SFD Lite Report

Rishikesh
India

This SFD Lite Report was prepared by:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Date of production: 23/07/2018

1 The SFD Graphic

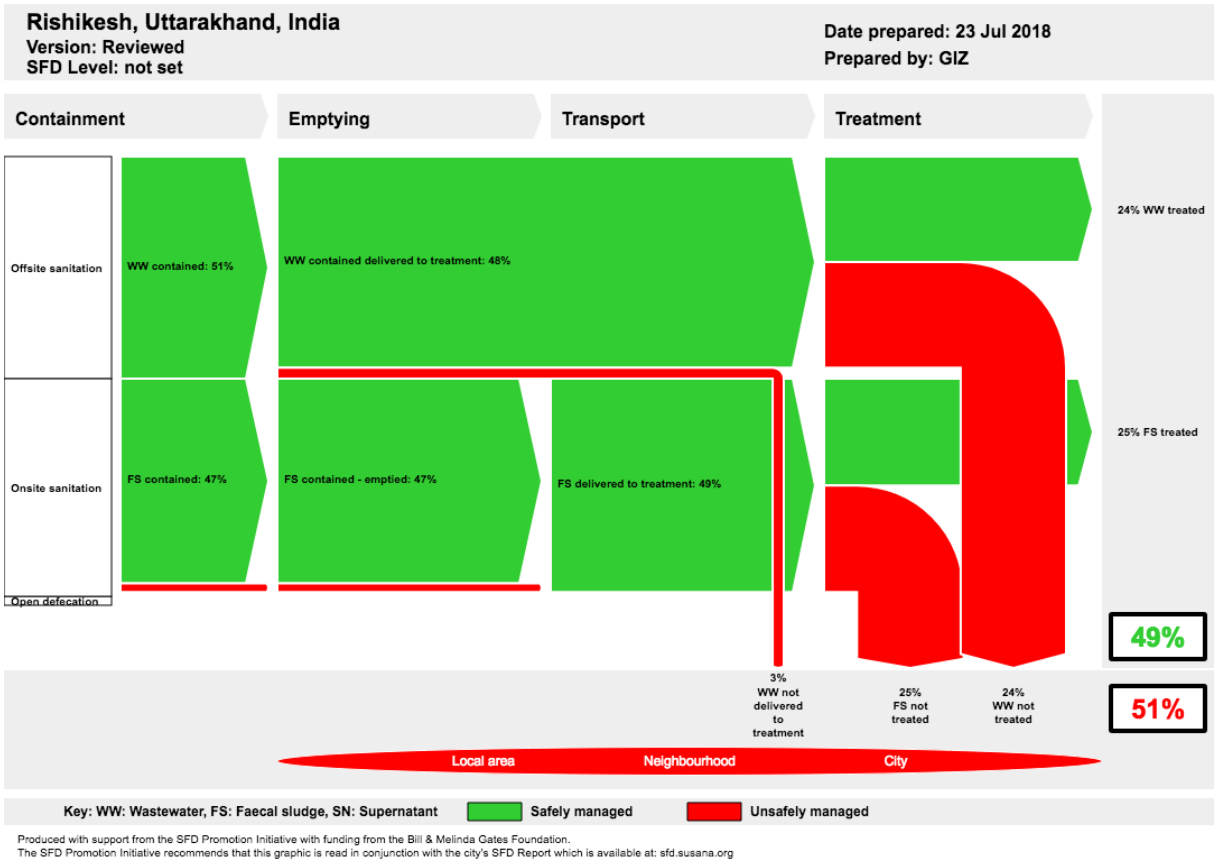

Figure 1: SFD Graphic for Rishikesh

2 SFD Lite information

Produced by:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Rahul Sharma (Technical Advisor - GIZ) with support from Mr. Merajuddin Ahmed (Technical Expert - GIZ) and Mr. Liju Matthew (Junior Technical Expert - GIZ).

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3 General city information

Rishikesh is an important pilgrim city on the banks of river Ganga in Dehradun district of the Indian state, Uttarakhand. Over the years, it has also established itself as the yoga capital of the world.

In April 2018, Rishikesh Municipality (Nagar Palika Parishad) was upgraded to Rishikesh Municipal Corporation (Nagar Nigam). Subsequently, the municipal area, population and number of wards have increased from 10 sq.km, 70,499 people and 20 wards, to 26 sq.km, 106,320 people and 40 wards (NPP, 2017 and KII 1, 2018). The equivalent daily floating population in Rishikesh is considered as 12,344 (Peyjal Nigam, 2016).

Rishikesh has an average elevation of 372 metres above mean sea level and the local climate is humid subtropical.

GIZ supported the town to prepare a City Sanitation Plan (CSP) in 2017. The municipal boundary was subsequently changed, resulting in an increase in the administered area. This SFD was, therefore, prepared to incorporate the new area and build upon the existing CSP.

4 Service outcomes

Table 1 shows the SFD Matrix and the data used to prepare the SFD Graphic in Figure 1. Overall, the SFD Graphic depicts that 49% of excreta is safely managed while 51% is discharged untreated to the environment.

The town was declared open defecation free (ODF) in 2017.The additional areas that were included in the new municipal limit were already notified as ODF, hence the town with its new limits continues to be ODF. A few areas (Chandreshwar Nala, Shisham jhaadi, Triveni colony and Sarvahara colony) still need some attention for maintaining the ODF status.

Rishikesh, Uttarakhand, India, 23 Jul 2018. SFD Level: not set
Population: 118664
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 100%

System label	Pop	W4a	W5a	F3	F4	F5	S4e	S5e
System description	Proportion of population using this type of system	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised 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
T1A1C1 Toilet discharges directly to a centralised combined sewer	51.0	95.0	50.0					
T1A2C5 Septic tank connected to soak pit	15.0			100.0	100.0	50.0		
T1A3C5 Fully lined tank (sealed) connected to a soak pit	30.0			100.0	100.0	50.0		
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	2.0			100.0	100.0	50.0	95.0	50.0
T1A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit	2.0			100.0	100.0	50.0		

Table 1: SFD Matrix for Rishikesh (GIZ, 2018)

4.1 Sewered areas

Approximately 51% of the population (47% of the city population plus 90% of equivalent floating population) is covered by the sewerage network (FGD 1, 2018; KII 2, 2018; and KII 1, 2018).

In sewered areas, though the sewerage system is designed and constructed for both blackwater (wastewater from toilets) and greywater/sullage (wastewater from bathrooms, kitchens and wash), it is observed that in many areas (especially old town) only the blackwater is discharged into the sewer system (FGD 1, 2018 and field observations). The greywater is discharged into the open/storm water drains (Figure 2). In many cases, the public urinals directly discharge into the open drains rather than discharging into existing sewers.

Figure 2: Greywater discharged in open drains in areas having sewerage network (Rahul/GIZ, 2018)

There is no separate underground storm water drainage network in Rishikesh. Generally, the open drains are connected to the sewer network. These open drains are laden with greywater from the households and solid waste (due to littering). Often these open drains (of much bigger size) are connected to sewers of smaller size (FGD 1, 2018 and field observations). All this leads to regular blockage of sewers, which ultimately results in regular water logging during monsoons and backflow of wastewater from sewers. In some cases, the open drains are connected to the existing sewers without the permission of Uttarakhand Jal Sansthan, which is the institution responsible for operation and maintenance of the sewerage system.

In some areas having no sewer network, underground drains were constructed by Rishikesh Municipal Corporation (institution responsible for constructing municipal roads and adjoining storm water drains) for the conveyance of storm water. These underground drains have been subsequently used by households for conveyance for sewage and are functioning as sewers.

Major storm water drains (known locally as nalas), which are laden with greywater and solid waste are intercepted at sewage pumping stations and pumped to the sewage treatment plant (STP). A few nalas (Sai Ghat Nala, Chandreshwar Nala, Shamshan ghat Nala and Dhalwala Nala), which are also laden with greywater, directly discharge into the environment. Peyjal Nigam has installed bar screens at these nalas for intercepting solid waste before these nalas discharge to the river (Figure 3).

Figure 3: Bar screens installed at Chandreshwar Nala for intercepting solid waste (Rahul/GIZ, 2018)

At present two outfall sewers carry sewage to the STP. Certain stretches of the sewer lines are very old and with insufficient capacity to handle the present wastewater generation. The existing old trunk sewer is in extremely dilapidated condition, this was commissioned in 1966 and is approximately 6-7 km in length (Source Peyjal Nigam, 2016). Housing settlements (Nirmal Block) have been built above the 2 km stretch of the trunk sewer (Figure 4). Because of this construction, there is no direct access to the sewer, therefore

Figure 4: Settlements constructed over trunk sewer in Nirmal Block (Rahul/GIZ, 2018)

operation and maintenance along this stretch is very difficult. Considering these issues and for the purposes of the SFD, transmission losses/leakages in sewers are assumed to be 5%.

The wastewater collected by the sewerage network reaches the STP at Lakkarghat. This STP is being currently operated and maintained under the direct supervision of Jal Sansthan. The STP was initially (1966) designed, constructed and operated for treating 3 MLD of wastewater but later (1996) redesigned and retrofitted to treat 6 MLD of wastewater (Peyjal Nigam, 2016). Currently, the STP is overloaded and receives approximately 16 MLD of wastewater, including from the Rishikesh Municipal area and other peripheral areas (Muni ki Reti and Dhalwala) (FGD 1,2018).

The entire wastewater is treated at the existing STP without being bypassed. Most of the STP effluent discharge standards (except COD) are met as per the test reports of STP effluent (Apr-May 2018) from the office of the Executive Engineer, Uttarakhand Jal Sansthan (UJS, 2018). As per the data from CPCB for the year 2014 (Jan-Oct), the treated effluent from the Lakkarghat STP is not meeting the effluent discharge standards suitable for river discharge (Jal Nigam, 2016). Hence, of the total wastewater reaching the STP, partial treatment as per required effluent discharge standards occurs at the STP, which is assumed as 50% for SFD purpose. The treated wastewater from the STP is discharged into the Song river which later meets the river Ganga. The solid waste screenings from the STP is being disposed of at the existing solid waste dumping site in Rishikesh.

4.2 Non-sewered areas

Nearly 21 wards in Rishikesh are not covered by sewerage network (Table 1 and Annexure 2). A joint field visit was carried out in these wards by the author with the ULB representative and following observation were made. The non-sewered areas mainly depend on onsite sanitation systems (septic tanks, lined tanks, etc), as shown in Annexure 3.

Figure 5: Septic Tank in under construction house (Rahul/GIZ, 2018)

In old constructions / settlements, most (assumed as 30% of households in Rishikesh, field observations and FGD 2, 2018) of the onsite sanitation systems are in the form of fully lined single tanks connected to a soak pit. Most (assumed as 10% for SFD, field observations and FGD 2, 2018) of the new constructions have circular or rectangular septic tanks connected to soak pit (Figure 5). In some old construction / settlements, the onsite sanitation system is a tank with impermeable walls and open bottom connected to open bottom tank / soak pit (assumed as 2% for SFD because these tanks get emptied after 8-10 years, field observations and FGD 2, 2018). The onsite sanitation systems are not designed as per the national standards. In non-sewered areas, generally, only the blackwater is discharged into the onsite sanitation systems. The greywater/sullage is discharged into the open storm water drains. In very few areas where there are no storm water drains, even the grey water is discharged into the existing onsite sanitation systems.

Ward No.	Ward Name	Population (Census 2011)	Piped water supply (Yes / No)	Sewerage network (Yes / No)
1	Chandreshwar Nagar	3011	Yes	Yes
2	Triveni Colony	3024	Yes	No
3	Durga Mandir	3054	Yes	Yes
4	Bhairav Mandir	2912	Yes	No
5	Pushkar Mandir	2764	Yes	Yes
6	Aadarsh Gram	2498	Yes	Yes
7	Mayakund	2696	Yes	Yes
8	Bharat Mandir	2983	Yes	Yes
9	Mukherjee Marg	2532	Yes	Yes
10	Sadanand Marg	2635	Yes	Yes
11	Ashutosh Nagar	2628	Yes	Yes
12	Pragati Vihar	2345	Yes	No
13	Valmiki Nagar	2710	Yes	Yes
14	Subhash Nagar	2840	Yes	Yes
15	Maniram Ward	2634	Yes	Yes
16	Tilak Marg	2668	Yes	Yes
17	Ganga Vihar	2334	Yes	Yes (approx. 70 % sewered)
18	Shanti Nagar	2844	Yes	Yes
19	Someshwar Mandir	2760	Yes	No
20	Ganga Nagar	2740	Yes	Yes
21	Upper Ganga Nagar	2677	Yes	Yes
22	Shastri Nagar	2720	Yes	No
23	Sarvahara Nagar	2566	Yes	No
24	Bharat Vihar	2927	No	No
25	Aavas Vikas	3086	Yes	Yes (approx. 90 % sewered)
26	Shivaji Nagar	2488	No	No
27	Barrage Ward	2377	Yes	No
28	Veerbhadra Mandir	2385	Yes	Yes (approx. 50 % sewered)
29	20 Bigha	2545	Yes	No
30	Meera Nagar	2499	Yes	No
31	Bapugram	2455	Yes	No
32	Suman Vihar	2631	Yes	No
33	Geeta Nagar	2488	Yes	No
34	Malviya Nagar	2485	Yes	No
35	Amit Gram (East)	2545	Yes	No
36	Amit Gram	2602	Yes	No
37	Mansha Devi	2657	No	No
38	Indra Nagar	2595	Yes	No
39	Nehru Gram	2545	Yes	No
40	THDC	2435	THDC's own water supply	No
	TOTAL	**106320**	**95775 (Population having piped supply)**	**50176 (Population having sewer network)**

Table 2: Water supply and Sewerage network coverage in Rishikesh (KII 1, 2018; KII 3, 2018; and FGD 1, 2018)

In areas near to river Ganga/river Rambha where the water table is high (e.g. less than 1 m below ground level), the onsite containment systems do not have soak pits. In this location, the lined tanks are connected to open drains outside the houses (assumed as 2% for SFD, field observations and FGD 2, 2018).

The onsite sanitation systems are mechanically emptied by the households using a vacuum truck operated by private operator. Generally, all the households with onsite sanitation systems get them emptied (field observations and FGD 2, 2018). However, the frequency of emptying varies from three years to more than 10 years. Currently, there is only one private service provider for emptying the onsite sanitation systems in the town. The private operator maintains two vacuum trucks for emptying, one with a capacity of 5,000 litres and one with a capacity of 3,000 litres. The operator receives nearly two or three emptying requests per day and charges approximately Rs. 2,500 per trip. After collection, the entire septage/faecal sludge is discharged into the trunk sewer via a manhole near the STP (FGD 1, 2018 and FGD 2, 2018).

4.3 Risk of groundwater contamination

Approximately 92% of the town is supplied with piped water supply (Table 1 and Annexure 1; KII 3, 2018 and KII 2, 2018). 14 tube wells and two mini wells (water production approximately 22 MLD) spread across the town are the main source of water supply. The remaining 8% of the town depends on hand pumps or borewells for drinking water. The soil is generally sand/loam mixed with boulders. The drinking water in the entire town is of potable quality (KII 3, 2018).

4.4 Septage management related policies

The 'National policy on faecal sludge and septage management (FSSM)' was launched in 2017. The key objective of the national FSSM Policy is to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all Urban Local Bodies such that safe and sustainable sanitation becomes a reality for all (MoUD, 2017).

For proper septage management in urban areas, the Government of Uttarakhand had notified the 'Protocol for Septage Management' on 22nd May 2017. For effective implementation of the protocol, every ULB has been mandated to create a Septage Management Cell (GoUK, 2017).

'The prohibition of employment as manual scavengers and their rehabilitation Act, 2013' defines insanitary latrine as a latrine which requires human excreta to be cleaned or otherwise handled manually, either in situ, or in an open drain or pit into which the excreta is discharged or flushed out, before the excreta fully decompose in such manner as may be prescribed (MLJ, 2013). The 'Guidelines for Swachh Bharat Mission – Urban, 2014' consider even single pit latrines as insanitary latrines. The SBM mandates to convert 100% of households having insanitary latrines to sanitary latrines during the mission period 2014-19 (MoUD, 2014).

4.5 Ongoing and proposed sanitation projects

Currently, the desludging/emptying of tanks is done on-demand basis. As per the Protocol for Septage Management (GoUK, 2017) it is planned that routine desludging will be introduced alongside proper treatment and disposal of septage. Eventually, it is planned that all areas will be connected to the sewerage network.

The World Bank is currently funding a project 'Interception and Diversion of Nalas and Construction of 26 MLD STP at Lakkarghat with Tertiary Treatment and online monitoring system.'. The contractor has started works and the STP is expected to be commissioned in November 2019 (KII 2, 2018).

The German government has committed an interest subsidised loan of up to Euro 120 million through German Development Bank KfW for financing projects under the Namami Gange programme, which is the flagship funding programme of the Government of India for effective abatement of pollution, conservation and rejuvenation of National River Ganga. The loan will be mainly utilised to set up sewerage network along the Ganga in the cities of Rishikesh and Haridwar. The programme is under final stage of preparation. Respective agreements are expected to be signed by end of 2018. (KII 4, 2018)

5 Data and assumptions

The objectives of preparing this SFD report are a) to improve understanding of the current situation relating to sanitation service delivery in Rishikesh and b) to provide decision-makers in Rishikesh with an advocacy document that can be used to aid the taking of appropriate actions for improving the sanitation situation in the city.

Population data is based on Census 2011 (*http://censusindia.gov.in/DigitalLibrary/Archive_home.aspx*), while the equivalent floating population considered is based on secondary source (Peyjal Nigam, 2016). The proportion of various onsite sanitation systems mentioned in the report is based on a rapid field visit by the author to the town and various rounds of discussions with different stakeholders.

In addition, and in order to prepare the SFD Graphic, the following key assumptions were made:

- The proportion of the contents of each type of onsite container is considered as 100% faecal sludge.
- Most of the commercial establishments, institutions, etc. are located within the old municipal limit and all these have sewerage connections.
- One of the trunk sewers was laid in 1966 and is in a dilapidated condition, therefore transmission loses/leakages are assumed to be 5%.
- The STP at Lakkharghat is heavily overloaded i.e. the STP has a design capacity of 6 MLD and receives nearly 16 MLD of waste-water. Most of the STP effluent discharge standards are met as per the test reports of the local office (Executive Engineer, Jal Sansthan). However, the CPCB report 2014 states the treated effluent is not meeting the discharge standards (Peyjal Nigam, 2018). Hence, it is assumed that 50% of the wastewater reaching the STP is treated as per discharge standards.
- 100% of the households have their onsite sanitation systems emptied when they are full.

6 List of data sources

Reports and literature

- NPP, 2017. City Sanitation Plan – Rishikesh Cluster, Nagar Palika Parishad. Prepared with the support of GIZ.
- Peyjal Nigam, 2016. Detailed Project Report – Pollution abatement works for river Ganga at Rishikesh (Interception & Diversion on Nalas & Construction of 26 MLD STP at Lakkar ghat with tertiary treatment & online monitoring system) in Uttarakhand state including O&M of 1 year for I&D works & 15 years for STP works. Implementation funded by the World Bank.
- UJS, 2018. Test Reports of Sewer Effluent samples taken from different STPs of Haridwar & Rishikesh, Office of the Executive Engineer (Maintenance Division, Ganga) Uttarakhand Jal Sansthan Haridwar, April-May 2018
- MoUD, 2017. National policy on Faecal sludge and Septage management, Ministry of Urban Development, Government of India.

- GoUK, 2017. Protocol for Septage Management, Government of Uttarakhand.
- MLJ, 2013. The prohibition of employment as manual scavengers and their rehabilitation Act, Ministry of Law and Justice, Government of India.
- MoUD, 2014. Guidelines for Swachh Bharat Mission – Urban, Ministry of Urban Development, Government of India.

Key informant interviews

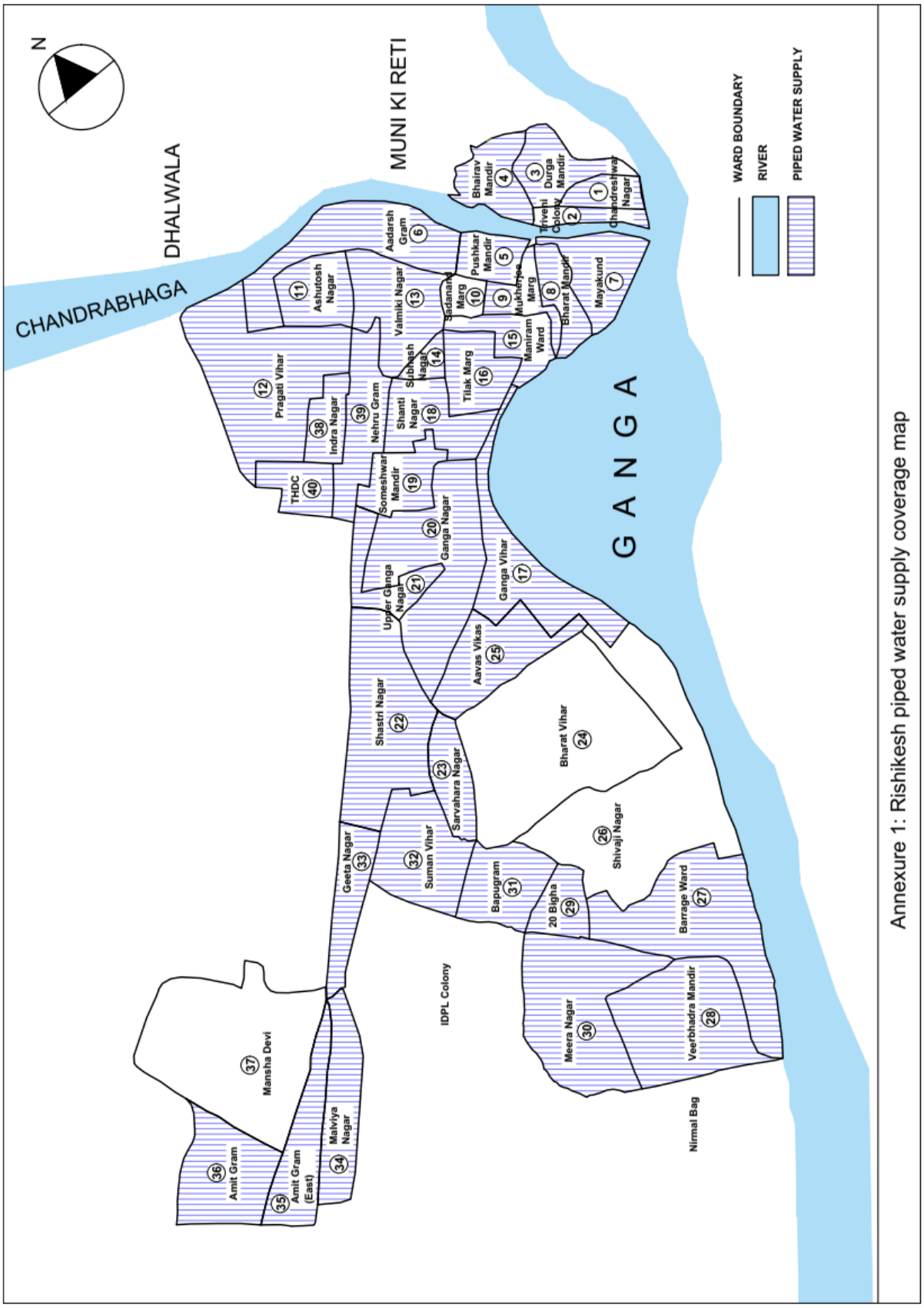
- KII 1, 2018. Interview with Mr. Uttam Singh Negi, Assistant Municipal Commissioner, Municipal Corporation Rishikesh
- KII 2, 2018. Interview with Mr. Sandeep Kashyap, Project Manager, Uttarakhand Peyjal Nigam, Rishikesh
- KII 3, 2018. Interview with Mr. Manoj Dabral, Additional Assistant Engineer, Uttarakhand Jal Sansthan, Rishikesh
- KII 4, 2018. Interview with Mr. Anirban Kundu, Deputy Director, KfW Office New Delhi, India

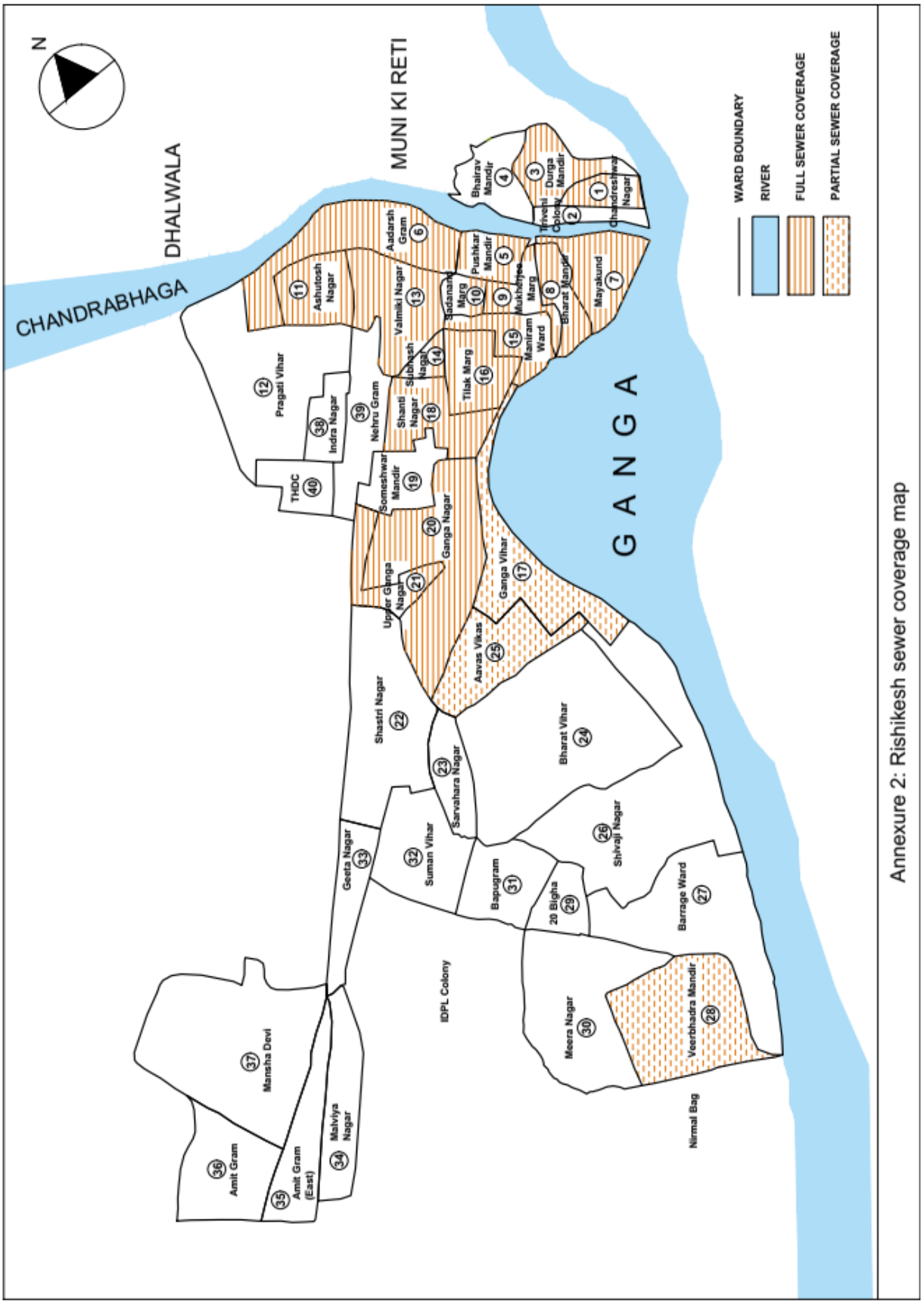
Focus group discussions

- FGD 1, 2018. Focus Group Discussion with Mr. Harish Bansal (Assistant Engineer, Uttarakhand Jal Sansthan, Rishikesh); Mr. Manoj Kumar (Additional Assistant Engineer, Uttarakhand Jal Sansthan, Rishikesh) and Mr. Brijpal Singh Rana (Ex-Councillor Ganga nagar ward, Municipal Corporation Rishikesh).
- FGD 2, 2018. Focus Group Discussion with Mr. Sachin Rawat (Sanitary Inspector, Municipal Corporation Rishikesh) and Mr. Sethi, (Septic Tank Emptying Private Operator).

Field visit and observations

- STP at Lakkarghat, Sewage Pumping Station at Triveni ghat, Chandrabhaga Bridge, Sai ghat nala, Chandreshwar Nala, Aadarsh Gram, Someshwar Mandir, Ganga Nagar, Shastri Nagar, Sarvahara Nagar, Bapugram, Bharat Vihar, Aavas Vikas, Shivaji Nagar and Nirmal Bag.


N
CHANDRABHAGA
DHALWALA
MUNI KI RETI
GANGA
WARD BOUNDARY
RIVER
PIPED WATER SUPPLY
Dhandreshwar Nagar
Triveni Colony
Durga Mandir
Bhairav Mandir
Aadarsh Gram
Pushkar Mandir
Mayakund
Bharat Mandir
Mukherjee Marg
Sadanand Marg
Maniram Ward
Ashutosh Nagar
Valmiki Nagar
Subhash Nagar
Tilak Marg
Pragati Vihar
Indra Nagar
Nehru Gram
Shanti Nagar
THDC
Someshwar Mandir
Ganga Nagar
Upper Ganga Nagar
Ganga Vihar
Aavas Vikas
Shastri Nagar
Bharat Vihar
Sarvahara Nagar
Shivaji Nagar
Geeta Nagar
Suman Vihar
Bapugram
20 Bigha
Barrage Ward
IDPL Colony
Meera Nagar
Veerbhadra Mandir
Nirmal Bag
Mansha Devi
Malviya Nagar
Amit Gram
Amit Gram (East)
Annexure 1: Rishikesh piped water supply coverage map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Bharat Mandir
Mukhimas Marg
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Pushkar Mandir
Sadanand Marg
Aadarsh Gram
Valmiki Nagar
Ashutosh Nagar
Subhash Nagar
Tilak Marg
Pragati Vihar
Indra Nagar
Nehru Gram
Shanti Nagar
Someshwar Mandir
THDC
Ganga Nagar
Upper Ganga Nagar
Ganga Vihar
Aavas Vikas
Shastri Nagar
Sarvahara Nagar
Bharat Vihar
Shivaji Nagar
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Bapugram
Suman Vihar
Geeta Nagar
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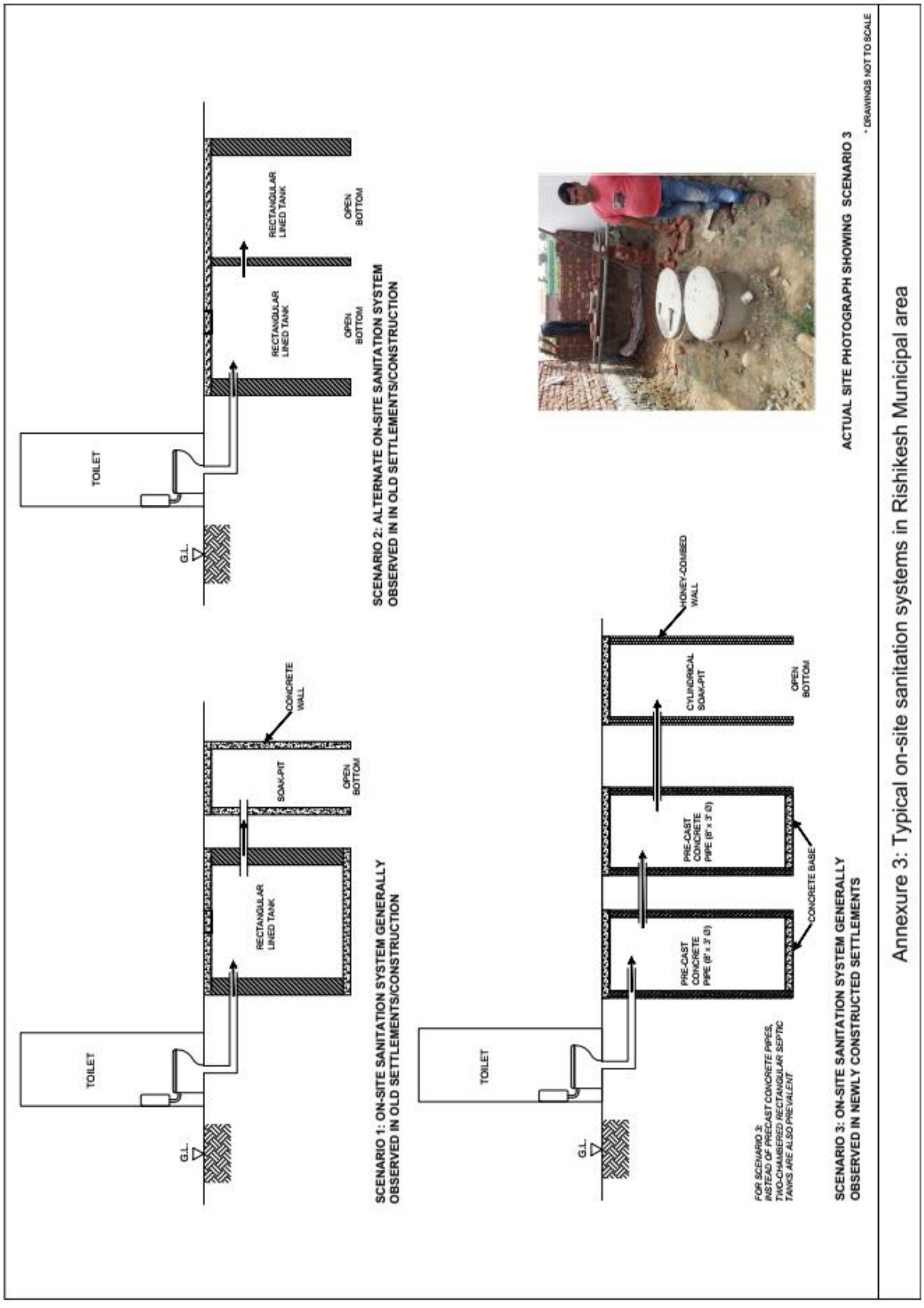
Malviya Nagar
Amit Gram (East)
Amit Gram
Annexure 2: Rishikesh sewer coverage map



Annexure 3: Typical on-site sanitation systems in Rishikesh Municipal area