SFD Report

Darjeeling
India

Final Report

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SFD Report Darjeeling, India, 2025

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1. The SFD Graphic

Darjeeling, West Bengal, India
Version: Reviewed
SFD Level: 3 Comprehensive SFD

Date prepared: 11 Dec 2024
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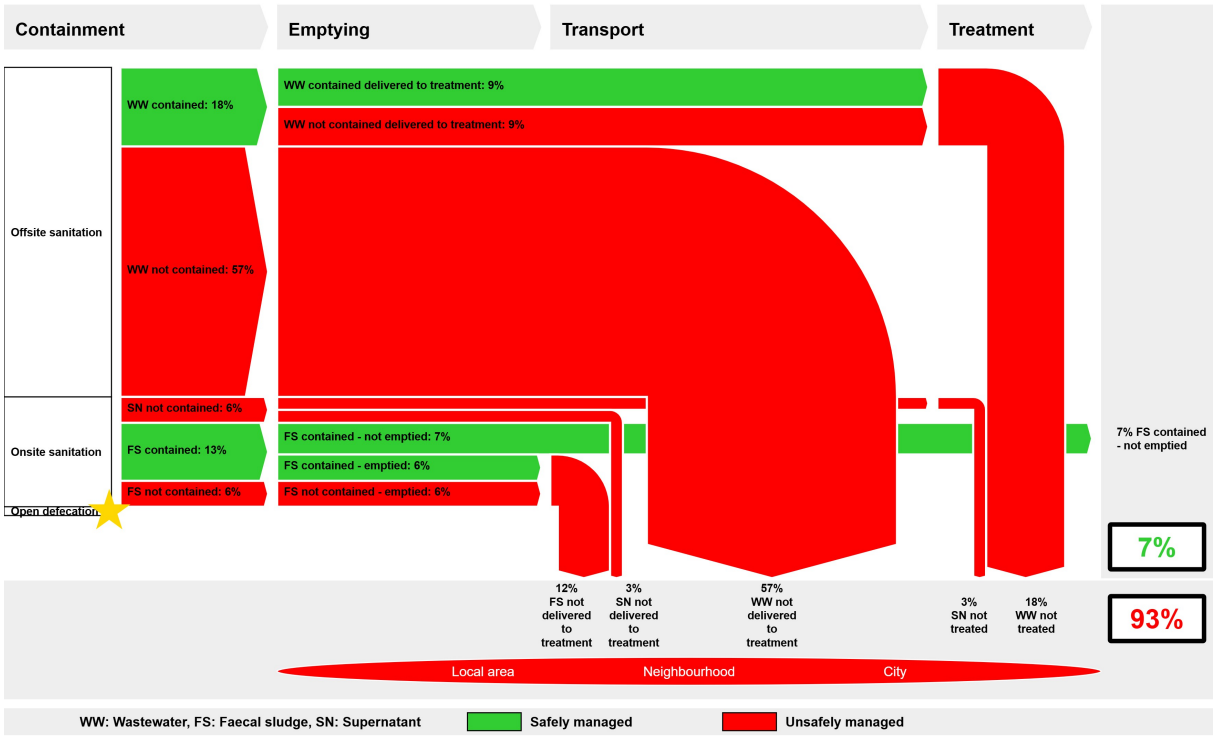

The SFD Promotion Initiative recommends preparation of a report on the city context the analysis carried out and data sources used to produce this graphic.
Full details on how to create an SFD Report are available at sfd.susana.org

2. Diagram information

SFD Level: level 3 - Comprehensive report.

Produced by:
National Institute of Urban Affairs (NIUA). New Delhi with the help of Darjeeling Municipality (DM).

Status:
Final SFD report.

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3. General city information

Darjeeling is located on the northernmost edge of the state of West Bengal with the geological coordinates 27°2′15″ N, 88° 15′ 47″ E and has an elevation of 2042m from the mean sea level, it consists of four major sub-divisions, namely Darjeeling Sadar, Kurseong, Siliguri and Mirik. The Darjeeling Sadar division consists of the Darjeeling Municipality (DM), which is the governing body administering an area of 10.57 km^2, (Ray B, 1961) followed by a total of 32 wards. The connectivity in the town relies on two major transport systems: railways and roadways. The railway system now primarily serves as a tourist attraction, with major connectivity relying on the road network, which expands from Siliguri to Bagdogra's airport, which is the nearest airport to the city. According to the Census of India, 2011 the population of Darjeeling city was 118,805, using the geometric increase[1] method, the population for 2024 is projected to be 165,049. Darjeeling, also known as the "Queen of Hills", sees a monthly footfall of 84,000 visitors (Koner et al. 2021) contributing to the floating population; hence, a total population of 245,049 is considered for the SFD preparation.

Darjeeling has a warm-humid climate with four seasons. Summers (May–July) are mild (11–19°C) with occasional rain, while monsoons (June–September) bring heavy rainfall, peaking in July (700–1,000 mm). Winters (December–February) are cold (2–10°C) with occasional snowfall, and spring and autumn (6–18°C) offer pleasant views of tea plantations and snow-capped peaks with avg. annual rainfall of 3,000–3,800mm (Governmental of West Bengal, 2024).

[1] The geometric increase method was chosen for population projection as it aligns with the approach taken by the Darjeeling Municipality, as indicated during Focus Group Discussions.

4. Service outcomes

Overview of technologies and methods used for different sanitation systems through the sanitation service chain, which includes Containment, Emptying, Transport and Treatment facilities.

Containment: Roughly half of the town is partially sewered i.e. there is a mix of three kinds of systems – 1) Households connected to onsite systems, 2) Households connected to open drains and 3) Households connected to decentralised sewers. The other half of the town does not have any sewerage system, but the other two systems i.e. type 1 and 2 (mentioned above) are prevalent. The field survey revealed that 25% of the households, across the town are dependent upon the Onsite Sanitation Systems (OSS), which include 5.9% as septic tanks connected to open drains or storm sewers, 5.9% as septic tanks connected to soak pit, 6.1% as fully lined tanks (sealed) connected to a soak pit, 5.9% as fully lined tank (sealed) connected to the open drain or storm sewer and 1.2% as unlined pit with no outlet or overflow.

Figure 1 : Public Toilet in Ward 11, Darjeeling City (Source: Sachin/NIUA/2024).

Therefore, rest of the 75% of the households can be considered dependent on offsite sanitation systems. Since half of the town is partially sewered we can consider that 37.5% population are solely dependent on open drains and 37.5% population is dependent on both open drains and sewers. Furthermore, these sewers are very old and dilapidated and often found ending up in drains. Differentiating percentage of population solely dependent on sewers is difficult, therefore it is considered that 18.5% (approximately 50% of 37.5%) of households are dependent on sewers. Hence the overall percentage of households where toilets are directly connected to drains become 57% (19% + 37.5% = 56.5%~ 57%). According to government records, all households have access to toilets. However, few instances of open defecation were observed during the field visit. This can be attributed to a behavioural issue.

Emptying: Conservancy department of Darjeeling Municipality used to provide emptying services but discontinued the same after the breakdown of their solitary vehicle. Privately owned vacuum tankers stationed at Siliguri, 60 km away from Darjeeling town, on the other hand, mostly cater to the emptying demand of commercial establishments and institutions. During the survey, households responded that manual emptying is practiced by private emptiers. The emptying service charges range between 800 and 6,000 INR (9.53 to 71.50 USD). The household surveys also revealed that all OSS are emptied except unlined pits, averaging every 4 years (~3.39), which translates to 100% emptying of these containment systems. The septic tank and fully lined tank connected to soak pits are contained systems, hence faecal sludge (FS) emptied (3% from each system) is considered contained, making FS contained emptied as 6%. Approximately FS from 6% households percolates in the ground through soak pits (3% connected to septic tank and 3% connected to fully lined tank) and hence contributes to FS not emptied. Another FS of another 1.2% households percolates in ground via unlined pits, making the total FS not emptied equal to ~7%. As septic tanks and fully lined tanks (corresponding to 12% population) are connected to open drain, it is a 'not contained' system, hence both FS and supernatant (SN) produced from these systems is not contained. It was challenging to determine the exact percentage of effluent[2] (i.e. SN) and FS generated from the OSS; to reduce discrepancies, we assumed that 50% of contents of onsite systems corresponds to FS and rest of the 50% is SN. Hence FS not contained but emptied comes out to be 6%.

Figure 2 : Desludging vehicle used for emptying of OSS (Source: Sachin/NIUA/2024).

Transport: In the case of off-site sanitation systems, the sewer networks established under various missions and programs were observed to be incomplete during the field survey. Additionally, the decentralized sewers

[2] Supernatant is the effluent that comes out of the containment unit like a septic tank, fully lined tank, etc, there can be suspended faecal sludge present in the effluent, so, it can also be addressed as "liquid waste".

laid by the Britishers have reached the end of their designed life, resulting in a deteriorated and dilapidated sewerage system. These sewers were originally designed to transport used water to five community-level septic tanks, which were also built during that period.

The second system, in which the toilet discharges directly into open drains, exists alongside the decentralized sewer network. These drains were found to carry human excreta along with domestic waste such as used clothes and plastic bottles. As discussed in the previous section, used water of approximately 18.5% households flows through these sewers and used water of roughly 57% of households flows in open drains. However, due to the uncertainty in rationalizing how these open drains mixed with the decentralized sewer network before reaching the community-level septic tanks, it was assumed that 50% of the used water flowing in these sewers reaches the community septic tanks via intact sewers (corresponding to 9% population) and the rest of the 50% (~9% population) reaches via dilapidated/leaking sewers (combination of drains and sewers) corresponding to waste water[3] (WW) not contained but delivered to treatment plant.

During the household surveys, three major outflowing drains were identified: Victoria Falls, Kag Jhora and W. Point Jhora, as these drains were located to the east of the city, the majority of them flowed naturally downslope into the Rangeet river. Open drains also convey the used water from the southern part of the city into the Balason river. For the Onsite systems, the government-owned emptying vehicle (when operational) used to make 5-10 trips a month charging a fee of 8,500 INR[4] (101.30 USD) per trip. The emptied faecal sludge was transported to the dumpsite, located near the crematorium, within the city premises.

On the other hand, the private emptiers discharge the collected faecal sludge into the nearest drain to save time and reduce the haulage distance (and hence save fuel cost). Therefore, 0% of the emptied sludge is considered to be safely transported from all the OSS, which corresponds to faecal sludge from 12% of households not delivered to treatment.

In the SFD, SN not contained is considered 6% (50% of 12% population dependent on OSS). It is not contained as it flows through the open drains and eventually gets discharged into environment.

Treatment and Disposal: The effluent (i.e. Supernatant (SN)) from the community-level septic tanks gets discharged into the open drains that flows beyond city boundaries. These community-level septic tanks are located at five different locations, namely Bazar Point, Wilson, Kakjhora, Bhutia Busty and Tukvar. During the household surveys, all these community septic tanks were found non-operational. Since the treatment efficiency of these septic tanks couldn't be evaluated, the treatment efficiency for these systems is considered to be 0%. As there is no faecal sludge Treatment Plant (FSTP) present in the town, the emptied faecal sludge/septage from OSS is considered to be not treated.

The SFD graphic shows that excreta generated from 7% of the population is safely managed while 93% of the population is unsafely managed. However, safely managed FS generated from that 7% of population is temporary as the FS has not been emptied. The proportion of safely managed FS will become unsafely managed once the containments start filling up.

5. Service delivery context

The National Urban Sanitation Policy (NUSP) was issued in 2008 by the Ministry of Housing and Urban Affairs (MoHUA), formerly known as the Ministry of Urban Development (MoUD). The policy's pedagogy aligned with the Swachh Bharat Mission's (SBM) objectives of raising sanitation awareness; promoting behavioral change; achieving open defecation-free cities; developing citywide sanitation plans; and providing 100% safe containment, transport, treatment, and disposal of human excreta and liquid waste. The approach also commanded states to create Urban Sanitation rules and work along with Cities to develop their particular City Sanitation Plans. NUSP's framework also carves the constitution of the multi-stakeholder task force, known as the City Sanitation Task Force (CSTF), as one of the principal activities to be addressed before the commencement of the City Sanitation Planning process. CSTF has now been renamed as the Swachh Bharat City level task force (SBCLTF).

Anchoring the Water (Prevention and Control of Pollution) Act of 1974 and the Environmental Protection Act (EPA) of 1986, as it has provisioned individuals and cities with regards to the disposal of wastes into the surrounding environment and made every individual liable for protecting it. The Urban Local Bodies (ULBs) are also liable to comply with

[3] Wastewater and Used water are used interchangeably.
[4] 1 $ = 83.91 INR

regulations issued by Central Pollution Control Board (CPCB). In February 2017, the National Policy on Faecal Sludge and Septage Management (NFSSM) was issued by MoHUA, for contextualising and facilitating the nationwide implementation of Faecal Sludge and Septage Management (FSSM) services across all the cities and states. Central schemes like the Swachh Bharat Mission (SBM) launched in 2014, identified as "Nirmal Bangla" in West Bengal, focused on eradicating Open defecation by providing everyone with access to toilet, the mission achieved its objective of making urban India ODF in its phase 1, with the phase 2 (i.e. SBM 2.0) commencing in the year 2021, addressed the objective of sustaining the ODF status and encourage ULBs/city and the state towards achieving ODF+, ODF++ and water+ status, ODF+ status ensured no open defecation and well-maintained, functional public and community toilets; whereas an ODF++ status demanded, ODF+ standards and included safe management of faecal sludge, with mechanized cleaning of sewers and septic tanks. In the year 2010, Darjeeling Municipality applied for a sewerage scheme fund amounting to a cost of INR 4,511.34 lakhs (5,402,796 USD) through the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). However, the funds were not sanctioned, and the implementation was never carried out. Leveraging various central schemes, such as Atal Mission for Urban Rejuvenation and Transformation (AMRUT), SBM 2.0 and financial funds under the 15th Finance Commission (FC), the annual budget of Darjeeling Municipality for the fiscal year 2024-25 reflected about the amount of ₹200,000 (2,395 USD) available for the sewerage connection fee, with additional ₹50 crore (5,988,024 USD) available under AMRUT 2.0 and ₹70,85,060 (84,865 USD) under SBM 2.0. According to Darjeeling Municipality, these funds will be utilised for enhancing water supply and managing solid waste in the city. Considering the Septage Management Policy of West Bengal, Darjeeling District is enlisted under the Non-Kolkata Metropolitan Area (Non-KMA), the strategy for FSSM for Darjeeling Municipality will be to either set an STP with a co-treatment facility or a standalone FSTP for the given time frame of 2024-25.

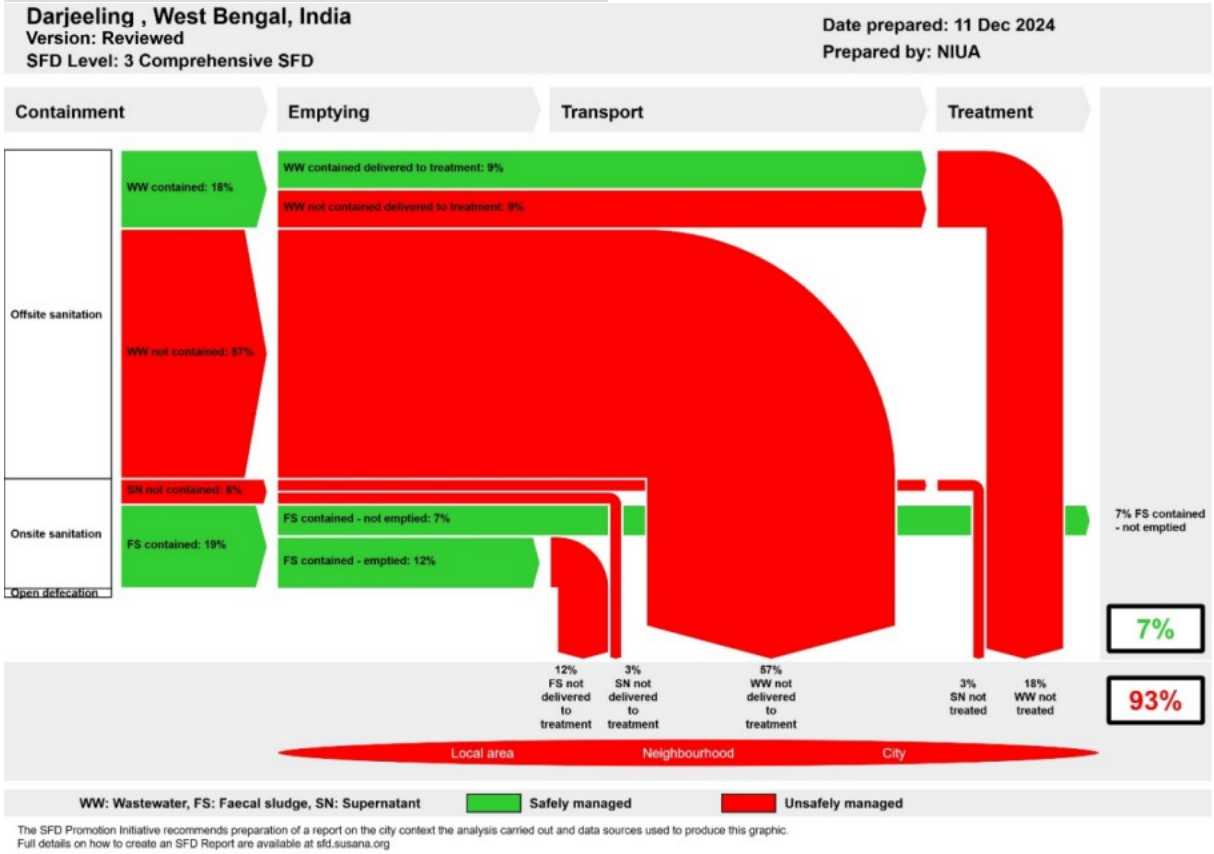
6. Overview of stakeholders

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), but have resulted into conflicts in roles allocation and responsibilities between state and other parastatal bodies. The Water Works Department (WWD) is responsible for planning, designing, and constructing/developing assets in the sewerage and drainage. In contrast, Darjeeling Municipality (DM) is responsible for the operation and maintenance of assets (Ministry of Urban Development, 2013). Urban Development & Municipal Affairs Department-West Bengal (UDMAD-WB) is accountable for the administrative and financial management of municipalities and the implementation of development programmes. West Bengal Pollution Control Board (WB-PCB) is responsible for monitoring and evaluating water resources and quality parameters. State Urban Development Agency-West Bengal (SUDA-WB) is responsible for the implementation of central and state government schemes, DM is responsible for septage management, and SPMG Coordinates and oversees the implementation of projects sanctioned by the Government of India under the National Ganga Council (NGC). AMRUT is responsible for providing piped water supply at the household level for the given benchmark of 135 Lpcd.

Table 1: Key Stakeholders (Source: Compiled by NIUA, 2024).

Key Stakeholders	Institutions / Organizations /
Public Institutions	Ministry of Housing and Urban Affairs (MoHUA), Urban Development & Municipal Affairs Department-West Bengal (UDMAD-WB), State Urban Development Agency-West Bengal (SUDA-WB), Gorkhaland Territorial Administration (GTA), Water Works Department (WWD), Darjeeling Municipality (DM), West Bengal Pollution Control Board (WB-PCB), State Programme Management Group (SPMG)
Governmental Organizations (GOs)	National Institute of Urban Affairs (NIUA)
Private Sector	Private desludging operators, Manual emptiers, and Local masons.

7. Description of Context-adapted SFD



In context adapted SFD, there is a difference at the containment stage of onsite sanitation systems. The FS contained becomes 19% while it was 13% in the original SFD.

8. Description of context-adapted SFD graphic

According to FGDs and KIIs, the solid FS collected in the correctly designed septic tank and the fully lined tank should be considered contained as it's neither polluting the groundwater nor the solid excreta is seen floating in the open drains, since the FS collected in such systems is considered contained, there is 6% increase in the FS contained, at the containment stage, pushing the overall FS contained to 19% (represented green in colour), 12.4%~12% FS contained is emptied and 6.6%~7% percolates in the ground via soak pits, hence contributes to FS contained but not emptied.. The supernatant generated from septic tanks and fully lined tanks connected to open drains is not contained and, hence, considered to be unsafely managed (represented 6% SN red in colour at the containment stage). The 'FS not contained' changes from 6% to zero as 'FS contained' becomes 19% from 13%, and there is no change in SN, though FS contained and emptied increases from 7% to 12% (i.e. 12.4%), with no change to 'FS contained- not emptied' when compared to SFD generated through the graphic generator.

Overall, excreta of 93% of the population is not safely managed according to the context-adapted SFD.

9. Process of SFD development

Data is collected through secondary sources, including published reports and research papers. The city was visited to conduct the household surveys, Focused Group Discussions (FGDs) and Key Informant Interviews (KIIs) with relevant stakeholders as to fill in the data gaps and to cross-check the data collected from secondary sources. The data is fed into the SFD graphic generator to calculate the excreta flow in terms of percentage of the population and also produce the SFD graphic. It can be concluded that the excreta of 93% population is discharged into the environment untreated.

10. Credibility of data

Two key sources of data are used: (i) Census of India, 2011 as base data to feed into the SFD graphic generator for population and (ii) a random survey of 659 households based on the sample size decided by Cochran's formula, where at least 1 respondent was recorded per

household. Most of the data were then updated by KIIs, with an overall of 6 KIIs and 4 FGDs.

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.

11. List of data sources

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

- Published reports and books
  - Census of India 2011, Housing listing and housing data 2001.
  - Census of India 2011, District Handbook- Darjeeling
  - Groundwater yearbook, Central Groundwater Board (2014).
- KII
  - Masons
  - Assistant engineer- WWD- Darjeeling Municipality (DM)
  - Chief Medical Officer- DM
  - Municipal engineer- DM
  - Fire Department Officers
  - Public toilet caretaker
- FGD
  - DM officials
  - Cesspool vehicle operator
  - Conservancy Dept., valve operator
  - Private water tank operator

Darjeeling, India, 2025

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Abbreviations

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BIS	Bureau of Indian Standard
BORDA	Bremen Overseas Research and Development Association
BPL	Below the Poverty Line
CA	Context Adapted
CPHEEO	Central Public Health and Environmental Engineering Organisation
CPCB	Central Pollution Control Board
CT	Community Toilet
CSP	City Sanitation Plan
CSTF	City Sanitation Task Force
DM	Darjeeling Municipality
DPR	Detailed Project Report
DWS	Darjeeling Welfare Society
EPA	Environmental Protection Agency
FC	Finance Commission
FGD	Focussed Group Discussion
FS	Faecal Sludge
FSM	Faecal Sludge Management
FSSM	Faecal Sludge and Septage Management
FSTP	Faecal Sludge Treatment Plant
GeM	Government e-Market
GoI	Government of India
GoWB	Government of West Bengal
GTA	Gorkhaland Territorial Administration
HHs	Household
IHHL/T	Individual Household Latrine/Toilet
IMI	Integrated Mountain Initiative
JMI	Jamia Milia Islamia
INR	Indian National Rupee
KMA	Kolkata Metropolitan Area
KII	Key Informant Interview
LPCD	Litres per Capita per Day
MBGL	Metre Below Ground Level
MED	Municipal Engineering Department
MLD	Million Litres per Day
MoHUA	Ministry of Housing and Urban Affairs
MoUD	Ministry of Urban Development

NABARD	National Bank for Agriculture and Rural Development
NBC	National Building Code
NFSSM	National Faecal Sludge and Septage Management Alliance
NIUA	National Institute of Urban Affairs
NUSP	National Urban Sanitation Policy
NGC	National Ganga Council
NGO	Non-Government Organisation
ODF	Open Defecation Free
OSS	Onsite Sanitation System
PHED	Public Health Engineering Department
PMAY-U	Pradhan Mantri Awas Yojna- Urban
PPE	Personal Protective Equipment
PT	Public Toilet
PVC	Polyvinyl Chloride
SBCLTF	Swachh Bharat City Level Task Force
SBM	Swachh Bharat Mission
SFD	Shit Flow Diagram
SLB	Service Level Benchmark
SMP	Septage Management sub-Plan
SN	Supernatant
SPMG	State Programme Management Group
Sq km	Square Kilometre
STP	Sewage Treatment Plant
SUDA-WB	State Urban Development Agency-West Bengal
TCPO	Town and Country Planning Organisation
UDD-WB	Urban Development Department- West Bengal
UDMAD-WB	Urban Development & Municipal Affairs Department-West Bengal
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
ULB	Urban Local Body
USD	United States Dollar
UWM	Used Water Management
WB-PCB	West Bengal Pollution Control Board
WSS	Water Supply and Sewerage
WWD	Water Works Department
WW	Waste Water

1 City context

Darjeeling is located on the northernmost edge of the state of West Bengal, India; with the geological coordinates 27°2′15″ N, 88° 15′ 47″ E, it has an elevation of 2042m from the mean sea level and consists of four major sub-divisions namely Darjeeling Sadar, Kurseong, Siliguri and Mirik. The districts of Darjeeling and Kalimpong fall under the Gorkhaland Territorial Administration (GTA), established by the Gorkhaland Territorial Administration Act of 2011. Section 26 of the Act grants GTA the administrative, executive, and financial powers over 59 subjects and since its inception, GTA has focused on socio-economic, infrastructural, educational, cultural, and linguistic development, prioritizing the Gorkhas' ethnic identity while promoting peaceful co-existence among all hill communities. Following the Darjeeling Sadar division, which consists of the Darjeeling Municipality (DM), it is the governing body for the town and administers a total area of 10.57 km^2, (Ray B, 1961) followed by a total of 32 wards. According to the Census of India, 2011 the population of Darjeeling was 118,805, by using the geometric increase method of population projection, the population for 2024 is projected to be 165,049. Darjeeling, also known as the "Queen of Hills", sees a monthly footfall of 84,000 visitors (Koner et al., 2021) hence, a total population of 245,049[5] is considered for the SFD preparation.

Table 1 Population growth rate (Source: District Census Handbook 2001,2011).

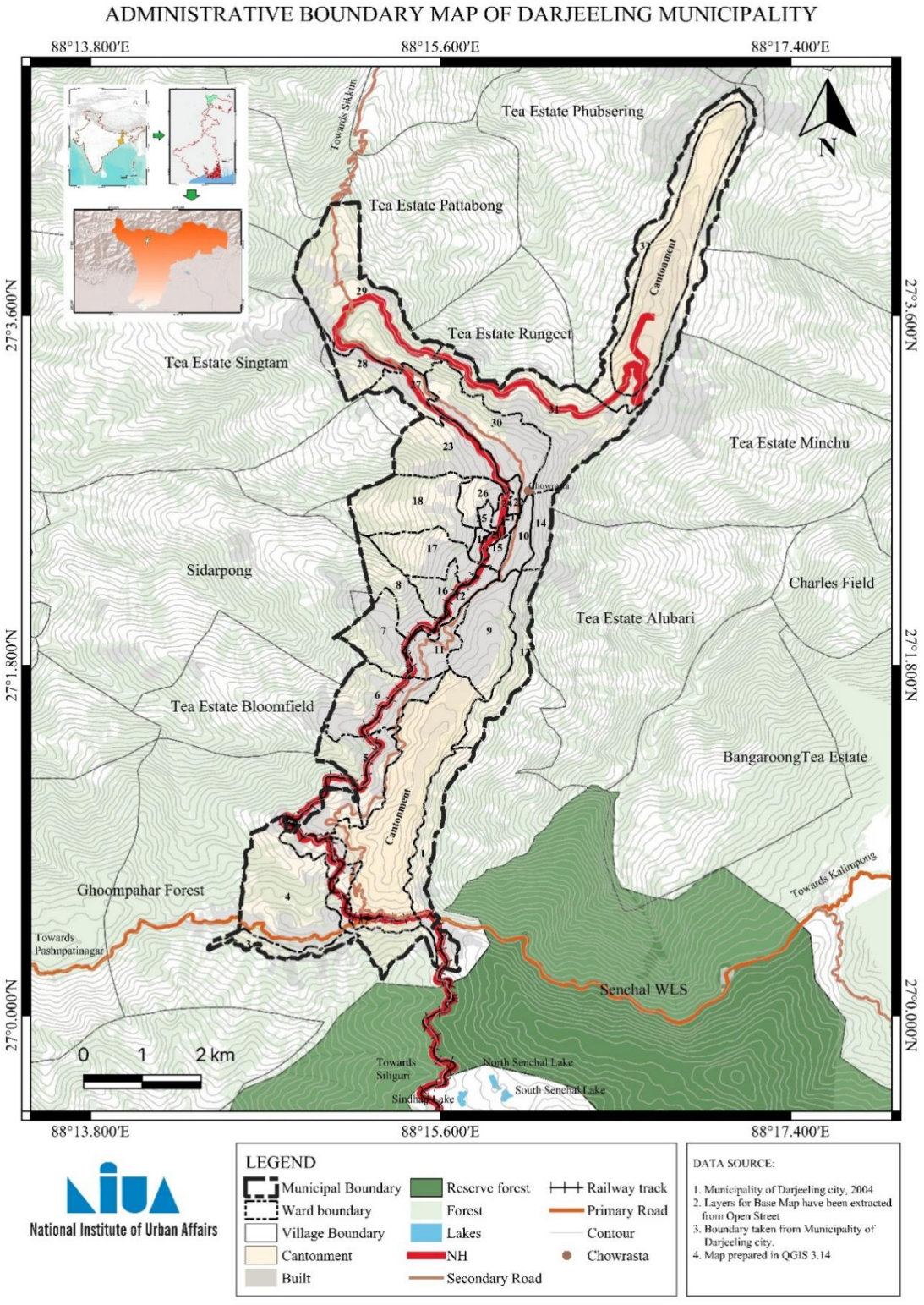
Census Year	Population	Growth rate (%)	Source
1991	73062	-	District Census Handbook 2001
2001	107197	46.72%	District Census Handbook 2001
2011	118805	10.82%	District Census Handbook 2011
2024	165049	38.92%	Projected by Geometric Increase Method

Since the British Raj[6], Darjeeling has remained one of the top tourist destinations in West Bengal (WB). In 2019, it attracted 750,000 domestic and 42,000 foreign visitors, and currently around 350,000-400,000 tourists visit it annually. The peak tourist season lies from April to June, with an average of 5,000 daily visitors and hotel occupancy often reaching 90%, with sometimes October-November also see a high influx of tourists visiting the major attractions including Mall Road, Tiger Hill, Batasia, the War Memorial, Himalayan Zoological Park, and Happy Valley Tea Estate. Darjeeling experiences a warm-humid climate with four distinct seasons. Summers (May–July) are mild, with temperatures ranging from 11–19°C and occasional rain, while the monsoon season (June–September) brings heavy rainfall, peaking in July (700–1,000 mm). Winter (December–February) is cold, with temperatures between 2–10°C and occasional snowfall. Spring (March–April) and autumn (October–November) are pleasant, with temperatures ranging from 6–18°C, offering views of tea plantations and snow-capped peaks with the average annual rainfall ranges from 3,000–3,800 mm (Government of West Bengal, 2024). The connectivity for the town relies on two major transport systems: railways and roadways. The railway system now primarily serves as

[5] As per the FGD conducted with DM, the floating population for the recent year is considered to be 84,000 per month.

[6] British Raj: The period of British parliament rule on the Indian subcontinent between 1858 and 1947, for around 89 years of British occupation.

a tourist attraction, with major connectivity relying on the road network which expands from Siliguri to Bagdogra's airport, which is the nearest airport to the city.



Map 1 Darjeeling Municipality administrative boundary map (Source: NIUA/2024).

2 Service Outcomes

The analysis is based on data available from the Census of India, 2011, published reports of government, non-profit organisations and reconnaissance household surveys. Data collected from secondary sources was triangulated by the field-based study. Data on the containment is available in Census 2011, which is cross-checked and updated by Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) of different stakeholders. According to the SFD promotion initiative (PI) definitions of sanitation systems, the types of containments prevalent in the wards were examined through random household surveys (Table 2). Data on emptying, transport, treatment and disposal of faecal sludge was collected through KIIs with Urban Local Bodies (ULBs), private emptiers and parastatal bodies. However, most of the data are qualitative.

2.1 Overview

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

Table 2 Sanitation technologies and corresponding percentages of the population dependent on those systems (Source: Census of India, 2011).

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	47
2	Septic Tank	Septic tank connected to open drain or storm sewer	T1A2C6	26.2
3	Other Systems	User interface discharges directly to open ground	T1A2C8	4.1
4	Pit latrine with Slab	Lined pit with semi-permeable walls and open bottom, no outlet or overflow, general situation	T1A5C10	0.3
5	Pit latrine without Slab	Unlined pit no outlet or overflow, general situation	T1A6C10	0.2
6	Night soil disposed into open drain	User interface discharges directly to open drain or storm drain	T1A1C6	0.8
7	Service latrine	User interface discharges directly to “don’t know where”	T1A1C9	0.1
8	Public latrine	Septic tank connected to open drain or storm sewer	T1A2C6	16
9	Open defecation	Open defecation	T1B11C7 TO C9	5.3

2.1.1 Sanitation facilities

The section particularly describes the existing sanitation facilities across households and tourist spots[7].

Community (CTs) /Public Toilets (PTs): The city has 112 existing community toilets and 9 pay-per-use toilets, all of which are functional. All the community toilets have septic tanks connected to the user interface, but not the case with the public toilets. Considering the community toilets' septic tank, constraining construction space and design aspects, these tanks did not fulfil the criteria of IS 2470-Part 1 and were emptied once in a decade (Figure 4. Public Toilet in Ward 11), in most cases for public toilets, the human faeces were directly discharged into the open environment as not all the public toilets had septic tanks.

In a KII with the mason, for a community toilet septic tank where space was available, the tank size usually followed 20 ft (6m) x 10 ft (3m) x 6ft (1.8m) dimensions, with a single partition wall in the middle to support the slab cover, these tanks were built on the rudimentary approach for never to empty the tank to save the desludging fees. As these community toilets had a fixed set of users, the condition of these toilets was usable, but the scenario was different in the case of public toilets. The lack of robust data restricted the scope of analysis and in response, based on secondary data coupled with the audit performed [8] for 14 PTs (Appendix 7.8. Details of public toilets taken up for perception survey in the high-footfall area of Chowrasta).

Figure 3: Public Toilet near Mahakal temple (Source: Shatabdi/NIUA/2024).

Figure 4: Public Toilet in Ward 11, Darjeeling City (Source: Sachin/NIUA/2024).

The audit provided that 42.85% of toilets surveyed did not have running water, users were subjected to no access to water or had to fill a container/bucket/mug from a tank outside before using the toilet, 57.14% of toilets did not have doors and 35.71% toilets either had taps that were not in working condition or did not have taps at all, only 14.28% of toilets had soap and water available for handwashing. The rest 85.72% did not have any provisions for

[7] Tourist spots include Mall Road, Tiger Hill, Batasia, the War Memorial, Himalayan Zoological Park, Happy Valley Tea Estate, etc.

[8] Audit Questionnaire was based on the checklist for amenities for Aspirational toilets provided by MoHUA under SBM 2.0 guidelines and draft guidelines inclusive sanitation by NIUA.

handwashing with none of the toilets surveyed had menstrual hygiene products available, even for those public toilets, where a minimum user fee ranged between 5 to 10 INR (USD 0.05 - 0.1), and lacked basic amenities like clean water, safe containment, electricity, hand-wash, menstrual hygiene products, provisions for caretakers etc.

Figure 5: Shared household toilet in Ward 14 (Source: Sumit/NIUA/2024).

Figure 6: Public Toilet drain outlet in Ward 5 (Source: Sachin/NIUA/2024).

2.1.2 Containment

According to the Census of India 2011, Darjeeling is covered with 46.9% sewerage network which was laid during the British Raj, but according to the conducted household surveys and KIIs, it revealed that 17 out of 32 wards had sewer pipe connectivity, given that the 53% of the administrative area had sewer lines, it was noticed that these sewers followed a decentralised regime. Therefore, half of the town was considered to be partially sewered i.e. there is a mix of three kinds of systems – 1) Households connected to onsite systems, 2) Households connected to open drains and 3) Households connected to decentralised sewers. The other half of the town does not have any sewerage system, but other two systems are prevalent i.e. either option 1 or 2 (of the above mention). The Onsite Sanitation Systems (OSS), according to the Census of India 2011, presented 26.9% of the city's population is dependent on OSS, out of which 26.5% are dependent on septic tank, 0.3% on pit latrine with slab, 0.1% on pit latrine without slab and the public latrine on the other side had an overall share of 16.4%.

Figure 7: Toilet discharge into the open drain (Source: Sachin/NIUA/2024).

The household surveys revealed that 25% of the households across the town are dependent upon the OSS, which include 5.9% as septic tanks connected to open drains or storm sewers, 5.9% as septic tanks connected to soak pit, 6.1% as fully lined tanks (sealed) connected to a soak pit, 5.9% as fully lined tank (sealed) connected to the open drain or storm sewer and 1.2% as unlined pit with no outlet or overflow. Adhering to the household surveys and KIIs conducted with different stakeholders, it was estimated that 25% population is dependent on OSS, out of which 5.9% population is

dependent on fully lined tanks (sealed) connected to open drains or storm sewers, 6.1% population is dependent on fully lined tanks (sealed) connected to soak pits, 5.9% population is dependent on septic tanks connected to open drains or storm sewers, these systems are 1-2 chambered tanks connected to open drains, 5.9% population is dependent on septic tanks connected to soak pit and 1.2% population is dependent on pits, which are never emptied when full and covered with soil.

Figure 8: Sewer Line Manhole, Ward 11 (Source: Sachin/NIUA/2024).

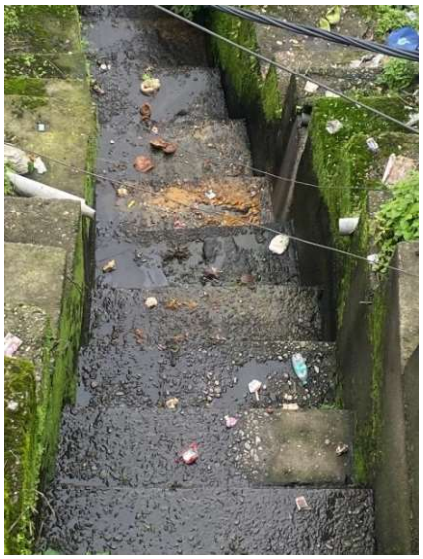


Figure 9: Traces of human faeces into open drains (Source: Sachin/NIUA/2024).

Figure 10: A toilet is connected to the septic tank with a gas vent outlet (Source: Sachin/NIUA/2024).

Figure 11: Lined tank (Source: Anant/NIUA/2024).

Therefore, rest of the 75% of the households can be considered dependent on offsite sanitation systems. Since half of the town is partially sewered we can consider that 37.5% population are solely dependent on open drains and 37.5% population is dependent on both open drains and sewers. Furthermore, these sewers are very old and dilapidated and often found ending up in drains. Differentiating percentage of population solely dependent on sewers is difficult, considering the open drains not to be shallow sewers but a combination of rudimentary “Nalli” (uncovered stormwater drains) and PVC pipes connected to the user interface, which carried black water directly into the larger open drains (Figure 8. shows traces of human faeces in the open drains). Therefore, it is decided that 18.5% (approximately 50% of 37.5%) of households are dependent on sewers. Hence the overall percentage of households where toilets are directly connected to drains become 57% (19% + 37.5% = 56.5%~ 57%). According to government records, all households have access to toilets. However, few instances of open defecation were observed during the field visit. This can be attributed to a behavioural issue.

2.1.3 Emptying

Conservancy department of Darjeeling Municipality used to provide emptying services to

Figure 12: KII with the Conservancy Department (Source: Sumit/NIUA/2024).

Figure 13: Desludging vehicle used for emptying of OSS (Source: Sachin/NIUA/2024).

households and establishments, but discontinued the same after the breakdown of their solitary vehicle, it was told that the truck-mounted 2,000-litre vacuum tanker was purchased from “Smartech services”, a cesspool vehicle manufacturing firm based out of Kolkata, West Bengal. Apart from getting spare parts of the vehicle locally, other challenges included accessibility, traffic congestion, insufficient parking space, and irregular maintenance, all of which is held responsible for the vehicle's dysfunctionality since 2020. Privately owned vacuum tankers stationed at Siliguri, 60 kms away from Darjeeling town, on the other hand, mostly cater to the emptying demand of commercial establishments and institutions.

During the survey, households responded that manual emptying is practiced by private emptiers. The emptying service charges range between 800 and 6000 INR (9.53 to 71.50 USD). The household surveys also revealed that all OSS are emptied except unlined pits, averaging every 4 years (~3.39), which translates to 100% emptying of these containment systems. The septic tank and fully lined tank connected to soak pits are contained systems, hence FS emptied (3% from each system) is considered contained, making FS contained emptied as 6%. Approximately FS from 6% households percolates in the ground through soak pits (3% connected to septic tank and 3% connected to fully lined tank) and hence contributes to FS not emptied. Another FS of another 1.2 % households percolates in ground

via unlined pits, making the total FS not emptied equal to ~7%. As septic tanks and fully lined tanks (corresponding to 12% population) are connected to open drain, it is a 'not contained' system, hence both FS and SN produced from these systems is not contained. It was challenging to determine the exact percentage of effluent9 (i.e. SN) and FS generated from the OSS; to reduce discrepancies, we assumed that 50% of contents of onsite systems corresponds to FS and rest of the 50% is SN. Hence FS not contained but emptied comes out to be 6%.

2.1.4 Transport

In the case of off-site systems, the sewer networks established under various missions and programs were observed to be incomplete during the field survey. Additionally, the decentralized sewers laid by the Britishers have reached the end of their designed life, resulting in a deteriorated and dilapidated sewerage system. These sewers were originally designed to transport used water to five community-level septic tanks, which were also built during that period.

The second system, in which the toilet discharges directly into open drains, exists alongside the decentralized sewer network. These drains were found to carry human excreta along with domestic waste such as used clothes and plastic bottles (Figure 15. Drainage containing solid waste and faecal matter). As discussed in the previous section, used water of approximately 18.5% households flows through these sewers and used water of roughly 57% of households flows in open drains. However, due to the uncertainty in rationalizing how these open drains mixed with the decentralized sewer network before reaching the community-level septic tanks, it was assumed that 50% of the used water flowing in these sewers reaches the community septic tanks via intact sewers (corresponding to 9% population) and the rest of the 50% (~9% population) reaches via dilapidated/leaking sewers (combination of drains and sewers) corresponding to WW not contained but delivered to treatment plant.

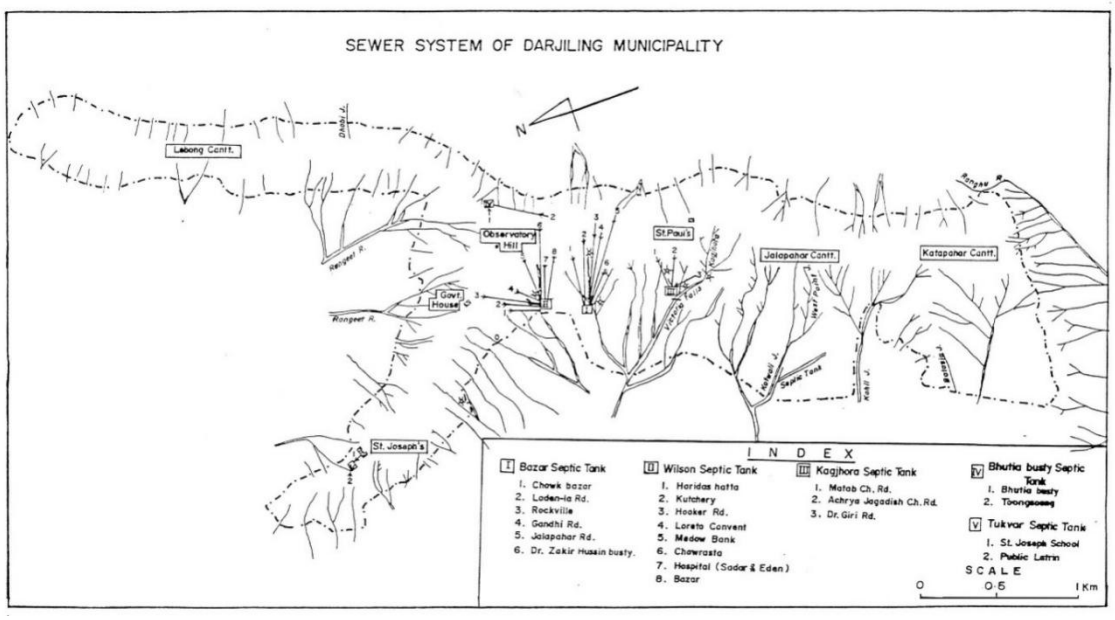
During the household surveys, three major drains were identified: Victoria Falls, Kag Jhora, and W. Point Jhora (Map 2.), as these drains were located to the east of the city, the majority of them flowed naturally downslope into the Ranjeet river. Open drains carry the used water from the central part of the city, including the Secretariat area, into the Rangeet river and diverts the used water from the southern part of the city into the Balason river.

For the Onsite systems, the government-owned emptying vehicle (when operational) used to make 5-10 trips a month charging a fee of 8500 INR (USD 101.30) per trip. The emptied faecal sludge was transported to the dumpsite, located near the crematorium, within the city premises.

On the other hand, the private emptiers discharge the collected faecal sludge into the nearest drain to save time and reduce the haulage distance (and hence save fuel cost). Therefore, 0 % of the emptied sludge is considered to be safely transported from all the OSS, which corresponds to faecal sludge from 12% of households not delivered to treatment.

In the SFD graphic, SN not contained is considered 6% (50% of 12% population dependent on OSS). It is not contained as it flows through the open drains and eventually gets discharged into environment.

[9] Supernatant is the effluent that comes out of the containment unit like a septic tank, fully lined tank, etc, there can be suspended faecal sludge present in the effluent, so, it can also be addressed as "liquid waste".



Map 2: Sewer and drainage system of Darjeeling Municipality (Source: University of North Bengal).

Figure 14: Solid waste dumping chute (Source: Shatabdi/NIUA/2024).

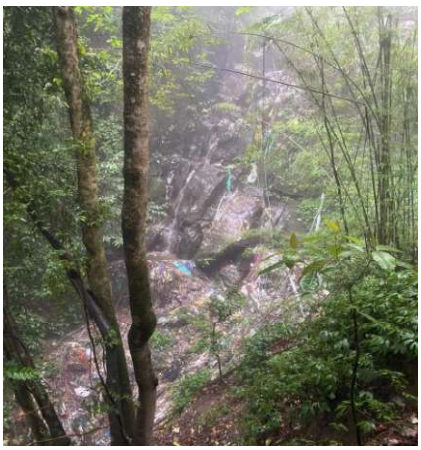


Figure 15: Drainage containing solid waste and faecal matter (Source: Sachin/NIUA/2024).

2.1.5 Treatment and Disposal

The effluent (i.e. Supernatant (SN)) from the community-level septic tanks gets discharged into the open drains that flows beyond city boundaries. These community-level septic tanks are located at five different locations, namely Bazar Point, Wilson, Kakjhora, Bhutia Busty and Tukvar.

During the household surveys, all these community septic tanks were found non-operational, this was primarily supported abiding to the achieving the design period and ground evidence. Since the treatment efficiency of these septic tanks could not be evaluated, the treatment efficiency for these systems is considered to be 0%. As there is no Faecal Sludge Treatment Plant (FSTP) present in the town, the emptied faecal sludge/septage from OSS is considered to be not treated.

Figure 16: Community Septic tank in Ward 11 (Source: Sachin/NIUA/2024).

Figure 17: Abandoned Community Septic Tank in Bhutia Busty (Source: Anant/NIUA/2024).

Table 3 List of septi tanks built during the British Raj, which served a total of 21,600 users (Source: DM, 2010).

Name of the place	Ward Number	No. of users served	Condition
Bazar	18	13,000	Out of Service
Wilson	16	3,350	Out of Service
Kakjhora	16	3,300	Out of Service
Bhutia Busty	31	1,650	Out of Service
Tukvar	Outside Municipal limits	300	Out of Service

2.2 SFD Matrix

The SFD for Darjeeling is presented in appendix 7.3 and the SFD matrix is shown in appendix 7.7.

2.2.1 SFD Matrix Explanation

The definition and estimation of different variables are explained below in Tables 4 and 5.

Table 4 Description of variables used for defining containment systems.

S.No.	SFD reference variable	SFD promotion initiative	Percentage of Population
1	T1A2C5	Septic tank connected to soak pit	5.9%
2	T1A2C6	Septic tank connected to open drain or storm sewer	5.9%
3	T1A3C5	Fully lined tank (sealed) connected to a soak pit	6.1%
4	T1A3C6	Fully lined tank (sealed) connected to an open drain or storm sewer	5.9%
5	T1A6C10	Unlined pit, no outlet or overflow	1.2%
6	T1A1C4	Toilet discharges directly to a de-centralised foul/ separate sewer	18.0%
7	T1A1C6	Toilet discharges directly to 'open drains or stormwater sewer'	57.0%

Offsite systems

Population with user interface discharging WW directly to 'open drains / stormwater sewer' (T1A1C6) produces 57.0% WW not delivered to treatment, this discharge reaches the three major drains as mentioned in section 2.1.4 and 2.1.5., Population with user interface discharging WW directly to 'a de-centralised foul/ separate sewer' produces 18.0% WW which is not treated.

Onsite Systems

25% of the city is dependent on OSS, out of which 5.9% is dependent on Septic tank connected to open drain or storm sewer (T1A2C6), 5.9% on Septic tank connected to soak pit, where there Is a 'low risk' of groundwater pollution (T1A2C5), 6.1% fully lined tank (sealed) connected to a soak pit, where there Is a 'low risk' of groundwater pollution (T1A3C5), 5.9% fully lined tank (sealed) connected to an open drain or storm sewer (T1A3C6) and 1.2% Unlined pit, no outlet or overflow and where there Is a 'low risk' of groundwater pollution (T1A6C10). As we cannot clearly distinguish the volume of supernatant (SN) i.e. liquid fraction and solid FS generated from fully lined and septic tanks, it was challenging to determine the exact volume of effluent (i.e. SN) and solid FS generated from the OSS; to reduce discrepancies, we assumed a 50% split of emptied sludge: 50% SN and 50% FS.

Summary of assumptions

- ✓ It was assumed that the percentage of FS emptied from systems T1A2C5, T1A2C6, T1A3C5, T1A3C6 is 100% and hence, variable F3 for these systems was set to 100%. For system T1A6C10, variable F3 was set to 0%.
- ✓ For systems T1A2C6 and T1A3C6, variable S4e (proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants) and variable S5e (proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated)were set to 50% and 0%, respectively.
- ✓ The percentage of FS delivered to treatment (variable F4) and the percentage of FS treated (variable F5) was set to 0% for all systems.
- ✓ For system T1A1C4, variable W4b (proportion of wastewater in sewer system, which is delivered to decentralised treatment plants) and variable W5b (proportion of wastewater delivered to decentralised treatment plants, which is treated), were set to 50% and 0%, respectively.
- ✓ For system T1A1C6, variable W4c (proportion of wastewater in open sewer or storm drain system, which is delivered to treatment plants) and variable W5c (proportion of wastewater delivered to treatment plants, which is treated), were set to 15.8% and 0%, respectively.

Table 5 Description of variables used in SFD.

System Type	Variables	Description (City Context)	Percentage of Population
Off-Site Sanitation	WW contained	Wastewater from the user interface connected directly to the de-centralised foul/ separate sewer (T1A1C4).	18%
	WW not contained	Wastewater from the user interface connected directly to open drains or stormwater sewer (T1A1C6).	57%
	WW not delivered to treatment	Wastewater from the user interfaces connected directly to open drains (T1A1C6) and not delivered to the treatment plant.	57%
	WW not treated	Wastewater from the user interfaces connected directly to sewers and not treated.	18%
On-Site Sanitation	SN not Contained	Supernatant (SN) from OSS (T1A2C6 and T1A3C6), i.e. the liquid portion which is let out into the drains.	6% (i.e. 5.9 %)
	SN not delivered to treatment	Supernatant (SN) from OSS) (T1A2C6 and T1A3C6), that does not reach a treatment plant.	3% (i.e. 2.95%)
	FS contained	Faecal sludge from OSS (T1A2C5, T1A3C5 and T1A6C10) which does not pollute the groundwater due to “low risk” of contamination.	13% (i.e. 13.2%)
	FS contained-not emptied	Faecal sludge from OSS (T1A2C5, T1A3C5 and T1A6C10) remains in the tank and does not get desludged, alongside liquid portion from T1A6C10 which infiltrates and does not pollute the groundwater due to “low risk” of contamination.	7%
	FS contained-emptied	Faecal sludge from OSS (T1A2C5 and T1A3C5) gets desludged using motorized emptying or manual emptying.	6%
	FS not contained	Faecal sludge from OSS (T1A2C6 and T1A3C6) is not contained as these systems are connected to open drains.	6%
	FS not contained-emptied	Faecal sludge removed from OSS (T1A2C6 and T1A3C6) where FS is not contained and emptied using either motorized emptying equipment.	6%
	FS not delivered to the treatment plant.	Faecal sludge is discharged into the environment (open fields, water bodies etc.).	12%

The SFD graphic estimated 6% of the population has SN not contained, as Septic tanks and fully lined tanks connected to open drains represented 11% of the total population, its 50% is SN = 5.5 ~6% and 50% is FS not contained ~ 6% of the total population, whereas FS contained is 13.2% ~ 13% of the total population, given that Septic tanks and fully lined tank connected to soak pit are 5.9% and 6.1% respectively, followed by unlined pits contributing 1.2% of the total population dependent on such systems. SFD graphic estimated that ‘FS contained-not emptied’ contributed to 7% which is safely managed, whereas ‘FS contained-emptied’ contributed to 6% alongside, ‘FS not contained’ to be 6% provided a total of 12% ‘FS not delivered to treatment’ is unsafely managed.

Open Defecation

Darjeeling was declared an Open Defecation Free (ODF) city in 2018. ODF city means that everyone in the city will have access to the toilet, even if there is no toilet at the house, the people would have an approachable public toilet or a community toilet, also at any given time no person should be seen openly defecating. Although, Darjeeling was declared ODF, the survey revealed that 90.41% of HHs have access to IHHT. Thus, remaining 9.59% of HHs are dependent on public, community, or shared sanitation facilities.

2.2.2 *Risk of Groundwater Contamination*

Darjeeling is located at an elevation ranging between 91 to 3,658 metres, the soils of the uplands is usually red and gritty while that of the plains is dark and more fertile. Along the banks of the Teesta River, silt or silty loam predominates. Red and yellow soils have developed on the gneisses and schists in the higher slopes of the Darjeeling Himalaya. The greater portion of the hill area lies on Darjeeling Himalaya which most commonly decomposes into a stiff reddish loam but may also produce almost pure sand or a stiff red clay (Forest Survey of India, 1997). The SFD graphic generator includes a risk assessment tool that uses groundwater as an important factor in determining whether excreta is contained or not. Using this tool, we evaluated various parameters, including the vulnerability of the aquifer, the lateral separation of sanitation facilities from water sources, the percentage of drinking water produced from groundwater sources, and existing water production technology. Since the risk of groundwater contamination also depends on soil strata, the random household survey and KIIs in Darjeeling revealed that the groundwater table was more than 10 metres below ground level (mbgl) and no borewells were found. None of the households depended on groundwater, so all onsite sanitation systems were considered to have a 'low risk' of groundwater pollution. According to the Census of India 2011, about 45.7% of the city's population depends on treated piped water, 5.8% on tap water from untreated sources, and 39.3% on natural springs.

2.2.3 *Discussion of certainty/uncertainty levels of associated data*

The major challenges to develop the SFD were associated with the triangulation of the secondary data with the primary data which was to be obtained from different stakeholders., categorising it into three key sets, census, and published/unpublished reports were unable to provide (i) up-to-date data on containment (ii) detailed typology of containment and (iii) actual information about sanitation services provided to households by the ULB. For these reasons, field-based studies were conducted to validate the data secondary data. The Census 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 FS and WW generated. Therefore, a random survey of 659 households was conducted across all the wards of the city to identify and cross-check the data collected from the Census, 2011 and other relevant sources. For this survey, the National Institute of Urban Affairs (NIUA) collaborated with Integrated Mountain Initiative (IMI), Bremen Overseas Research and Development Association (BORDA), Jamia Milia Islamia (JMI) and Darjeeling Welfare Society (DWS) and other local agencies. A team consisting of 15 members from all partner organisations conducted the KIIs, FGDs and random surveys. Despite quality checks in place, there is a possibility of misreporting due to various reasons including inadequate knowledge of the respondents or enumerators. The number of respondents considered per ward were proportional to the ward population and the overall sample size was calculated using Cochran's formula to get a sample that is representative of the whole town.

2.3 Context-adapted SFD Graphic

According to the FGDs and KIIs with stakeholders, the solid FS collected in the septic tank and the fully lined tank should be considered contained as it is neither polluting the groundwater nor the solid excreta (i.e. FS) seen floating in the open drains. The SFD generated does not sufficiently visualize the actual situation at the containment stage of the sanitation chain, according to stakeholders, the correctly designed septic tanks should be considered ‘contained’ as it’s neither polluting the groundwater nor the solid excreta is seen

floating in the 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 to appendix 7.5 for the context-adapted SFD graphic as there is no major change in the graphic, for those households having correctly designed septic tanks and fully lined connected to drains, FS is not visible in the effluent, only SN gets discharged, therefore Septic tank and fully lined tank connected to soak pit was considered as 'contained. since the FS collected in such systems is considered contained, there is 6% increase in the FS contained, at the containment stage, pushing the overall FS contained to 19% (represented green in colour), 12.4%~12% FS contained is emptied and 6.6%~7% percolates in the ground via soak pits, hence contributes to FS contained but not emptied. The supernatant generated from septic tanks and fully lined tanks connected to open drains is not contained and, hence, considered to be unsafely managed (represented 6% SN red in colour at the containment stage). The 'FS not contained' changes from 6% to zero as 'FS contained' becomes 19% from 13%, and there is no change in SN, though FS contained and emptied increases from 7% to 12% (i.e. 12.4%), with no change to 'FS contained- not emptied' when compared to SFD generated through the graphic generator.

Overall, excreta of 93% of the population is not safely managed according to the context-adapted SFD.

3 Service delivery context

3.1 Policy, legislation and regulation

3.1.1 Policies, legislation and regulations at the National level

In 2008, the Ministry of Housing and Urban Affairs (MoHUA), formerly known as the 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 sanitary facility operation and maintenance (O&M). 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) (Singh et al., 2024) . Considering the Wastewater[10] management for the city, NUSP also directs states to develop strategies for using low energy intensive onsite/decentralised wastewater treatment technologies, with viable technical options that promote recycle and reuse of treated used water for all non-potable applications wherever possible.

The state must subjectify the objectives of NUSP which must be realized through CSPs and state sanitation strategies, as NUSP identifies the constitution of the 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, organisations, individuals, NGOs, academics, media representatives, local councillors, industry owners, consultants, representatives of the private sector, etc.

The constitution of the Swachh Bharat City Level Task Force (SBCLTF) formerly known as the 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 analysing the strengths and competencies required to overcome the current situation and to improve sanitation facilities (GiZ, 2014). The advisory note on septage management in urban India, issued by MoUD in 2013, recommends supplementing CSPs with a Septage Management Sub-Plan (SMP), prepared and implemented by cities, as 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 anchors CPHEEO guidelines, and the Bureau of Indian Standard (BIS). The advisory 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, of 1986 and the Water (Prevention and Control of Pollution) Act, of 1974 have provisions relating to sanitation services and environmental regulations. It applies to households and cities about disposing of wastes in 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

[10] Wastewater is also addressed as used water, in order to decrease the negative perception for reuse of treated wastewater, instead we term it “safe reuse of treated used water”, which also align with the objective of SBM 2.0.

boundaries, for complying with the Water Act, and for meeting all state permit requirements and regulations. Municipal acts and regulations usually refer to the management of solid and liquid wastes but may not provide detailed rules for septage management (Ministry of Law and Justice, 2013) .

The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act was enacted in 2013. This act prohibits the 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 maintain a survey of Manual Scavengers and their Rehabilitation (Ministry of Law and Justice, 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 every household, street, town, and city in India (Ministry of Urban Development, 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 2015-20. Its assignments include distributing revenue between the union and state, devising formulas for grants, suggesting methods to augment local bodies' resources, and taking care of any matter referred to it. Model Municipal Building Bye-laws 2016 prepared by Town and Country Planning Organization (TCPO). Building Byelaws 2016 is used to regulate coverage, height, building bulk, and architectural design and construction aspects of buildings to achieve orderly development of an area. They are mandatory 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 rooftop 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 (Town and Country Planning Organisation, 2016).

3.1.2 At State and ULB level-

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

State-level Policies and Legislation:

a) **West Bengal Urban Development Act, 1973:**

This act provides the framework for urban planning and development, including the management of sanitation and sewerage systems in urban areas like Darjeeling. It establishes the roles and responsibilities of municipal authorities in maintaining services.

b) **West Bengal Municipal Act, 1993:**

This act governs the functioning of municipal bodies and includes provisions related to the management of sewerage and sanitation. It empowers municipal authorities to implement sanitation services and infrastructure projects.

c) **West Bengal Sewerage and Drainage Act, 1966:**

This legislation provides for the establishment of an authority responsible for maintaining, developing, and regulating water supply, sewerage, and drainage services in the Calcutta Metropolitan District. It is also, related to the planning, construction, and maintenance of sewerage systems. It outlines standards for sewerage infrastructure and addresses issues related to pollution control and waste management.

d) **State Water Prevention and Control of Pollution Act, 1974:**

This act aims to prevent and control water pollution and maintain or restore the wholesomeness of water. The West Bengal Pollution Control Board (WBPCB) is mandated to implement this act within the state.

- To oversee water pollution prevention and control.
- Assignment of powers and functions to these boards for effective implementations.
- Measures to regulate industrial discharges, sewage and other pollutants into water bodies.
- Monitoring and enforcement mechanisms to ensure compliance.

e) **Nirmal Bangla Swachhata Mission, 2014:**

The mission aims to ensure zero open defecation by the construction of latrines in households, especially in uncovered rural households. Launched by the West Bengal government in concurrence with the Swachh Bharat Abhiyan on October 2, 2014, Mission Nirmal Bangla consolidated existing sanitation projects under a unified scheme.

- Construction of functional toilets in households.
- Ensuring sufficient functional toilets in educational institutions, along roads, and in public places.
- Spreading awareness and promoting safe hygiene behaviour and proper waste disposal methods.

Urban Local Body (ULB) Policies and Legislation:

a) **Darjeeling Municipality Regulations:**

As the local governing body, Darjeeling Municipality is responsible for implementing sanitation and sewerage services. This includes maintaining the sewerage infrastructure, overseeing waste management, and ensuring compliance with state and central regulations. It also ensures that sewage is properly collected and treated before disposal. To address the needs of a growing population and improve service quality, the DMC undertakes sewerage upgrade projects. This includes expanding the network, replacing old pipes, and enhancing treatment facilities.

Sewerage & Drainage Regulations (Building Bye-Laws):

Local regulations require new constructions to adhere to specific standards for sewerage and drainage, ensuring proper connection to municipal systems and preventing issues like blockages and overflows. Regulations govern the process for connecting private properties to the municipal sewerage system. This includes

requirements for proper connection points and ensuring that no untreated sewage is discharged into public drains.

3.1.3 Institutional roles

The MoHUA 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 programs through institutional expertise and finance. The ministry is also responsible for managing international sources of finance. The Central Public Health and Environmental Engineering Organisation (CPHEEO), created in 1953, is the technical wing of the MoHUA, 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 programs. CPHEEO also plays a central role in setting design standards and norm-setting for urban water supply and sanitation (Athar et al., 2022).

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 and a lack of clarity in the roles and responsibilities of state and local agencies, resulting in large gaps in implementation.

The management and delivery of basic urban services in Darjeeling are governed by various institutions. The following are the institutions responsible for policymaking, service provision, and regulation of urban services.

Table 6 Institutional roles and responsibilities.

S. No	Institutions	Roles & Responsibilities
1.	**Darjeeling Municipality (DM)**	• It is primarily responsible for planning, implementing, and managing the city's sanitation and sewerage systems. • This includes designing and maintaining infrastructure, overseeing waste management services, and implementing sanitation policies. • Manages day-to-day operations of sewerage systems, including maintenance of sewer lines, wastewater treatment plants, and public sanitation facilities. • Ensures the cleanliness of streets, and public spaces, and the maintenance of public toilets. It is also responsible for managing solid waste collection and disposal. • Enforces local regulations related to sewerage and sanitation, including building bylaws that mandate proper sewer connections and waste management practices.
2.	**Urban Development Department (UDD) of West Bengal**	• It formulates policies and guidelines for urban sanitation and sewerage systems at the state level. • It provides the framework within which local bodies like the DM operate. • Oversees and supports major infrastructure projects related to sewerage and sanitation, including funding and technical assistance. • Ensures that local urban bodies comply with state-level regulations and standards for sanitation and sewerage.
3.	**West Bengal State Pollution Control Board (WBPCB)**	• Conducts inspections and audits to ensure compliance with environmental regulations and standards for waste management and sewage management. • Promotes awareness about pollution control and environmental protection practices related to sewage and sanitation. • Regulates and monitors environmental standards related to wastewater discharge and pollution control. • Ensures that wastewater treatment plans meet required pollution control norms.
4.	**Public Health Engineering Department (PHED)/ Water Works Department (WWD)**	• Oversees the provision of potable water and the management of sanitation systems, especially in rural and semi-urban areas. • Although its primary focus is on water supply, it also supports sanitation infrastructure development. • Provides technical support and expertise for designing, constructing, and maintaining sewerage systems, and wastewater treatment facilities.
5.	**Municipal Engineering Department (MED)**	• Handles the engineering aspects of sanitation and sewerage projects, including design, construction, and maintenance of sewer networks and treatment plants. • Manages infrastructure development projects related to sewerage and sanitation, ensuring they meet technical and safety standards.

6.	**Sanitation Workers ("Nirmal Bandhus")**	• These frontline workers play a critical role in waste management, they face challenges during monsoons when household solid waste ends up in drains. • Their efforts are essential for maintaining cleanliness and preventing water lodging situations,
7.	**Local Community-Based Organizations (CBOs) and NGOs**	• Conducts public awareness campaigns and educational programs on sanitation and hygiene practices, often work related to educating residents about correct waste management and sewerage issues. • Engages in local sanitation initiatives, including waste segregation programs and community clean-up drives. • Collaborative work with municipal authorities to address local sanitation challenges.
8.	**Local Committees and Advisory Boards**	• Provide a platform for residents to voice concerns and offer feedback on sanitation and sewerage service. They play a role in shaping local policies and improvements based on community needs.
9.	**State and Central Government Agencies**	• Provide financial support and technical assistance for sewerage and sanitation projects. • Agencies such as the Ministry of Housing and Urban Affairs and State-level finance departments may be involved in funding and resource allocation. • Develop and enforce National and State-level policies that guide urban sanitation and sewerage practices.

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 (Raghupathi et al., 2005a). 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. Despite decentralization, ULBs remain dependent on capital subsidies from state governments. Tariffs are also set by state governments, which often subsidize operating costs (Athar et al., 2022)

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 the local government is also in charge of planning and investment (Raghupathi et al., 2005b). In Darjeeling Municipality (DM), wastewater management comes under the Water Works Department (WWD) which is headed by the Municipal Engineer (ME). The laying of sewers and new connections are provided by WWD, with wastewater treatment and scrutiny of newly developed Detailed Project Reports (DPRs) of upcoming sewerage schemes taken up by the ME. For Septage Management Services, the Health Department at the DM is responsible for sanctioning new IHHLs and providing desludging services, which leverages the conservancy department to provide the necessary support with manpower and equipment. The treatment of emptied sludge falls under the DM, given that, the strategy for FSSM for Darjeeling Municipality will be, to either set an STP with a co-treatment facility or a standalone FSTP for the given time frame of 2024-25, as provided in the State FSSM policy, Darjeeling Municipality falls under the slab of ULBs with a population between 1 Lakh[11] to 10 Lakh, the share of funding under SBM 2.0 – Urban for FSSM and Used Water Management (UWM) will be divided as, Central government share to be 33%, State government share to be 22% and remaining 45% share to be handled under 15th FC/ULB Share/Private sector.

3.1.5 Service standards-

1. **Service Level Benchmarks (SLBs), 2008:**

   Issued by the Ministry of Housing and Urban Affairs (MoHUA), formerly known as the Ministry of Urban Development (MoUD) in 2008, the SLB seeks to

   a) 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.

   b) Define a common minimum framework for monitoring and reporting on these indicators.

   c) 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.

[11] 1 Lakh = 10^5

Table 7 SLB Ranking for Indicator Values for Sewerage (Source: Ministry of Urban Development, 2010).

	Benchmark	Median	Average	GREEN	BLUE	BLACK	RED
Coverage of toilets	100%	72.6	69.5	>90	70-90	35-70	0-35
Coverage of sewer network	100%	0	12.2	>70	40-70	0-40	0
Collection efficiency of sewage network	100%	0	10.3	>70	40-70	0-40	0
Adequacy of sewage treatment capacity	100%	0	5.3	>70	40-70	0-40	0
Reuse and recycling	20%	0	4.0	>20	10-20	0-10	0
Quality of sewage treatment	100%	0	3.3	>100	80-100	40-80	0-40
Efficiency in redressal of customer complaints	80%	0	21.2	>80	50-80	25-50	0-25
Cost recovery	100%	0	5.2	>60	30-60	0-30	0
Efficiency in collection of charges	90%	0	7.3	>60	30-60	0-30	0

2. **General Standards for Discharge of Environmental Pollutants**:

The Environment (Protection) Rules, 1986 (Schedule VI): Issued by the 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 concerning parameters for safe discharge of effluent to inland surface water/public sewers/land for irrigation/ marine coastal areas.

Table 8 Sewage discharge standards in India (Source: Shende and Pophali, 2023).

Parameters	Old sewage discharge standards (EPA 1986)	Draft: sewage discharge standards for revision (MoEFCC 2015)	Revised sewage discharge standards (MoEFCC 2017)	Existing sewage discharge standards after Hon'ble National Green Tribunal (NGT) order (NGT 2019)
pH	5.5 – 9.0	6.5 – 9.0	6.5 – 9.0	5.5-9.0
Total suspended solids (TSS)	100	20	<50 (Metro and state capital) <100 (Rest of India)	20
Oil & grease (O&G)	10	-	-	-
Biochemical oxygen demand (BOD)	30	10	20 (Metro and state capital) 30 (Rest of India)	10
Chemical oxygen demand (COD)	250	50	-	50
Total Kjeldahl Nitrogen (TKN)	100	(Total nitrogen = 10)	-	(Total nitrogen = 10)
Ammonia Nitrogen	5	5	-	
Total phosphorus	-	-	-	1
Faecal Coliform (FC)	-	<100 MPN/100 ml	<1000 MPN/ 100 ml Anywhere in the country	Desirable-100 Permissible-230

Note: All parameters except pH and FC are in mg/L; FC is expressed in the Most Probable Number (MPN).

3. **Manual on Sewerage & Sewage Treatment, Second Edition, 2013:**

   This manual was developed by the Central Public Health and Environmental Engineering Organization (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, the Bureau of Indian Standards, the code specifies standards and design considerations for the installation of septic tanks.

3.2 Planning

3.2.1 Service targets

State governments are supposed to put in place targets for the delivery of essential services provided by the local bodies viz. water supply, sewerage, solid waste management, and stormwater management on lines of the handbook for SLB by MoHUA. The state government must notify or cause all ULBs to notify the service standards and targets by the end of a fiscal year (Lalbhai, 2013). The Swachh Bharat Mission (SBM), one of the flagship programs of the government of India, was launched on October 2nd, 2014 by MoHUA. SBM-Urban aimed to eliminate open defecation, eradicate manual scavenging, capacity augmentation of ULBs, and generate awareness about sanitation and its linkage with public health during the mission period till 2019.

In the second phase, SBM 2.0, launched in 2021, emphasized that all used water including fecal sludge, especially in smaller cities is safely contained, transported, processed, and disposed of so that no untreated faecal sludge and used water pollutes the ground or water bodies. To ensure that no untreated faecal sludge or used water is discharged into the environment, and all used water (including sewerage and septage, grey water, and black water) is safely contained, transported, and treated, along with maximum reuse of treated used water, in all cities with less than 1 lakh population. The following components were made eligible for funding under the "used water management" component of SBM 2.0:

a) Purchasing[12] of desludging equipment, for scheduled and need-based desludging of all septic tanks, new applications for IHHLs based on gap analysis provided by respective ULBs, additional public toilets for all tourist destinations under the "*Aspirational toilet's*" initiative.

b) Interception and diversion of drains (I&D) (including last mile connectivity for nearest sewer network).

c) Construction of Sewage Treatment Plants (STPs)/STP cum Fecal Sludge Treatment plants (FSTPs) for used water treatment.

d) Delivery progress of the ULBs evaluated via Swachh Survekshan every year.

3.2.2 Investments

In the KII with the CMO, it was revealed that the State Government had proposed 54 new community toilets and public toilets under the "*Nirmal Bangla Mission*". A Letter from SUDA, WB revealed that a total of 1,131 IHHL were targeted, with the central share of 4,524,000 lakh INR (5.296 billion USD), matching the state share of 1,508,000 INR (17,643 USD) and an additional state share of 3,004,690 lakh INR (3.516 billion USD) provided overall funding of 9,036,690 lakh INR

[12] Purchasing of desludging equipment would be done through Government e-Market Place (GeM) portal for enlisted service providers only.

(10.578 billion USD), with the implementation responsibility held with the ULB alongside coordination of district magistrate.

Since Darjeeling had a population of over 1 lakh, the AMRUT scheme launched in 2017 was aimed at funding both water supply and sewerage projects. Given the records, in 2010 Darjeeling Municipality applied for a sewerage scheme fund amounting to a cost of INR 4,511.34 lakhs (5,279,267 USD) to the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). The project comprised two phases, phase 1 intended to lay a 21.79 km sewer line to convey used water toward the identified outfall. Phase 2 included an extension of a 22.10 km sewer network to increase the reach of sewerage connections. However, the funds were not sanctioned and the implementation was never carried out. Leveraging various central schemes such as Atal Mission for Urban Rejuvenation and Transformation (AMRUT), SBM 2.0, and financial funds under the 15th Finance Commission (FC), the budget estimates for the fiscal year 2024-25 of the Darjeeling Municipality revealed that 200,000 lakhs INR (233.8 million USD) were estimated towards sewerage connections fee, with the AMRUT 2.0 scheme estimated for 50 crore INR (5.85 million USD), proceeded with 7,085,060 lakhs INR (8.28 billion USD)under SBM 2.0 and considering the water deficit of the city, DM conveyed, the funds from AMRUT will be utilised for enhancing water supply and managing solid waste in the city.

3.3 Reducing Inequity:

3.3.1 Current choice of services for the urban poor

There are around eighty-eight notified slums, namely in the regions around the railway station in Dhirdham, Giri Dhara, Nava Jyoti, and Amar Jyoti area(Rai, 2015).

Table 9 Number of notified slums in Darjeeling Municipality (Source: (Rai, 2015)).

Name of the slum area	Ward No.	No. of household
Sunar Busty, Raja Hatta (Jorebunglow)	1	116
3 Pinnel Market, Dara Gaon (Ghoom)	2	109
Jarul Hatta, Beri Khan (Ghoom) and Municipal Gaon (Jorebunglow)	4	277
Nimki Dara	6	82
Lasha Villa	7	74
Bhaktey Busty	8	58
Cedder Cottage and Vineete	9	60
Nabin Gram (Gandhi Road)	11	184
Khola Gaon	12	47
Alubari Busty	13	96
Jawahar Busty I and II	14	115
Lower Rockwood	16	73
Mangal Puri, Sister Nevidita	17	167
Pragati Gram	18	42

Donavan Park	19	56
Bawney Busty	21	96
Lal Dehki	22	47
Shiva Gram, Jyoti Gram	23	176
Eden Compound	26	54
Bons Gram, Frymal Village A, B, and C	27	226
Pinnel Market (Ghoom), Singtam Fatak, Mahakal Gram and Bhotey Busty	28	304
Navin Gram (Singamari)	29	60
Middle Bhotia Busty and Naya Gaon	31	197
Ging Naya Busty	32	79

The sanitation systems in these slums are not robust, given that 46% of households use toilets on a sharing basis, 9% rely on public toilets, 35% of households have their own toilet and 10% do not have one, and are dependent on the public toilets at the railway station or use jungle as an open toilet with leaves as paper rolls. The containment system for these toilets was mostly choice-based and depended on the space availability for construction. These systems included a toilet interface connected either to open drains, septic tanks, or soak pits.

The health problem is also amplified by the existing water distribution in these slums, as the per capita water available ranges between 20-30 Lpcd, 63% of the slum population is dependent on spring water (i.e. Giri dhara, which can be private or public), 13% has the municipal water supply, with 9% rely on their source of water, rest 15% has to buy water daily, leaving most of the public toilets with no water facilities, remains unsafe to use.

Though Darjeeling was declared ODF in 2018 and the municipality also adhered to the Manual Scavenging Act 2013, instances of open defecation and manual emptying are still prevalent in these vicinities and around the town, as they serve as an alternative to the service delivery gaps of the sanitation value chain towards safely emptying the faecal sludge. Considering the accessibility and cost of motorized equipment, the emptying services are mostly done manually, which takes 2-3 people using buckets and shovels to empty the tank; to maximize profit, these men don't use personal protective equipment (PPEs) being unaware of the health risk the occupation carries. It should be noted that Darjeeling Municipality has never endorsed manual emptying practices.

3.3.2 Plans and measures to reduce inequity

To improve water availability for urban families within DM administration, specifically, those families living Below the Poverty Line (BPL), a rainwater harvesting project funded by the National Bank for Agriculture and Rural Development (NABARD) was launched for a tenure of 4 years (2016-2019), in which 3200 BPL families were targeted to safeguard water security for at least 100 days in a year.

The impacts of the project included:

- Setting up water storage tanks with a capacity of 30 lakh litres (3,000 households @ 1,000 litre) and related piping infrastructure for 3,000 BPL households,

- Setting up water storage tanks with a capacity of 15 lakh litres for 200 households. Development of ward-wise maps of water distribution systems for 3,200 BPL households of the 30 wards of the Darjeeling Municipality area.
- Improved water carrying capacity of about 32 natural springs (Jhoras) through channelization of surplus water, drainage facility, and groundwater recharge.
- Monetary savings of approximately Rs. 2,250 (26.33 USD) per month by avoidance of requirement for the purchase of water per BPL household in the days of water stress.

Under the Pradhan Mantri-Awas Yojana Urban (PMAY-U), the Darjeeling district has received funds for 16,253 households, with 14,454 grounded for construction and 6,258 completely constructed. Houses built under this scheme had the provision of a toilet along with the construction of a septic tank for containment purposes, as the scheme directed the beneficiary to strictly follow the National Building Codes (NBC).

Table 10 Service Delivery Targets for ULBs as per SLBs (Source: (Ministry of Urban Development, 2010).

S. No	Sanitation Service Chain	Parameter	National Benchmark	Timeframe Achieve Benchmark
1.	Containment	Coverage of toilets	100%	2019
2.	Transport	Coverage of sewer network services	100%	2031
		Collection efficiency of the sewerage network	100%	2031
3.	Treatment	Adequacy of sewage treatment capacity	100%	2031
		Quality of sewage treatment	100%	2031
4.	End-Use Disposal	Reuse & recycling	100%	2031
5.	Other	Cost recovery	100%	2031
		Efficiency of collection	100%	2031
		Redressal of customer complaints	100%	2031

Table 11 Service delivery progress as per SBM (Source: SUDA, WB, 2018).

S. No	SBM Head	Online Application Status		
		Target	Verified	Approved
1.	Individual Household Latrines (IHHLs)	-	-	1,131
2.	Community Toilets (CTs)	0	0	0
3.	Public Toilets (PTs)	0	0	0

The inclusion of aspirational toilet[13] as per the SBM 2.0. guidelines and adhering to its norms will improve sanitation facilities for the high-footfall market/ tourist area of the city. Considering the aspirational toilet as the benchmark, and the checklist provided by MoHUA, about 14 PTs were analysed to assess the infrastructure provisions for vulnerable groups of women, children, the elderly, and the differently-abled (appendix – 7.8), the audit survey comprised 175 indicators spanning across the components of location, accessibility across vulnerable groups, amenities like

[13] Toilets with high-end features such as luxurious bath cubicles, touchless flushing, breast-feeding rooms, and automatic sanitary napkin incinerators.

provision of clean water, safe containment, electricity, hand-wash, menstrual hygiene products, provisions for caretakers, etc.

Given the data, DM has already commissioned the renovation work of these old community toilets, while 54 new community toilets and public toilets have been proposed by the State Government under the Nirmal Bangla Mission (KII with CMO, Darjeeling Municipality).

3.4 Outputs

3.4.1 Capacity to meet service needs, demands, and targets

The municipality has insufficient funds to meet the demand for providing basic sanitation services and amenities through the revenue it generates. Municipality is majorly dependent on state and central schemes for funding. It is learned during the focus group discussion, that there is often a Adelay in the disbursement of funds through the state finance department.

In the context of Darjeeling, the major source of income (both revenue and capital) is through grants from the Finance Commission (FC), and the remaining is generated through taxes and user charges. The municipality also received funds for sanitation infrastructure development which came through SBM 1.0, SBM 2.0, and AMRUT.

A shortage of human resources was witnessed and they largely rely on staff hired on a contractual basis to provide the daily service needs to the public. Also, the staff lacks the basic know-how and technical skills.

3.4.2 Monitoring and reporting access to services

Data on service levels should be collected, documented, and reported to MoHUA according to the format prescribed by the SLB framework. The health department is responsible for monitoring the desludging services provided by the municipality, in the KII with the CMO, it was told that before the breakdown of the desludging vehicle in 2020, 5-10 trips/month were made within the municipal limits, the services were held terminated as the machinery part were not available and required more funds to make it fully functional. For getting municipal clearance for the drafted building projects or any residential building, 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.

Cleaning of drains and civil work of laying new sewer lines are mainly carried out by the conservancy department staff, as there are no Sewage Treatment Plants (STPs) present in the city, the sewage is left untreated downstream.

DPRs for the upcoming STPs are still under scrutiny by the Municipal Engineer, once sanctioned, these STPs will surely support the DM to progress towards ODF++ and Water+ status.

3.5 Expansion

In 2018, Darjeeling achieved ODF status under the Swachh Bharat Mission 1.0, the city slowly progressed to improve its municipal infrastructure by leveraging other central and state-funded schemes. Some of the challenges in infrastructure development concerning water, mobility, and pollution were to be met under the AMRUT 1.0 and 2.0 scheme, with some financial assistance from the central government and the rest of the share mobilised by both states and respective cities. The mission was drawn to cover 500 cities and towns with a population of over one lakh with notified municipalities, Darjeeling is one of the cities. AMRUT scheme's key objectives are as follows:

a) Ensure that every household has access to a tap with an assured supply of water and a sewerage connection.

b) Increase the value of cities by developing greenery and well-maintained open spaces such as parks.

c) Reduce pollution by switching to public transport or constructing facilities for non-motorised transport

Under AMRUT 2.0, it was aimed at making cities 'water secure' and providing functional water tap connections to all households in all statutory towns. Ambitious targets were set up such as providing 100% sewage management in 500 AMRUT cities, The total outlay for AMRUT 2.0 is ₹299,000 crore (35.01 billion USD), with the Central outlay being ₹76,760 crore (8.98 billion USD) for five years, and the rest of the amount to be mobilised by the States and cities.

The SBM-U 2.0 focused on the treatment of used water & its safe reuse and scientific management of faecal sludge, the mission was launched with a budget of ₹1,416 billion (16.57 billion USD), of which ₹398.37 billion (4.66 billion USD) is allotted for Solid Waste Management and ₹56 billion (655.2 million USD) for sanitation. These national-level schemes combined with the tied funds under the 15th FC have given DM's interest in achieving the targeted objective.

3.5.1 Stimulating demand for services

The following activities may stimulate demand for services:

- Awareness generation on septic tank construction, and regular emptying of septic tanks through awareness campaigns.
- Awareness campaigns on the ill effects of environmental degradation caused by disposing of untreated septage into the 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 achieving the objectives of both SBM 2.0 (i.e. ODF++) and AMRUT 2.0 (i.e. Water+) can't be converted into reality unless proper management of faecal sludge is achieved over the sanitation value chain. It's quite evident that the city's terrain doesn't contribute to the centralised approach for handling sewage, a combination of both OSS and Offsite (centralised and de-centralised) systems must co-exist at the city level and should be given the utmost priority. SBM 2.0 and AMRUT 2.0, schemes are explicit enough and allow the parastatal body to choose the best technology to scientifically treat the liquid waste.

3.5.2 Strengthening service provider roles

DM has not estimated the funds for septage management initiatives, the tied fund that is channelized via 15th FC is completely utilised in improving the water supply network and solid waste management of the city. The provision of procuring cesspool vehicles under SBM 2.0 can play a major role in strengthening the service delivery gap of providing municipal services for the safe emptying of faecal sludge. Considering the "*Used Water Management (UWM)*" component of SBM 2.0, it grants funds for the following:

- To procure desludging equipment, for scheduled and need-based desludging of septic tanks.
- Interception and diversion of drains (I&D) (including last mile connectivity for nearest sewer network).
- Construction of Sewage Treatment Plants (STPs)/ STP cum Faecal Sludge Treatment plants (FSTPs) for used water treatment for ULBs under 1 lakh population.

The service delivery of used water/wastewater and FS treatment and disposal can be met via converging the two national schemes SBM 2.0 and AMRUT 2.0, as mentioned earlier, considering the population of Darjeeling to be over 1 lakh, STPs/FSTPs funds can be leveraged from AMRUT 2.0. The DM can take benefit of these schemes and strengthen the service delivery gaps along the sanitation value chain in conjunction with the mission goals of both schemes.

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 research work was facilitated with the support of the Darjeeling Municipality through the key engagement of elected counselors from each ward, as outlined in the MoU signed with the Darjeeling Municipality. The purpose of the SFD study and the depth of data required were conveyed through an introductory letter to respective departments. Overall, three KIIs were conducted with different stakeholders like government functionaries, emptiers, masons[14] and community representatives (see appendix 7.1).

Apart from KIIs, the survey was also conducted, which included interviews with representatives from NGOs and the fire department. Indeterminate information was available before the field-based research about the type of containment, emptying service, transportation, and disposal of used water generated by the city. The visit enabled enhancing data collection by gathering progress details of SBM. Interviews with the private emptiers, masons, and other stakeholders provided additional insight into the service delivery context.

4.2 Field Observation

To get a better picture of the variety/typology of the onsite sanitation systems, random surveys were conducted. The sample was carefully chosen to get a good spatial representation from each ward of OSS dependence based on the Census, 2011 (Table 2). The researcher also recorded the field observations related to sanitation. Such surveys, observations, and KIIs helped to produce a more credible and accurate SFD, providing both qualitative data and potentially more accurate quantitative data related to service delivery. Some of the observations are listed below.

During the field observations, it was noted that some households in the Economically Weaker Section (EWS) had poorly constructed toilets. While most homes had toilets, those without access relied on community toilets, and open defecation was found. The type of containment system varied across different economic sections of society. Given this variation, a decision was made to conduct a random survey in wards dependent on On-Site Sanitation (OSS) within the municipal area. The survey included visits to various sewage and septage disposal points in the city. These observations were crucial for sample selection, providing a clearer understanding of the city's sanitation context.

4.3 Focussed Group Discussion

The focus group discussions (FGDs) were organized to supplement, verify, and question the data gathered from the literature review and interviews. A total of four FGD sessions took place, involving DM officials, cesspool vehicle operator, conservancy Dept., and Private water tank operator. Although the questionnaires were initially prepared in English, the interviewer translated and asked the questions in the regional language.

[14] Link to video documentary of the KII performed with mason: https://drive.google.com/file/d/13Qy7V77zkGYDN_AkPvYqV5AangSZDkCI/view?usp=sharing

Figure 18: KII with Mason making Septic tank in ward 5 (Source: Sumit/NIUA/2024).

Figure 19: FGD with ward 5 Counsellor, Nirmal Sathi (Source: Sachin/NIUA/2024).

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6 References

Athar, S., White, R. and Goyal, H. 2022. *Financing India's urban infrastructure needs Constraints to commercial financing and prospects for policy action* [Online]. Available from: www.worldbank.org.

Forest Survey of India 1997. *For Official Use Only ~, ON FOREST RESOURCES OF DARJEELING DISTRICT FOREST SURVEY OF INDIA EASTERN ZONE CALCUTTA 1997*.

GiZ 2014. *Preparation for City Sanitation Plan: A Toolkit*.

Government of West Bengal 2024. Demography | Darjeeling District, Government of West Bengal | India. [Accessed 7 February 2025]. Available from: https://darjeeling.gov.in/demography/.

Governmental of West Bengal 2024. History of Darjeeling | Darjeeling District, Government of West Bengal | India. [Accessed 24 September 2024]. Available from: https://darjeeling.gov.in/history/.

Koner, K. and Gopa Samanta, · 2021. 'Where does water go'? A critical analysis of nature of water crisis in Darjeeling city, India. *Applied Water Science*. **11**, p.184.

Lalbhai, K. 2013. *Performance Assessment System (PAS) Project Team CEPT University* [Online]. Available from: www.pas.org.in.

Ministry of Law and Justice 2013. Manual Scavenging Act 2013.

Ministry of Urban Development 2017. *Government of India Ministry of Urban Development National Policy on Faecal Sludge and Septage Management (FSSM)*.

Ministry of Urban Development 2013. *Ministry of Urban Development Government of India SEPTAGE MANAGEMENT IN URBAN INDIA* [Online]. Available from: http://urbanindia.nic.in.

Ministry of Urban Development 2010. Service levels in Urban Water and Sanitation Sector.

Raghupathi, U.P., Pancholy, A., Srivastav, V., Ahmed, M., Nigam, A., Pandey, H.P. and Usman Khan, M. 2005a. *STATUS OF WATER SUPPLY, SANITATION AND SOLID WASTE MANAGEMENT IN URBAN AREAS*.

Raghupathi, U.P., Pancholy, A., Srivastav, V., Ahmed, M., Nigam, A., Pandey, H.P. and Usman Khan, M. 2005b. *Status of Water Supply, Sanitation and Solid Waste Management in Urban Areas*.

Rai, M. 2015. *HEALTH SECURITY OF WOMEN LABOURERS LIVING IN SLUMS: A CASE STUDY OF DARJEELING TOWN*.

Ray B 1961. *Darjeeling, West Bengal* [Online]. [Accessed 17 December 2024]. Available from: https://censusindia.gov.in/nada/index.php/catalog/29150/download/32331/22888_1961_DAR.pdf.

Shende, A.D. and Pophali, G.R. 2023. Sewage and faecal sludge management; revisiting discharge standards in India. *International Journal of Environmental Science and Technology*. **20**(11), pp.12793–12806.

Singh, S., Raju, N.J., Mehmood, G., Gupta, S.K. and Ahmed, S. 2024. A review of the current scenario and best possible solution for fecal sludge management (FSM) in India. *Groundwater for Sustainable Development*. **27**, p.101346.

Town and Country Planning Organisation 2016. Model Building Bye Laws 2016.

7 Appendix

7.1 Stakeholder Identification

Table 12 Stakeholder Identification.

S.No.	Stakeholder group	In Darjeeling context
1	City Council/ Municipal Authority	Darjeeling Municipality
2	Ministry in charge of urban sanitation and sewerage	Department of Urban Development and Municipal Affairs- West Bengal Government
3	Ministries in charge of urban planning finance and economic development	Department of Urban Development and Municipal Affairs- West Bengal Government
4	Ministries in charge of environmental protection	Department of Environment- West Bengal Government
5	Ministries in charge of health	Health & Family Welfare Department- West Bengal Government
6	Service provider for construction of onsite sanitation technologies	Local Masons
7	Service provider for emptying and transport of faecal sludge	Municipality, private emptiers, manual emptiers
8	Service provider for operation and maintenance of treatment infrastructure	N/A
9	Market participants practicing end-use of faecal sludge end products	N/A
10	Service provider for disposal of faecal sludge (sanitary landfill management)	Private emptier
11	External agencies associated with FSM services: e.g. GOs, academic institutions, and donors.	National Institute of Urban Affairs, New Delhi.

7.2 Tracking of Engagement

Table 13 Tracking of engagement.

S.No.	Name of Organisation	Designation	Date of engagement	Purpose of engagement
1.	DM	Chairman and Municipal Staff	10/06/2024	Introduction of SFD and permission to conduct FGDs in the offices and municipal wards. **FGD** with administrative staff of DM.
2.	DM	Sub-Assistant Engineer-Water Works	10/06/2024	KII
3.	DM	Health and Sanitary Officer/ Medical Officer	10/06/2024	KII
4.	DM	Municipal Engineer	11/06/2024	KII
5	DM	Fire Department Officer	11/06/2024	KII
6.	Private	Mason	11/06/2024	KII
7.	Public Toilets	Caretaker	12/06/2024	KII
8.	Private	Emptiers/ Manual emptiers/Cesspool vehicle operator	12/06/2024	FGD
9.	DM	Conservancy Department, Solid Waste, Valve operator	12/06/2024	FGD
10.	Private	Private water tank operator	14/06/2024	FGD

7.3 SFD graphic

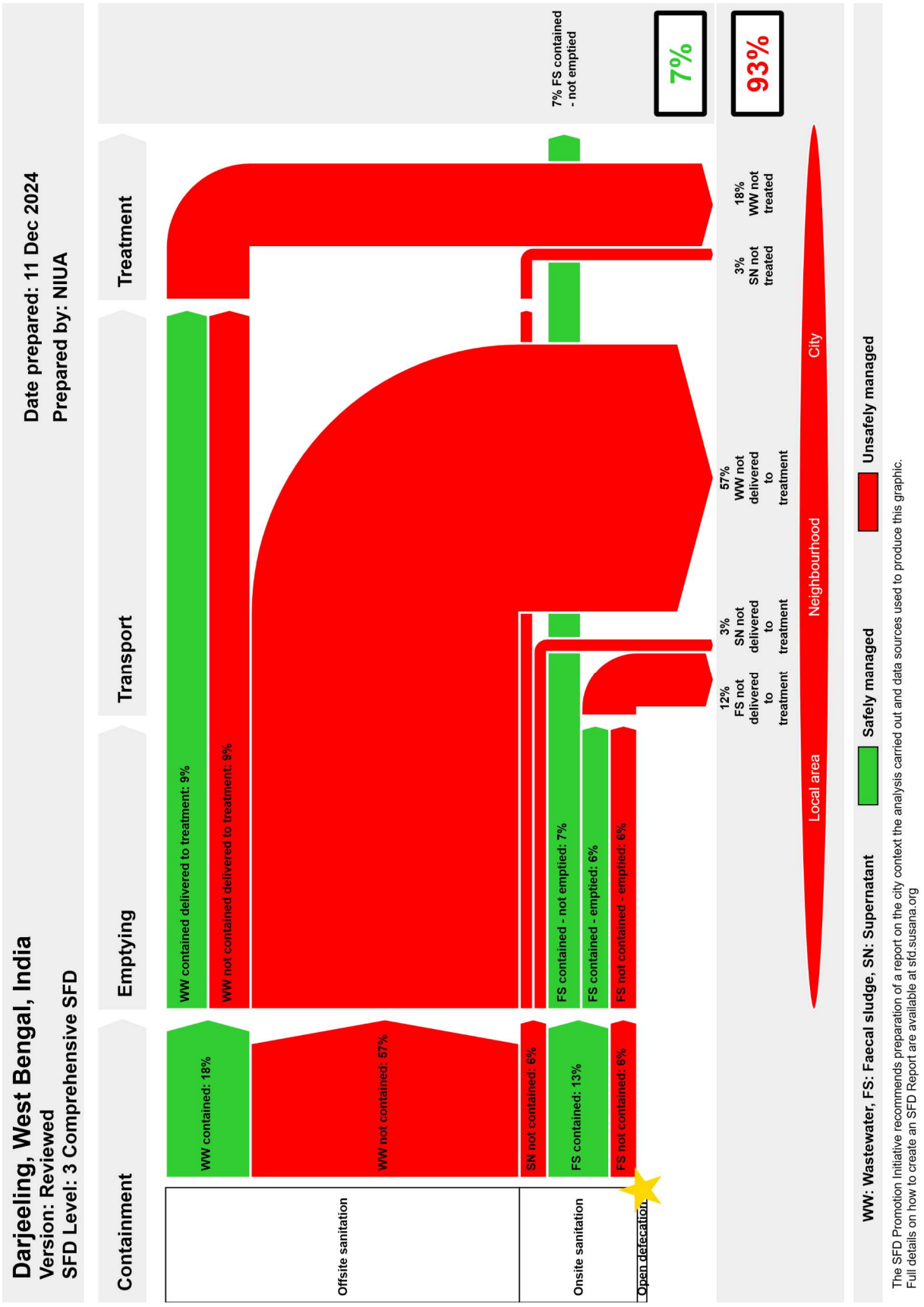

Figure 20: SFD graphic (Source: SFD graphic generator).

7.4 SFD brief explanation

System Type	Containment	Emptying	Transport	Treatment and End-use/ Disposal
Offsite	T1A1C6:57% of the Population is discharging their excreta directly to open drains. T1A1C4: 18% of the Population is discharging their excreta directly to a de-centralised foul/separate sewer.	Not applicable	WW not delivered to the treatment plant is 57%	There's no treatment of wastewater in the city. 57% population's wastewater gets discharged into nalli (drains) untreated.
Onsite	T1A2C5: 5.9% of the population is dependent on septic tank connected to soak pit. T1A2C6: 5.9 % of the population is dependent on septic tank connected to open drains. T1A3C5: 6.1% of the population is dependent on fully lined tank connected to soak pit. T1A3C6: 5.9% of the population is dependent on fully lined tank connected to open drains. T1A6C10: 1.2% of the population is dependent on unlined pit which has no outlet or overflow.	• Since most of the population is getting their system emptied, it's assumed 100% of the population has their onsite system. • Since there is no clear differentiation between the percentage of septage and effluent, it is assumed to be 50%. FS not contained-emptied comes out to be 6%, FS not contained- not emptied is estimated to be 6% and FS contained 13%. • Of the 6% FS not contained, 3% is attributed to population using septic tanks, and 3% is attributed to population using fully lined tanks.	No treatment facility exists hence no FS is transported to treatment plant therefore FS not delivered to treatment plant is 12%. Since there is low risk of groundwater contamination, the infiltration from the pits is taken as safe and is equal to 7%	No treatment facility exists hence no FS is treated; therefore, FS treated is 0%. All the FS emptied ends up in local area without any treatment.
Open Defecation	Not Applicable			

7.5 Context-adapted SFD graphic

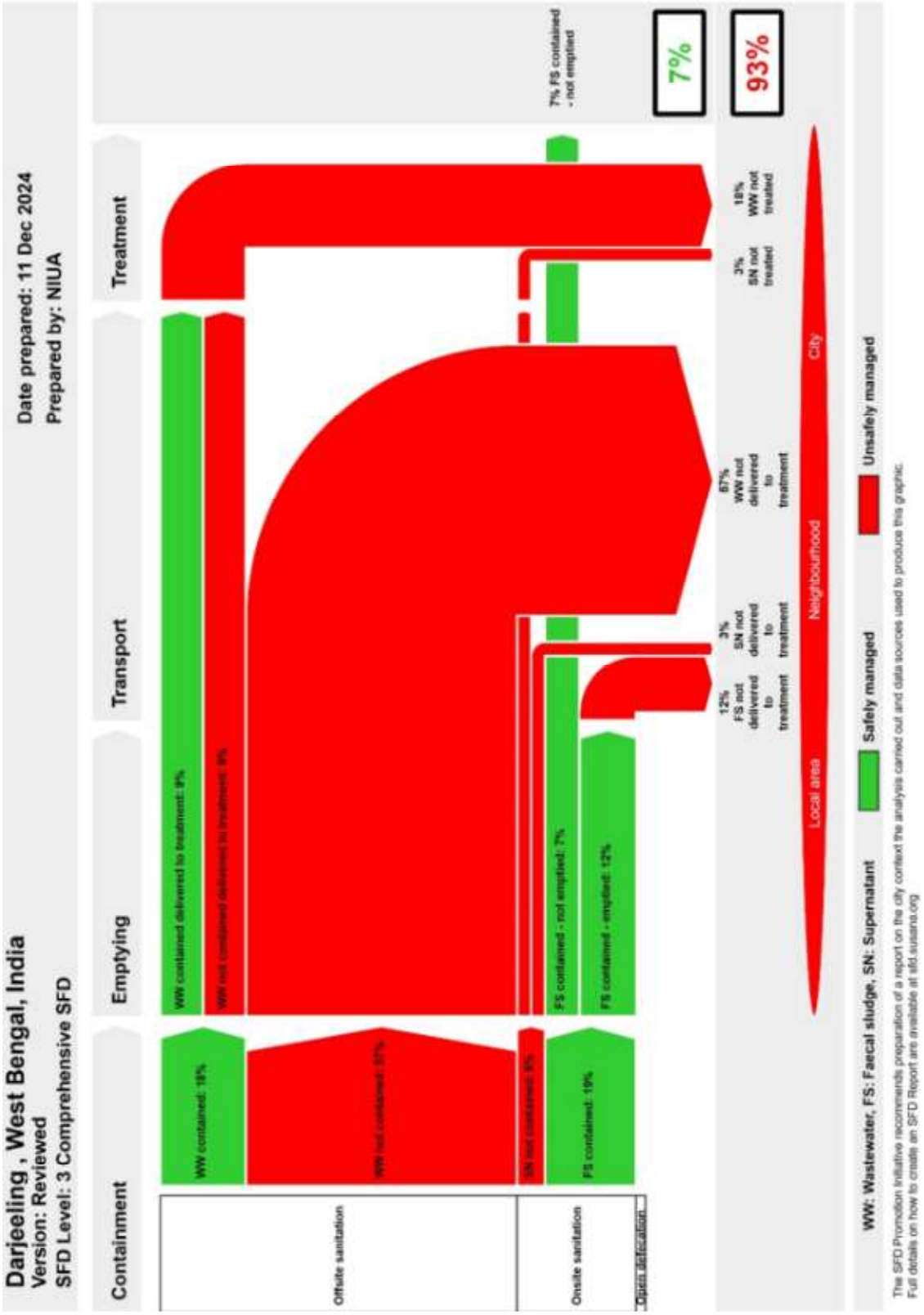

Figure 21: Context-adapted SFD graphic (Source: SFD graphic generator, 2024).

7.6 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				T1A1C4	Significant risk of GW pollution / Low risk of GW pollution	T1A1C6				Not Applicable
Septic tank					Significant risk of GW pollution / T1A2C5	T1A2C6				
Fully lined tank (sealed)					Significant risk of GW pollution / T1A3C5	T1A3C6				
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					Significant risk of GW pollution / Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution / Low risk of GW pollution
Unlined pit										Significant risk of GW pollution / T1A6C10
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										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										
No toilet. Open defecation	Not Applicable									Not Applicable

Figure 22: SFD selection grid (Source: SFD graphic generator/2024).

7.7 SFD matrix

Table 14 SFD matrix (Source: SFD graphic generator/2024).

Darjeeling , West Bengal, India, 11 Dec 2024. SFD Level: 3 - Comprehensive SFD
Population: 245049
Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%

Containment										
System type	Population	WW transport	WW treatment	WW transport	WW treatment	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	W4b	W5b	W4c	W5c	F3	F4	F5	S4e	S5e
System label and description	Proportion of population using this type of system (p)	Proportion of wastewater in sewer system, which is delivered to decentralised treatment plants	Proportion of wastewater delivered to decentralised treatment plants, which is treated	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
T1A1C4 Toilet discharges directly to a decentralised foul/separate sewer	18.0	50.0	0.0							
T1A1C6 Toilet discharges directly to open drain or storm sewer	57.0			15.8	0.0					
T1A2C5 Septic tank connected to soak pit	5.9					100.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	5.9					100.0	0.0	0.0	50.0	0.0
T1A3C5 Fully lined tank (sealed) connected to a soak pit	6.1					100.0	0.0	0.0		
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	5.9					100.0	0.0	0.0	50.0	0.0
T1A6C10 Unlined pit, no outlet or overflow	1.2					0.0	0.0	0.0		

7.8 Public Toilets Assessment

Table 15 Details of public toilets taken up for perception survey in the high-footfall area of Chowrasta (Source: Fieldwork/NIUA/2024).

Location of Public toilet	Ward no.	No. of toilet seats				Facilities				Caretaker room
		Male (M)		Female (F)		Urinal	Bath	Washbasin		
1) At Chowrasta (near Bellvue hotel)	18	4 Indian WC (pour flush)	1 western WC (with flush)	6 Indian WC (pour flush)	1 western WC (with flush)	5	-	3 (M)	2 (F)	Yes (in M washroom on first floor only)
2) At Chowrasta (below auditorium)	30	1 Indian WC (pour flush)	1 western WC (with flush)	1 Indian WC (pour flush)	1 western WC (with flush)	4	1	1 (M)	1 (F)	Yes, on ground floor
3) At Jai complex	-	1 Indian WC (pour flush)	1 western WC (with flush)	3 Indian toilet (pour flush)	-	5	-	1 (M)	1 (F)	No
4) At Rink mall	-	2 Indian WC (pour flush)	-	4 Indian toilet (pour flush)	-	7	-	1 (M)	1 (F)	No
5) Near Turnbull Highschool		4 Indian toilet (pour flush)	-	-	-	-	-	-	-	No
6) Near railway station	15	4 Indian toilet (pour flush)	-	9 Indian toilet (pour flush)	-	5	-	1 (M)	1 (F)	No (only table for caretaker to collect money provided)
7) At NC Petrol pump		1 Indian toilet (pour flush)	-	1 Indian toilet (pour flush)	-	0	-	-	-	Yes, on ground floor
8) At Chowkbazar (Infront of Hotel Shambala)	30	4 Indian toilet (pour flush)	-	4 Indian toilet (pour flush)	-	0	-	1 (M)	1 (F)	No
9) At NB Singh Road (near Royal Khana Khazana restaurant)	21	3 Indian toilet (pour flush)	-	5 Indian toilet (pour and flush)	-	0	-	-	-	Yes, on ground floor
10) Below Glenary's	30	6 Indian toilet (pour flush)	-	1 Indian toilet (pour flush)	-	6	-	-	-	No
11) Below Sumitel Hotel	-	1 Indian toilet (pour flush)	-	1 Indian toilet (pour flush)	-	0	-	-	-	No
12) At Chowkbazar (near Unique building)	-	20 Indian toilet (pour flush)	-	-		3	-	1	-	No
13) At Chowkbazar (near Laxmi Bhandar)	-	-	-	17 Indian toilets (pour-flush	1 western WC (with flush)	-	-	-	3	No
14) At Chowkbazar (near old supermarket)	-	10 Indian toilets (pour flush)	-	6 Indian toilets (pour-flush	-	6	-	3 (M)	2 (F)	No

7.9 Questionnaire for Random House Surveys

CONSOLIDATED QUESTIONNAIRE FOR CSP

Date:	Area name:
Name of Surveyor:	Ward no:

- Respondent's Name, gender and age (प्रतिक्रिया देने वाले व्यक्ति का लिंग व आयु):
- Household Size (परिवार के सदस्य की गिनती)
- How Many years are you staying in this town? (आप इस शहर में कितने वर्षो से रह रहे हैं?)
  - 0 to 10 years (0 साल से 10 साल तक)
  - 10 years to 15 years (10 साल से 15 साल तक)
  - 16 to 20 years (16 से 20 वर्ष)
  - 21 to 30 years (21 से 30 वर्ष)
  - More than 30 years (30 वर्ष से अधिक)

CSP component: **WATER SUPPLY** Sub-component: **HH survey WFD**

1) Observation question
Which type of structure is your House ? Please Select one from the below option
(आपका घर किस प्रकार की संरचना का है? कृपया नीचे दिए गए विकल्प में से एक का चयन करें)

P-Pakka K-Kacha SP- Semi Pakka

2) Do you rely on Single Source or Multiple Source of Water?(Select one or more from the given options) ? (क्या आप पानी के एक स्रोत या एकाधिक स्रोत पर निर्भर हैं?) (कृपया दिए गए विकल्पों में से चयन करें)

Handpump- H
Private Borewell- PB
Others (Specify)- O
Piped Supply- PS
Municipal Meter Connection- MMC

3) What is the duration of the Municipal water supplied in a day and how many times in a week? (Frequency) (नगर निगम/नगर पालिका द्वारा एक दिन में जल आपूर्ति की अवधि क्या है? एक सप्ताह में कितनी बार जल की आपूर्ति जाती है?)

- 1 hour- 1H
- 2 hour- 2H
- 3 hour- 3H

Daily(हर रोज)- D
Alternate Days(एक दिन छोड़कर)- AD
Once a week (हफ्ते मे एक बार)- O

4) Do you have Overhead Tank? (क्या आपके पास ओवरहेड टैंक/पानी की टंकी है?)
If Yes, select one of the provided tank capacities and No. of Tanks (यदि हाँ , तो दी गई टैंक क्षमता का चयन करें और उनकी संख्या भी बताएं)

500 Litre- 500P 1000 Litre- 1000P 2000 Litre- 2000P

5) How many times do you fill up your Overhead tank in a week? (आप एक सप्ताह में अपने ओवरहेड टैंक/पानी की टंकी को कितनी बार भरते हैं?)
   - Daily(हर रोज)- D
   - Alternate Days(एक दिन छोड़कर)- AD
   - Once a week (हफ्ते मे एक बार)- O

   Do you fill up the overhead tank with the Municipal Supply? YES/ NO (क्या आप नगर निगम/ नगर पालिका द्वारा की गयी पानी को आपूर्ति से अपने ओवरहेड टैंक / पानी की टंकी को भरते है ? If No, mention source of water for filling up. (यदि नहीं, तो भरने के लिए पानी के स्रोत का उल्लेख करें।)

6) Do you rely on private tankers for your water needs? If yes, how frequently do you require the water tanker. Please mention the volume of the tanker in litres. (क्या आप अपनी पानी की जरूरतों के लिए निजी टैंकरों पर निर्भर हैं? यदि हाँ, तो आपको कितनी बार पानी के टैंकर की आवश्यकता पड़ती है। कृपया टैंकर की मात्रा लीटर में बताए।)
   - Daily(हर रोज)- D
   - Alternate Days(एक दिन छोड़कर)- AD
   - Once a week (हफ्ते मे एक बार)- O

7) Do you also share the private tankers providing water supply with your neighbours? If Yes, how frequently do you share it. Please mention the number of sharing households and the volume of tanker in litre. (क्या आप अपने पड़ोसियों के साथ जलापूर्ति करने वाले निजी टैंकरों को साझा करते हैं? यदि हाँ, तो आप इसे कितनी बार साझा करते हैं। कृपया साझा करने वाले व्यक्तियों की संख्या और टैंकर की मात्रा लीटर में का उल्लेख करें।)

   .....

8) Rate your satisfaction level with the current water supply situation in your city? (अपने शहर में जलापूर्ति की वर्तमान स्थिति के आधार पर अपने संतुष्टि स्तर का मूल्यांकन करें? (यदि प्रदर्शन कम है, तो कारण बताये) (If low performance, then why?)

   1- Poor (ख़राब) 4- Good (अच्छा)
   2- O.k.(ठीक है.) 5- Excellent (उत्कृष्ट)
   3- Satisfactory (संतोषजनक)

CSP component: ACCESS TO TOILETS **Sub-component: HH survey**

9) Do you have an IHHL toilet? (YES /NO) (क्या आपके घर के अंदर या आपकी प्लाट सीमा के भीतर/परिसर शौचालय है और क्या शौचालय में आवश्यक जल सील है? हाँ / नहीं)

.....

10) If Yes, what type of toilet facility does your household use? Please select from the given options (यदि हाँ , तो आपका परिवार किस प्रकार की शौचालय सुविधा का उपयोग करता है? कृपया दिए गए विकल्पों में से चयन करें)

Pour Flush, mention source of water (handpump, tap inside toilet, storage tank)(मग से पानी डालने वाला)

Cistern Flush (फ्लश से पानी डालने वाला)

11) If no, where do you go for the use of Toilet? यदि नहीं, तो आप शौचालय के उपयोग के लिए कहाँ जाते हैं? Kindly select from the given options (कृपया दिए गए विकल्पों में से चयन करें)

- ST: Shared toilet (साझा शौचालय का उपयोग)
- CT: Community Toilet (सामुदायिक शौचालय का उपयोग)
- PT: Public Toilet (सार्वजनिक शौचालय का उपयोग)
- OD: Open Defecation (खुले में शौच) and Other (specify)

12) If Shared, how many households in total use this toilet facility, including your own HH? (यदि साझा शौचालय किया गया है, तो आपके अपने घर सहित कुल कितने परिवार इस शौचालय सुविधा का उपयोग करते हैं?)

- Number of HHs (परिवारों की संख्या)
- Don't know (नहीं मालूम)

13) How often do you empty your pit latrine/ septic tank?(क्या आप अपने पिट लैट्रिन / सेप्टिक टैंक खाली करते हैं?)

- Less than 1 year
- 2 to 3 years
- 3 to 5 years
- More than 5 years

14) Rate your satisfaction level with the access to toilet situation in your city? अपने शहर में शौचालय की पहुंच की वर्तमान स्थिति के आधार पर अपने संतुष्टि स्तर का मूल्यांकन करें? (If low performance, then why?) (यदि प्रदर्शन कम है, तो कारण बताये)

1- Poor (ख़राब)
2- O.k.(ठीक है)
3- Satisfactory (संतोषजनक)
4- Good (अच्छा)
5- Excellent (उत्कृष्ट)

CSP component: WASTEWATER MANAGEMENT(Sub-component: HH survey WW)

15) Where does your wastewater go? Kindly select from the given options (आपका अपशिष्ट जल कहाँ जाता है? कृपया दिए गए विकल्पों में से चयन करें)

Sewers (S) (गंदा नाला) Open drains (OD) (खुली नालियाँ)

Open ground (OG) (खुला मैदान) Soak pits (SP) (सोखने के गड्ढे)

Water Body (lake, river, pond etc.) (जल निकाय (झील, नदी, तालाब आदि)

16) If connected to Sewers, Does the sewers overflow in monsoon season or any manholes sighted open? (YES/NO) (यदि सीवर से जुड़ा है, तो क्या मानसून के मौसम में सीवर ओवरफ्लो हो जाता है या कोई मैनहोल खुला दिखता है? हाँ / नहीं)

17) Do you re-use the grey water coming out for Kitchen/bathing at your premises? YES/NO (क्या आप अपने परिसर में रसोई/स्नानघर के लिए निकलने वाले गंदे पानी का पुन: उपयोग करते हैं? हाँ / नहीं) If yes, then for what do you use the greywater for? (यदि हाँ ,तो आप गंदे पानी का उपयोग किस कार्य के लिए करते हैं?)

CSP component: SEPTAGE MANAGEMENT **Sub-component: HH survey SM**

18) What is the containment type ? Kindly select from the given options (टैंक प्रणाली का प्रकार क्या है? कृपया दिए गए विकल्पों में से चयन करें)

- ST: Septic Tank (सेप्टिक टैंक)
- Pit: Pit Latrine (गढ्ढे वाला शौचालय)
- FLT: Fully lined Tank (टैंक)
- NC- No containment (कोई टैंक नहीं है)
- O- others (अन्य)/ Sewers

19) Can you tell us where does the black water coming out from the containment type go? kindly select from the given options (क्या आप हमें बता सकते हैं कि टैंक प्रणाली से निकलने वाला काला पानी कहाँ जाता है? कृपया दिए गए विकल्पों में से चयन करें)

- Sewers (S) (सीवर)
- Open drains (OD) (खुली नालियाँ)
- Open ground (OG) (खुला मैदान)
- Soak pits (SP) (सोखने के गड्ढे)
- Water Body (lake, river, pond etc.)(जल निकाय (झील, नदी, तालाब आदि)
- Others (specify)

20) Can you tell where does the open drain ends up into ? Kindly select from the given options (क्या आप बता सकते हैं कि खुली नाली कहाँ जाकर खत्म होती है? कृपया दिए गए विकल्पों में से चयन करें)
- River (R) (नदी में)
- Open ground (OG) (खुले मैदान)
- Stormwater drain (SWD) (तूफानी/बारिश जल नाली में) में)
- Others (specify)

21) What is the size of your containment? (Mention the "length x breadth x height" in ft.") (टैंक का आकार क्या है? ("लंबाई x चौड़ाई x ऊंचाई" का उल्लेख फीट में करें।)

22) Do you have public/private/manual desludging facility in your ward/locality? (Yes/No/don't know) If Yes, what are the charges? (INR/trip) क्या शहरी स्थानीय निकाय आपके वार्ड/इलाके में मनुष्य मल-कीचड़ हटाने की कोई सुविधा प्रदान करता है? (हाँ / नहीं/नहीं पता)

23) Do you know where do these desludging vehicles dumps the emptied septage? Please select from the given option (क्या आप जानते हैं कि ये मल-कीचड़ खाली करने वाले वाहन खाली किये गए मल-कीचड़ को कहां फेकते है करते हैं? कृपया दिए गए विकल्प में से चयन करें)
- On Open ground (खुले मैदान में)
- Into River (नदी में)
- Open Drains (खुली नालियों में)
- Into Lakes/Ponds (झीलों/तालाबों में)
- Sewer (सीवर में)
- Nearby Treatment facility (निकट के उपचार सुविधा में)
- Others(specify) (अन्य)

24) Rate your satisfaction level with the current wastewater and septage management situation in your city? अपने शहर में अपशिष्ट जल और सेप्टेज प्रबंधन की वर्तमान स्थिति के आधार पर अपने संतुष्टि स्तर का मूल्यांकन करें? (यदि प्रदर्शन कम है, तो कारण बताये) (If low performance, then why?)

1- Poor (ख़राब)
2- O.k.(ठीक है)
3- Satisfactory (संतोषजनक)
4- Good (अच्छा)
5- Excellent (उत्कृष्ट)

CSP component: STORMWATER MANAGEMENT **Sub-component: HH survey**

25) When precipitation occurs, how does the water release out of your terrace? ((जब बारिश होती है,तो पानी आपके घर की छत से कैसे बाहर निकलता है?)
- Discharge onto open ground
- Discharge into drains/nullah
- Do not have any pipelines on the terrace
- Pipeline discharges into septic tank

26) What happens to your houses' outdoor premises in the event of precipitation? (क्या होता है जब बारिश आपके घर के आँगन में गिरती है?)
- The premises get waterlogged during high precipitation and are not connected to any drains/pipelines (ज्यादा बारिश के कारण घर के आँगन में पानी भर जाता है और आँगन किसी भी पानी निकासी वाली नाली/पाइपलाइन से जुड़ा नहीं है।)
- It doesn't get waterlogged and doesn't have any drains/pipelines either (घर के आँगन में जलभराव नहीं होता और आँगन किसी भी पानी निकासी वाली नाली/पाइपलाइन से जुड़ा नहीं है।)
- It doesn't get waterlogged, all water normally infiltrates or flows away from the premises (घर के आँगन में बारिश के कारण जलभराव नहीं होता है, सारा पानी सामान्य रूप से जमीन के अंदर चला जाता है या परिसर से दूर बह जाता है)
- It gets water logged despite having the pipelines/drains (पानी निकासी की पाइपलाइन/नालियां होने के बावजूद, घर के आँगन में बारिश के कारण जलभरावहो जाता है)

27) When a flood or extreme precipitation happens, what becomes most difficult to access for you and your family? (surveyor can choose more than one, but ask them which is the most dominant one) (जब बाढ़ या अत्यधिक वर्षा होती है तो आपके और आपके परिवार के लिए किस सुविधा चीज़ तक पहुंचना सबसे कठिन हो जाता है?) (प्रतिभागी एक से अधिक विकल्प चुन सकते हैं, लेकिन उनसे पूछें कि सबसे प्रभावशाली बाढ़ कौन सा है)
- Access to Clean Water (स्वच्छ जल तक पहुंच)
- Access to the Clean toilets (स्वच्छ शौचालय तक पहुंच)
- Disposal of the waste (कचरे का निपटान)
- No Problem at all (कोई समस्या नहीं)

28) Have you seen septic tanks or pits overflow during heavy rain in your town? YES/NO (क्या आपने अपने शहर में भारी बारिश के दौरान सेप्टिक टैंक या गड्ढों को पूरा भर कर, बहते देखा है?) हाँ/नहीं

29) During floods or heavy rainfall, how long does water usually stay in your area before it goes away? (बाढ़ या भारी वर्षा के दौरान, आपके क्षेत्र में आमतौर पर पानी उतरने से पहले, कितने समय तक ठहरता है?)
- Less than 1 hour (1 घंटे से भी कम)
- Less than 12 hours (12 घंटे से भी कम)
- Less than 2 days (2 दिन से भी कम)
- Less than 7 days (7 दिन से कम)

30) Have you witnessed instances where low-lying areas, waterbodies, forested areas (unreserved), or, high mountain slopes, have been used for establishing buildings and became vulnerable to flood risks and landslides?
Yes. Name of areas?

31) Rate your satisfaction level with the current storm water management in your city? If low performance, then why? (अपने शहर में तूफानी जल का प्रबंधन की वर्तमान स्थिति के आधार पर अपने संतुष्टि स्तर का मूल्यांकन करें? (यदि प्रदर्शन कम है, तो कारण बताये)

1- Poor (ख़राब)
2- O.k.(ठीक है.)
3- Satisfactory (संतोषजनक)
4- Good (अच्छा)
5- Excellent (उत्कृष्ट)

CSP component: SOLID WASTE MANAGEMENT **Sub-component: HH survey**

32) Is there Door-to-Door waste collection facility at your home? If yes, what is the frequency of waste collection? (क्या आपके घर पर कचरा उठाने वाली गाडी आती है ? यदि हाँ तो कितने दिन में चक्कर लगाती है?)

No service yet (कचरा गाड़ी नहीं आती) Daily (प्रतिदिन आती है)
Alternate day (एक दिन छोड़ कर आती है) Bi-weekly (हफ्ते में दो बार आती है)

33) How much are you willing to pay for door to door waste collection service? (monthly) (यदि कचरा गाड़ी की सुविधा नहीं है, तो आप इस सुविधा के लिए कितना शुल्क भुगतान करने के लिए राज़ी है?)

34) How do you generally dispose of your HH waste? Kindly select from the given options (आप अपने घर के कूड़े का निपटान कैसे करते है? (कृपया दिए गए विकल्पों में से चयन करें)

- Open burning (जला देते है)
- Door to door (कूड़ा गाडी में डालते है)
- Curbside dumping (रोड किनारे फेंक आते है)
- Others (कोई अन्य उपाय)

35) Are you willing to carry out source segregation at home if provided with 2 bins? YES/NO (अगर आपको २ डस्टबिन दिए जाये, तो क्या आप गीला और सूखा कूड़ा अलग अलग रखना शुरू करेंगे? हाँ/नहीं)

36) Do you compost/recycle? Yes/no (क्या आप कूड़े को रीसायकल या उससे खाद बनाते है? (हाँ/नहीं)

37) If no, are you willing to compost/recycle if knowledge and resources are provided? YES/NO (अगर आपको सही जानकारी और संसाधन मुहैया कराये जाये, तो क्या आप रीसायकल करेंगे? हाँ/नहीं)

38) Is it practical/possible for you to live without plastic bags? YES/NO (क्या आप पॉलीथिन के बिना अपना जीवन जी सकते है? हाँ/नहीं) .....

39) How do you acquire relevant information? (आप अधिकतर जानकारिया किस माध्यम से लेते है?)
TV(टीवी के माध्यम से)
Newspaper(अखबार से)
Social Media (फेसबुक/सोशल मीडिया)
Government announcements/ads(बैनर या सरकारी विज्ञापन)
Friends/family (परिवार या मित्रो से)
Others (कोई अन्य उपाय)

40) Rate your satisfaction level with the current Solid Waste situation in your city? (If low performance, then why?) (अपने शहर के कूड़ा निपटान व्यवस्था से आप कितना संतुष्ट है? यदि प्रदर्शन कम है, तो कारण बताये)

1- Poor (ख़राब)
2- O.k.(ठीक है)
3- Satisfactory (संतोषजनक)
4- Good (अच्छा)

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