



SFD Lite Report

Sircilla India

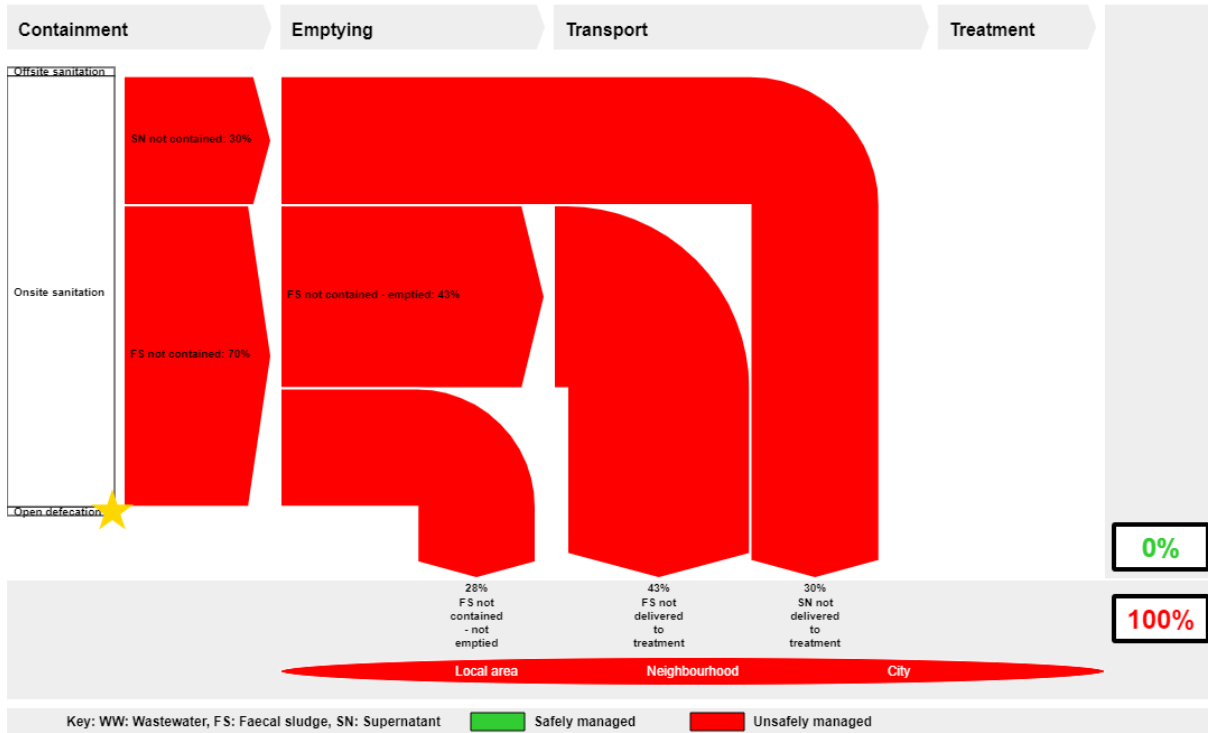
This SFD Lite Report was prepared by:
Eawag and CDD Society

Date of production: 07/05/2019

1. The SFD Graphic

Sircilla, Telengana, India
Version: Reviewed
SFD Level: not set

Date prepared: 23 Oct 2019
Prepared by: CDD society & Eawag



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

2. SFD Lite information

Produced by:

- The excreta flow diagram (or Shit Flow Diagram (SFD)) for Sircilla, India was created using the SFD Generator tool on the SuSanA website. It was prepared by the Consortium for DEWATS Dissemination Society (CDD Society) and with support and inputs from officials of the Sircilla Municipality, Telengana, India, and Eawag/Sandec.

Date of production: 07/05/2019

3. General city information

Sircilla, founded in 1987, is a second grade municipality in Rajanna Sircilla District in the Indian state of Telangana. According to the 2011 census, the total population is 75,640 and the urban agglomeration population of the city is 83,186. Sircilla is situated on Karimnagar Kamareddy Road, 40 km from Karimnagar, at 78° 48' 00" East and 18° 25' 00" North. It is located on the banks of the Maner River and is known as a textile town due to the presence of a large number of power loom sand textile processing and dyeing units. Sircilla is the largest textile hub in the state of Telangana and is a commercial center due to which there is a considerable floating population.

The current administrative boundaries were chosen for the data collection and preparation of the SFD graphic. The municipality is spread over 15.25 square km with 12 revenue wards and 33 election wards. As per the Census 2011, a total of 22,401 households are found in Sircilla. There are 23 notified informal settlements (or "slums") in Sircilla, which are located throughout the 33 election wards. The informal settlement population is 52,182.

Presently, a protected supply scheme controlled by the municipality ensures drinking water to the town. The drinking water comes from two rivers and is treated before being made available for the inhabitants of Sircilla. 135 litres per person per day is allotted, according to the municipality. In addition, some households are still using boreholes. It is important to note that during the dry season, the rivers do not flow and the drinking water supply comes from the groundwater below the rivers. Concerning wastewater, the existing drainage facilities in Sircilla are inadequate. There is no underground drainage system (sewer) and some parts of the town are served with surface masonry drains and other parts of the town with "Pucca" and "Kutchra" drains. Pucca and Kutchra drains are defined by the type of material. *Pucca* consists of burnt bricks, stones, cement or timber. *Kutchra* materials are uncured bricks, bamboo, mud, or grass. *Kutchra* is often used to describe crude, imperfect, or temporary.

Telangana is the only state in Southern India with a large amount of coal deposits. This coal is often mined by a state government company. Tan brown porphyritic granite deposits that are found in 4 different districts of the state, of which Sircilla is one, are being exploited on a large scale to be exported to China and South East Asian countries. The major part of Telangana state is underlain by gneissic complex, which is then overlain by basaltic lava flows and several younger rocks, notably granites, dolerites, pegmatites and quartzites. The geology of the region allows for the groundwater to be replenished during the Monsoon period (June-September) (Madhnure and Sudhakar, 2016). Telangana state has a semi-arid and predominantly hot and dry climate. The annual rainfall is 826 mm, though 80% of the total rainfall in the region comes during the South-West Monsoon, between July and September (Madhnure and Sudhakar, 2016). The average annual temperature in Sircilla is 27.5°C and the average annual rainfall is 907 mm, as seen in Figure 1.

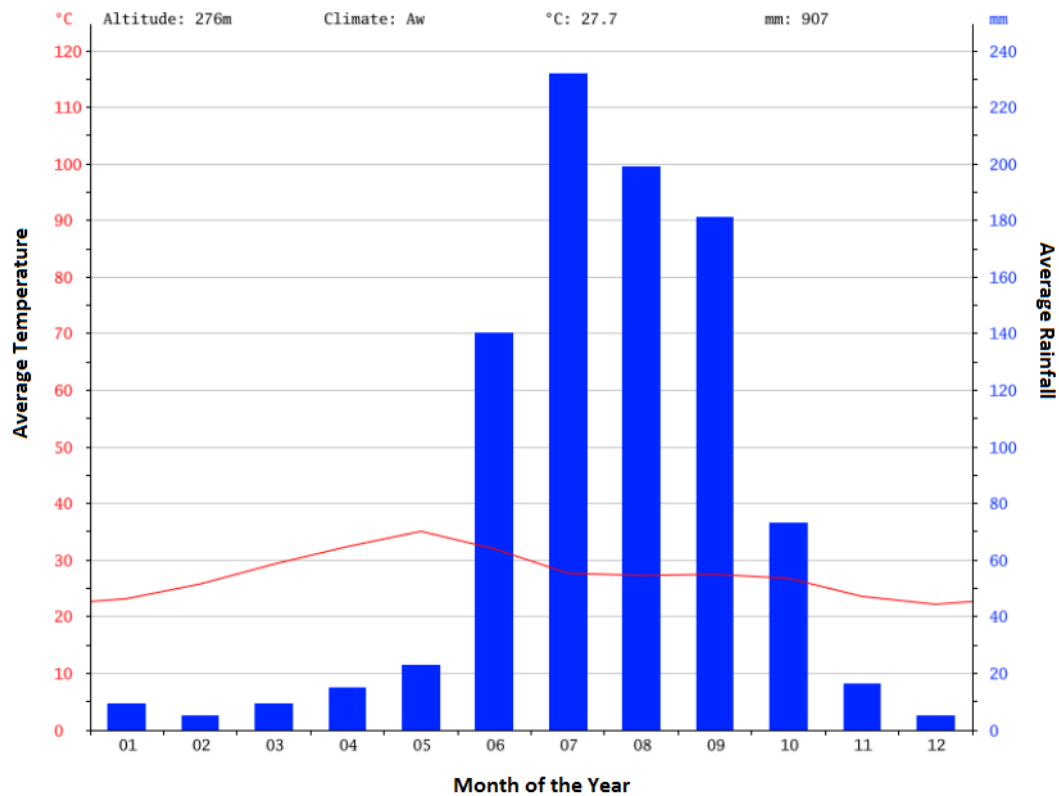


Figure 1: Average temperature and average rainfall in Sircilla. Source: <https://en.climate-data.org/asia/india/karimnagar/karimnagar-968191/>

4. Service outcomes

Table 1 shows the SFD Matrix and the data used to prepare the SFD Graphic. Overall, the SFD Graphic depicts that 100% of excreta is unsafely managed.

Table 1: SFD matrix for Sircilla (Sircilla Town Profile, Sircilla municipality, and desludging operators).

Sircilla, Telengana, India, 23 Oct 2019. SFD Level: not set

Population: 83186

Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 100%

System label	Pop	F3	F4	F5	S4e	S5e
System description	Proportion of population using this type of system	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated	Proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A2C6 Septic tank connected to open drain or storm sewer	10.0	75.0	0.0	0.0	0.0	0.0
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	50.0	75.0	0.0	0.0	0.0	0.0
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	40.0	50.0	0.0	0.0		

The distribution of containment types and the percentage of containments that are emptied were estimated through interviews with municipality officials, households, and desludging operators. It is estimated that 75% of all septic tanks and lined tanks and 50% of pit latrines have been desludged at least once. Many containments were built in the past three years (since the initiative to improve sanitation in 2015) and have not yet needed desludging, which may explain a portion of the 25% as of yet unemptied septic tanks and lined tanks. It is important to note that, despite desludging, none of the faecal sludge produced in Sircilla is treated, due to the lack of a faecal sludge treatment plant (FSTP) in the area. However, a FSTP is currently being constructed and is expected to be commissioned by June 2019, according to the site engineer. Currently, all the faecal sludge that is emptied is dumped untreated on the side of roadways, just outside of the city, into open, rocky fields (Figure 2).



Figure 2: Open disposal of untreated faecal sludge.

Sircilla was the first district in Telangana state to have achieved “open defecation free” (ODF) status, which was celebrated by the municipal administration minister in January 2017 (NDTV-Dettol Banega Swachh India, 2017). The other villages in the outskirts of Sircilla are also ODF certified, though some open defecation is still occurring in the urban towns located near Sircilla.

4.1 Containment system typology

Table 2: Containment systems in Sircilla (Sircilla Town Profile, Sircilla municipality).

Containment system	System label	Proportion available in Sircilla
Septic tank to open drain or storm sewer	T1A2C6	10% (1,612 containments)
Fully lined tank (sealed) connected to an open drain or storm sewer	T1A3C6	50% (8,106 containments)
Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a “significant risk” of groundwater pollution	T2A5C10	40% (6,485 containments)
Total number of onsite containments	-	16,203

Three different types of containment systems are known to exist in Sircilla: septic tanks, fully lined tanks, and lined pit latrines. The number of units per type of containment was calculated by the municipality in a pre-Swachh Bharat Mission survey. The Swachh Bharat Mission (SBM) is a national government initiative to achieve universal sanitation coverage. The definition and description of these types of containments that were used for this study are as follows:

Septic tank to open drain or storm sewer (T1A2C6): This is a properly constructed and fully functioning septic tank with an outlet connected to an open drain or storm sewer. The supernatant/effluent flowing from the tank is only partially treated (settling of solids, no pathogen reduction) and is hence still hazardous. Therefore, all the excreta in this system are considered not contained.

Fully lined tank (sealed) connected to an open drain or storm sewer (T1A3C6): This includes both correctly and poorly designed or constructed tanks that may or may not be properly maintained. Because of these faults (poor design, poor construction, poor maintenance, or a combination of these), these tanks are not performing as septic tanks, instead they are acting as sealed vaults. The tank is fitted with a supernatant/effluent overflow which is connected to an open drain or storm sewer. For this reason, the excreta in this system are considered not contained.

Lined pit latrine with semi-permeable walls and open bottom, no outlet or overflow, where there is a “significant risk” of groundwater pollution (T2A5C10): This is a correctly designed, properly constructed and maintained pit latrine with semi permeable, honeycombed lined walls and an open, permeable base, through which infiltration can occur. The pit is not fitted with a supernatant/effluent overflow but since there is a significant risk of groundwater pollution, this system is considered not contained.

The definition of contained and not contained used in the report is as follows: Contained is used to describe a sanitation technology system which ensures a safe level of protection from excreta. Not contained systems describes containments that may put the general public at risk for pathogen transmission.

The containment types observed in Sircilla vary with differing levels of affordability, education, and space constraints. As discussed previously, the SBM, which started in 2015, has greatly increased the number of individual containments in Sircilla. Since 2015, CDD Society has been able to follow the construction of 4,858 containments through the Swachh Telangana website (<https://swachhhs.cgg.gov.in/designEngineer.do>). Of the containments constructed since 2015, 18.9% are singular circular pits (T2A5C10), 37.2% are twin circular tanks (T1A3C6), 2.3% are rectangular septic tanks (T1A2C6), 21.4% are elliptical (T1A3C6), and 20.1% are unknown or unclear. The model of elliptical septic tanks being installed (Figure 3 and Figure 4) is lacking a bottom baffle which separates the tank into two containments, allowing for the solid portion of the faecal sludge to move freely between the two compartments (though a top baffle keeps top scum layer in the first compartment). The septic tank runoff is released into an open drain, so these tanks are considered to be not contained and fall under the category of fully lined tank connected to an open drain or storm water sewer (T1A3C6) (as opposed to the category “septic tank to open drain”).

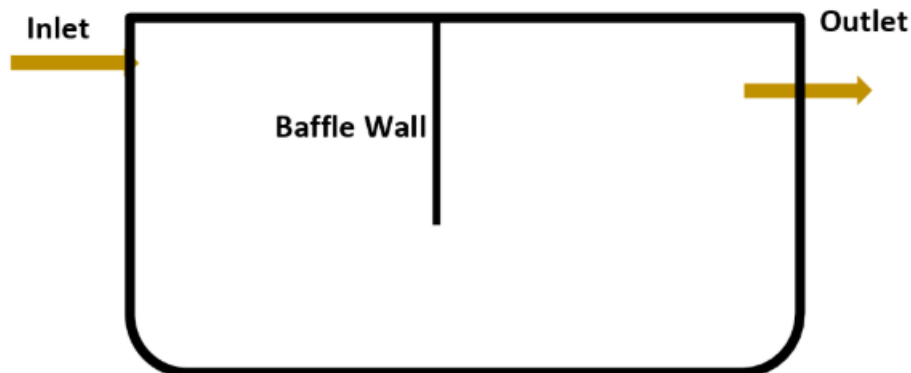


Figure 3: Cross-section of the newly constructed elliptical septic tanks in Sircilla.



Figure 4: Elliptical septic tanks with partition wall built in Sircilla.

For pit latrines, the government implements the installation of twin pits because they are the cheapest to construct and need little maintenance, although they also have the highest risk of groundwater contamination compared to the other options (discussed in section 4.2). The twin pits which are being newly constructed, like the elliptical and rectangular containment systems, are also connected to an open drain. Because of this connection, the new twin pits fall under the category “Fully Lined tank connected to an open drain or storm water sewer (T1A3C6)”.

A study to estimate quantities (including sludge accumulation rate) and qualities of faecal sludge in Sircilla is currently being performed, which will help to better understand flows of faecal sludge in the city. The percentage of safely managed faecal sludge is expected to increase once the FSTP is commissioned in June, 2019.

4.2 Risk of groundwater contamination

Due to the geology in the unsaturated zone (sandstone, limestone and fractured rock) and the depth of the groundwater table (between 10 and 20 metres), the risk of groundwater pollution is deemed as significant (Government of Telangana, 2018). The lateral separation, or the percentage of sanitation facilities that are located at less than 10 metres from ground water sources is not known, and so the worst-case scenario was assumed (greater than 25% of sanitation facilities are located in less than 10

metres from groundwater sources). The percentage of sanitation facilities located uphill of groundwater sources is less than 25% because uphill regions do not exist in Sircilla. Nevertheless, the lateral separation of sanitation facilities from groundwater sources also infers a significant risk of groundwater contamination.

The Mission Bhagiratha initiative started in 2016 with the intention to bring safe drinking water to 22,248 people by December 2018, though data confirming this have yet to be provided (Sircilla district, 2018). The Mission Bhagiratha is a project that will take water from the Krishna and Godavari rivers in order to cover 6,526,779 households over 30 districts in the Telangana State. The water will be treated in a water treatment plant and pumped, via a secondary pipeline network, to all households. In Sircilla, these works were completed by April 15th, 2018. Despite this and other municipality supplied water sources, some households still use private borewells as a domestic water source and at this point it cannot be confirmed that 100% of the town has access to municipality supplied drinking water. During the dry season, municipal-supplied water comes from the water table below the rivers, as both of the rivers do no flow during this time.

It is also important to note that the number of industries is likely to grow in the area due to rapid population growth and development, increasing the demand for water. An additional 10% of the total water requirement is proposed towards the industrial demand. This should be kept in mind in order to protect groundwater sources and avoid the over-pumping of groundwater. As new industries are starting in the Sircilla region, it is important to install proper FSTPs to avoid groundwater contamination.

5. Data and assumptions

The SFD was created using information collected from municipality officials and general observations about the city were made by the CDD Society and Eawag teams. The desludging of septic tanks and fully lined tanks was estimated to be around 75% and the desludging of lined pits which are partially permeable was estimated to be 50% after discussions with the different stakeholders that play an important role in faecal sludge management in Sircilla. This means that a total of 65% of the 16,203 containments located in Sircilla are desludged (assuming the information in Table 1 is correct). The municipality has records that include the number of households and the types of onsite containments present at each household, and the records of the desludging operators. These were not examined first-hand by CDD, but the information was obtained through interviews. However, according to the municipality environmental engineer, the desludging records are not kept up to date and are therefore not an accurate source of information.

From interviews with the 3 desludging operators serving the Sircilla region, it can be calculated that roughly 650 desludging events happen in the Sircilla area per year, which accounts for 2.3% of the total containments. These data do not correspond with the municipality records nor with the interviews with the municipality, which state that 65% of the containments in Sircilla are emptied. One reason for this ambiguity may be that the majority of containments being emptied are households, which are emptied every 5 to 15 years. If 65% of the containments are emptied and a total of 16,203 containments are accounted for in Sircilla, a total of 10,531 containments are emptied. If the containments are emptied every 5 years, 2,106 containments should be emptied per year. If the containments are emptied every 15 years, 702 containments should be emptied per year, which is a large discrepancy. Another source of ambiguity may be due to the fact that 29% of the total containments (4,858 of the total 16,203 containments in Sircilla) are new (having been built between 2015 and 2018), and these containments have yet to be emptied, which could explain why the percentage of containments emptied per year is so low. Another reason for the ambiguity is that public toilets, schools, and hospitals are not often served by the 3 desludging operators in Sircilla, which was confirmed in the interviews with the desludging

operators. These containments are being desludged by desludging operators from other towns and no record from the municipality or the local desludging operators has been kept concerning these containments. The percentage of containments that are emptied by non-local desludging operators is not known, but future logging of these desludging events can help better understand the overall faecal flows for the town.

Due to missing and inaccurate desludging frequency records, many assumptions were made concerning the desludging rate. The desludging rate for the different types of containments was assumed based on the incomplete documents, complemented by interviews with the municipality and the desludging operators, as well as recent field observations. The municipality has suggested putting GPS trackers on the desludging trucks, which will help clarify the number of containments being desludged in the future. Since the FSTP is just opening and there are only 3 emptying service providers, this could also be achieved through a ledger system at the FSTP.

Since the SBM, many new onsite sanitation containments have been constructed in Sircilla, which also make it challenging to calculate the emptying frequencies. The total number of onsite containments that will be emptied per year will most likely increase in the upcoming years due to the increase in the amount of onsite containment systems. Gaps in the data include a proper register of the containment emptying events, although this could be remedied with the opening of the new FSTP. Gaps also include the understanding of the situation in Sircilla by the municipality and how this differs from the actual situation (such as with the ODF certificate). These gaps will be made clearer in the future as current projects and documentation of new containments and emptying activities are currently being put in place.

Overall, the municipality is very open to sharing data and are interested in the project that CDD Society is implementing in Sircilla, though they lack the resources and expertise necessary to implement a FSTP on their own. For this reason, CDD Society is constructing the new FSTP in Sircilla, while the municipality is funding the project. A team of employees and environmental engineers were hired to construct the FSTP, and also to ensure that it is implemented and operated properly. Following commissioning of the FSTP the SFD of Sircilla will improve, and therefore, a new SFD report is planned for the upcoming year, to be able to compare the situation in Sircilla before and after the implementation of the FSTP.

6. List of data sources

Reports and literature

- *Sircilla municipality (2018). Town Profile Sircilla.*
- *Sircilla municipality. Desludging Operators Record. Accessed December 2018.*
- *Government of Telangana (2018). Groundwater Levels Scenario in Telangana. Ground Water Department, Government of Telangana. Accessed November 28, 2018. http://gwd.telangana.gov.in/open_record_view.php?ID=141*
- *Sircilla district. Key Statistics. Accessed November 28, 2018. <http://sircilla.telangana.gov.in/district-profile/key-statistics/>.*
- *Madhnure, P., and Sudhakar, P. (2016). Ground Water Year Book 2015-2016 Telangana State. Central Ground Water Board. [http://cgwb.gov.in/Regions/GW-year-Books/GWYB-2015-16/GWYB%20SR%20\(Telangana\)%202015-16.pdf](http://cgwb.gov.in/Regions/GW-year-Books/GWYB-2015-16/GWYB%20SR%20(Telangana)%202015-16.pdf).*
- *Swachh Telangana website. Accessed December 4, 2018. <https://swachhts.cg.gov.in/Welcome.do>*
- *NDTV-Dettol Banega Swachh India (2017). 22,000 New Toilets Later, Sircilla Is Telangana's First Open Defecation Free District News blog, January 25, 2017. <https://swachhindia.ndtv.com/22000-new-toilets-later-sircilla-telanganas-first-open-defecation-free-district-4849/>*

Key informant interviews

- *Household interviews and surveys (50 houses surveyed).*
- *Mason interviews.*
- *Desludging operators interviews (with 3 desludging operators).*

Focus group discussions

- *Sircilla municipality officials (with three officials: an environmental engineer, a health inspector and a commissioner).*



SFD Promotion Initiative



SFD Sircilla, India, 2019

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