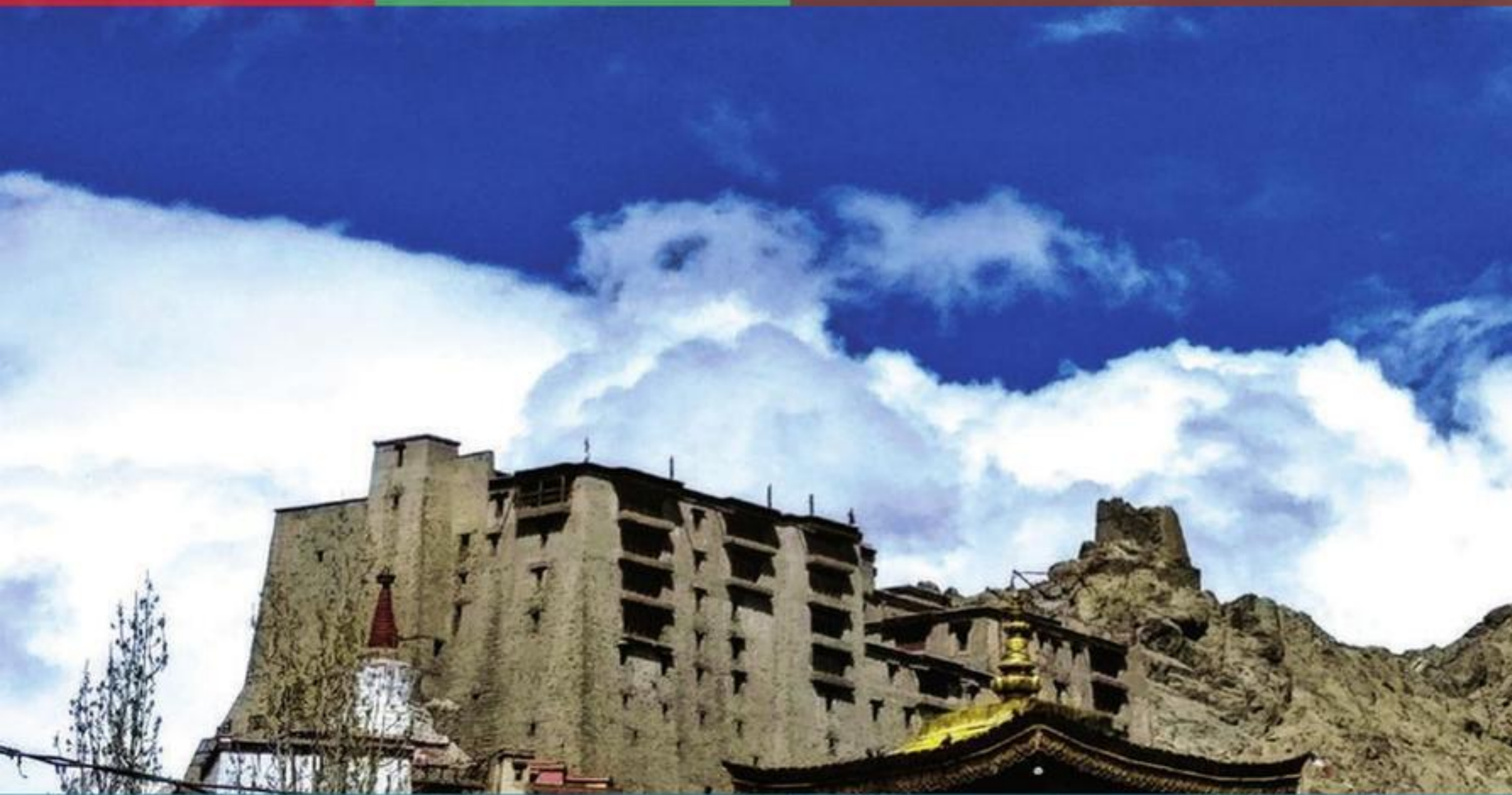




SFD Report Leh, India

prepared by:

**Ladakh Ecological
Developmental Group
(LEDeG)**

November 2021



Leh is the joint capital and the largest town of the Union Territory of Ladakh. Leh lies at an elevation 3500m above mean sea level. The resident population of Leh as per Census 2011 is 30,870.

SFD GRAPHIC

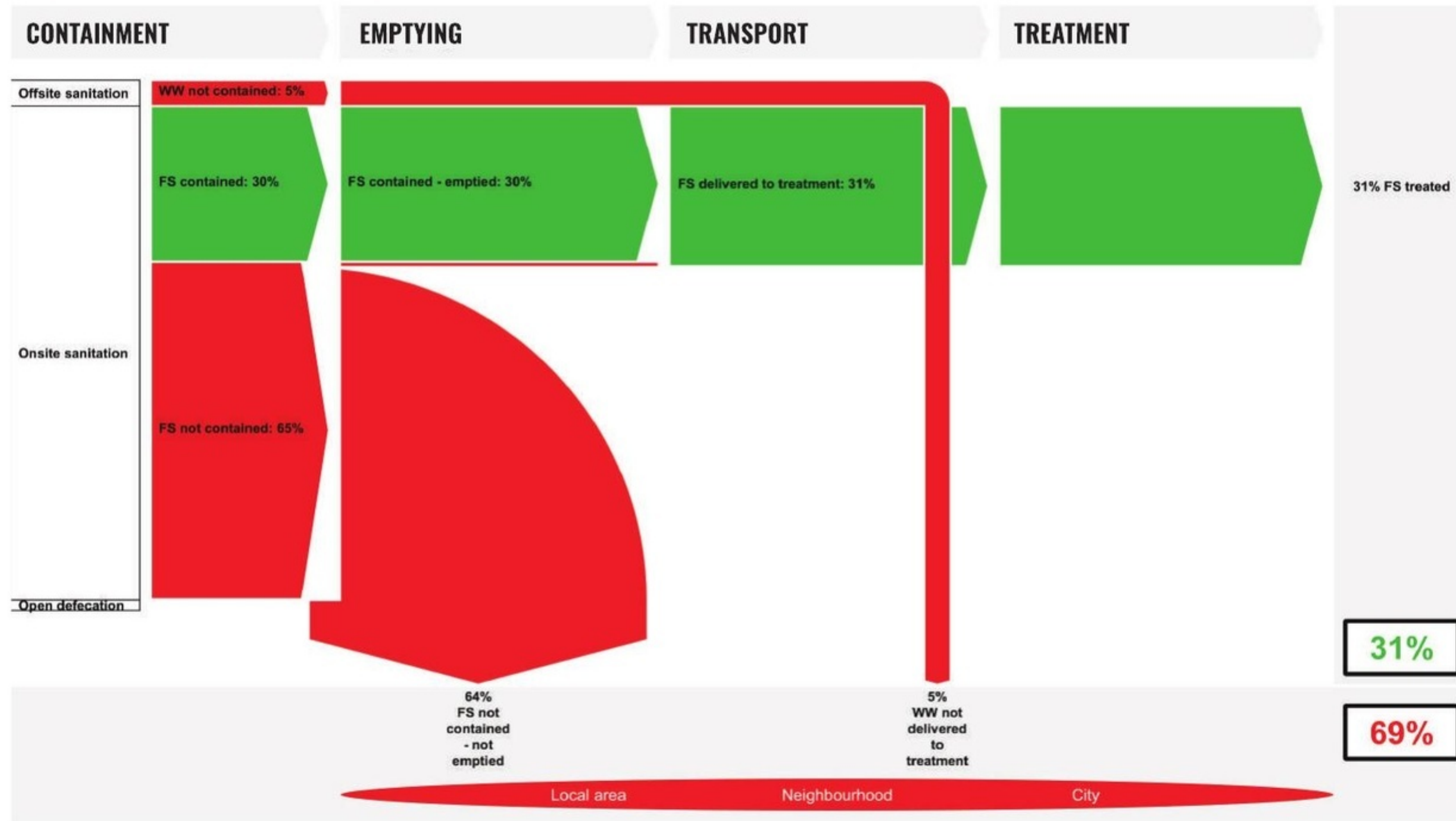
Leh, Ladakh, India

Version: Draft

SFD Level: SFD Lite

Date prepared: 14 Jun, 2021

Prepared by: LEDeG



Key: WW: Wastewater, FS: Faecal sludge, SN: Supernatant

■ Safely managed

■ Unsafely managed

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

The SFD generated shows that 31% of the wastewater is being safely treated/disposed, while 69% of the wastewater is not being safely treated or disposed.

SERVICE OUTCOMES

SFD MATRIX FOR LEH

Tabulated form of the grid selection for data entry

Leh, Ladakh, India, 14 Jun 2021. SFD Level : SFD Lite						
Population : 34798						
Proportion of Tanks : Septic Tanks : 0%, Fully Lined Tanks : 30%, Lined, Open Bottom Tanks : 65%						
Containment						
System Type	Population	Transport	Treatment	FS Emptying	FS Transport	FS Treatment
	Pop	W4c	W5c	F3	F4	F5
System Label and Description	Proportion of population using this type of system (p)	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
T1A1C6 Toilet discharges directly to open drain or storm sewer	5.0	0.0	0.0			
T1A3C10 Fully lined tank (sealed), no outlet or overflow	30.0			100.0	100.0	100.0
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	65.0			2.0	100.0	100.0

OFFSITE SANITATION SYSTEM

The centralised sewerage system in Leh is not operational as of now, sewerage lines have been laid but the sewage treatment plant (STP) is under construction. Even though the sewerage system is not operational, people are disposing the wastewater in the sewer line. This leads to the wastewater leaking into open and natural drains, or they are carried to an open pit near the site of the STP (under construction).

ONSITE SANITATION SYSTEM

CONTAINMENT:

The most prevalent On-site Sanitation System (OSS) in Leh is lined pit with semi-permeable walls and open bottom, with no outlet and overflow, with a significant risk of ground water pollution (T2A5C10, 65%) in Leh. The other one is fully lined tanks (sealed) which are mostly the containment unit for hotels and guest houses (T1A3C10, 30%).

The toilets in parts of housing colony and old town are either connected to the drain or the not operational sewerage system. This wastewater is finally flowing in the open drains and into the environment. This has been accounted as 5% in the SFD as toilet directly discharged into open drains or storm sewers.

Also, in Leh people use the traditional dry toilets. The excreta collected in the chamber is converted into a compost. The compost is a stable, inoffensive product is used as a soil conditioner in the agricultural fields (for the SFD we have not considered the dry toilets).

EMPTYING:

The city is dependent on Municipal committee Leh (MCL) owned desludging tankers for services for emptying of faecal sludge (FS). MCL has four desludging tanker which is operational. City has narrow and congested roads and some household can be inaccessible. The desludging tanker is equipped with a motorized pump, storage and a boosting pump and 250 ft long hose pipe to access containment systems in narrow roads and congested areas. Desludging is usually carried out by 2 people (1 Driver + 1 Helper) and a fee of INR 3,000 to 3,500 per trip is charged for tankers of different capacities. The variation in fees depends upon the size of the containment system.

Emptying of containments in Leh is done on demand and most of the demand is from hotels and guest houses which are using fully lined tanks (sealed). The frequency of emptying varies from 5 to 15 years. Hence, the percentage of containment emptied for fully lined tanks is assumed to be 100%.

The households which use lined pits with semipermeable walls and open bottom do not empty their tanks as they soak away into the ground - becoming a major threat to groundwater. Therefore, only 2% of such systems are considered to be emptied for the SFD.

TRANSPORTATION:

The emptied FS is transported using a desludging tanker, owned by MCL. Vacuum tankers are of different capacities - one of 3,500 l capacity, one of 7,000 l capacity and two of 8,000 l capacity. These vehicles cover over a distance of 5 to 8 km per trip on an average after desludging from the households and discharging the FS at the faecal sludge treatment plant (FSTP).

TREATMENT/DISPOSAL:

MCL has an FSTP of 12 KLD capacity and is planning for another 20 KLD FSTP. The FSTP uses an up flow anaerobic sludge blanket and gravitational process.

The treated solids are used as soil conditioner and treated liquid are used as nutrient water. The FSTP is not functional in winter (November to March) due to the sub-zero temperature.

RISK TO GROUNDWATER:

There is no hydrogeological data known for Leh. It has been observed that the groundwater level varies across the city. There is no sufficient information on groundwater level and the risk significance of the on-site sanitation system.

MCL has issued a notice, stating that every household at least needs to have a fully lined tank to prevent risk to groundwater, which is the main source for water supply in Leh.

So, in the SFD matrix the lined tanks with semi-permeable walls and open bottom is considered to be of significant risk to ground water.

GENERAL CITY INFORMATION

Leh is the joint capital and a municipal committee of the Union Territory of Ladakh. Leh Lies in the Trans Himalayan region of India. It has a cold desert climate with temperatures raising to 35°C in summer and falling as low to -24°C in winter. The town is at an elevation 3,500m above mean sea level. The geographical coordinates of Leh are 34.1526° N, 77.5771° E.



Being a cold desert Leh receives very little rain. the weather conditions in Leh are extreme. Water resources mainly result from melted snow water forming rivulets merging into streams in the valleys of this region. The average annual precipitation in Leh region is low with less than 100mm and further high annual deviations ranging from 142.5mm to only 18.2mm in 2007

The urban local body governing the town is Municipal Committee Leh (MCL). The town has a total population of 30,870, as per census 2011. As per MCL, in 2021 it has a population of 34,798, this population is used for preparation of SFD. MCL has an administrative area of 9.15 sq.km which is divided into 13 wards.

As per census 2011, the density of the city is 3,374 persons per sq.km which is high in comparison to district density of 3 persons per sq.km. Leh receives a high number of tourists and migrant workers in summers, the peak population in summers is almost 3 times the base population of Leh.

The SFD was generated for the area in the administrative boundary of the MCL, as most of the urbanisation is in this area only. The net residential density of the town is 13,500 persons per sq.km. 53% of land use in Leh comes under agricultural use. Almost 70% of the tourist population is concentrated in 3 wards – Ward 3 (Changspa), 4 (Tukcha) and 5 (Shenam) and Ward 13 (Leh Main market). Sanitation services in Leh are difficult to setup and maintain due to the extreme climate and undulating topography.



WARD-WISE POPULATION, LEH

Ward No.	No. of Households	Population
1.	175	850
2.	375	2,100
3.	180	1,080
4.	183	1,550
5.	125	1,700
6.	671	3,350
7.	450	1,400
8.	1711	8,473
9.	425	1,550
10.	778	3,580
11.	865	4,325
12.	950	2,370
13.	472	2,470
Total	7,360	34,798

Source: Municipal Committee Leh, 2021

DATA AND ASSUMPTIONS

There is no data available on the onsite sanitation system in Leh. The data used for SFD is based on interviews conducted with stakeholders.

Major assumptions that were made:

- Leh has a significant floating population in summer (almost 3 times the resident population) however for the preparation of SFD the floating population is not considered. The SFD is prepared for the current resident population of Leh.
- The traditional dry toilets that are used by people in Leh are not accounted in the preparation of the SFD.
- There is no data on the hydrogeology or groundwater levels in Leh, hence it is assumed that any percolation from containment structure to the ground is considered as risk to groundwater.
- Based on discussions with MCL officials, it is estimated that 30% of population have lined pit (often referred as septic tank) and 65% lined pit with semi permeable walls and open bottom (often referred as soak pit), no outlet or overflow, where there is a significant risk of groundwater pollution.
- The fully lined pit (sealed) which accounts to 30% of the containment units are from hotels and guest houses, and the FS from fully lined pits are emptied. There is no unsafe dumping of emptied FS practised in Leh therefore it is deducted that 100% of the emptied FS is discharged at the FSTP.
- Based on the discussion with the operators at FSTP, it is deducted that out of the 65% of the lined pit with semi-permeable walls and open bottom, 2% is emptied and discharged at the FSTP. Remaining do not empty as it is percolates to the ground and the tank does not fill-up.

LIST OF DATA SOURCES

- Assistant Engineer, Municipal Committee Leh (MCL)
- Assistant Engineer, Public Health Engineering Department (PHED) Leh
- FSTP, Leh Engineers (Blue water Company)
- WASH Baseline Assessment Report Leh 2021 (LEDeG-BORDA)

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The Shit Flow Diagram was created using the **SFD Lite Graphic Generator** on the Susana website

<https://sfd.susana.org/>