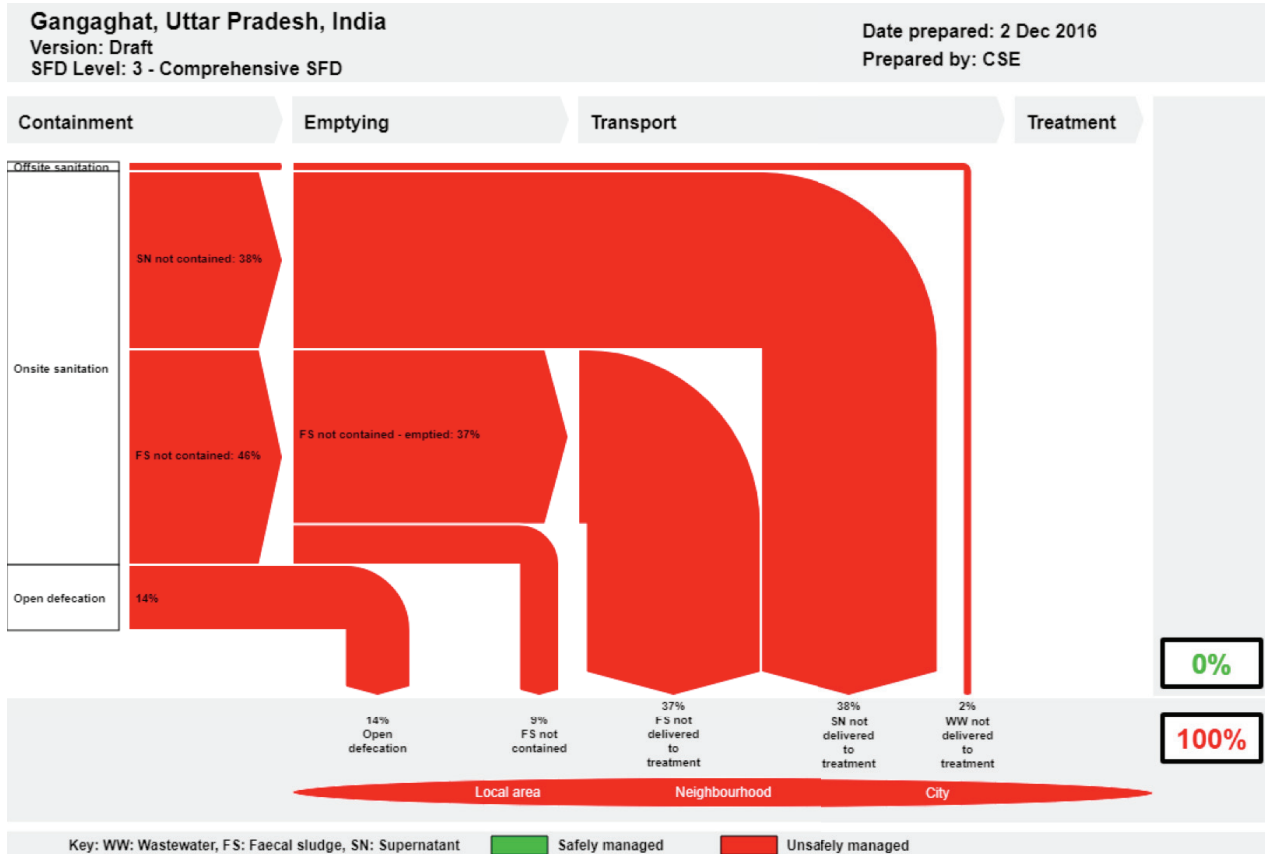
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1. The SFD Graphic



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

2. Diagram information

SFD Level:
Comprehensive

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3. General city information

The city of Gangaghat is situated along the banks of Ganga River in the state of Uttar Pradesh, India. The city lies in the Indo Gangetic plain, at a distance of 5 km from Kanpur. The city is located 83 km south west from Lucknow, the state capital.

The population of the city, as per Census of India, 2011 is 84,072. Population density is 17,122 persons per sq.km which is considerably high when compared to population density of U.P. state i.e. 828 persons per sq.km (Census, 2011). The slum population is 6,342 (GNPP, 2016), representing only about 8% of the total population. The area under the Gangaghat Nagar Palika Parishad (GNPP) is 4.91 sq.km, which is divided into 25 wards. Administrative boundary of GNPP has been chosen for the current study. The temperature rises to 41oC in peak summers and 7oC in winters. Gangaghat has a water depth range of 2-5 mbgl and soil type is alluvial. Gangaghat lies in central plains of agro climatic zone and receives an average rainfall of 979 mm (MoAFW, 2001).

4. Service outcome

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

Containment: The entire city is dependent on Onsite Sanitation Systems (OSS). Three types of OSS are prevalent to which user interface is connected to, namely: (i) septic tanks (ii) lined pits with semi permeable walls and open bottom (iii) lined tanks with impermeable walls and open bottom. Few households in close proximity to river have user interface discharging directly to water body. As per the field visit, septic tank system has been further divided into (i) septic tanks connected to open drains (ii) septic tanks connected to water bodies (iii) septic tanks connected to soak pits where the groundwater risk is high.

Emptying: The emptying frequency of OSS is 1-2 years for the households in proximity to the river. It increases to 5-10 years in the dense and core settlements of the city. GNPP does not have any operational vacuum tanker. Emptying service is provided by private emptiers in the city. On an average, a private emptier provides service to more than 30 households per month.

Transport: Private emptiers ply from Kanpur city to provide the service in the Gangaghat. There are five private emptiers plying in the city. The capacity of vacuum tankers is 3000 and 5000 litres. The emptiers charge INR 1000-1500 per trip for emptying. Vehicles used are tractor mounted tanker, which are procured from Delhi or Punjab. Few private emptiers have procured tankers which are fabricated in local metallurgy workshops. A pre-owned tractor is preferred for assembling of tractor mounted tanker.



Figure 1: Vacuum Tankers (Source: Amrita/ CSE, 2016)

Treatment and Disposal: There is no treatment facility for sewage and faecal sludge generated in the city. Private emptiers discharge collected faecal sludge into open drains or open grounds.

According to Census of India, 2011 around 3.6% of the city is dependent on sewerage system, 82.6% of the city is dependent on OSS, out of which 77.6% is dependent on septic tanks and 5% on other systems and pits, while 13.8% defecate in open.

During the field based research it was found that there is no sewerage network and the entire population is dependent on OSS. Containment systems considered for SFD preparation are based on ward wise household survey data: (i) Septic tank connected to open drain is used by 70% population (ii) septic tank connected to soak-pit is used by 2% population (iii) Septic tank connected to water body is used by 2% population (iv) lined tank with impermeable walls and open bottom connected to open drain is used by 6% population and (v) lined pit with semi permeable walls and open bottom with no outlet serves 4% population. The public latrines are connected to septic tanks and hence are incorporated in onsite systems. Septic tanks are not contained as they are connected to open drains. Open defecation is attributed to 14% of the population. While remaining 2% of the population is attributed to be user interface directly connected to open drains/open ground.

5. Service delivery context

National Urban Sanitation Policy (NUSP) was issued in 2008, by the Ministry of Housing and Urban Affairs (MoHUA, GoI), formerly known as Ministry of Urban Development (MoUD). The policy aims to: raise awareness, promote behaviour change; achieve open defecation free cities; develop citywide sanitation plans; and provide 100% safe



Figure 2: Chhamak Ganga, where faecal waste is discharged (Source: Amrita/CSE, 2016)



confinement, transport, treatment and disposal of human excreta and liquid wastes. The NUSP mandates states to develop state urban sanitation strategies and work with cities to develop City Sanitation Plans (CSPs).

NUSP identifies the constitution of multi-stakeholder task force, known as city sanitation taskforce (CSTF) as one of the principal activities to be taken up to start the city sanitation planning process. CSTF has now been renamed as Swachh Bharat City Level Task Force (SBCLTF) (MoUD, 2014).

The Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Act, 1974 have provisions relating to sanitation services and environmental regulations. It applies to households and cities with regard to disposing wastes into the environment. Urban local bodies (ULBs)/utilities also have to comply with discharge norms for effluent released from sewage treatment plants and to pay water cess under the Water Cess Act, 1977 (MoUD, 2013).

In February 2017, MoHUA issued the National Policy on Faecal Sludge and Septage Management (FSSM). The policy aims to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city in India (MoUD, 2017).

There are various schemes launched by the central government to provide basic civic amenities including improvement of urban sanitation. Under Swachh Bharat Mission (SBM), 8 individual households' toilets have been approved but no toilet has been constructed yet. The city has proposed to National Mission for Clean Ganga (NMCG): laying of 76 km sewer line, installation of a 30 MLD (Phase1: 26 MLD + Phase 2: 4 MLD) Sewage Treatment Plant (STP) (UPJN, 2015)

The municipality did a rapid assessment of FSM in the city to calculate the funds required for the same. It was estimated that INR 6,321.44 Lakh (USD 9.5 million) is required for implementation of effective faecal sludge and septage management including operation and maintenance for five years (MoUD, 2016).

6. Overview of stakeholders

The 74th Constitutional Amendment Act of 1992 reformed the sector by transferring responsibility for domestic, industrial, and commercial water supply and sewerage (WSS) from state agencies, such as Departments of Public Health Engineering and State Water Boards, to Urban

Local Bodies (ULBs). This transfer has resulted in a variety of implementation models, as well as lack of clarity in the allocation of roles and responsibilities between state and local agencies, which sometimes result in large gaps in implementation (USAID, 2010).

The following stakeholders are responsible for sanitation service delivery in Gangaghat:

Table 1: Key Stakeholders (Source: Compiled by CSE, 2017)

| Key Stakeholders | Institutions/organizations |
|---------------------|---|
| Public institutions | Ministry of Housing and Urban Affairs (MoHUA), UP Jal Nigam (UPJN), Gangaghat Nagar Palika Parishad, National Ganga Council, Unnao Shuklaganj Urban Development Authority (USDA), Uttar Pradesh Pollution Control board (UPPCB), State Programme Management Group (SPMG) |
| NGOs | Centre for Science and Environment (CSE), New Delhi, IWMI, India |
| Private Sector | Private emptiers, local masons |

UP Jal Nigam (UPJN) is responsible for planning, designing and construction/development of the assets in sewerage and drainage sector, while GNPP is responsible for operation and maintenance of assets (MoUD, 2013). UDD is responsible for administrative and financial management of municipalities, implementation of development programmes. UPPCB is responsible for monitoring and evaluation of STPs. DUDA/USDA is responsible for the implementation of central and state level schemes. SPMG coordinates and oversees the implementation of projects sanctioned by Government of India under National Ganga Council (NGC).

SBCLTF is a multi-stakeholder platform comprising representatives from different sectors of society, including agencies directly responsible for sanitation, agencies indirectly involved or impacted, eminent persons, practitioners, NGOs and sanitary workers.

7. Description of context-adapted SFD graphic

As mentioned in section 4 (i) Septic tank connected to open drain is used by 70% population (ii) septic tank connected to soak-pit is used by 2% population (iii) Septic tank connected to water body is used by 2% population



(iv) lined tank with impermeable walls and open bottom connected to open drain is used by 6% population and (v) lined pit with semi permeable walls and open bottom with no outlet serves 4% population. The only difference suggested in this context adapted SFD graphic is at containment stage for correctly designed septic tanks. With an earlier assumption of 50% of the proportion of the content of the septic tank is solid FS, generated and collected inside the septic tanks.

Rest of the 50% of the content is supernatant, which attributes to 35% of the population that flows through open drains. According to SBCLTF the solid FS collected in the septic tank should be considered contained as it is neither polluting the ground water nor the solid excreta is overflowing in the open drain.

Hence 35% of FS is considered contained (represented green in colour). 32% FS contained is emptied and remaining 3% FS remains in the tank which is contained and never emptied. Nevertheless, the supernatant generated from septic tank connected to open drain is not

contained and hence considered to be unsafely managed (represented red in colour).

Hence in context adapted SFD, 'FS not contained' reduces from 46% to 11 %, and 'FS contained increases from zero to 35% when compared with SFD generated through graphic generator. Overall excreta of 97% population is not managed safely according to the context adapted SFD.

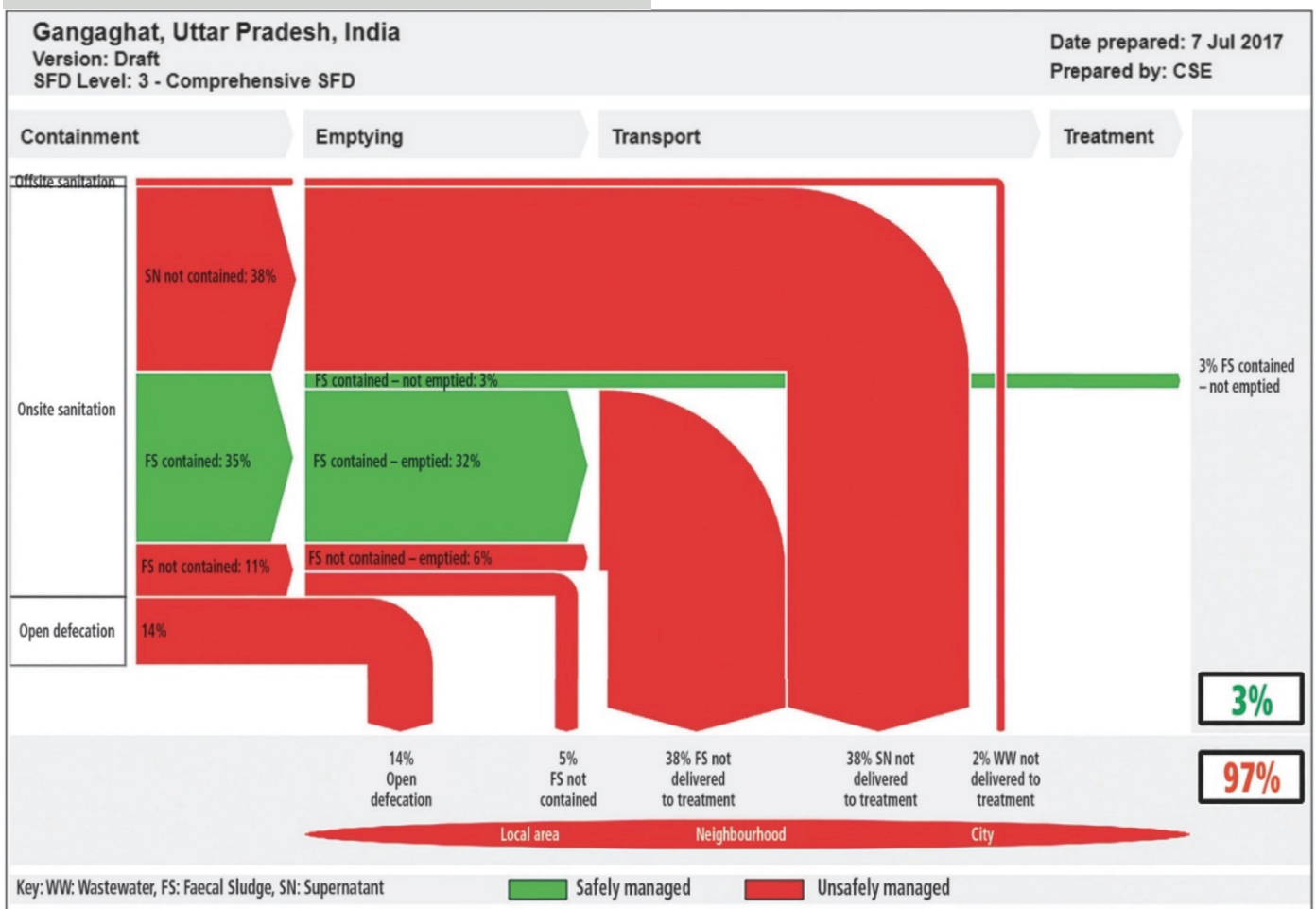
9. Process of SFD development

Data is collected through secondary sources. The city is visited to conduct the surveys, FGDs and KIIs with relevant stakeholders, to fill in the data gap and to crosscheck the data collected.

To start with, a relationship between sanitation technologies defined in Census of India and that defined in the project is established. The survey data is quantified and crosschecked with FGDs and KIIs.

The data is fed into the SFD graphic generator to calculate the excreta flow in terms of percentage of the population

8. Description of context-adapted SFD graphic





and also produce the SFD graphic. It can be concluded that excreta of the whole population is discharged untreated into environment. The SFD graphic of Gangaghat city, developed using graphic generator is not able to capture the correctly designed fully functional septic tanks as a contained system, as per feedback from SBCLTF. Hence, a context adapted city specific SFD graphic is manually corrected to convey the on-ground picture of the excreta management in the city.

10. Credibility of data

Two key sources of data are used; (i) Census of India, 2011 as base data to feed into SFD graphic generator for population (ii) random household survey based on socio economic condition of each ward. KII and FGD are further used for data triangulation. Overall two KIIs and four FGDs have been conducted with different stakeholders.

On the ground, there is no sewer network which gets further validated by the Detailed Project Report (DPR) for proposed sewer network and Sewage Treatment Plant (STP).

There were three major challenges to develop the SFD. Census and published/unpublished reports were not able to provide (i) up-to-date data on containment (ii) detailed typology of containment and (iii) actual information about FSM services provided to households. For this reason, field based studies were conducted to validate the data provided by secondary sources.

The Census and published/unpublished reports mostly differentiate between systems connected to the user interface, if any, but does not give information about the design of actual containment systems on ground level or about the disposal of septage and waste water generated. Therefore, a random household survey was conducted in each ward of the city to identify and cross check the data collected from the secondary sources.

The objective of the survey conducted was to obtain a more accurate measure of how excreta is managed through stages of sanitation service chain (from containment to end-use or disposal).

For the validation of the SFD prepared for the city, the diagram was presented in a SBCLTF meeting. The SBCLTF's members have validated the collected data and the final SFD graphic.

11. List of data sources

Below is the list of data sources used for the development of SFD.

- o Published reports and books
 - Census of India 2011, House listing and housing data, Government of India
- o KIIs with representatives from
 - Chunar NPP: Sanitary Inspector
- o FGDs
 - Chunar NPP staff and council members
 - Local masons
 - SBCLTF members
- o Random household survey

Gangaghat, India, 2017

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Abbreviations

| | | | |
|--------|---|--------|---|
| AMRUT | Atal Mission for Rejuvenation and Urban Transformation | NITI | National Institution for Transforming India (Formerly known as Planning Commission) |
| BIS | Bureau of Indian Standard | NIUA | National Institute of Urban Affairs |
| CAA | Constitution Amendment Act | NMCG | National Mission For Clean Ganga |
| CAPEX | Capital Expenditure | OD | Open Defecation |
| CGWB | Central Ground Water Board | ODF | Open Defecation Free |
| CPCB | Central Pollution Control Board | OPEX | Operational Expenditure |
| CPHEEO | Central Public Health & Environmental Engineering Organization | OSS | Onsite Sanitation System |
| CPR | Centre For Policy Research | PMAY | Pradhan Mantri Aawas Yojna |
| CSE | Centre for Science and Environment | SBCLTF | Swachh Bharat City Level Task Force |
| CSTF | City Sanitation Task Force | SBM | Swachh Bharat Mission |
| DUDA | District Urban Development Authority | SFD | Shit Flow Diagram |
| EWS | Economically Weaker Sections | SLB | Service Level Benchmarks |
| FGD | Focus Group Discussion | SN | Supernatant |
| FS | Faecal Sludge | SPS | Sewage Pumping Station |
| FSM | Faecal Sludge Management | STP | Sewage Treatment Plant |
| FSSM | Faecal Sludge and Septage Management | SWM | Solid Waste Management |
| GoI | Government of India | UDD | Urban Development Department |
| GoUP | Government of Uttar Pradesh | ULB | Urban Local Body |
| KII | Key Informant Interview | UPJN | Uttar Pradesh Jal Nigam |
| LPCD | Litres per capita per day | UPPCB | Uttar Pradesh Pollution Control Board |
| MHUPA | Ministry of Housing and Urban Poverty Alleviation | UPSIDC | Uttar Pradesh State Industrial Development Corporation |
| MIS | Management Information System | UPSP | Uttar Pradesh Urban Sanitation Policy |
| MLD | Million Litres per Day | USAID | United States Agency for International Development |
| MoHUA | Ministry of Housing and Urban Affairs (formerly known as Ministry of Urban Development) | USD | United States Dollar (1 USD = 66.5 INR) |
| MoUD | Ministry of Urban Development | USDA | Unnao Shuklaganj Development Authority |
| MSL | Mean Sea Level | UWSS | Urban Water Supply and Sanitation |
| NBC | National Building Code | WSS | Water Supply and Sewerage |
| NFSSM | National Faecal Sludge and Septage Management Alliance | WW | Waste Water |
| NGC | National Ganga Council | | |
| NGRBA | National Ganga River Basin Authority | | |
| NIC | National Informatics Centre | | |



1 City context

Gangaghat (also known as Shuklaganj) is a city in Unnao district, also considered as a suburb of Kanpur, Uttar Pradesh. It is situated on the banks of River Ganga about 5 km from Kanpur on the SH 58 to Unnao. The city lies in the Indo Gangetic plain. The city is located 83 km south west from Lucknow, the state capital of Uttar Pradesh (USDA, 2016).

The population of the city, as per Census of India, 2011 is 84,072. The urban local body administering Gangaghat is Gangaghat Nagar Palika Parishad (GNPP). The administrative boundary of GNPP has been chosen for the current study. It comprises of an area of 4.91 sq.km with a population density of 17,122 persons per sq.km which is extremely high when compared to a population density of Uttar Pradesh which is 828 persons per sq.km. The slum population in the city is 6,342 (GNPP, 2016), representing only about 8% of total population. The area under the Nagar Palika Parishad (NPP) is divided into 25 wards. The population growth of the city is given in Table 1.

Table 1: Population growth rate

| Census year | Population | Growth rate (%) |
|-------------|------------|-----------------|
| 1991 | 50,260 | |
| 2001 | 70,803 | 41% |
| 2011 | 84,072 | 19% |

Source: Census, 2011

The city is located at 26°58"North latitude 80°10"East longitude (UPJN, 2015). The temperature rises to 41oC in peak summers and drops down to 7oC in winters (GNPP, 2016). Gangaghat has water depth in the range of 2-5 metres below ground level (mbgl) (CGWB, 2015). Due to the proximity of the city to the Ganges, the soil is very fertile.

Gangaghat lies in Agro climatic zone IV, central plains and receives an average rainfall of 979 mm; the climate ranges from dry sub humid to semi-arid and the soil is alluvium calcareous sandy loam. About 62% of the land is cultivated of which 56% is irrigated. The soils in the region falling under Agro-climatic zone IV are alluvium derived soils mostly khaddar (recent alluvium) and hangar (old alluvium). In some areas, the soil is highly calcareous. The soils are loamy and high in organic matter content. Rice, maize, pigeon pea, moong bean crops are common in kharif season (GoI, 2001).

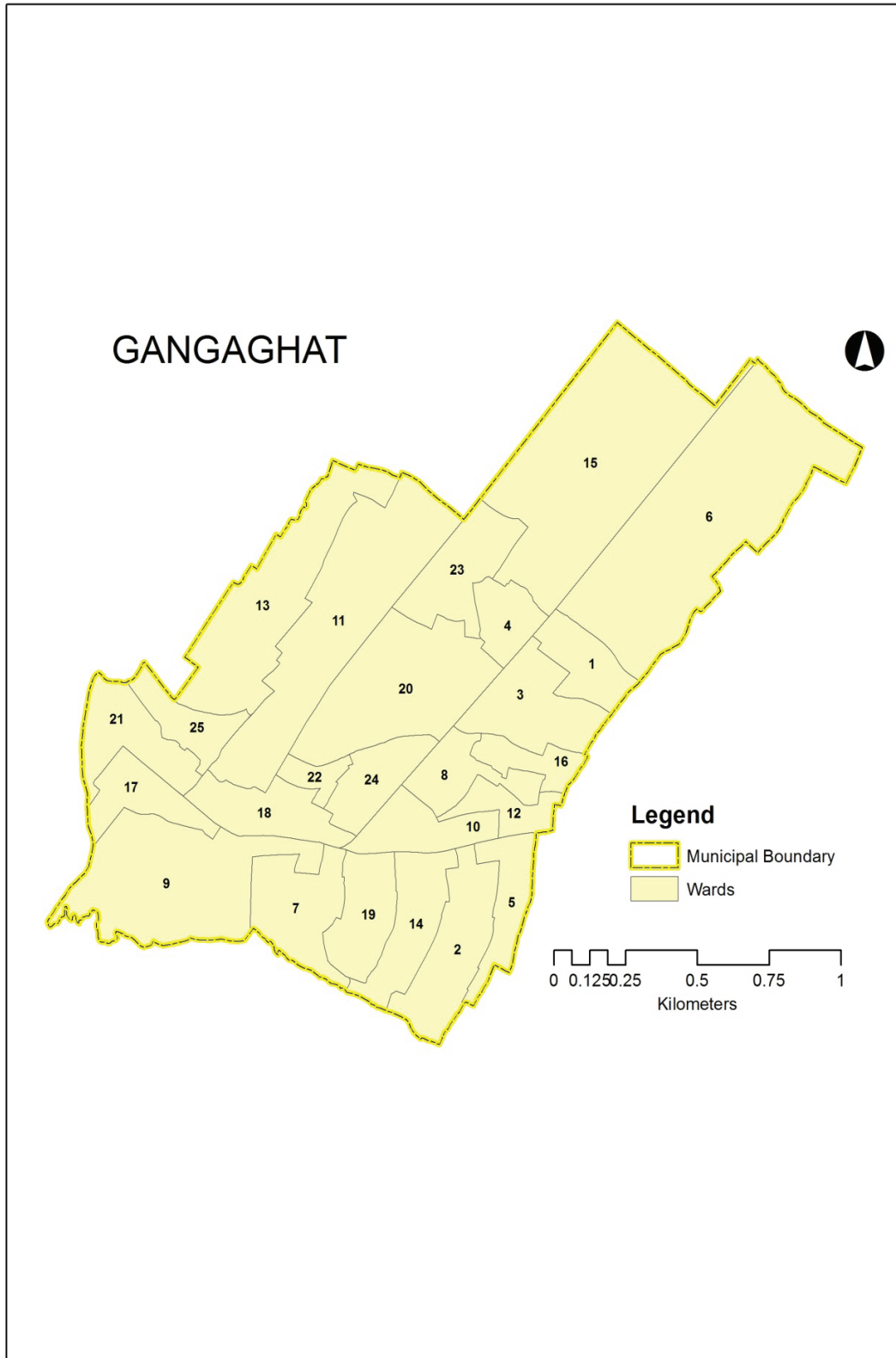


Figure 1: Ward map of Gangaghat city (Source: CSE, 2017)



2 Service outcomes

The analysis is based on data available from Census of India, 2011, the government published reports and random household survey. Data collected from secondary sources is triangulated in field based study. Data on the containment is available in Census 2011. Data has been cross-checked and updated by Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). According to the SFD promotion initiative (PI) definitions of sanitation systems, the types of onsite sanitation systems (OSS) prevalent in the wards are examined through random survey (refer table 2). Data on emptying, transport, treatment and disposal of faecal sludge is collected through KIIs with municipality, private emptiers and parastatal body. However, most of the data is qualitative.

2.1 Overview

To start with, a relationship between sanitation technologies defined in Census of India and the variables defined in the project is established. Then the population dependent on those systems is represented in terms of percentage of the population, as shown in Table 2 below:

Table 2: Sanitation technologies and corresponding percentages of population

| S. No. | Sanitation technologies and systems as defined by: | | SFD reference variable | Percentage of Population |
|--------|--|---|------------------------|--------------------------|
| | Census of India | SFD Promotion Initiative | | |
| 1 | Piped sewer system | User interface discharges directly to a centralized foul/ separate sewer. | T1A1C2 | 3.6 |
| 2 | Septic tank | Septic tank connected to open drain or storm sewer | T1A2C6 | 76.3 |
| 3 | Other Systems | User interface discharges directly to open ground | T1A2C8 | 3.5 |
| 4 | Pit latrine with slab | Lined pit with semi-permeable walls and open bottom, no outlet or overflow, general situation | T1A5C10 | 0.8 |
| 5 | Pit latrine without slab | Unlined pit no outlet or overflow, general situation | T1A6C10 | 0.2 |
| 6 | Night soil discharged into open drain | User interface discharges directly to open drain or storm drain | T1A1C6 | 0.4 |
| 7 | Service latrine | User interface discharges directly to 'don't know where' | T1A1C9 | 0 |
| 8 | Public latrine | Septic tank connected to open drain or storm sewer | T1A2C6 | 1.3 |
| 9 | Open defecation | Open defecation | T1B11C7 TO C9 | 13.8 |

Source: Census of India, 2011

2.1.1 Sanitation facilities

This section presents the existing sanitation facilities in institutions, commercial establishments and slums.

Community/public toilets: There are a total of four public and community toilets in the city, of which only one is functional. This functional toilet is located in Mishra colony which is constructed by GNPP. Its operation and maintenance are managed by GNPP. The toilet has 20 seats for males and 10 seats for females.

Commercial areas: Gangaghat is concentrated along Kanpur-Raebareli Road (main road). There are no public toilets in the city to serve the shopkeepers.

Institutions: There are 20 government schools and 7 private schools in Gangaghat. The schools have toilets for boys and girls which are connected to septic tank in the respective school premises (Sanitation staff-GNPP, 2016).

Due to lack of data on excreta generated from institutions, industrial areas, restaurants, community toilets, public toilets, hotels and schools, these establishments have not been taken into consideration for production of the SFD.

2.1.2 Containment

According to Census 2011, 3.6% of households are connected to sewer networks, though on ground no sewer network was observed, which was found to be in line with the field based study including FGD with municipal officials. Dependence on Onsite Sanitation Systems (OSS) is 82.6% while 13.8% population practices open defecation.

As per field survey, it was observed that there are 3 prevalent OSS in the city, namely: septic tank, pit system and lined tank. The size and type of OSS depend upon space availability and affordability of households. Septic tanks can be further subdivided into 3 categories: Septic tank connected to open drain which serves 70% of the city, septic tank connected to soak pit which serves 2% population and septic tank connected to water body which serves 3% population. Generally, septic tanks don't have a depth more than 10 ft.; as the ground water is available at a depth of 25 ft. Pit latrines serve 4% of the city. Pits are mostly found in settlements situated in vicinity of the river bank. As these systems have an open bottom and no outlet they pose a significantly high risk to groundwater which is further aggravated due to proximity to the river bank. Lined tanks with open bottom serve 5% population. Lined tanks with open bottom were observed in households which either have inadequate space to construct septic tanks or households which cannot afford septic tanks. Affordability here does not directly correlate to economically weaker section/slum areas. Despite the ongoing efforts towards open defecation free (ODF) drive in India, about 14% population, as per the survey, and 13.8% population according to Census still practice open defecation. Households situated at the river bank were observed to have toilet discharging directly to the river without any containment.



Figure 2: Containment system and its outlet (Source: Amrita/CSE, 2016)

2.1.3 Emptying & transportation

Emptying frequency varies in the city; households in wards towards the river bank have a frequency of 1-2 years, while the wards far from the bank have larger septic tanks and an increased emptying period of 5-10 years. Emptying process is performed by 2 workers (1 driver + 1 helper), during which the workers don't use



Figure 3: Tractor mounted tankers used for emptying in Gangaghat (Source: Anshul/CSE, 2016)

any personal protective equipment (PPE). GNPP has a vacuum tanker which is currently non-operational; therefore emptying in Gangaghat is facilitated using tractor mounted tankers which operate out of Kanpur.

Tankers are of two capacities: 3000 litres and 5000 litres, manufactured locally or bought second hand from other states. The tankers are mounted on tractors which are purchased from Delhi or Punjab. The emptying vehicle usually covers a distance of 10 km per trip within the municipal boundary. Private emptiers claim that there are 2-3 requests for emptying received on an average per day. The emptiers charge INR 1000-1500 per emptying (15- 22.5 USD) (Private Emptiers, 2016). The supernatant (SN) from the onsite sanitation system is conveyed through open drains to two locations (refer figure 4).

2.1.4 Treatment and disposal/end use

There is no faecal septage treatment plant (FSTP) or sewage treatment plant (STP) at present in the city. Faecal sludge collected by the private emptiers is either discharged off in major drains or at following two locations:

- Chhamak Ganga
- Railway khanti



Figure 4: Railway Khanti and Chhamak Ganga (Source: Anshul/CSE,2016)



Figure 5: Emptying of sludge in open drains (Source: Anshul/CSE, 2016)

Both the points of discharge contain standing water which is left behind after the barrage gets closed. After emptying, the vehicles discharge faecal sludge within 4 km distance from the source, to reduce their fuel cost.

2.2 SFD matrix

The final SFD for Gangaghat is presented in Appendix 7.3.

2.2.1 SFD matrix explanation

Definition and estimation of different variables (used to make SFD) are explained below in Table 3 and 4.

Table 3: Description of variables used for defining containment systems

| S. No. | SFD reference variable | Description of sanitation systems | Percentage of population used for SFD calculation |
|--------|------------------------|---|---|
| 1 | T1A1C7 | User interface discharges directly to water body | 2% |
| 2 | T2A2C5 | Septic tank connected to soak pit, where there is a “significant risk” of groundwater pollution | 2% |
| 3 | T1A2C6 | Septic tank connected to open drain or storm sewer | 70% |
| 4 | T1A2C7 | Septic tank connected to open water body | 2% |
| 5 | T1A4C6 | Lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer | 6% |
| 6 | T2A5C10 | Lined pit with semi permeable walls and open bottom, no outlet or overflow where there is a “significant risk” of groundwater pollution | 4% |
| 7 | T1B11 C7 TO C9 | Open defecation | 14% |

Source: CSE, 2017



Table 4: Description of variables used in SFD

| System type | Variables | Description (city context) | Percentage of population |
|--------------------|-------------------------------|--|--------------------------|
| Offsite Sanitation | WW not contained | Wastewater from user interfaces connected directly to open drains | 2 |
| | WW not delivered to treatment | Wastewater from user interfaces connected directly to open drains and not treated | 2 |
| Onsite Sanitation | SN not contained | Effluent (supernatant, SN) from OSS (T1A2C6 & T1A4C6), being discharged into open drains | 38 |
| | SN not delivered to treatment | SN from OSS (T1A2C6 & T1A4C6) connected to open drains which do not get treated and is discharged to the environment (to a water body or to open ground) | 38 |
| | FS not contained | Faecal sludge from OSS (T1A2C5, T1A2C6, T1A2C7, T2A5C10, T1A4C6), where there is a significant risk of groundwater contamination due to infiltration of liquid component or OSS discharging liquid (SN) component to open drain. | 46 |
| | FS not contained – emptied | Faecal sludge removed from OSS (T1A2C6, T1A2C7, T2A5C10, and T1A4C6) where FS is not contained, and is emptied using either motorized emptying equipment. (Assumption made that 90% faecal sludge is emptied from a given containment system) | 37 |
| | FS not delivered to treatment | Faecal Sludge emptied from OSS is discharged on open ground or water body in the city and surrounding villages, which directly pollutes the environment. | 9 |
| | FS not contained- not emptied | Faecal Sludge from OSS (T1A2C5, T1A2C6, T1A2C7, T2A5C10 and T1A4C6) is not contained and not emptied due to 10% FS remains in the OSS and cannot be emptied, it also includes liquid component which infiltrates and causes groundwater contamination. | 14 |
| Open defecation | Open defecation | With no user interface, users defecate in water bodies or on open ground; consequently, the excreta is NOT contained. | 14 |

Source: CSE, 2017

Offsite sanitation

Population with user interface directly discharging waste water into the river bank attributes to 2%, these are the households/wards which are constructed at the bank. WW which is directly discharged from this population is not treated and ultimately leads to River Ganga.

Onsite sanitation systems

84% of the city is dependent on OSS, out of which septic tank connected to open drain or storm sewer (T1A2C6) is 70%, septic tanks connected to soak pit, where there is a “significant risk” of ground water pollution (T2A2C5) is 2%, septic tanks connected to open water body (T1A2C7) is 2%, lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer (T1A4C6) is 4% and lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a ‘significant risk’ of groundwater pollution (T1A4C6) is 6%. None of the tanks are contained as they are either connected to open drains or open water body or soak pits. None of the lined pits are contained as the infiltrate pollutes the ground water.

There is no clear differentiation between the volume of effluent and solid FS generated from systems mentioned above, hence to reduce the maximum error, it’s assumed to be 50% each. Therefore, supernatant that



goes into open drains is attributed to 38% population (where 35% is attributed to T1A2C6, 1% to T1A2C7 and 2% is attributed to T1A4C6).

FS from T1A2C6, T2A2C5, T1A1C7, T1A2C7, T2A5C10 and T1A4C6 is not contained as either these systems are connected to open drain or infiltration is occurring from the system. This FS not contained sums up to 46% (35% is attributed to T1A2C6 + 2% is attributed to T2A2C5 + 1% is attributed to T1A2C7+ 4% is attributed to T2A5C10+ 4% is attributed to T1A4C6).

Due to nature of containment, infiltration of FS take place in T1A4C6, T2A5C5 and T2A5C10, therefore for systems with infiltrating it is assumed that FS from these is 50% infiltrates and 50% FS not contained.

In general for all systems, irrespective of infiltration, it is assumed that 90% population gets their containments emptied or can be attributed to the percentage of FS not contained which is emptied from the containment upon getting full and is termed as FS not contained emptied. Remaining 10% FS not contained is either left behind in tanks after emptying or can be attributed to the population that is not getting their systems emptied and is termed as FS not contained not emptied. As infiltration cannot be emptied, it is assumed to be a portion of FS not contained not emptied.

FS not contained and emptied is estimated to be 37% (32% is attributed to T1A2C6+ 1% is attributed to T2A2C5+ 1% is attributed to T1A2C7+ 2% is attributed to T2A5C10+ 1% is attributed to T1A4C6). FS not contained not emptied is estimated to be 9% (4% from T1A2C6+ 1% from T1A2C7+ 1% from T2A5C10+ 3% from T1A4C6). As explained above, infiltration is a portion of FS not contained not emptied, it is estimated to be 4% (1% is attributed to T1A4C6 + 1% is attributed to T2A5C5 + 2% is attributed to T2A5C10).

2.2.2 Risk of groundwater contamination

Uttar Pradesh is covered with rich fertile soil and underlain by a large thickness of alluvium making it one of the richest ground water repositories of the world (CGWB, 2014).

The SFD assessment includes the risk of groundwater pollution as an important factor in determining whether excreta is contained or not contained. If the risk of contamination to groundwater is low then FS is considered “contained”. The type of onsite sanitation technology in use also has an influence on the infiltration of liquid into the groundwater and therefore on the potential risk of groundwater pollution.

Based on the survey with households and KIs in Gangaghat, it was decided to characterize all existing sanitation containment systems as having “significant risk” of groundwater pollution, as groundwater table is less than 10mbgl (CGWB, 2014). According to the Census, 93% of the population is dependent on hand pump and 7% on well, tube well or bore well. Household survey revealed 80% of the respondents were depended on hand pump and 20 % were dependent on bore wells.

2.2.3. Discussion of certainty/uncertainty levels of associated data

There were three major challenges to develop the SFD. Published/unpublished reports were not able to provide completely (i) up-to-date data on containment (ii) detailed typology of containment and (iii) actual information about FSM services provided to households. For this reason, field based studies were conducted to validate the data and for triangulation of data provided by secondary sources.

The Census only differentiates between systems connected to user interface, if any, but does not give information about the design of actual containment systems on ground level or about the disposal of septage and waste water generated. Therefore, a random household survey was conducted in each ward of the city to



identify and cross check the data collected from the Census, 2011.

CSE's representative conducted the KIIs, FGDs and random surveys.

The assumption regarding the volume of FS emptied as compared to FS generated has a high impact on the overall SFD. A reliable method for estimating quantities of FS generated on a citywide scale do not yet exist, and it is complicated because the containment size and emptying period greatly vary. The volume of FS emptied is not clear because GNPP does not own an operational emptying vehicle in order to analyze FS generated. Since there is no clear differentiation between the volume of effluent/supernatant and septage generated from septic tanks and lined tanks, hence it's assumed to be 50% each. Based on the random survey, it is assumed that respondents getting their OSS emptied within 10 years are using their systems with emptying and respondents getting their OSS emptied after 10 years are using their system without emptying.

The objective of the survey conducted was to obtain a more accurate measure of how excreta is managed through stages of sanitation service chain (from containment to end-use or disposal). To reduce the uncertainty around the data collected, the draft SFD was prepared based on the analysis done and was presented to the SBCLTF's members and based on their feedback a context SFD was prepared.

2.3 Context adapted SFD

According to the SBCLTF, SFD generated by graphic generator is not sufficiently visualizing the actual situation at containment stage of sanitation chain. According to the stakeholders the properly designed septic tanks, which are regularly emptied, should be considered contained even if the supernatant is discharged into open drains. Hence, a context adapted city specific SFD graphic is manually corrected to convey the true picture of the excreta management in the city.

Please refer Appendix 7.5 for the context adapted SFD graphic. There is no major change done in the graphic. The only difference suggested in this context is at containment stage, i.e. for correctly designed septic tanks. Out of 84% of the population, dependent on onsite sanitation system, 70% of the population is dependent on septic tanks connected to open drain or storm sewer. 14% of the population, dependent on the other mentioned containment systems as mentioned in section 2.2.1, is attributed to be FS not contained.

With an earlier assumption of 50% of the proportion of the content of the septic tank is solid FS, rest of the 50% is assumed to be supernatant, which attributes to 24% of the population, that flows through open drains. According to SBCLTF the solid FS collected in the septic tank (attributed to 35% population) should be considered contained as it is neither polluting the ground water nor the solid excreta is overflowing in the open drain. Hence 35% of FS is considered contained (represented green in colour). 32% FS contained is emptied and rest 3% FS remains in the tank which is contained and never emptied. Nevertheless, the supernatant generated from septic tank connected to open drain is not contained and hence considered to be unsafely managed (represented red in colour).

Hence in context adapted SFD, 'FS not contained' reduces from 46% to 11 %, and 'FS contained increases from zero to 35% when compared with SFD generated through graphic generator.

Overall excreta of 97% population is not managed safely according to the context adapted SFD. The graphic is well received by the stakeholder's group and city's authority has agreed that the context adapted SFD graphic is representing much closer picture to the ground conditions.



3 Service delivery context description

3.1 Policy, legislation and regulation

3.1.1 *Policies, legislations and regulations at national level*

In 2008, the Ministry of Housing and Urban Affairs (MoHUA), formerly known as Ministry of Urban Development (MoUD) issued the National Urban Sanitation Policy (NUSP). The policy aims to: raise awareness; promote behaviour change; achieve open defecation free cities; develop citywide sanitation plans; and provide 100% safe confinement, transport, treatment and disposal of human excreta and liquid wastes. The NUSP mandates states to develop state urban sanitation strategies and work with cities to develop City Sanitation Plans (CSPs). NUSP specifically highlights the importance of safe and hygienic facilities with proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.) and proper operation and maintenance (O&M) of all sanitary facilities. Furthermore, it explicitly states that cities and states must issue policies and technical solutions that address onsite sanitation, including the safe confinement of Faecal Sludge (FS) (USAID, 2010). The objectives of NUSP are to be realized through CSPs and state sanitation strategies. NUSP identifies the constitution of multi-stakeholder task force as one of the principal activities to be taken up to start the city sanitation planning process. As per the requirement of CSP, a major role is to be played by the members of institutions, organizations, individuals, NGOs, academics, media representatives, local councillors, industry owners, consultants, representatives of private sector, etc. Constitution of Swachh Bharat City Level Task Force (SBCLTF) formerly known as City Sanitation Task Force (CSTF) is facilitated by drawing members from these groups in consensus with citizens who will be constantly supporting the CSP preparation by analyzing the strengths and competencies required to overcome the current situation and to improve sanitation facilities (MoUD, 2014).

The advisory note on septage management in urban India, issued by MoHUA in 2013, recommends supplementing CSPs with a Septage Management Sub-Plan (SMP), prepared and implemented by cities. Septage here broadly refers to not only FS removed from septic tanks but also that removed from pit latrines and similar on-site systems. This advisory provides a reference to Central Public Health & Environmental Engineering Organisation (CPHEEO) guidelines, Bureau of Indian Standard (BIS), and other resources that users of this advisory may refer, for details while preparing their SMP (MoUD, 2013). The advisory clearly discusses the techno-managerial and socio-economic aspects of septage management in India and provides guidelines for Urban Local Bodies (ULBs) to plan and implement SMP.

The Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Act, 1974 have provisions relating to sanitation services and environmental regulations. It applies to households and cities with regard to disposing wastes into the environment. ULBs/ utilities also have to comply with discharge norms for effluent released from sewage treatment plants and to pay water cess under the Water Cess Act, 1977. The ULB is responsible for ensuring the safe handling and disposal of septage generated within its boundaries, for complying with the Water Act and for meeting all state permit requirements and regulations (CSE, 2010). Municipal acts and regulations usually refer to the management of solid and liquid wastes but may not provide detailed rules for septage management (MoUD, 2013).

The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act is enacted in 2013. This act prohibits employment of manual scavengers and insanitary latrines - Laying strong emphasis on rehabilitation of manual scavengers. The broad objectives of the act are to eliminate insanitary latrines, prohibit the employment of manual scavengers and the hazardous manual cleaning of sewer and septic tanks, and to maintain a survey of manual scavengers and their rehabilitation (MoSJE, 2014).



In February 2017, MoHUA issued the National Policy on Faecal Sludge and Septage Management (FSSM). The policy aims to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that safe and sustainable sanitation becomes a reality for all in each and every household, street, town and city in India (MoUD, 2017).

The Fourteenth Finance Commission (FC-XIV) was constituted by the President of India under Article 280 of the Constitution on 2 January 2013 to make recommendations for the period 2015-20. Its assignments include distribution of revenue between union and state; devising formula for grant; suggesting method to augment resources for local bodies; and taking care of any matter referred to it (MoF, 2015).

Model Municipal Building Bye-laws 2016 prepared by Town and Country Planning Organization (TCPO). Building Bye-laws 2016 is used to regulate coverage, height, building bulk, and architectural design and construction aspects of buildings so as to achieve orderly development of an area. They are mandatory in nature and serve to protect buildings against fire, earthquake, noise, structural failures and other hazards. It includes chapters on green buildings and sustainability provisions, rainwater harvesting, Wastewater (WW) reuse and recycle, installation of solar roof top photo voltaic norms, revised norms for adequate toilet facilities for women and public conveniences in public buildings and mandatory provisions for segregated toilet facilities for visitors in public buildings (TCPO, 2016).

3.1.2 Policies, legislations and regulations at state and municipal level

According to the Constitution of India, water and sanitation are state subjects. Statutory powers are conferred to the state for making laws on water and sanitation. Some of the policies, laws and regulations are listed below:

The Uttar Pradesh Water Supply and Sewerage Act, 1975

An act to facilitate the establishment of corporation, authorities and organizations for the development and regulation of water supply and sewerage services, related matters. According to this act, the corporation has powers to fine the owner of the improper/damaged septic tank.

The Uttar Pradesh Urban Sanitation Policy, 2010

In 2010, the Director of Local Authorities, Uttar Pradesh issued the Uttar Pradesh Urban Sanitation Policy (UPUSP). The policy aims to: raise awareness; promote behaviour change; achieve open defecation free cities; develop citywide sanitation plans; and provide 100% safe confinement, transport, treatment and disposal of human excreta and liquid wastes. The UPUSP mandates the cities to establish City Sanitation Task Force (CSTF) and to elevate the consciousness about sanitation in the minds of municipal agencies, government agencies and most importantly, amongst the people of the city. UPUSP specifically highlights the importance of safe and hygienic facilities with proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.) and proper operation and maintenance (O&M) of all sanitary facilities. As of now, there are very few cities that have finalized their CSPs, and it remains a major drawback in the implementation of the UPUSP.

The Uttar Pradesh Urban Planning and Development Act, 1973

The Act was brought into enactment due to increasing need of planned development to tackle increasing population in urban and its surrounding areas. Under the focus on sanitation, the act entails powers to examine works under construction and ascertain the course of sewers and drains as part of its roles and responsibilities.

Draft Faecal Sludge and Septage Management Guidelines, 2016

The draft guidelines provide step by step approach for the preparation of a plan for septage management and



financial resource mobilization, along with a focus on the existing situation across sanitation service chain and sources of revenue. The guidelines stress upon Uttar Pradesh Municipal Corporation Act, 1959, Chapter IX: Corporation taxation, Section 173(d), where Conservancy tax can be levied on all the properties by the corporation where city undertakes the collection, removal and disposal of excreta and polluted matter from privies, urinals and cesspools.

Uttar Pradesh Municipal Building Bye-Laws, 2008: Issued by Housing Department, Government of Uttar Pradesh. The codes specify standards and design consideration for installation of toilets and septic tank.

Uttar Pradesh Finance Commission is a committee pertaining to the state of Uttar Pradesh, established with a purpose of reviewing the financial implementations of the state. The main purpose of this committee is to formulate implementation of financial policies pertaining to the state of Uttar Pradesh. The Finance Commission is set up under the Article 243 Sec I of the Indian Constitution, which orders that the Governor of the state would, at the end of every fifth year establish a Finance Commission for the purpose of reviewing, within the introduction of the 73rd Amendment of the Constitution Act, 1992 (BMol, 2016).

3.1.3 Institutional roles

The MoUD is the nodal ministry for policy formulation and guidance for the urban water supply and sewerage sector. The ministry's responsibilities include broad policy formulation, institutional and legal frameworks, setting standards and norms, monitoring, promotion of new strategies, coordination and support to state programmes through institutional expertise and finance. The ministry is also responsible for managing international sources of finance. The CPHEEO, created in 1953, is the technical wing of the MoUD, which advises the ministry on all technical matters and collaborates with the State Agencies about water supply and sanitation activities. CPHEEO plays a critical role in externally funded and special programmes. CPHEEO also plays a central role in setting design standards and norm setting for urban water supply and sanitation (Planning Commission, 2002a).

National Council for Rejuvenation, Protection and Management of River Ganga referred as National Ganga Council formerly known as National Ganga River Basin Authority (NGRBA) is the implementation wing of National Mission for Clean Ganga (NMCG), which was constituted under the provisions of the Environment (Protection) Act (EPA), 1986. The council aims at ensuring effective abatement of pollution and rejuvenation of the river Ganga by adopting a river basin approach to promote inter-sectoral co-ordination for comprehensive planning and management, maintenance of minimum ecological flows in the river Ganga with the aim of ensuring water quality and environmentally sustainable development (NMCG, 2011).

The 74th Constitutional Amendment Act of 1992 reformed the sector by transferring responsibility for domestic, industrial, and commercial water supply and sewerage (WSS) from state agencies, such as Departments of Public Health Engineering and State Water Boards, to Urban Local Bodies (ULBs). This transfer has resulted in a variety of implementation models, as well as a lack of clarity in roles and responsibilities of state and local agencies, resulting in large gaps in implementation (USAID, 2010).

Management and delivery of urban basic services in Gangaghat is governed by various institutions. Table 55 provides the institutions responsible for policy making, service provision and regulation of urban services: -

Table 5: Roles and responsibilities

| Institutions | Roles and responsibilities |
|---|--|
| Urban Development Department | Policy formulation, preparation of municipal laws, monitoring and evaluation of programmes, supervision of municipal administration, coordination with related state government departments, liaison with the central government and external funding agencies, administrative and financial management of municipalities, implementation of development programmes. |
| Nagar Palika Parishad – Gangaghat (GNPP) | Water supply and sewerage, public health, sanitation, conservancy and solid waste management, urban poverty alleviation by providing infrastructure, provision and maintenance of urban amenities and facilities such as parks, gardens, playgrounds, provision and maintenance of the lighting in the public streets, corporation markets, public buildings. Registration of births and deaths, O&M of burial grounds, cremation grounds, etc. The ULB has a vital role: to design, develop, plan and implement ULB level FSSM strategy, set up and ensure operation of systems for 100% safe and sustainable collection, transport, treatment and disposal of faecal sludge & septage, monitor and evaluate FSSM strategy and implementation plan and Implement Municipal Bye-laws. |
| Uttar Pradesh Jal Nigam | Carry out the functions of – <ul style="list-style-type: none"> • Preparation, execution, and promotion of ULB and state level plans of water supply and sewerage schemes • Establishment of standards for water supply and sewerage in the state |
| District Urban Development Authority | Its functions are to– <ul style="list-style-type: none"> • Execute various government schemes for urban development and employment generation • Create urban infrastructure, including water supply • Undertake tasks related to urban infrastructure to generate local employment • Construct community toilets and link it to sewer lines etc. • Lay sewerage network according to plan made by Jal Nigam • Regulate and help ULBs set up systems to ensure financial sustainability in provision of sanitation services |
| Uttar Pradesh Pollution Control Board (UPPCB) | Regulation, licensing for environmental check etc. Monitor the compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified in Schedule II, III & IV of ‘The Water (Prevention and Control of Pollution) Act 1974’. |
| State Programme Management Group (SPMG) | State Programme Management Group (SPMG) - It is an implementing arm of NMCG in the state. Coordinate and oversee the implementation of projects sanctioned by Government of India under NGRBA. Takes all such action and to enter all such actions as may appear necessary or incidental for the achievements of the objectives of the NGRBA. |

Source: Compiled by CSE, 2017

3.1.4 Service provision

Institutional arrangements for water supply and sanitation in Indian cities vary greatly. Typically, a state-level agency is in charge of planning and investment, while the local government (Urban Local Bodies) is in charge of operation and maintenance (NIUA, 2005). Some of the largest cities have created municipal water and sanitation utilities that are legally and financially separate from the local government. However, these utilities remain weak in terms of financial capacity. In spite of decentralization, municipalities remain dependent on capital subsidies from state governments. Tariffs are also set by state governments, which often subsidize operating costs (Planning Commission, 2002).

Furthermore, when no separate utility exists, there is no separate allocation of accounts for different activities within a municipality. Some states and cities have non-typical institutional arrangements. For example, in Rajasthan, the sector is more centralized and the state government is also in charge of operation and maintenance while in Mumbai the sector is more decentralized and local government is also in charge of planning and investment (NIUA, 2005).



3.1.5 Service standards

1. Service Level Benchmarks (SLB), 2008: Issued by the Ministry of Urban Development in 2008, the SLB seek to (I) identify a minimum set of standard performance parameters for the water and sanitation sector that are commonly understood and used by all stakeholders across the country; (II) define a common minimum framework for monitoring and reporting on these indicators and (III) set out guidelines on how to operationalize this framework in a phased manner. The SLB refers to improving service through better provision and delivery. It evaluates the performance of urban services provided by different ULBs throughout the country.
2. General Standards for Discharge of Environmental Pollutants – The Environment (Protection) Rules, 1986 (Schedule VI): Issued by Central Pollution Control Board (CPCB), a statutory organization constituted in September 1974 under the Water (Prevention and Control of Pollution) Act, 1974. General standards are notified with respect to parameters for safe discharge of effluent to inland surface water/public sewers/land for irrigation/ marine coastal areas.
3. Manual on Sewerage & Sewage Treatment, Second Edition, 2013: This manual was developed by CPHEEO. It provides detailed designs and guidelines for various technologies of wastewater management.
4. Code of Practice for Installation of Septic Tanks, 1985: Issued by, Bureau of Indian Standards. The code specifies standards and design consideration for installation of septic tanks.

3.2 Planning

3.2.1 Service targets

State governments must put in place standards for delivery of essential services provided by the local bodies for four services viz., water supply, sewerage, solid waste management and storm water drains on lines of handbook for SLB by MoUD. State government must notify or cause all ULBs to notify by the end of a fiscal year the service standards and targets (PAS, 2009-16).

The Swachh Bharat Mission (SBM), one of the flagship programmes of the government of India, was launched on October 2nd 2014 by the Ministry of Urban Development. SBM-Urban aims to eliminate open defecation by the year 2019, eradicate manual scavenging, capacity augmentation of ULBs and generate awareness about sanitation and its linkage with public health. The SBM (urban) aims to ensure that no new insanitary toilets are constructed during the mission period and that pit latrines should be converted into sanitary latrines. The target group for construction of household units of toilets thus is (i) 80% of urban households engaging in open defecation, remaining 20% of households practicing open defecation are assumed to be catered by community toilets due to constraints of space (ii) all households with insanitary latrines (iii) all households with single-pit latrines (MoUD, 2014). Table 6 provides an overview of service delivery progress in accordance with SBM.

Table 6: Service delivery targets in accordance with SLBs

| Sanitation service chain | Parameters | National benchmark | Timeframe to achieve benchmark |
|--------------------------|---|--------------------|--------------------------------|
| Containment | Coverage of toilets | 100% | 2019 |
| Transport | Coverage of sewer network services | 100% | 2031 |
| | Collection efficiency of the sewerage network | 100% | 2031 |
| Treatment | Adequacy of sewage treatment capacity | 100% | 2031 |
| | Quality of sewage treatment | 100% | 2031 |
| End-use/disposal | Reuse and recycling | 20% | 2031 |
| Other | Cost recovery | 100% | 2031 |
| | Efficiency of collection of charges | 100% | 2031 |
| | Redressal of customer complaints | 80% | 2031 |

Source: Adapted from MoUD, 2008

Table 7: Service delivery progress in accordance with SBM

| Name of the Institution | District name | Applications received | Accepted applications | Verified applications | Status of construction of toilets | |
|---------------------------------|---------------|-----------------------|-----------------------|-----------------------|-----------------------------------|----------------------------|
| | | | | | Constructed toilets | Under construction toilets |
| Gangaghat Nagar Palika Parishad | Unnao | 1304 | 754 | 654 | 83 | 8 |

Source: GNPP, 2016

According to rapid assessment of FSM in the city done by NPP, they would need to buy nine additional emptying trucks, which will improve the emptying services provided by them. Each vehicle is expected to complete 2 trips per day with an average distance of round trip being 10 km. Along with the emptying trucks, the NPP also aims to install an FSTP in the municipal area, which is expected to treat 86 cum/day of septage initially and 95 cum/day after a period of 5 years (MoUD, 2016).

3.2.2 Investments

Under SBM-Urban, state-wise shares of total Gol allocations for the period from 2014 to 2019 are based on the number of statutory towns, their respective populations and open defecation (OD) rates. Until 18 January 2017, Uttar Pradesh has received 10 per cent of its total mission allocations. There is a significant variation in releases made under the mission since its inception (CPR, 2017).

As per the rapid assessment of FSM in city done by GNPP, the budgetary provision required for capital expenditure for FSM is around INR 6321.44 lakh (USD 9.5 million). Whereas, the operation and maintenance (O&M) cost associated with the emptying services and treatment operations is estimated to be INR 1108.38 lakh (USD 1.6 million) for 5 years (MoUD, 2016). Further details of CAPEX and OPEX have been provided in Table 8.



Table 8: Estimate of CAPEX & OPEX for FSSM

| S. No. | Component | CAPEX | OPEX | Total |
|--------|--------------------------------------|----------|----------|----------|
| 1 | Faecal sludge management (INR Lakhs) | 1,600.66 | 842.29 | 2,442.95 |
| 2 | Liquid waste management (INR Lakhs) | 4,720.78 | 266.09 | 4,986.87 |
| 3 | FSSM total (INR Lakhs) | 6,321.44 | 1,108.38 | 7,429.82 |

Source: MoUD, 2016

Under SBM the following investment has been shared by central government, state government and NPP for access to toilets:

Table 9: Status of applications for toilet construction

| Construction of toilets sanctioned (All figures in (INR Lakhs)) | | | |
|---|------------|----------|-------|
| Central fund | State fund | ULB fund | Total |
| 9.24 | 9.24 | 0 | 18.48 |

Source: GNPP, 2016

The following is the current stature of benefits received by the residents of the city:

Table 10: Funding for the toilets under SBM

| Beneficiaries of accepted applications | Central and state funds cleared for beneficiaries (INR Lakhs) | Total constructed toilets till date | Under construction toilets |
|--|---|-------------------------------------|----------------------------|
| 261 | 10,44,000 | 83 | 8 |

Source: GNPP, 2016

A sewerage proposal has been prepared by Jal Nigam, Uttar Pradesh for Gangaghat city. The proposal is submitted to National Ganga River Basin Authority (NGRBA). NGRBA is a financing, planning, implementing, monitoring and coordinating authority for the Ganges River, functioning under the Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India. NGRBA has to safeguard the drainage basin which feeds water into the Ganges by protecting it from pollution or overuse. The NGRBA has been reinstated as National Ganga Council (NGC). The project costs of the same have been listed in Table 11.

Table 11: Estimates for sewerage system at Gangaghat

| Particulars | Initial stage Year 2018 | Middle stage Year 2033 | Design stage Year 2048 |
|------------------------------------|-------------------------|------------------------|------------------------|
| Per Capita Cost (INR) | 11854.97 | 7281.82 | 4837.58 |
| Annual Income (INR Lakhs) | 245.18 | 465.69 | 73.25 |
| Annual maintenance (INR Lakhs) | 106.79 | 85.92 | |
| Annual profit and loss (INR Lakhs) | 63.35 | 227.53 | |
| Annual expenditure (INR Lakhs) | 232.28 | 301.28 | 381.49 |

Source: DPR for Sewerage works at Shuklaganj, Unnao District, and U.P.



3.3 Reducing inequity

3.3.1 Current choice of services for the urban poor

There are 8 slum settlements within the GNPP limits (GNPP, 2016). The total slum population is 6,342 (GNPP, 2016), which is 8% of the total population. Although, few households in slums have individual toilets but majority practices open defecation.

There is only one functional community toilet in the city for the slum located at Mishra colony of ward number 9. Private emptiers are hired by residents for emptying services. As the roads are narrow and congested causing complexity for providing emptying service. Narrow roads in combination with low income have led to houses along the river bank to let out waste water to river bank (Sanitation staff- GNPP, 2016).

3.3.2 Plans and measures to reduce inequity

Pradhan Mantri Aawas Yojna (PMAY), Housing for All (Urban) project is aimed for urban areas with following components: (i) Slum rehabilitation of slum dwellers with participation of private developers using land as a resource; (ii) Promotion of affordable housing for weaker section through credit linked subsidy; (iii) Affordable housing in partnership with public & private sectors; and (iv) Subsidy for beneficiary-led individual house construction or enhancement.

All houses built or expanded under the mission should essentially have toilets facility. The mission has the provision of civic infrastructure as per applicable state norms/CPHEEO norms/IS Code/NBC for connection sewer if existing or has to be made through the convergence of other national or state schemes (MHUPA, 2016).

Under PMAY, 2719 applications forms have been filled (GNPP, 2016), but no survey has been conducted after that. Also, 1304 forms for construction of toilets were filled under the Swachh Bharat Mission (SBM), of which 654 have been approved, while 83 have been constructed and 8 are under construction (GNPP, 2016).

3.4 Outputs

3.4.1 Capacity to meet service needs, demands and targets

GNPP has insufficient fund to meet the demand of providing basic sanitation services and amenities through the revenue it generates. It is majorly dependent on state and central schemes for funding. It is learnt during the focus group discussion with the GNPP that there is delay in the disbursement of fund through state finance department (GNPP, 2016).

Municipality has insufficient financial resources. Municipal expenditures in India account for 1.1% of the country's GDP, compared to 6.9% in South Africa and 9.7% in Switzerland. ULBs, therefore, rely mainly on national or state grants (AFD, 2014). In the context of Gangaghat, the major source of income (both revenue and capital) is through grants and contributions and the remaining is generated through taxes and user charges.

Shortage of human resource can be witnessed in the NPP. It is largely relied on staff hired on contractual basis and not on permanent employees, to provide the daily service needs to the public. Also, the staff lacks the basic know-how and technical skills of their domain.



3.4.2 Monitoring and reporting access to services

The service level benchmarks (SLBs) advisories are released from the MoHUA regularly. SLB is one of the conditions for allocation of performance based grants to ULBs through Finance Commission. Data on service levels should be collected, documented and reported to MoUD according to the format prescribed by SLB framework. The target for the fiscal year has to be revised yearly by a ULB. Under AMRUT, Service Level Improvement Plans (SLIPs) are prepared with yearly targets. It has to be reviewed each year and progress has to be monitored. The planning documents like CDP and CSP have to be reviewed once in 5 years. This gives an opportunity to monitor the progress on service level improvement.

The progress of toilet coverage gets reflected on mission progress dashboard in the SBM-Urban website. Of 4041+ Municipalities in 650+ districts, 3802 ULBs are active. 75 million plus cities are being monitored separately. Under SBM, no toilets have been constructed yet in the city.

In GNPP, there is only one vacuum tanker, which is not operational, which paves way for private emptiers. The sanitary inspector is supposed to inspect the design of septic tanks and their adherence to standards at the time of construction but, this is not done most of the time.

3.5 Expansion

In 2016, MoHUA initiated rapid assessment to estimate the budget requirement for apprehending Faecal Sludge and Septage Management (FSSM) in 131 cities across the country, supported by the National Alliance for Faecal Sludge and Septage Management (NFSSM). The states also need to include funding requirements in State Annual Action Plans (SAAP), produced under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) programme. The flagship cities include 100 smart cities, 12 cities in Ganga basin cities and others across India. A declaration was signed – for cities journey beyond ODF- mainstreaming effective faecal sludge and septage management by key decision makers and NFSSM alliance members. Gangaghat is not an AMRUT city, hence the NPP has to look for other source of funding like FC, NMCG or donor agencies.

National Mission for Clean Ganga, develop such infrastructure or make such infrastructure functional, as the case may be, for collection, storage, transportation and disposal of sewage in the territorial area of the local authority through its *Namami Gange* programme- an integrated Ganga conservation programme (NMCG, 2011). Under this mission, 118 towns have been identified as priority towns for the interventions near main stem of Ganga. Gangaghat city is one of the cities listed in 118 urban habitations.

Nirmal Dhara is proposed under *Namami Gange* Programme – an initiative ensuring sustainable municipal sewage management which plans for:-

- Project prioritization in coordination with MoUD
- Incentive for states to take up projects on Ganga Main-stem by providing an additional share of central grants for sewerage infrastructure.
- Uniform standards for both MoUD scheme and *Namami Gange* programme, 10 years mandatory O&M by the same service provider at par with NGRBA programme and Public- Private Partnership (PPP), Mandatory reuse of treated water.
- Expanding coverage of sewerage infrastructure in 118 urban habitations on banks of Ganga- estimated cost by MoUD is INR 51,000 Crores (USD 7.67 Billion).



3.5.1 Stimulating demand for services

The following activities may stimulate demand for services:

- Awareness generation on septic tank construction, regular emptying of septic tanks through awareness campaigns
- Awareness campaigns on ill effects of environmental degradation because of disposal of untreated septage into local environment
- Capacity building of ULB staff on septage management
- Skill development for local masons and plumbers
- Monitoring and regulation of private emptiers

It is recognized that the end objectives and corresponding benefits of SBM cannot be achieved without proper management of faecal sludge and septage across the sanitation service chain. Further, it is well understood that sewerage coverage will not meet the complete sanitation needs in all areas, and a strategy which is a combination of OSS and off-site (decentralized and centralized) must co-exist in all cities and must be given equal attention. However, the current policies are not explicit enough and also do not provide an outcome-focused direction on this issue (MoUD, 2017).

3.5.2 Strengthening service provider roles

Funding is available for septage management initiatives under rapid assessment for Faecal Sludge and Septage Management supported by the National Alliance for Faecal Sludge and Septage Management (NFSSM). These funds have been allocated to buy vacuum tankers, building treatment facility, etc. GNPP has to make use of these funds to strengthen the services. At present, there are no detailed plans for strengthening service delivery.

SBM majorly provides funds for access to toilets but thereafter lacks funds for treatment and disposal of sewage and faecal sludge throughout the service chain. The service delivery of sewage and faecal sludge treatment and disposal can be met through converging the two national flagship programmes – SBM and NMCG. The ULB can take the benefit of the programmes and strengthen the services along the value chain and achieve the goals of both programmes.



4 Stakeholder engagement

4.1 Key informant interviews

The KIIs were conducted with the stakeholders having a role or interest in sanitation and FSM services within the city. The relevant departments were contacted through e-mail, letter, call and fax prior to visit to the concerned departments. The purpose of the SFD study and depth of data required was conveyed through an introductory letter to respective departments. A total of 2 KIIs were conducted with government functionaries and private emptiers (see Appendix 7.2). Apart from KIIs, survey was also conducted, which included interviews with representative from, institutions and other commercial establishments. Indeterminate information was available prior to the field based research about the type of containment, emptying service, transportation and disposal of sewage generated by the city. The visit enabled in enhancing data collection through gathering progress details of SBM, published and unpublished reports like DPR for proposed sewerage network, etc. Interview with the private emptiers and other stakeholders provided additional insight into the service delivery context.

4.2 Field observations

In order to get a better picture of variety/typology of onsite sanitation system random surveys were conducted. Sample was carefully chosen to get good spatial representation from each ward of OSS dependence based on Census, 2011. At-least 5-6 respondents were surveyed in each of the selected wards of Gangaghat. It was made sure that respondents from slums are surveyed as well. The surveyor also recorded the field observations related to sanitation. Such surveys, observations and KIIs helped to produce a more credible and accurate SFD, provides qualitative data and perhaps more precise quantitative data relating to the service delivery. Some of the observations are listed below.

On a spatial aspect, a trend was observed: wards closer to the river bank were economically weaker class, while as distance from the river bank increased the socio-economic situation improved; in Gangaghat city one startling observation was that most of the properly built onsite sanitation systems were in the economically backward classes. A visit was done to observe various faecal sludge disposal points in the city. A reconnaissance survey was a very helpful technique in understanding the city better.

4.3 Focus group discussions

The FGDs were conducted to complement, validate and challenge data collected during literature review and interviews. In total, four FGDs were conducted. FGDs were held with private emptiers, community representatives and local masons. The questionnaires for FGDs were prepared in English, but the interviewer asked the questions, translating into the Hindi language.

The findings from the FGDs revealed information that increased the understanding of the sanitation and septage management in Gangaghat. FGDs were useful in data triangulation. Sample survey helped in validating secondary data and data provided by different stakeholders. It resulted in actual and true SFD of the city.

Stakeholders were identified and task force was formulated and notified under the mandate by NUSP (refer appendix 7.8 for more details). An FGD was conducted with the SBCLTF's members and the draft SFD was presented and analyzed. SBCLTF's members validated the collected data and the final SFD graphic (SBCLTF, 2017).



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7 Appendix

7.1 Stakeholder identification

Table 12: Stakeholder identification

| S. No. | Stakeholder group | In Gangaghat context |
|--------|---|--|
| 1 | City council / Municipal authority / Utility | Nagar Palika Parishad, Gangaghat |
| 2 | Ministry in charge of urban sanitation and sewerage | Urban Development Department, GoUP |
| 3 | Ministry in charge of urban solid waste | Urban Development Department, GoUP |
| 4 | Ministries in charge of urban planning finance and economic development | Urban Development Department, GoUP |
| | Ministries in charge of environmental protection/ | Environment Department, GoUP |
| | Ministries in charge of health | Department of Medical Health and Family Welfare, GoUP |
| 5 | Service provider for construction of onsite sanitation technologies | Local masons |
| 6 | Service provider for emptying and transport of faecal sludge | Private Emptier, Kanpur City |
| 7 | Service provider for operation and maintenance of treatment infrastructure | N/A |
| 8 | Market participants practicing end-use of faecal sludge end products | N/A |
| 9 | Service provider for disposal of faecal sludge (sanitary landfill management) | Nagar Palika Parishad, Gangaghat |
| 10 | External agencies associated with FSM services: e.g. NGOs, academic institutions, donors. | Centre for Science and Environment, New Delhi; IWMI, India |

Source: CSE, 2016

7.2 Tracking of engagement

Table 13: Tracking of engagement

| S. No. | Name of Organisation | Designation | Date of engagement | Purpose of engagement |
|--------|----------------------|-----------------------|--------------------|---|
| 1 | GNPP | Executive Officer | 20/10/2016 | <ul style="list-style-type: none"> Introduction of SFD and permission to conduct FGDs in the municipal wards Data collection FGD with administrative staff of GNPP |
| 2 | GNPP | Sanitary Officer | 20/10/2016 | FGD with sanitary wing to understand the sanitary condition and analyse the level of knowledge of septage and faecal sludge KII |
| 3 | GNPP | Pump Operator | | |
| 4 | GNPP | Public Toilet Cleaner | | |
| 5 | Private | Emptiers | 20/10/2014 | KII |
| 6 | GNPP | Tax Collector | 21/10/2016 | FGD with administrative staff of GNPP |
| 7 | GNPP | Computer Operator | 21/10/2016 | |
| 8 | GNPP | Senior Clerk | 21/10/2016 | |
| 9 | GNPP | Accountant | 22/10/2016 | |
| 10. | SBCLTF | 16 members of SBCLTF | 17/03/2017 | FGD |

Source: CSE, 2016

7.3 SFD graphic

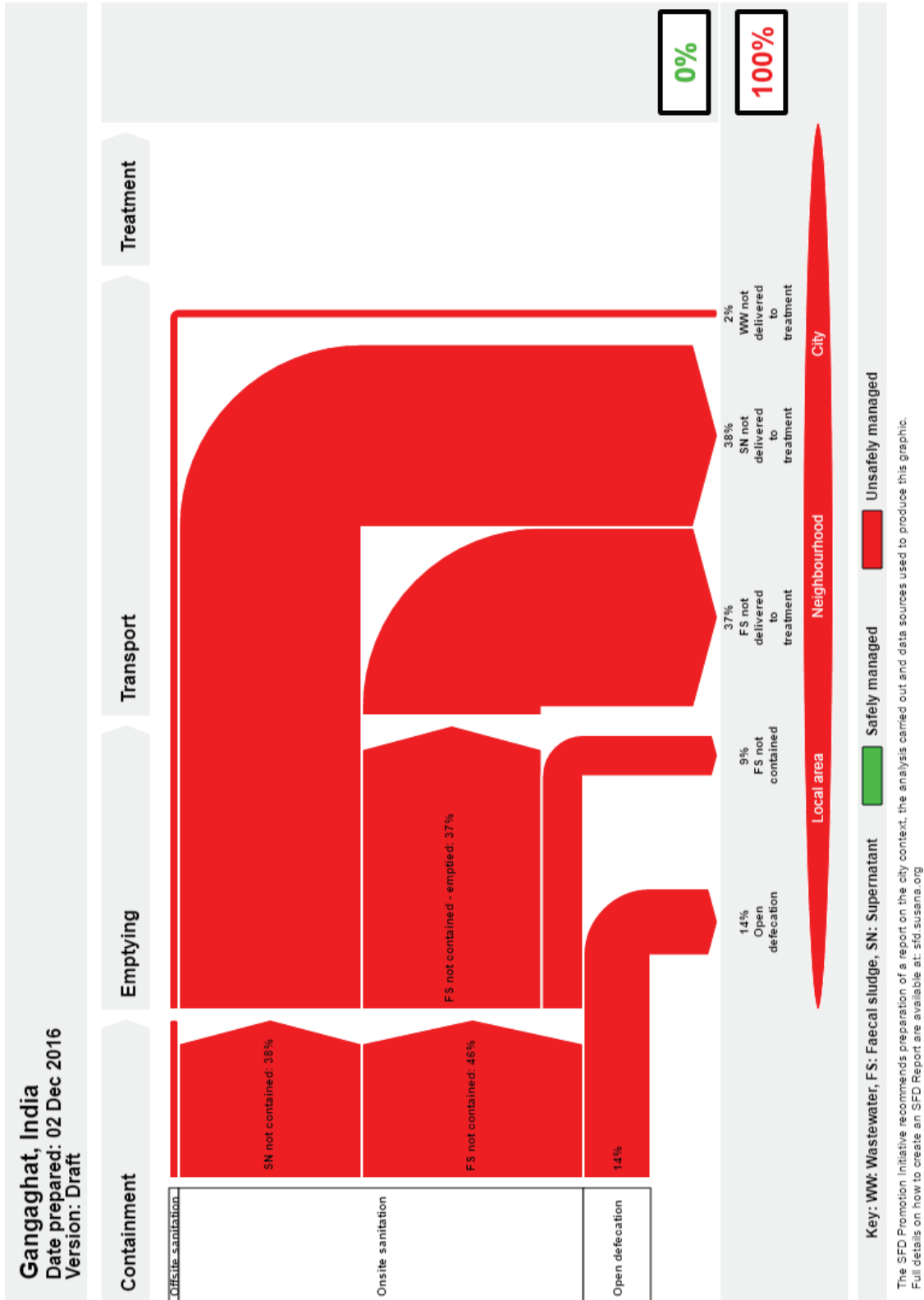


Figure 6: Shit Flow Diagram for Gangaghat city (Source: SFD graphic generator)



7.4 SFD brief explanation

Table 14: Percentage of the population using each system technology and method

| System Type | Containment | Emptying | Transport | Treatment |
|-----------------|---|--|---|--|
| Offsite | T1A1C7: 2% population whose user interface discharges directly to water body | Not applicable. | Transported through open drains to open grounds or water bodies | There's no treatment of waste water in the city. |
| Onsite | T2A2C5: 2% of population is dependent on septic tank connected to soak pit, where there is a "significant risk" of groundwater pollution | <p>Since there is no clear differentiation between % of faecal sludge and supernatant, it is assumed to be 50% each. SN is assumed to be 38% while FS is assumed to be 46%.</p> <p>Infiltration takes place in T1A4C6, T2A5C5 and T2A5C10. Therefore, FS from these systems is assumed to be 50% infiltrate and 50% FS not contained.</p> <p>In general for all systems, irrespective of infiltration, it is assumed that 90% of the population has their onsite technology emptied while 10% does not. Therefore, FS not contained - emptied comes out to be 37% and FS not contained-not emptied becomes 9%.</p> <p>As infiltration cannot be emptied it is assumed to be a portion of FS not contained not emptied, it is estimated to be 4% from the systems causing infiltration of FS.</p> | No treatment facility exists hence no FS or SN is transported to the treatment plant. | No treatment facility exists hence no FS or SN is treated; therefore FS or SN treated is 0%. |
| | T1A2C6: 70% of population is dependent on septic tank connected to open drain or storm sewer | | | |
| | T1A2C7: 2% of population is dependent on septic tank connected to open water body | | | |
| | T1A4C6: 6% of population is dependent on lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer | | | |
| | T2A5C10: 4% of population is dependent on lined pit with semi permeable walls and open bottom, no outlet or overflow where is a "significant risk" of groundwater pollution | | | |
| Open defecation | 14% of population practice open defecation. | | | |

Source: CSE, 2017

7.5 Context-adapted SFD

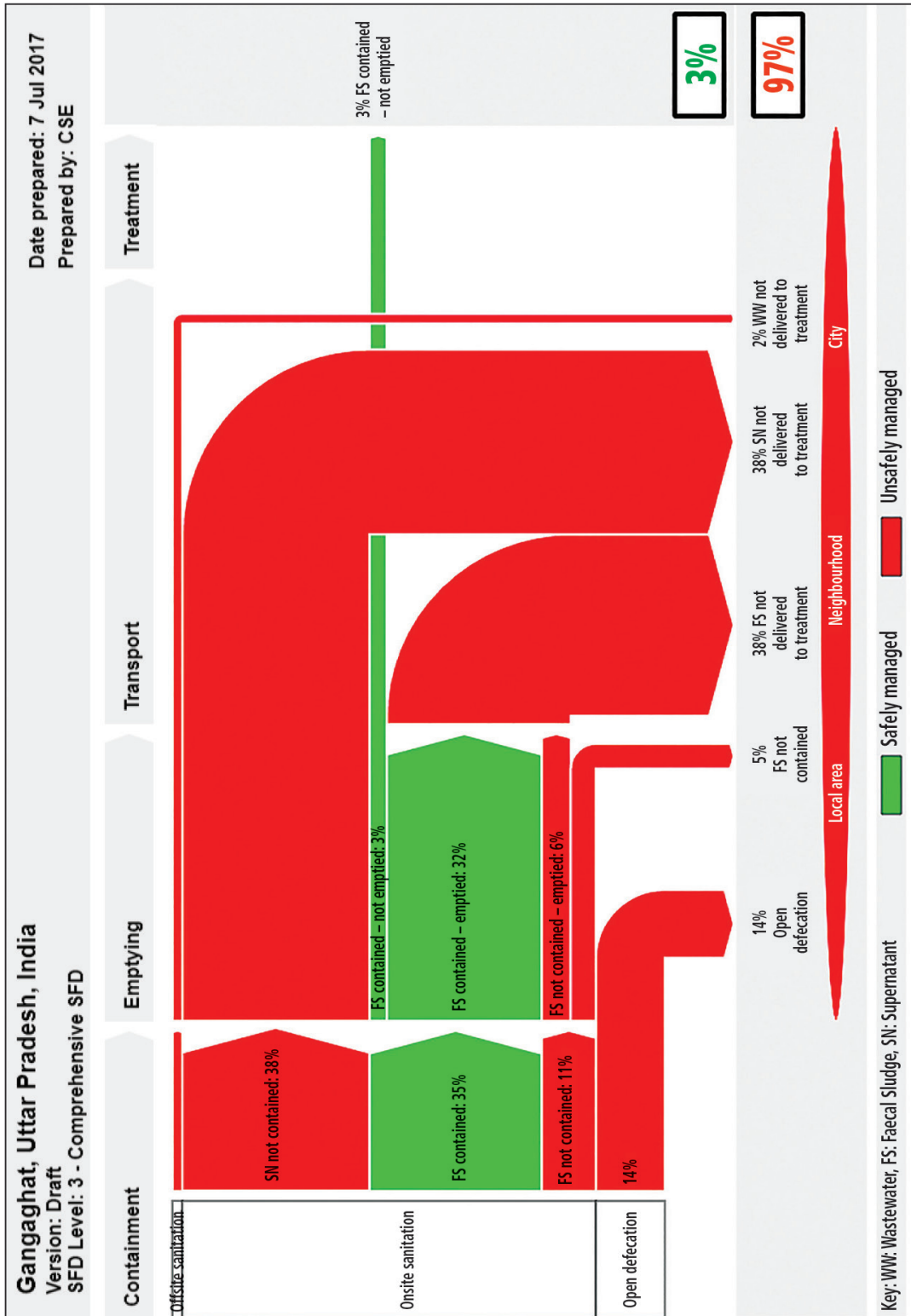


Figure 7: Context adapted SFD (Source: CSE)



7.6 SFD selection grid

Table 15: SFD selection grid

| List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?) | List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?) | | | | | | | | | |
|---|--|--|--|--|--|------------------------------|----------------|----------------|-----------------------|--|
| | to centralised combined sewer | to centralised foul/separate sewer | to decentralised combined sewer | to decentralised foul/separate sewer | to soakpit | to open drain or storm sewer | to water body | to open ground | to 'don't know where' | no outlet or overflow |
| No onsite container. Toilet discharges directly to destination given in List B | | | | | Significant risk of GW pollution Low risk of GW pollution | | T1A1C7 | | | Not Applicable |
| Septic tank | | | | | T2A2C5 Low risk of GW pollution | T1A2C6 | T1A2C7 | | | |
| Fully lined tank (sealed) | | | | | Significant risk of GW pollution Low risk of GW pollution | | | | | |
| Lined tank with impermeable walls and open bottom | Significant risk of GW pollution Low risk of GW pollution | Significant risk of GW pollution Low risk of GW pollution | Significant risk of GW pollution Low risk of GW pollution | Significant risk of GW pollution Low risk of GW pollution | Significant risk of GW pollution Low risk of GW pollution | T1A4C8 | | | | Significant risk of GW pollution Low risk of GW pollution |
| Lined pit with semi-permeable walls and open bottom | Not Applicable | | | | | | | | | T2A8C10 Low risk of GW pollution |
| Unlined pit | | | | | | | | | | Significant risk of GW pollution Low risk of GW pollution |
| Pit (all types), never emptied but abandoned when full and covered with soil | | | | | | | | | | Significant risk of GW pollution Low risk of GW pollution |
| Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil | | | | | | | | | | Significant risk of GW pollution Low risk of GW pollution |
| User interface failed, damaged, collapsed or flooded | | | | | | | | | | |
| Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded | | | | | | | | | | |
| No toilet. Open defecation | Not Applicable | | | | | | T1B11 C7 TO C9 | | | Not Applicable |

Source: SFD graphic generator, 2016



7.7 SFD calculation grid

Table 16: SFD matrix

Gangaghat, India, 02 Dec 2016. Field based study

Population: 84072

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

| System label | Pop | F3 | F4 | F5 | S4e | S5e |
|---|--|---|---|---|---|---|
| System description | Proportion of population using this type of system | 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 |
| T1A1C7 User interface discharges directly to water body | 2.0 | | | | | |
| T2A2C5 Septic tank connected to soak pit, where there is a 'significant risk' of groundwater pollution | 2.0 | 90.0 | 0.0 | 0.0 | | |
| T1A2C6 Septic tank connected to open drain or storm sewer | 70.0 | 90.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| T1A2C7 Septic tank connected to open water body | 2.0 | 50.0 | 0.0 | 0.0 | | |
| T1A4C6 Lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer | 6.0 | 90.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| T2A5C10 Lined pit with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution | 4.0 | 90.0 | 0.0 | 0.0 | | |
| T1B11 C7 TO C9 Open defecation | 14.0 | | | | | |

Source: SFD graphic generator

7.8 List of community/public toilets

Table 17: List of toilets in Gangaghat

| S. No. | Location of the Toilet | No. of Users per day | No. of functional toilet seats | | | | Toilet Connected to | Septic tank size in feet (L×B×H) | Emptying Frequency (in years) |
|--------|------------------------|----------------------|--------------------------------|-------|---------|-------|---------------------|----------------------------------|-------------------------------|
| | | | Men | | Women | | | | |
| | | | Urinals | Seats | Urinals | Seats | | | |
| 1 | Mishra colony | 300 | 10 | 10 | 0 | 10 | Lined pit | 2 weeks | |

Source: GNPP, 2016

7.9 Photographs from field visit



Figure 8: Pit used at the community toilet (Source: Amrita/CSE,2016)



Figure 9: Men's urinals at toilet at Mishra colony (Source: Amrita/CSE, 2016)



Figure 10: Hand pump at the local school (Source: Amrita/CSE, 2016)



Figure 11: FGD with ULB official (Source: Anshul/CSE, 2016)

7.10 Swachh Bharat City Level Task Force of Gangaghat

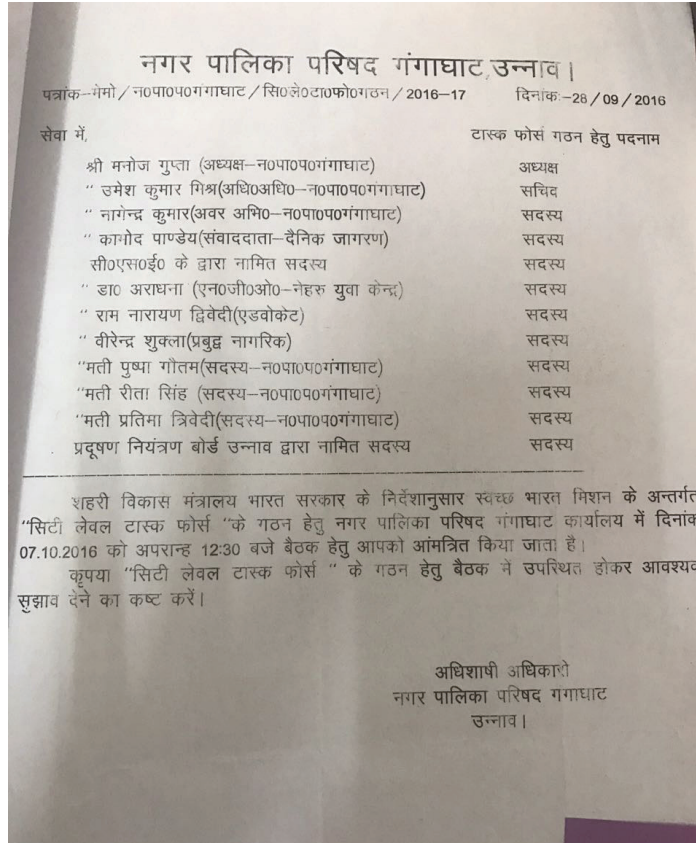


Figure 12: Notification and list of CSTF members of Gangaghat (Source: GNPP,2016)



Figure 13: SBCLTF meeting under process in Gangaghat (Source: Rajratna/CSE,2017)



Table 18: List of SBCLTF members

| LIST OF MEMBERS – SBCLTF GANGAGHAT | | |
|------------------------------------|---------------------|--|
| Chairperson | Manoj Gupta | President Gangaghat Nagar Palika Parishad |
| Secretary | Umesh Kumar | Executive Officer Gangaghat Nagar Palika Parishad |
| Member | Nagendra Kumar | Junior Engineer Gangaghat Nagar Palika Parishad |
| Member | Kamod Pandey | Reporter Dainik Jagran |
| Member | Aradhna Raj Nehru | Yuva Kendra |
| Member | Ram Narayan Dwivedi | Advocate |
| Member | Virendra Shukla | Learned Citizen |
| Member | Pushpa Gautam | Ward Representative (Ward No – 8) Gangaghat Nagar Palika Parishad |
| Member | Reeta Singh | Ward Representative (Ward No – 21) Gangaghat Nagar Palika Parishad |
| Member | Pratima Trivedi | Member |
| Member | Representative | Pollution Control Board |
| Member | Pannalal Kushwaha | Reporter Hindustan |
| Member | Durgesh Sharma | Reporter Amar Ujala |

Source: GNPP, 2017



7.11 Household survey questionnaire



CENTRE FOR SCIENCE AND ENVIRONMENT, NEW DELHI
Focus Group Discussion (FGD)
QUESTIONNAIRE

Date: ___/___/___, Area Name: _____, Ward: _____,

Co-ordinates: _____, No. of Participants (4-10) _____

Group Profile

No. of Male: _____ No. of Female: _____

| Respondents | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|----|
| Gender | | | | | | | | | | |
| Age | | | | | | | | | | |
| Marital Status (U/M) | | | | | | | | | | |
| Household size | | | | | | | | | | |
| Social category (G, OBC, SC, ST) | | | | | | | | | | |
| House Structure (P,K, SP) | | | | | | | | | | |
| Latrine facility (IT, ST, CT, PT, ODF) | | | | | | | | | | |
| IT: Individual Toilet, ST: Shared toilet, CT: Community Toilet, PT: Public Toilet, ODF: Open Defecation | | | | | | | | | | |
| Who constructed toilet (SF, Govt.,Pvt.,NGO) | | | | | | | | | | |

| Respondents | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|----|
| Does the current state of toilet cause trouble (Y/N)? State reasons?? | | | | | | | | | | |
| Do all females use toilet (Y/N)? | | | | | | | | | | |
| Do all males use toilet (Y/N)? | | | | | | | | | | |
| Do all children use toilet (Y/N)? | | | | | | | | | | |
| Types of toilet (ISP, Western) | | | | | | | | | | |
| ISP: Indian Squatter Pan | | | | | | | | | | |
| Kind of flushing (PF/CF) | | | | | | | | | | |
| PF: Pour Flush, CF: Cistern Flush | | | | | | | | | | |
| User interface connected to(S,ST,PL,OD, OG,LIC/O,LSC/O)? | | | | | | | | | | |
| S: Sewer, ST: Septic Tank, PL: Pit Latrine, OD: Open Drain, OG: Open Ground, LIC/O: Lined tank impermeable/Semipermeable walls with closed/open bottom. | | | | | | | | | | |
| Details of the tank | | | | | | | | | | |
| Circular/rectangular/Square (C/R/S) | | | | | | | | | | |
| Length: Breadth: Depth | | | | | | | | | | |
| Comment: | | | | | | | | | | |

Figure 14: Household questionnaire used during random survey (Source: CSE, 2016)



7.12 FS emptiers questionnaire



CENTRE FOR SCIENCE AND ENVIRONMENT, NEW DELHI
Septic tank Cleaner Survey

Date:/Nov/2016 Time: Place:

1. Owner name & Mob. No.
 2. De-sludging process (Manual/Mechanical/Semi M.M)
 3. Reasons for adopting the process.....
 4. Type of vehicle used for transportation (Tractor/Truck/trolley/others)
.....
 5. Price of vehicle.....
 6. Type of ownership (Own vehicle /hire from others)
 7. Number of vehicles (total in your area)
 8. Capacity of vehicles
 9. Typical age of Vehicles
 10. Vehicle Assembling point.....
 11. Vehicle Details.
- | | |
|--|--|
| New or second hand | |
| Mileage | |
| Durability of vehicle (Max.) | |
| Capacity of pump (in HP) | |
| Location of pump on vehicle | |
| Tank maintenance details (if any rupture etc.) | |
| Tank durability (max.) | |
12. Typical No of trips per day
 13. Average distance per trip.....
 14. Area of responsibility.....

15. Fees charge/trip.....
16. Time taken for desludging activity.....
17. Where is sludge dumped
18. Where should be disposal site to be located?
19. Official dumping site for city.....
20. Reuse for sludge
21. Total Quantity of faecal sludge received per day per trip (Approx.).....
22. Septic tank location (top place used for any activity or unused).....
23. Septic Tanks details (Capacity, dimension, materials used for construction, Inlet and outlet baffle etc.....
24. Areas having highest demand for sludge clearing
25. Frequency of desludging per household.....
26. Fees Charges /Trip (Competitors)
27. NO. Of private Operators in your area
28. Are you maintaining any register/produce any bill for payment?
29. Is the current practice suitable for the you (Suggest any changes)
.....
30. Major issue running in the business
.....
31. Safety Measures if any during desludging process
32. Marketing Strategy.....
33. Why you are doing this work?
.....

Figure 15: Survey questionnaire used during emptiers interview (Source: CSE/2016)



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