SFD Lite Report

Aya Nagar
India

This SFD Lite Report was prepared by
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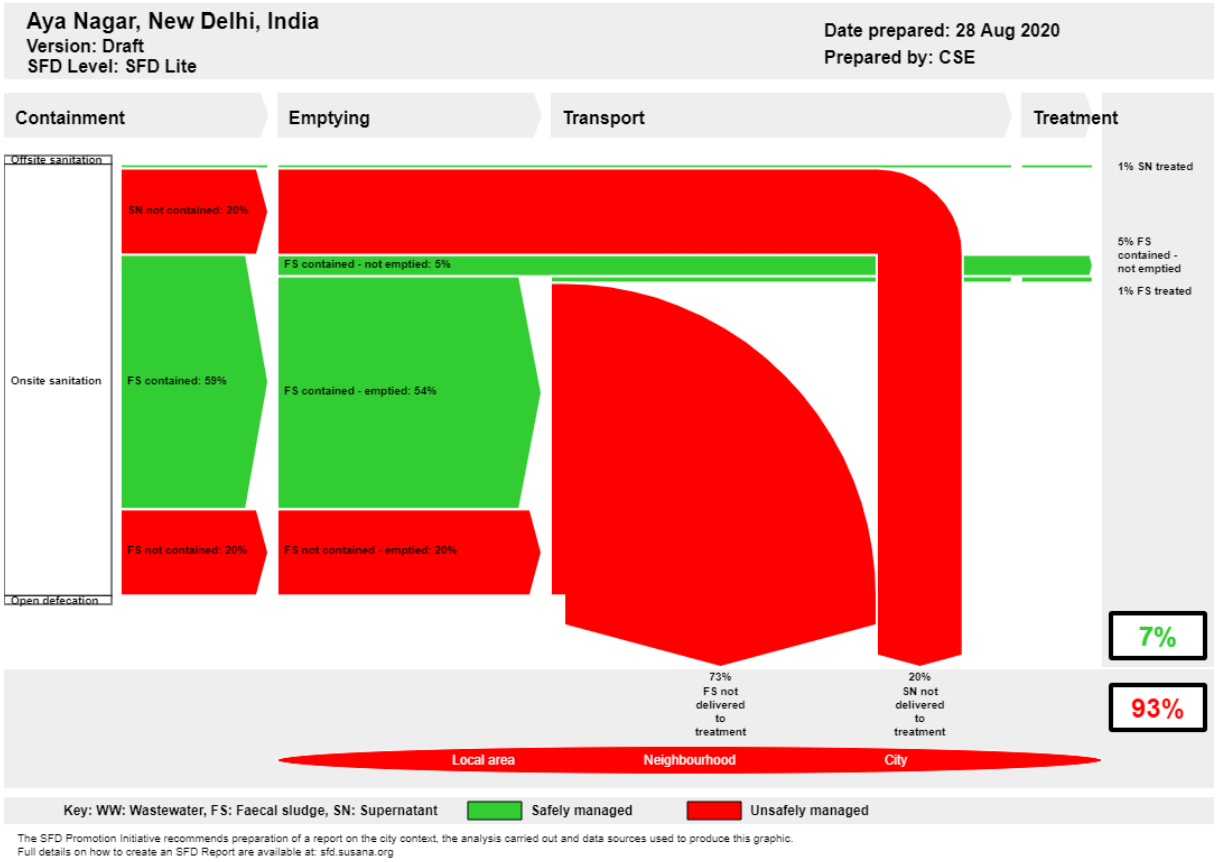
1 The SFD Graphic



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 SFD Lite information

Produced by:

- Centre for Science and Environment, New Delhi
- This report was compiled as part of the SFD Promotion Initiative project funded by Bill and Melinda Gates Foundation (BMGF). We would like to thank Ashish Ganju, Architect, Greha NGO; Manoj Chaudhary, Ward Parshad, Aya Nagar; Madan Singh Negi, RWA President, Aya Nagar; Manoj Jha, Director, Arkins; Vinod Kumar, Private Emptier Operator; Satish Kumar, AE, DJB; Babu Khan, Qutub Minar STP Operator for providing all the required secondary data and cooperating for Key Informant Interviews (KIIs) & Focus Group Discussions (FGDs).
- This report would not have been possible without constant support of Mr Manoj Chaufhary & Mr Ashish Ganju who helped in conducting sample surveys and FGDs in the field.

Collaborating partners:

- South Delhi Municipal Corporation, New Delhi, India

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3 General city information

Aya Nagar is situated on the Southwestern edge of Delhi. It is the last village of Delhi on the Mehrauli Gurgaon Road which connects South Delhi with the rapidly urbanizing city of Gurgaon in the adjoining state of Haryana. The settlement is bound by government campuses, the Aravali Hills and ravines formed by an ancient river course, now dry. It is one of the few villages in Delhi which has managed to retain the original village Johar (rain water harvesting pond) but now left neglected and used as a garbage dump

Although Aya Nagar is part of the rural fringe of Delhi, it is today a settlement of nearly 100000 people[1], half of which are the original rural inhabitants while the other half are low-income migrants from all parts of India. The new migrants have settled on the once agricultural lands of the village in an ill-planned manner and without legal sanction. In 1970-72, government intervention brought electricity and water supply facilities, and a bus terminus connecting the village to the city of Delhi. The urban village was regularised on 29th Oct 2019 (KII-3, 2020).

Aya Nagar is located at mean elevation of about 271 msl at 28°28'19.48"N and 77° 7'58.59"E. According to census, Aya Nagar comes under ward no. 175 which includes Aya Nagar, Jona Pur, Ghitorni[2]

According to 2011 census, the population of the city was 33123 and total no. of households (HH) was 6757 and spread across an area of 8.18 sq km. The current[3] population of the city is 150000 and total no. of households (HH) is 8895 with population growth rate of 35.3%. The current population is used for preparation of SFD.

Table 1: Population Growth rate Aya Nagar Village Source: Census, 2011

Census Year	Population	Growth Rate (%)	Source
2001	14000		
2011	33123	13.7%	Census 2011
2020	150000	35.3%	Ward Parshad & RWA President

Aya Nagar has a max temperature[4] in summers of 40.9° C and min temperature in winter less than 8.9°C and annual rainfall of about 617 mm. The risk of groundwater contamination is low as the depth of groundwater level is 400-450 ft (KII-2, 2020; KII-7, 2020). The water supplied in the city is predominantly through DJB borewells & tubewells, water supply tankers and Sonia Vihar Water Pumping Station (Field Observation; KII-1, 2020; KII-7, 2020; KII-8, 2020).

[1] Delhi Urban Art Commission (DUAC): Aya Nagar Urban Development
[2] Census, 2011
[3] Delhi Urban Art Commission (DUAC): Aya Nagar Urban Development
[4] https://indikosh.com/city/68437/aya-nagar/amp

4 Service outcomes

Aya Nagar, New Delhi, India, 28 Aug 2020. SFD Level: SFD Lite
Population: 150000
Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%

System label	Pop	F3	F4	F5	S4d	S5d	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 sewer system, which is delivered to treatment plants	Proportion of supernatant in sewer system that is 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
T1A3C10 Fully lined tank (sealed), no outlet or overflow	53.0	100.0	2.0	100.0				
T1A3C4 Fully lined tank (sealed) connected to a decentralised foul/separate sewer	2.0	100.0	2.0	100.0	100.0	100.0		
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	40.0	100.0	2.0	100.0			0.0	0.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	5.0	0.0	0.0	0.0				

Table 2: SFD Matrix for Aya Nagar

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

4.1 Offsite Systems

There is no sewerage network in Aya Nagar (Field Observation; KII-1, 2020). The village is completely dependent on on-site sanitation systems which may or may not be connected to open drains. The open drains in the city ends up in low lying area which are basicially ravines (Field Observation; KII-2, 2020). Majority of households in Aya Nagar have piped water supply. The source of water include DJB borewells and partly by Sonia Vihar Water Treatment Plant. There are some households which are dependent upon water tankers (Field Observation; KII-3, 2020; KII-4, 2020). There are 2 Johars[5] in Aya Nagar named as village johar and colony johar which receive the wastewater from village & colony area respectively and then entire wastewater flows into ravines. The wastewater from ravines is pumped back for horticulture purposes

Figure 1: Wastewater Flow in Aya Nagar: 1. Village Johar, 2. Wastewater flow into Ravines 3. Use of motor pump to reutilize wastewater for horticulture purpose (Ekta/CSE, 2020)

[5] Delhi Urban Art Commission (DUAC): Aya Nagar Urban Development

4.2 On-site Sanitation Systems

Containment: Based on sample household survey, KIIs and FGDs with relevant stakeholders, it was concluded that 100% population of the village is dependent on the On-site Sanitation Systems (OSS) (Field Observation; KII- 1, 2020; KII- 5, 2020; FGD-1, 2020). The containment systems prevalent in the city are fully lined tank (FLT) connected to decentralized foul/separate sewer (T1A3C4, 2%), fully lined tank (FLT) connected to an open drain or storm sewer (T1A3C6, 40%), fully lined tank (FLT) no outlet or oveflow (T1A3C10, 53%) and Lined pit with semi-permeable walls and open bottom, no outlet or overflow (T1A5C10, 5%) (Field Observation; KII- 1, 2020; KII- 5, 2020; FGD-1, 2020).

The general size of FLTs varies from 8 – 10 ft * 5 – 10 ft * 6 – 12 ft, depending upon the household size, income level, community, etc (Field Observation; KII-1, 2020; KII-5, 2020; FGD-1 & 2, 2020). The FLTs which are mostly single chambered with impermeable walls & sealed vaults.

Figure 2: FLT no outlet/overflow (an outlet located outside at every household for an easy accessibility to private emptiers) and FLT connected to open drains (Ekta/CSE, 2020)

Community Toilets/Public Toilets: There are 4 PTs and 0 CTs in Aya Nagar which have FLT no outlet or overflow (Field Observation, KII-1, 2020; KII-6, 2020). These public toilets are under the maintainence of SDMC but are not functional due to COVID-19 lockdown. The PTs are free of cost for users except one at Arjan Garh Metro Station. The average size of fully lined tanks in public toilet is 10 x 10 x 10 ft which is emptied every 5 times in a year (KII-1, 2020; KII-6, 2020).

Figure 3: FLT no outlet or overflow in bus stand PT (Source: Ekta/CSE, 2020)

There are no instances of open defecation observed in the village as every household has their own individual toilets (Field Observation).

Emptying: The locality is dependent on privately operated mechanised desludging service for emptying faecal sludge from FLTs (Field Observation; FGD-1, 2020; KII-5, 2020). The emptying frequency varies from once in a month to once in a year (demand based) depending upon the nature and the size of containment system (HH surveys; FGD-1, 2020). During field visits, it has been observed that most of the households in the locality have large family size (including tenents / paying guests) which creates the need for frequent emptying services. There are total 32 private vacuum trucks plying in the village, out of which 24 are functional (KII-5, 2020; FGD-1, 2020). Each of these vacuum trucks are GPS enabled, equipped with motorised pumps and have a storage capacity of 5000-6000 L (KII-5, 2020; FGD-1, 2020). In order to carry out the work in narrow and congested areas, these vehicles are equipped with ~100 ft long hose.

Figure 4: 1. Emptying process in HH; 2. Assembly point for vehicles; 3. Installed GPS tracking app (Source: Ekta/CSE, 2020)

The records are maintained in a common register by the private operator at the time of emptying service (KII-5, 2020; FGD-1, 2020). The GPS is installed by the owner of private vaccumm tankers for tracking no. of trips and FS discharge at designated disposal points. However, the installed GPS is under process to be notified by DJB in order to restrict illegal disposal and better utilization of STP (KII-5, 2020). Emptying service is carried out by 2 workers and charges are varying from INR 600 to INR 2500 based on the containment size and service area (HH Surveys; KII-5, 2020; FGD-1, 2020). DJB has fixed the emptying charges at INR 1200/- but private operators charges on a higher side due to difficulty in accessing the narrow lanes (HH Surveys; KII-5, 2020; FGD-1, 2020). All the vehicles are licensed under DJB (KII-5, 2020).

Figure 5: 1. Register maintained by private operator; 2. FS disposal at Ghitorni drainage line (Source: Ekta/CSE, 2020)

All the private emptying vehicles are maintained properly by private operators at the designated depot (Field Observation). The private emptiers are provided with Personal Protective Equipments (PPEs) which they partially use it while emptying (FGD-1, 2020). The emptying services for the public toilets is carried out periodically by the SDMC service providers and hence free of cost (KII-6; 2020).

Manual scavenging persist in Aya Nagar for mainly removing sludge from containment systems (FGD-2, 2020). There are around 8 manual scavengers and they charge fee varying from INR 500 – INR 15000 based on size of containment and number of labourers required (FGD-2, 2020). They use PPEs while removing sludge using spade/buckets which is loaded into a tractor (FGD-2, 2020). The situation also rises in the areas which are inaccessible for mechanical emptying process (FGD-2,2020).

Figure 6: Private Vaccumm Truck (Source: Ekta/CSE, 2020)

Transportation: The emptied septage is transported through the truck mounted vacuum trucks in around 2-3 trips per day (KII-5, 2020; FGD-1, 2020). Average 1100 trips/month are made for emptying of FS in Aya Nagar (KII-5, 2020; FGD-1, 2020). The

emptied faecal sludge (FS) by vacuum trucks is discharged into nearby farmlands, drainage line (Ghitorni) and trunk sewers in the vicinity (Field Observation, FGD-1, 2020).

About 100% of FS is getting emptied (F3) due to high demand but negligible amount is develivered to treatment facility due to illegal FS disposal in nearby open areas. Therefore, variable F4 is considered 2% in SFD matrix

Treatment/Disposal: There is STP of 5 MGD capacity in Qutub Minar which is designated for disposal of FS from Aya Nagar, Vasant Kunj and Chattarpur area (Field Observation; KII-1, 2020; KII-5, 2020; KII-7, 2020). However, at present only 3 vaccumm trucks out of the total 24 vaccum trucks from Aya Nagar dispose off at STP due to longer distances (KII-7, 2020). The STP is functioning well to its full capacity while complying with CPCB discharge standards (KII-7, 2020). The treated wastewater (around 4 MGD) is used for horticulture purpose and excess is released into nearby nallahs (KII-7, 2020). The sludge generated at STP is stored in sludge drying beds and given to the farmers or used for horticulture purpose (KII-7, 2020).

Figure 7: 1. Disposal of FS in STP inlet; 2. STP Qutub Minar; 3. Sludge drying bed at STP (Source: Ekta/CSE, 2020)

Aya Nagar has recently implemented pilot Decentralised Wastewater Treatment project[6] based on constructed wetland (reed bed) of 100 KLD capacity for wastewater treatment of Z Block area. The block has around 80 households. These households have onsite sanitation systems. The outlet of these onsite sanitation system (i.e. supernatant) and grey water is connected to biodigesters. These biodigesters are further connected to Decentralized Wastewater Treatment system via small bore sewers. The final treated wastewater from the outlet gets mixed with drains flowing into Johar (Field Observation; KII-8, 2020). However, the plans are to utilize the treated wastewater in public parks, school gardens, maintaining water flow in Johar (KII-8, 2020). Both SN & FS is delivered to treatment plant is getting treated. Therefore, varaibale F5, S4d & S5d is considered 100% in SFD Matrix.

Figure 8: Decentralized Wastewate Treatment Plant (Reed-Bed) in Z Block Aya Nagar (Source: Ekta/CSE, 2020)

[6] Sanitation Improvement Plan for Aya Nagar, Delhi

5 Data and assumptions

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

- 50% of the contents of Septic tanks and Fully lined tank is Faecal sludge
- Proportion of wastewater & supernatant conveyed to decentralized pilot project from Z block is estimated to be 100%
- Proportion of OSS emptied is considered as 100% because of its frequent emptying cycle,.

6 List of data sources

Reports and literature

- District Census Handbook 2011 for Village & Town Directory, NCT of Delhi (Houses and household amenities and assets table HH-08: percentage of households by availability of the type of Latrine Facility https://www.censusindia.gov.in/2011census/Hlo-series/HH08.html
- Greha Proposal for the Development of an Eco Park in Aya Nagar, New Delhi, Jan 2008
- Delhi Urban Art Commission (DUAC): Aya Nagar Urban Development - Planned Development of Unauthorized Colonies, January 2014
- Greha: Aya Nagar Development Project- Action Programme, 2009
- Sanitation Improvement Plan for Aya Nagar, Delhi, 2020
- MoUD. 2017. National Policy on Faecal Sludge and Septage Management. Ministry of Urban Development
- MoUD. 2014. Guidelines for Swachh Bharat Mission.: Ministry of Urban Development. Government of India.
- MoUD. 2013. Septage Management in Urban India. Ministry of Urban Development, Government of India.

Key Informant Interviews (KII)

- KII-1, 2020; Interview with Mr Manoj Chaudhary, Ward Parshad, Aya Nagar
- KII-2, 2020; Interview with Mr Ashish Ganju, Greha NGO
- KII-3, 2020; Interview with Khan Singh, DJB Water Pumping Station Operator, Baba Mohalla, Aya Nagar
- KII-4, 2020; Interview with Satish Kumar, Assistant Engineer, DJB
- KII-5, 2020; Interview with Mr Vinod Kumar, Private Vacuum Tanker Operator
- KII-6, 2020; Interview with Mr Ghanshyam, Sanitary Inspector, SDMC
- KII-7, 2020; Interview with Babu Khan, STP O&M Incharge, Qutub Minar
- KII-8, 2020; Interview with Manoj Jha, Director, Arkins
- KII-9, 2020; Interview with Mr Madan Singh Negi, RWA President, Aya Nagar

Focus Group Discussions (FGD)

- FGD-1, 2020; Focus Group Discussion with Emptying Service Providers
- FGD-2, 2020; Focus Group Discussion with Manual Scavengers

Field Observations

- Survey of Public toilet (4 nos)
- Visit to Qutub Minar Sewage Treatment Plant
- Visit to Decentralized Wastewater Treatment Plant (reedbed system)
- Visit to approximate 30 households covering village & colony areas spread throughout Aya Nagar.

Aya Nagar, India, 2020

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