

SFD LiteReport

Tinsukia India

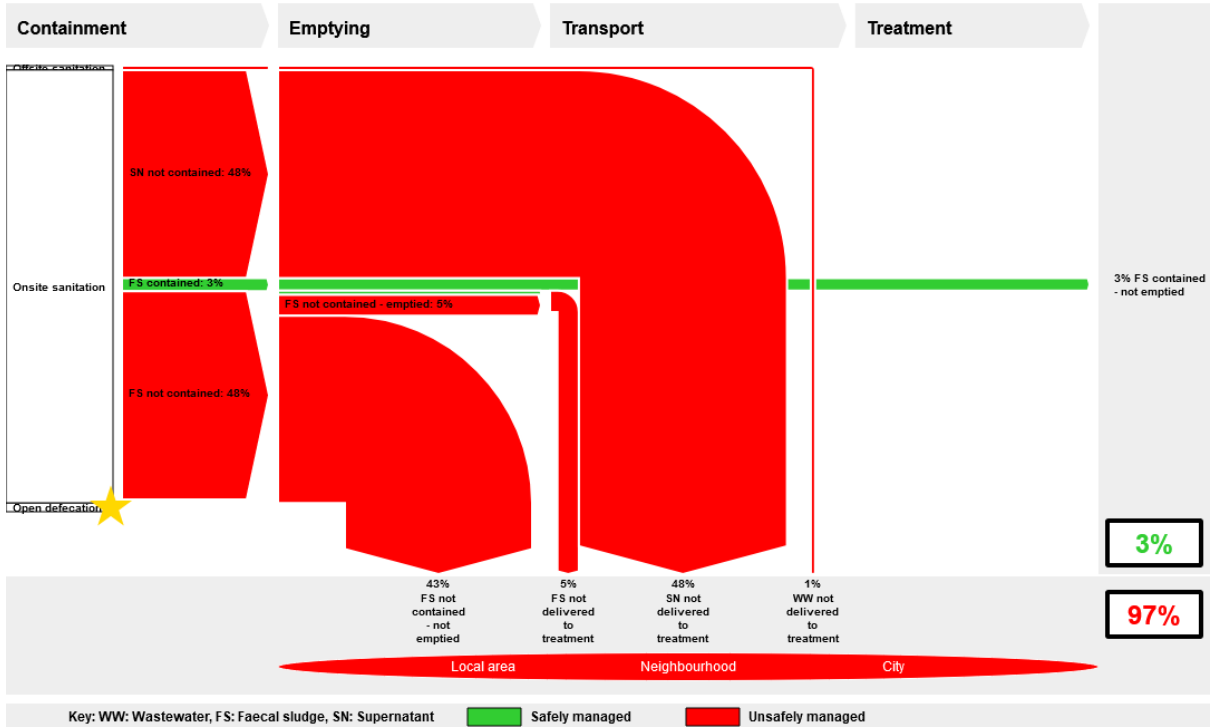
This SFD LiteReport was prepared by
Vikash K Agarwal.

Date of production/last update: 28/09/2020

1 The SFD Graphic

Tinsukia, Assam, India
Version: Draft
SFD Level: SFD Lite

Date prepared: 28 Sep 2020
Prepared by: Vikash K Agarwal



2 SFD Lite information

Produced by:

- Vikash K Agarwal
- 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 MrNiluramSharma, Executive Officer; TMB; Mr Prasanta Kr Gogoi, Former Executive Officer; TMB; MrNabjyotiDas, Junior Engineer; TMB; MrNitumaniPatowary, City Project Officer; TMB and Dr Sanjay K Gupta, Director Care North East Foundation (NGO) and Project In-charge; ISWM Project of TMB for providing all the required secondary data and cooperating for Key Informant Interviews (KIIs) & Focused Group Discussions (FGDs).
- This report would not have been possible without the constant support of MrNabjyoti Das, Junior Engineer; TMB and MrNitumaniPatowary, City Project Officer; TMB who helped in conducting sample surveys and FGDs in the field.

Collaborating partners:

- Centre for Science & Environment, New Delhi, India
- Tinsukia Municipal Board (TMB), Tinsukia, Assam

Date of production: 28/09/2020

3 General city information

Tinsukia, the headquarter town of Tinsukia district, is situated on NH-37 in the north-eastern part of the state of Assam, India. Originally Tinsukia was the capital of Motok Kingdom and was known as 'Changmai Pathar.' Located at a distance of 491 km east of State Capital, Dispur, it is strategically connected to surrounding tea gardens, oil towns, coalfields, orange cultivations and other agricultural products. Tinsukia is considered as a major commercial centre in Upper Assam¹.

The Urban Local Body (ULB) governing Tinsukia is Tinsukia Municipal Board (TMB) which is divided into 15 wards¹. According to 2011 census, the population of the city was 99,448 and total number of households was 26,405 and spread across an area of 10.52 sq. km². The projected population for the year 2020 is 1,39,000³. The municipal boundary and current population is used for preparation of SFD. There is an average daily footfall of around 10,000 individuals, being a commercial hub and availability of health and community facilities for nearby villages⁴.

Table 1: Population Growth rate Tinsukia (Source: Census, 2011)

Census Year	Population	Growth Rate (%)	Source
2001	82,990		Census 2001
2011	99,448	1.65	Census 2011
2014	105,694	0.59	TMB
2020	1,39,000	2.40	TMB

Tinsukia is located at mean elevation of about 116 msl at 27.4886° N, 95.3558° E. The soil type varies from sandy loam to clayey in nature⁵. Tinsukia has a max temperature in summers of 31°C and min temperature in winter less than 10°C and average annual rainfall of about 2,758 mm⁵. The risk of groundwater contamination is insignificant as the depth of groundwater is considered at >12 metres⁶. Due to presence of contaminants (particularly Fe) in groundwater, boring for drinking water is usually done beyond 12 metres and up to 30 metres depth⁶. The water supplied in the city is predominantly through borewells and tubewells⁶.

¹ TMB Profile, 2014; DPR - ISWM Project (TMB, 2018)

² District Census Handbook 2011 of Tinsukia

³ ULB data, 2019; KII-2, 2020; KII-3, 2020; KII-4, 2020

⁴ KII-3, 2020; KII-4, 2020; FGD-3, 2020; DPR - ISWM Project (TMB, 2018); Field Observations

⁵ DPR - ISWM Project (TMB, 2018); <https://en.climate-data.org/asia/india/assam/tinsukia-24719/>;

<https://indikosh.com/city/306217/tinsukia>

⁶ CGWB Report (Tinsukia District), 2014; FGD-2, 2020; FGD-4, 2020; FGD-5, 2020; FGD-6, 2020; FGD-7, 2020

4 Service outcomes

Tinsukia, Assam, India, 28 Sep 2020. SFD Level: SFD Lite

Population: 139000

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

System label	Pop	W4c	W5c	F3	F4	F5	S4e	S5e
System description	Proportion of population using this type of system	Proportion of wastewater in open sewer or storm drain system, which is delivered to treatment plants	Proportion of wastewater delivered to treatment plants, which is treated	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated	Proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A1C6 Toilet discharges directly to open drain or storm sewer	1.0	0.0	0.0					
T1A2C5 Septic tank connected to soak pit	3.0			30.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	25.0			30.0	0.0	0.0	0.0	0.0
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	70.0			30.0	0.0	0.0	0.0	0.0
T1B10C6 Containment (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - connected to open drain or storm sewer	1.0			30.0	0.0	0.0	0.0	0.0

Table 2: SFD Matrix for Tinsukia

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 Tinsukia⁷. The city is completely dependent on On-site Sanitation Systems (OSS) which may or may not be connected to open drains. The



Figure 2: Night Soil discharged directly into open drains

effectiveness of opendrain sare reduced due to indiscriminate dumping of solid waste and encroachment at different locations of the city. River Dibru (on the north) and river Tingrai (on the south) cater to the run-off from the municipal boundary⁸.



Figure 1: Open drains in slum area of Tinsukia

Around 1% (T1A1C6) of the population are connected to toilet discharges directly to open drain i.e. Night Soil disposed in Open Drain (NSOD)⁹. This can be majorly attributed to the presence of poor toilet infrastructure in the slum areas located within the municipal boundary⁹.

⁷ KII-3, 2020; FGD-1, 2020; FGD-2, 2020; FGD-6, 2020; FGD-7, 2020; Field Observations

⁸ TMB Profile, 2014; DPR - ISWM Project (TMB, 2018); KII-3, 2020; KII-4, 2020; Field Observations

⁹ FGD-1, 2020; FGD-6, 2020; KII-3, 2020; KII-4, 2020; Field Observations

Tinsukia generates an average of 15 MLD of wastewater¹⁰. Presently, the wastewater/supernatant from households is directly discharged into open grounds/nullahs¹⁰. Therefore, the variable W4c& W5c is considered 0% in SFD matrix.

4.2 On-site Sanitation Systems

Containment: Based on sample household surveys, KIIs and FGDs with relevant stakeholders, it was concluded that approximately 99% population of the city is dependent on the On-site Sanitation Systems (OSS)¹¹. The containment systems prevalent in the city are septic tank connected to soak pit (T1A2C5, 3%), septic tank connected to open drain or storm sewer (T1A2C6, 25%), fully lined tank connected to an open

drain or storm sewer (T1A3C6, 70%) and containment failed or damaged connected to an open drain or storm sewer (T1B10C6, 1%).

The general size of on-site containment system varies from 3 cum to 10 cum depending upon the household size, income level, community, etc.¹² The minimum and maximum depth of on-site containment system ranges from 1.8 m to 2.4 m¹². The STs are mostly two or three chambered with sealed vaults including plastered bottom. However, these septic tanks do

not necessarily adhere to the design specification of Bureau of Indian Standards (BIS) and are usually built according to the general designs followed by masons and architects¹².

The containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded connected to open drain or storm sewer are more prevalent in slums or in low-income areas¹². Few households with sufficient open land space have also built soakpits which are not confined to one particular locality¹².

Community Toilets/Public Toilets: Under the recent scheme of Swachh Bharat Mission, TMB has constructed 196 individual household toilets connected to twin pit latrine within the administrative boundary¹³. There are two community toilets (CTs) and seven public toilets (PTs) in the city which have STs connected to open drain or storm sewer¹⁴. CTs are more prevalent in slums¹⁴.

The average size of septic tanks in community toilet is 3.0 x 1.8 x 2.1 m and the average size of septic tanks in public toilet is 1.8 x 1.2 x 2.4 m which is manually emptied in 2-3 years¹⁴.



Figure 3: Septic Tank (3-chambered) in Ward no. 9



Figure 4: Septic Tank (3-chambered) in Ward no. 13 (Vikash/CSE/2020)



Figure 5: Community Toilet in Ward no. 13 (Vikash/CSE/2020)



Figure 6: Public Toilet in Ward no. 10 (Vikash/CSE/2020)

¹⁰TMB Profile, 2014; DPR - ISWM Project (TMB, 2018); FGD-4, 2020; FGD-5, 2020; FGD-6, 2020; FGD-7, 2020; KII-3, 2020; KII-4, 2020; Field Observations

¹¹FGD-4, 2020; FGD-5, 2020; FGD-6, 2020; FGD-7, 2020; KII-3, 2020; KII-4, 2020; Field Observations

¹² KII-3, 2020; FGD-1, 2020; FGD-2, 2020; FGD-5, 2020; FGD-6, 2020; FGD-7, 2020; Field Observations

¹³ KII-3, 2020; Field Observations

¹⁴ KII-3, 2020; FGD-3, 2020; FGD-6, 2020; FGD-7, 2020; Field Observations

Tinsukia was declared Open Defecation Free (ODF) in 2018¹⁵. However, during field visit, it was observed that poor toilet infrastructure or lack of adequate alternative toilet facilities in form of community/public toilets in slum areas (like Mazdoor Colony) can result in behavioural issue and such individuals have no choice other than defecating in open¹⁶. Also, during rainy season, flooding is prevalent in majority of the slum areas which results in waterlogging, exposing the population to a high risk of contamination¹⁶.

Emptying: The city is dependent on manually operated emptying services¹⁷. The emptying is infrequent and usually carried out at the time of backflow or damaged. However, the emptying frequency varies from 5-10 years (demand based) depending upon the nature and the size of containment system¹⁸. Manual emptying is carried out by 200 workers and charges are varying from INR 2,000 – 15,000 based on the containment size and service area¹⁸. These manual emptiers are primarily the habitants of one of the slum, *Harijan Colony*¹⁸. Around 2-8 workers are involved for one emptying service which is carried out by using spade and buckets¹⁸.



Figure 7: Manual emptying of septic tank (Vikash/CSE/2020)

Transportation: The emptied faecal sludge is transported through drums which requires 50 trips for the emptying of one containment system¹⁹. The drums have varying capacity of 20 litres to 210 litres each¹⁹. The manual emptiers use around 2 drums for each emptying service which is being discharged into open ground or open drains as per their convenience which does not attract any public attention¹⁹. As a consequence, there is considerable public health hazard in the neighbourhood.

The open drains carrying faecal sludge is conveyed into big drains/nullahs which ultimately ends up in River Dibru (on the north) and River Tingrai (on the south)²⁰. Also, some of the drains overflow into open grounds, ponds or are stagnant, owing to blockage or encroachment²⁰. Therefore, variable F4 & S4e is considered 0% in SFD matrix.



Figure 8: Faecal sludge discharged into open drains (Vikash/CSE/2020)

Treatment/Disposal: Tinsukia Municipal Board has no designated site and treatment facility for the disposal and treatment of Faecal Sludge²¹. Therefore in the absence of such provision, the manual emptier discharge the faecal sludge in open ground, nullahs etc. Since there is no proper treatment of emptied faecal sludge, F5 & S5e is considered 0% in SFD matrix.

¹⁵ KII-2, 2020; KII-3, 2020

¹⁶ FGD-6, 2020; Field Observations

¹⁷ KII-2, 2020; KII-3, 2020; FGD-1, 2020; FGD-3, 2020; FGD-6, 2020; FGD-7, 2020; Field Observations

¹⁸ KII-4, 2020; FGD-1, 2020; FGD-6, 2020; FGD-7, 2020; Field Observations

¹⁹ FGD-1, 2020; FGD-6, 2020; FGD-7, 2020; Field Observations

²⁰ DPR – ISWM Project (TMB, 2018); KII-3, 2020; FGD-1, 2020; Field Observations

²¹ KII-2, 2020; KII-3, 2020; KII-4, 2020; FGD-1, 2020; Field Observations

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 and secondary data collected from relevant stakeholders. Following assumptions were made for developing the SFD for Tinsukia.

- 50% of the contents of Septic tanks and Fully lined tank is Faecal sludge
- Volume of wastewater generated is 80% of water supplied
- Effective population is calculated on the basis of KII with relevant stakeholders
- Proportion of OSS emptied is considered as 30% based on the average no. of households emptied on annual basis divided by total no. of households while considering 3 years of minimum required emptying process

6 Context adapted SFD Graphic

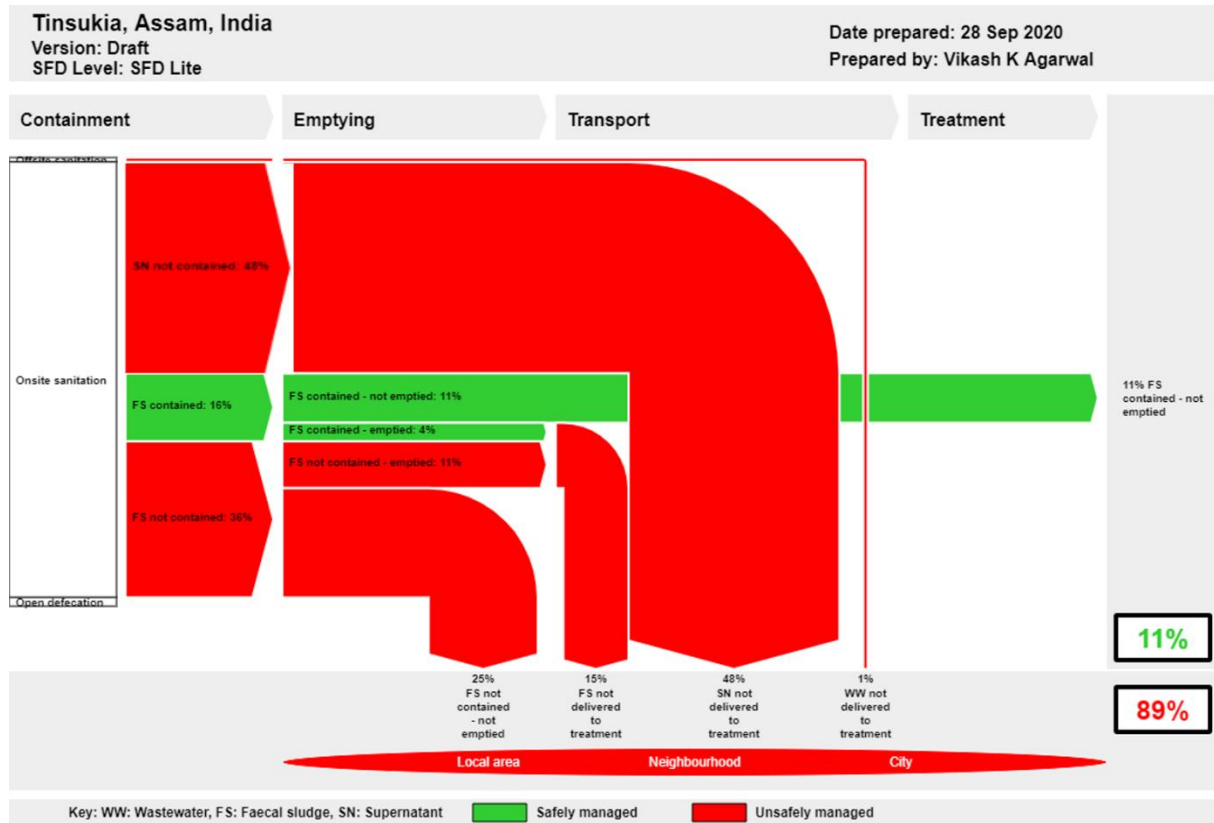


Figure 9: Context adapted SFD Graphic for Tinsukia

The only difference suggested in the context adapted SFD Graphic is at containment stage for correctly designed septic tanks, though connected to open drains. With an earlier assumption of 50% of the proportion of the content of the septic tank which is solid FS, generated and collected inside the septic tanks. 50% of the content is supernatant which attributes to be 48% of the population flows through open drains hence, not contained. The solid FS collected in the septic tank is considered to be contained and hence 16% of FS is contained (represented green in colour at containment stage). Followed by this, 4% FS contained is emptied, remaining 11% is FS remains in the tank which is contained and never emptied. The supernatant generated from the septic tank connected to open drain is not contained and hence considered to be unsafely managed (represented red in colour). Overall, excreta of 89% population is not managed according to the context adapted SFD.

7 List of data sources

Reports and literature

- 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>
- Tinsukia Municipal Board Profile, 2014
- Tinsukia Slum Profile, 2012
- DPR – Integrated Solid Waste Management (ISWM) Project (TMB, 2018)
- TMB data, 2019

Key Informant Interviews (KIIs)

- KII-1, 2020; Interview with Mr Prasanta Kr Gogoi, Former Executive Officer; TMB
- KII-2, 2020; Interview with Mr Nabjyoti Das, Junior Engineer; TMB
- KII-3, 2020; Interview with Mr Nitumani Patowary, City Project Officer; TMB
- KII-4, 2020; Interview with Dr Sanjay K Gupta, Director; Care North East Foundation (NGO) and Project In-charge; ISWM Project of TMB

Focus Group Discussions (FGDs)

- FGD-1, 2020; Focus Group Discussion with Manual Scavengers
- FGD-2, 2020; Focus Group Discussion with Mason
- FGD-3, 2020; Focus Group Discussion with maintenance staff of public toilets
- FGD-4, 2020; Focus Group Discussion with Plumbers
- FGD-5, 2020; Focus Group Discussion with Architects & Engineers
- FGD-6, 2020; Focus Group Discussion with Random HHs in Slum Areas
- FGD-7, 2020; Focus Group Discussion with Random HHs in Municipal area

Field Observations

- Survey of public toilet (5nos) and community toilet (2 nos)
- Visit to approximate 70 households covering Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG) spread throughout the city

Tinsukia, India, 2020

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