



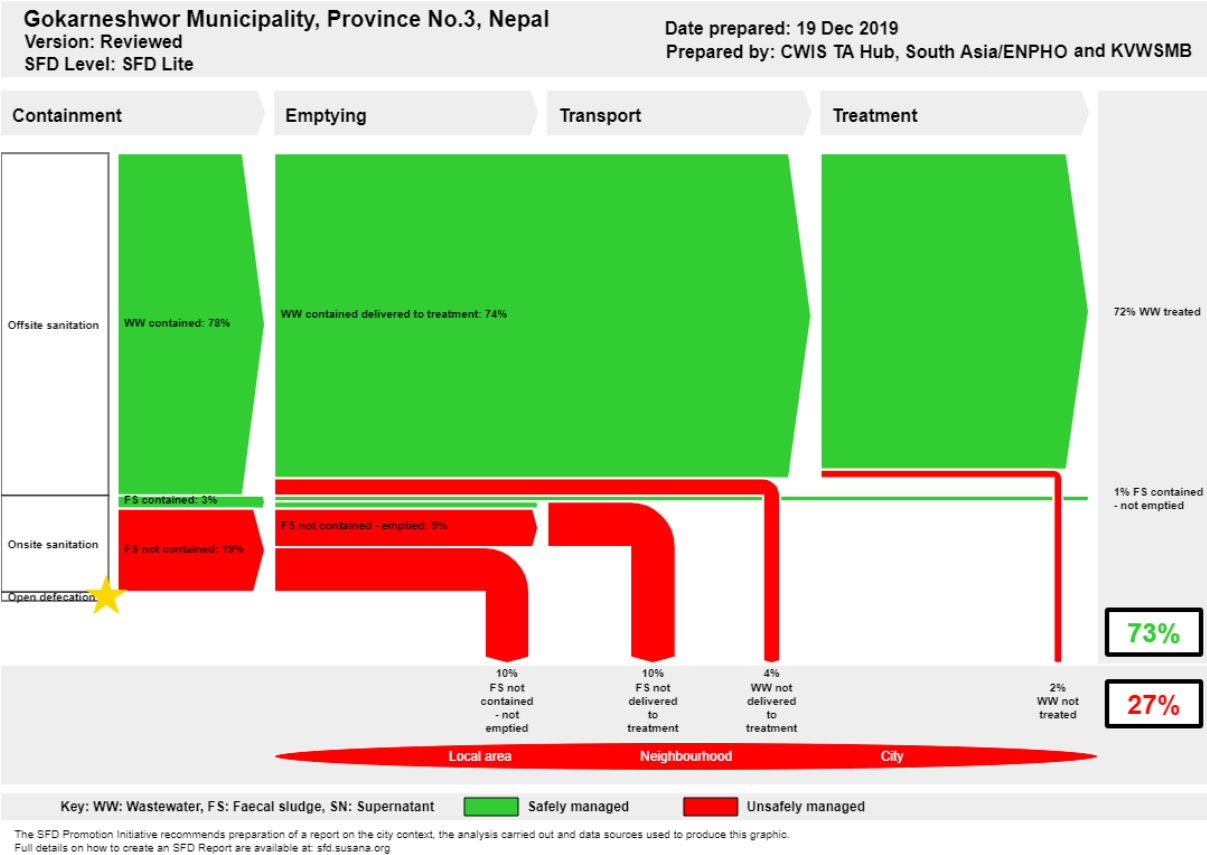
SFD Lite Report

Gokarneshwor Municipality 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: 19/12/2019

1 The SFD Graphic



2 SFD Lite information

Produced by:

- The Shit Flow Diagram for Gokarneshwor Municipality 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: 19/12/2019

3 General city information

Gokarneshwor Municipality is located in Kathmandu District in Province No. 3 of Nepal that was established on 2014 (2071 B.S in Nepali calender) by merging the former Village development committees Sundarijal, Nayapati, Baluwa, Gokarna and Jorpati (Annual Municipal Developmet Plan, 2018). The municipality is bounded by Melamchi Municipality in the east, Shivapuri Watershed and wildlife reserve in the north, Budhanilkantha in the west and Kathmandu metropolitan city in the south (Figure 1).

The municipality consists of 9 wards with the total population of 107,351 people residing in 27,106 households and covering an area of 58.50 km² (Annual Municipal Development Plan, 2018). Majority of the population are dependent on public taps as the main source of drinking water. The remaining population are dependent on spring water, tap water (bore water) and wells (KII1, 2019).

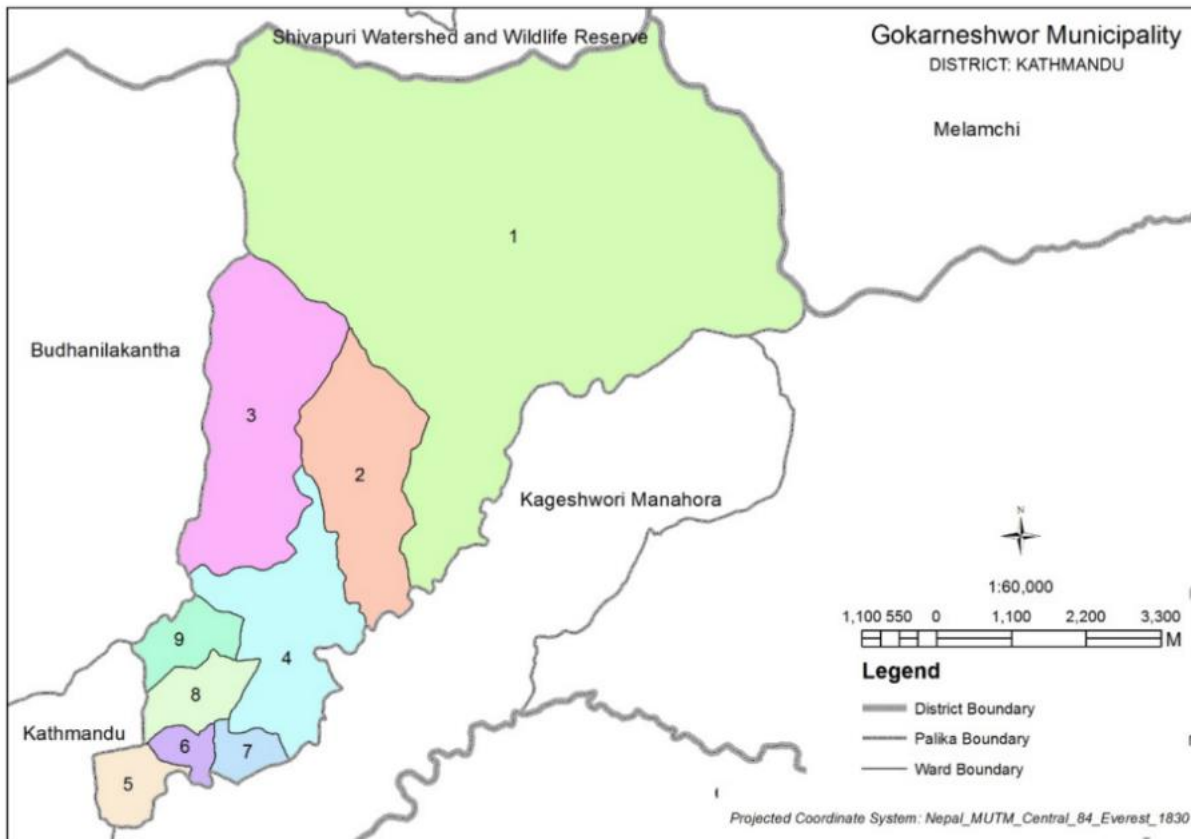


Figure 1: Map of Gokarneshwor Municipality (Source: Ministry of Federal Affairs and General Administration).

4 Service outcomes

Table 1: SFD Matrix for Gokarneshwor Municipality.

Gokarneshwor Municipality, Province No.3, Nepal, 19 Dec 2019. SFD Level: SFD Lite

Population: 107351

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

System label	Pop	W4a	W5a	W4b	W5b	F3	F4	F5
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 wastewater in sewer system, which is delivered to decentralised treatment plants	Proportion of wastewater delivered to decentralised 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
T1A1C1 Toilet discharges directly to a centralised combined sewer	75.0	95.0	98.0					
T1A1C3 Toilet discharges directly to a decentralised combined sewer	3.0			95.0	80.0			
T1A3C10 Fully lined tank (sealed), no outlet or overflow	3.0					55.0	0.0	0.0
T1A3C9 Fully lined tank (sealed) connected to 'don't know where'	2.0					42.0	0.0	0.0
T1A4C7 Lined tank with impermeable walls and open bottom, connected to a water body	1.0					50.0	0.0	0.0
T1A4C9 Lined tank with impermeable walls and open bottom, connected to 'don't know where'	2.0					42.0	0.0	0.0
T2A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	12.0					55.0	0.0	0.0
T2B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	2.0							

4.1 Containment

As presented in Table 1, most of the population in Gokarneshwor Municipality are dependent on offsite sanitation system comprising centralized combined sewer system (T1A1C1, 75%) and decentralised combined sewer (T1A1C3, 3%). Onsite sanitation systems installed in the municipality include: lined tanks with impermeable walls and open bottom (T2A4C10, 12%; T1A4C9, 2% and T1A4C7, 1%), fully lined tanks (T1A3C10; 3% and T1A3C9, 2%) and pits (all types) never emptied but abandoned when full and covered with soil, no outlet or overflow (T2B7C10, 2%). As per the household survey (2019), the average size of the containment is 7 m³.



Figure 2: Pit with semi-permeable walls and open bottom (HHs survey, 2019).

4.2 Emptying and transportation

Even though it is mandatory to have a septic tank to get building permission, the municipality lacks standard design guidelines for the construction of containments (KII1, 2019). So, the emptying frequency for different types of containments connected to different technology is estimated on the basis of the household survey and Key Informant Interviews. Emptying of the onsite sanitation facilities is either mechanical (57%), provided by a private desludging service provider, or manual (43%) in Gokarneshwor Municipality (HHs Survey, 2019). The transport of the mechanically emptied faecal sludge is done by a private desludging vehicle, consisting of a tank equipped with movable centrifugal pump on a truck (KII1, 2019). Whereas, the manual emptying is done by a household member or labour. In case of offsite sanitation system, the wastewater is transported through the sewer system.

4.3 Treatment

Centralized Wastewater Treatment Plant (WWTP)

The centralized Wastewater Treatment Plant (WWTP) is located in the Guheshwori, Kathmandu Metropolitan city ward no.8 close to the 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 60m³ 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 (KII6, 2019).

The Guheshwori WWTP is based on Activated Sludge Process (ASP) consisting of screening chambers, primary 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 Guheshwori wastewater treatment plant (Source: HPCIDBC).

Decentralized Wastewater System (DEWATS)

The decentralized wastewater system (DEWATS) is located in Ward no.4 of Gokarneshwor Municipality. It is assumed that 80% of the wastewater delivered to this treatment plant is treated and safely managed. The inflow capacity of the DEWATS is 0.5 MLD. The treatment plant consists of an screening chamber which is connected to a settling tank followed by a planted gravel filter. The treated effluent gets discharged to Bagmati River (Figure 4) (KII 5, 2019).



Figure 4: Decentralized Wastewater Treatment System.

4.4 Reuse and Disposal

Manually emptied faecal sludge is disposed by the household member or labour themselves in their household premises or in field. All the mechanically emptied faecal sludge gets finally discharged in streams and rivers of Kathmandu valley (KII1, 2019).

Treated effluent released from wastewater treatment plant gets discharged in the Bagmati River.

4.5 SFD Graphic

As shown in the SFD graphic, 73% of all the excreta generated are safely managed and 27% are unsafely managed. All the wastewater produced is contained in the technology and 72% is treated prior to disposal whereas 2% wastewater is not delivered to treatment plant. Out of the 19% of faecal sludge not contained in the technology, 9% is emptied and discharged in the environment untreated whereas 10% is not emptied but still considered as unsafely managed since it originates from onsite systems located in areas of high risk of groundwater pollution. The remaining 3% of the faecal sludge generated is contained, out of which, 2% corresponds to faecal sludge emptied and discharged in the environment without any treatment and 1% corresponds to faecal sludge not emptied from sealed tanks and considered as safely managed.

4.6 Groundwater Contamination

There are no published data available regarding groundwater table and soil profile of Gokarneshwor Municipality. So, the information was collected from KII1 (2019). The average estimated depth of groundwater table is more than 10 metres, consisting of weathered basement. 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 high risk of groundwater pollution in Gokarneshwor Municipality.

5 Data and assumptions

The data for the SFD Matrix were 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 Gokarneshwor Municipality.

The proportion of faecal sludge in septic tanks, fully lined tanks and lined tanks with impermeable walls and open bottom were set to 100%, according to the relative proportions of the systems in the Municipality, as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.

The proportion of emptied faecal sludge for different types of containment connected to different technologies (variable F3) was estimated on the basis of the data collected from the household survey and Key Informant Interviews.

95% of the wastewater generated was assumed to reach the treatment facilities, so variables W4a and W4b were set both to 100% (KII6, 2019).

BOD removal was used as the basic indicator of the wastewater treatment plant efficiency. As per the information provided by KII 6 (2019), the value of BOD was 450 mg/l at the inflow and 10 mg/l at the outflow and thus, the proportion of wastewater that has been delivered to treatment plant, which is treated (variable W5a) was set to 98%.

According to KII5 (2019), 80% of the wastewater delivered to the DEWATS was considered as treated, so variable W5b was set as 80%.

6 List of data sources

- *Gokarneshwor Municipality, 2019/2020, Annual Municipal Development Plan, 2018.*
- *Household Survey, 2019, City-Wide Inclusive Sanitation Technical Assistance Hub, South Asia.*
- *HPCIDBC,2019, High Powered Committee for Integrated Development of the Bagmati Civilization.*
- *MoFALD, 2019, Ministry of Federal Affairs and General Administration.*
- *KII1, December 2019, Interview with Municipal Engineer Gokarneshwor Municipality.*
- *KII2, December 2019, Interview with Municipal Engineer Gokarneshwor Municipality.*
- *KII3, December 2019, Interview with Municipal officer Gokarneshwor Municipality.*
- *KII4, September 2019, Interview with Private desludging service provider, Lalitpur Metropolitan city.*
- *KII5, December 2019, Consultant, Eco Concern Pvt.Ltd.*
- *KII6, December 2019, Project Implementation Directorate Officer, Kathmandu Upatyaka Kahanepani Limited, Kathmandu Metropolitan city.*

SFD Gokarneshwor Municipality, Nepal,
2019

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