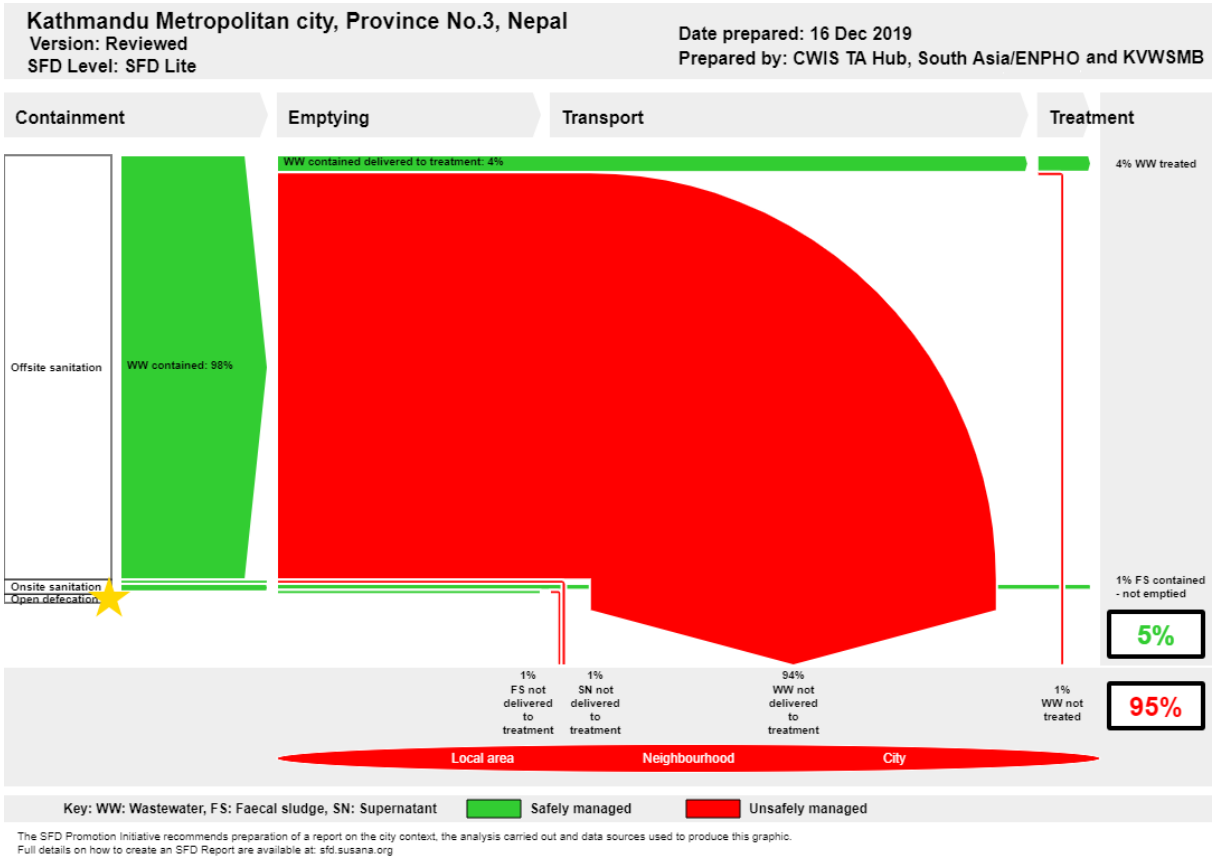
SFD Lite Report

Kathmandu Metropolitan city Nepal

This SFD Lite Report was prepared by City-wide Inclusive Sanitation Technical Assistance Hub, South Asia (CWIS TA Hub, South Asia)/Environment and Public Health Organization (ENPHO) and Kathmandu Valley Water Supply Management Board (KVWSMB).

Date of production/ last update: 16/12/2019

1 The SFD Graphic



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 Shit Flow Diagram for Kathmandu Metropolitan city was created by City-wide Inclusive Sanitation Technical Assistance Hub, South Asia (CWIS TA Hub, South Asia)/ Environment and Public Health Organization (ENPHO) and Kathmandu Valley Water Supply Management Board (KVWSMB) with the SFD graphic generator tool available on the SuSanA Website.

Collaborating partners:

- Eco- Concern Pvt. Ltd.
- DevCon.

Date of production: 16/12/2019

3 General city information

Kathmandu Metropolitan city is the eldest metropolitan city and capital of the Federal Democratic Republic of Nepal, located in Kathmandu district of Province no.3 of Nepal. The city is enriched with cultural and historical significance consisting of three world heritage sites namely Swayambunath temple, Pashupatinath temple and Bouddhanath (Metropolitan city Profile, 2019). The city is the urban core area of the Kathmandu valley, surrounded by two sister cities namely Lalitpur to the southeast and Bhaktapur to the west (Figure 1).

Kathmandu metropolitan city lies within an altitude of 1,400 metres. The city consists of 32 wards with the total population of 1,347,011 people residing in 298,752 households and covering an area of 50.6 km^2 (Metropolitan city Profile, 2019).

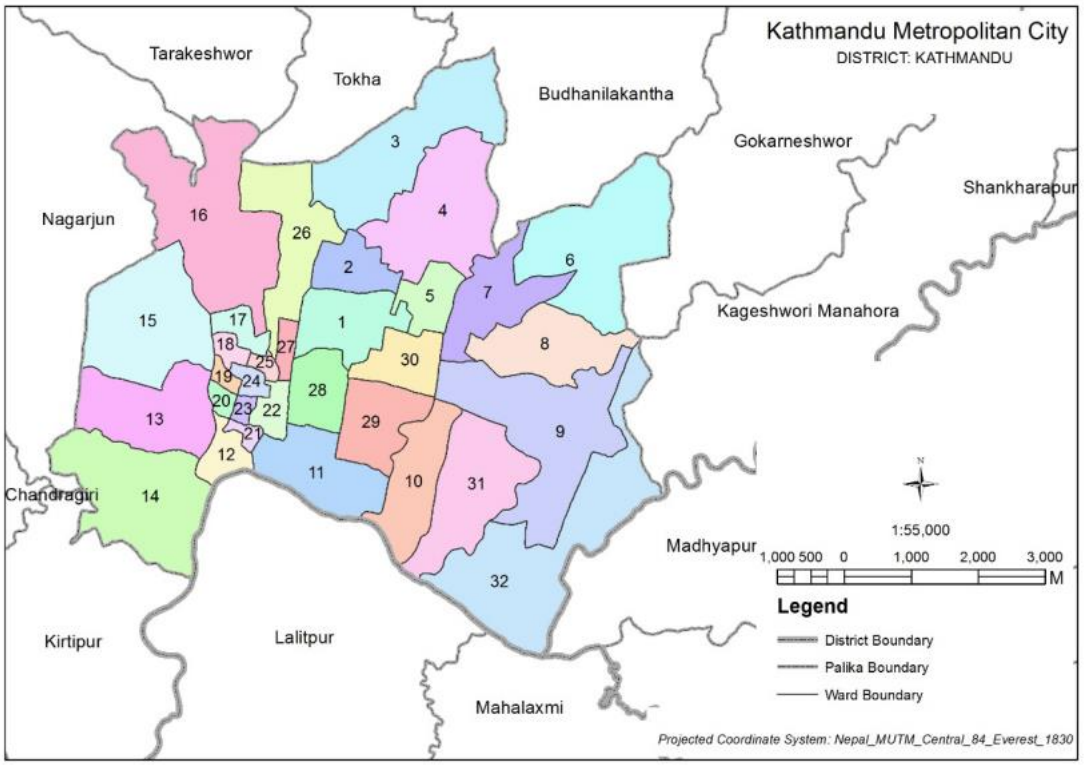


Figure 1: Map of Kathmandu Metropolitan city (Source: Ministry of Federal Affairs and General Administration).

4 Service outcomes

Table 1: SFD Matrix for Kathmandu Metropolitan city.

Kathmandu Metropolitan city, Province No.3, Nepal, 16 Dec 2019. SFD Level: SFD Lite
Population: 1347011
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 75%

System label	Pop	W4a	W5a	F3	F4	F5	S4d	S5d
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 sewer system, which is delivered to treatment plants	Proportion of supernatant in sewer system that is delivered to treatment plants, which is treated
T1A1C1 Toilet discharges directly to a centralised combined sewer	98.0	4.0	98.0					
T1A4C1 Lined tank with impermeable walls and open bottom, connected to centralised combined sewer	1.0			0.0	0.0	0.0	0.0	0.0
T1A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit	1.0			50.0	0.0	0.0		

4.1 Containment

Majority of the population of Kathmandu Metropolitan city are dependent on sewer system (T1A1C1, 98%), followed by lined tanks with impermeable walls and open bottom connected to centralized combined sewer (T1A4C1, 1%) and lined tanks with impermeable walls and open bottom, connected to soak pits (T1A4C5,1%).

4.2 Emptying and transportation

Mechanical emptying is prevalent in Kathmandu Metropolitan city. The mechanically emptied faecal sludge is transported by private desludging vehicle, consisting of a tank equipped with movable centrifugal pump on a truck (KII1, 2019).

The wastewater and supernatant are transported through the combined sewer system. The proportion of wastewater which is delivered to the centralized treatment plant (Gueshwori WasteWater Treatment Plant, WWTP) (Variable W4a; 4%) is estimated on the basis of the sewerage catchment area of Gueshwori WWTP in Kathmandu Metropolitan city (wards no. 6, 7 and 8) (Figure 2). Remaining 94% of wastewater of other remaining wards gets discharged in the streams and rivers of Kathmandu Metropolitan city through the combined sewer system. Due to diverse topography, variation in elevation, only 4% of the population of Katmandu Metropolitan city are benefited by Guheshwori WWTP (KII1, 2019).

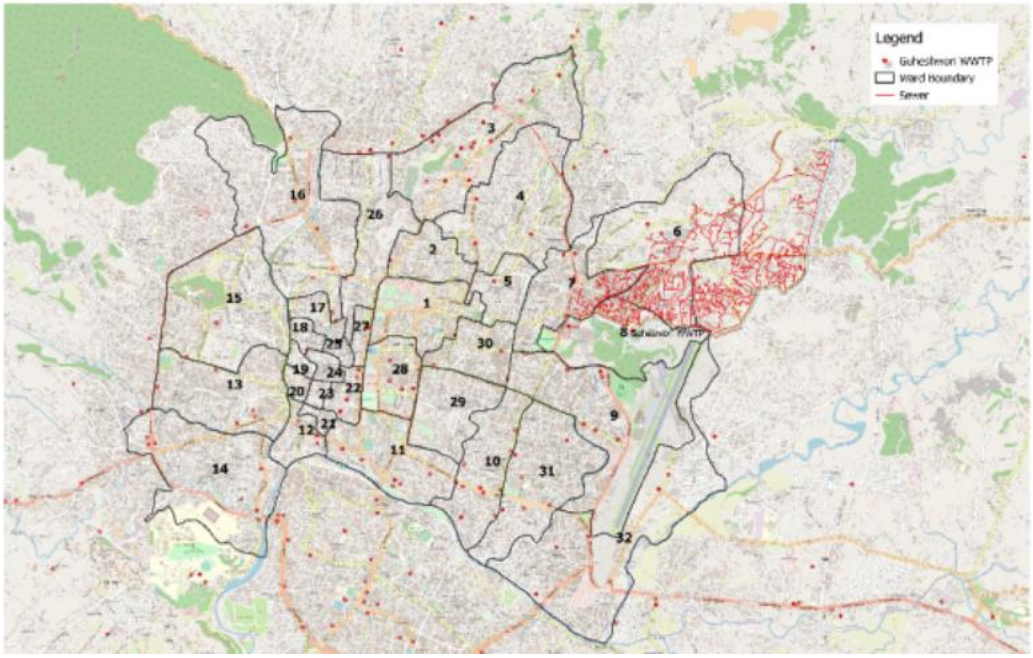


Figure 2: Catchment area of Gueshwori treatment plant in Kathmandu Metropolitan city (Source: Innovative Solution, 2020).

4.3 Treatment

The wastewater treatment plant is located in the Guheswori, Kathmandu Metropolitan city ward no.8 close to the river bank of Bagmati River. The capacity of the existing wastewater treatment plant is 32.4 MLD (million litres per day) and the projected value for treatment of septage is 60m^3 per day. Even though the Guheshwori WWTP has been approved for co-treatment, the co-treatment has not been practised yet, due to some contractual issues (KII1, 2019).The Guheshwori WWTP is based on Activated Sludge Process (ASP) consisting of screening chambers, sedimentation tanks, activated sludge tanks, secondary sedimentation tanks, tertiary treatment facility, disinfection facility, sludge thickening facility, anaerobic sludge digester, biogas generation facility and sludge dewatering machine (Figure 3) (HPCIDBC, 2019).

Figure 3: Schematic diagram of Gueshwori wastewater treatment plant (Source: HPCIDBC).

4.4 Reuse and Disposal

The treated wastewater is released to Bagmati River, while remaining 94% of wastewater and emptied faecal sludge gets finally disposed untreated in Bagmati and other rivers of Kathmandu valley (KII1 and KII2, 2019).

4.5 SFD Graphic

The SFD graphic shows that 5% of the excreta is safely managed resulting from 4% of wastewater contained in the technology which is delivered to treatment and treated before disposal and 1% of faecal sludge safely contained in the containment technology which is not emptied from lined tanks. 94% of the wastewater which is contained in the technology eventually gets discharged to an open environment without any treatment. A further 1% of supernatant is first contained in lined tanks connected to the centralised combined sewer and finally disposed in the environment untreated. Finally, 1% of faecal sludge contained in the technology is emptied but discharged untreated in the environment.

4.6 Groundwater Contamination

There are no published data available regarding ground water table and soil profile of Lalitpur Metropolitan city. So, the information was collected from KII1 (2019). Less than 25% of the population rely on underground sources of water such as protected boreholes, protected dug wells extracted within a depth of 10 metres consisting of fine sand, slit and clay in unsaturated zone. The lateral separation between sanitation facilities and groundwater sources with less than 10 metres is considered greater than 25% and the percentage of sanitation facilities that are located uphill of groundwater sources was estimated less than 25% (KII1, 2019). So, it has been estimated that there is low risk of groundwater pollution in Kathmandu Metropolitan city.

5 Data and assumptions

The data for the SFD Matrix was estimated using the data collected from the household survey carried out by CWIS TA Hub, South Asia in 2019. The collected data were further discussed and finalized with Key informants of Kathmandu Metropolitan city.

The proportions of faecal sludge in septic tanks, fully lined tanks and lined tanks with impermeable walls and open bottom were set to 100%, 100% and 75% respectively according to the relative proportions of the systems in the Metropolitan city.

The proportion of emptied faecal sludge for different types of containments connected to different technologies (variable F3) was estimated on the basis of Key Informant Interviews. In case of lined tanks with impermeable walls and open bottom connected to centralized combined sewer, the supernatant gets discharged through the sewer system and it was assumed that they are not emptied since they are not fully lined (KII1, 2019).

Only 4% of the wastewater generated reaches the treatment facility, so variable W4a was set to 4% (KII1, 2019).

The efficiency of the wastewater treatment plant is a basic indicator of the wastewater treatment plant function. So, the BOD removal value was used as an indicator for WWTP efficiency. The value of BOD was 450 mg/l at the inflow and 10 mg/l at the outflow as per the information given (KII1, 2019) and thus, the proportion of wastewater delivered to the WWTP, which is treated (variable W5a), was set to 98%.

6 List of data sources

- *Kathmandu Metropolitan city Profile, 2019.*
- *HHs survey data, 2019, City-Wide Inclusive Sanitation Technical Assistance, South Asia.*
- *HPCIDBC,2019, High Powered Committee for Integrated Development of the Bagmati Civilization.*
- *Innovative Solutions Pvt.Ltd, 2020.*
- *MoFALD, 2019, Ministry of Federal Affairs and General Administration.*
- *WWTP 2019, Report on Gueshwori wastewater treatment plant, Kathmandu metropolitan city.*
- *KII1, December 2019, Project Implementation Directorate Officer,Kathmandu Upatyaka Kahanepani Limited, Kathmandu Metropolitan city.*
- *KII2, September 2019, Interview with Private Mechanical desludging service Provider, Lalitpur Metropolitan city.*

SFD Kathmandu Metropolitan city, Nepal, 2019

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This Executive Summary and the SFD Report are available from:

www.sfd.susana.org

SFD Promotion Initiative