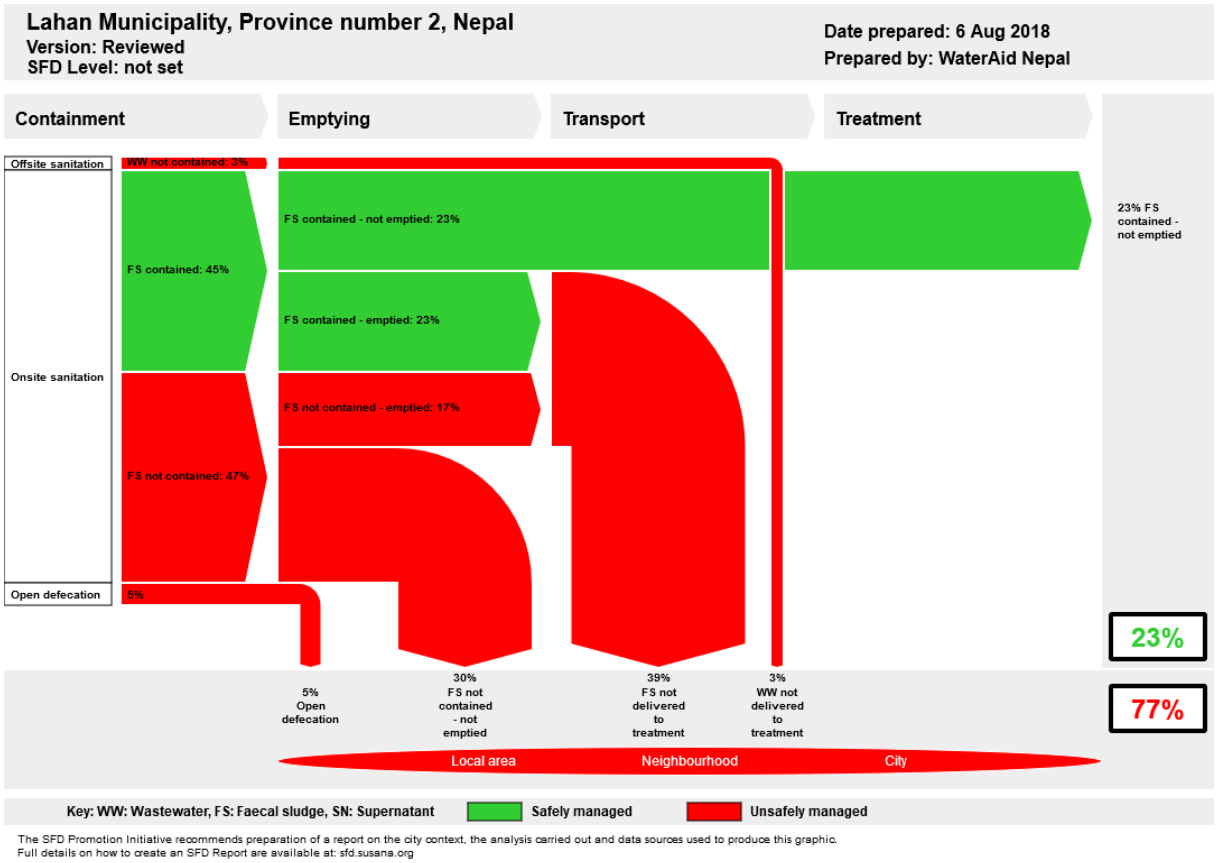
SFD Lite Report

Lahan Municipality
Nepal

This SFD Lite Report was prepared by WaterAid Nepal
Date of production/ last update: 01/10/2018

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 Flow Diagram (SFD) for Lahan Municipality was created through desk-based research by the WaterAid country programme in Nepal using the SFD Graphic Generator on the SuSanA website.

Collaborating partners:

Lahan Municipality and WaterAid Nepal.

Date of production: 20/08/2018

3 General city information

Lahan Municipality is a small commercial town in Siraha District, located in province number 2 in Nepal. It is built along the East-West Highway and has a population of about 93,000 people. It is nearly 350 kilometres east of the capital city Kathmandu.

Lahan is located at latitude of 26.717°N and longitude of 86.483°E. It is built primarily on flood plain in the Terai region of southern Nepal and Northern India, which lies south of the outer foothills of the Himalayas known as the Siwalik Hills and north of the Indo-Gangetic Plain. The municipality covers an area of 167.17 km^2 (64 percent lowland and 36 percent Siwalik Hills) and lies at an elevation of 104-327 metres above sea level. About 61.5 percent of the land is agricultural, making the peri-urban area larger than the core city area (Lahan profile).

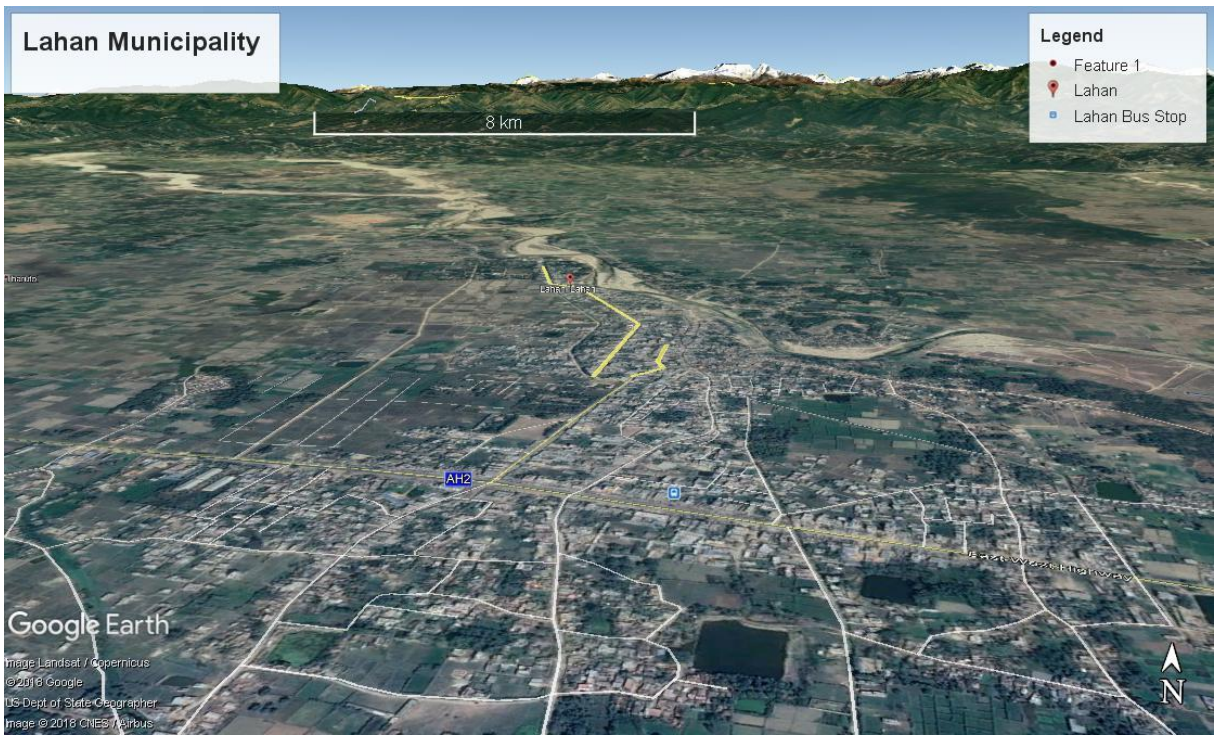


Figure 1: Google image of Lahan Municipality

The population has increased rapidly over the last 20 years due to the migration of families from remote hill areas during and after the Maoist insurgency. It experiences four distinct seasons and the average annual precipitation is 1,431 mm. The core city area is located along the banks of the Khutti River (Lahan Municipality Profile). Recently, Lahan municipality was divided into 24 administrative wards. Fourteen new wards, which were added to the municipality following restructuring at local level in 2016, still have a rural setting. Only the ten wards that made up the core city before the restructuring are included in this study. Approximately 32,990 people in 6,264 households live in these wards (Lahan ODF monitoring report, 2017).

Alluvial aquifers are the only source of water supply in the Terai region. About 16 percent of households have access to piped drinking water, which is extracted from deep boreholes (NWSC Lahan data). The rest of the population has access to shallow boreholes and dug wells. Observations by WaterAid Nepal indicate that lower middle income and poor families have installed shallow boreholes less than 15 metres deep. The nearby Khutti River regularly floods during the monsoon (June to September) and some households experience frequent

inundation during this period. As a result, some household toilets are flooded, forcing people to defecate in the open on higher ground. The municipality was declared open defecation free (ODF) in 2017. No further data on monsoon affected areas or results are available.

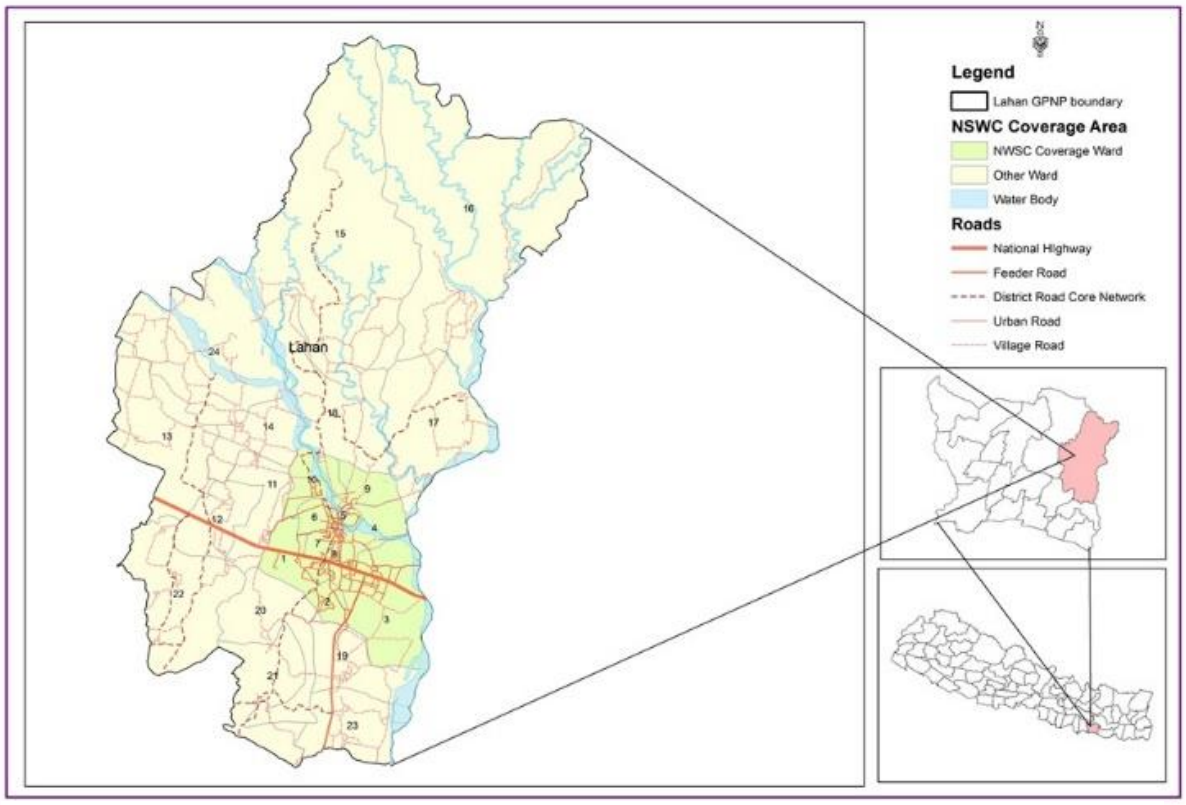


Figure 2: Map of Lahan Municipality

4 Service outcomes

As Table 1 shows, the majority of the population use onsite sanitation, such as pour-flush latrines that are connected to septic tanks, fully-lined tanks or pits. A small percentage of households use toilets that are directly connected to open drains, and some people still practice open defecation. Institutional and commercial buildings such as schools, colleges, hotels and offices have good sanitation facilities, helping to keep the city clean. Although no faecal sludge or wastewater is treated because the city has no wastewater or faecal sludge treatment plant, 23 percent is safely disposed. The city has no sewerage system, and no storm water management system exist in the city as storm water is transported through open drains and irrigation canals, and mixes into ponds and rivers.

Figure 3- HH single pit toilet (Photo credit – Dharma Ratna Chitrakar, WaterAid Nepal)

4.1 Containment

The selection grid (Table 1) shows the types of containment in use in the core city. Lahan was declared open defecation free (ODF) in 2017, and of 17,372 households in the city that have access to toilets, 6,264 (i.e. 36 percent) were used for this study (Lahan ODF data, 2017). Table 2 shows the proportion of population by containment type.

During the ODF campaigns in the last five years, 20 percent of households constructed a lined tank with impermeable walls and open bottom, connected to a soak pit. Similarly, 27 percent of households constructed toilets connected to an open-bottomed pit with semi-permeable walls. In the core city, 20 percent of households have septic tanks with soak pits and 25 percent of households have fully-lined (sealed) tanks. Three percent of toilets discharge directly into open drains (KII 1, 2018).

The SFD graphic (Figure 1) shows that 45 percent of the population use an onsite sanitation system in which faecal sludge is contained, 47 percent use an onsite sanitation system in which faecal sludge is not contained, and three percent use household toilets that discharge directly into open drains. An estimated five percent of the population practice open defecation.

4.2 Emptying

Faecal sludge (known locally as septage) from septic tanks and pit toilets is removed by the municipality and a private emptier using suction machines. The septic tanks and pits are generally emptied once every three to five years and/or on the request of the individual household. A municipal tanker empties five to six household septic tanks and pits each day on average. The private emptier provides regular desludging services in the Lahan municipality area, using a $4m^3$ tanker.

The desludging tankers are attached to tractors and are usually operated by two or three people – a driver, an operator and a helper. The operators and helpers do not use any personal protective equipment (KII 2, 2018). The SFD shows that only 23 percent of contained faecal sludge, and 17 of uncontained faecal sludge, is emptied regularly. Since many of the septic tanks and pits were constructed during the ODF campaigns in the last couple of years and have not yet filled up, it is estimated that only around half of all onsite containers have ever been emptied (KII 2, 2018).

Figure 4- Irrigation canal turned open drain in the core city area of Lahan (Photo credit – Dharma Ratna Chitrakar, WaterAid Nepal)

Lahan Municipality, Province number 2, Nepal, 6 Aug 2018. SFD Level: not set
Population: 93000
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 100%

System label	Pop	W4c	W5c	F3	F4	F5
System description	Proportion of population using this type of system	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	3.0	0.0	0.0			
T1A2C5 Septic tank connected to soak pit	20.0			50.0	0.0	0.0
T1A3C5 Fully lined tank (sealed) connected to a soak pit	25.0			50.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	5.0					
T2A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit, where there is a 'significant risk' of groundwater pollution	20.0			50.0	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	27.0			25.0	0.0	0.0

Table 1: SFD Matrix of Lahan Municipality (WaterAid 2018)

4.3 Transportation

In Lahan municipality, there is no centralised or decentralised sewer system but there are open drains to carry storm water in the core city areas. Storm water is transported through the open drains and discharged into the nearby Kutti River. Some of the open drains are connected to the irrigation canals and ponds that are located in the residential areas. In the absence of a sewer system, during the rainy season some households connect their soak pits to open drains to manage effluent spilled over from the soak pit. The soak pits often fill more rapidly during the rainy season due to the ingress of rising groundwater. The municipality is aware of this practice, but in the absence of proper policy and enforcement, there is no control mechanism, nor any sanctions or penalties (KII 1, 2018).

Faecal sludge emptied from septic tanks and pits is transported by vacuum tanker to agricultural land on the outskirts of the city, a distance of approximately five kilometres (KII 1, 2018). It is estimated that about 20 percent[1] of household septage is emptied and transported by the vacuum tankers (WA, 2018). During the rainy season the desludging tanker service stops for almost three months, due to poor road conditions.

[1] This figure assumes that between five and six household septic tank/pits are emptied daily for a period of nine months. The percentage is low because many of the toilets are new, constructed during ODF campaigns in the past two years, and those pits have not been emptied yet.

4.4 Treatment

There is no treatment facility for faecal sludge or wastewater.

4.5 Reuse and disposal

The septage emptied and transported by the private emptier is disposed to agriculture fields or sometimes into nearby rivers. Farmers are willing to pay NPR 1,000 (USD 10) per tanker load ($4m^3$) of faecal sludge, which they use as a soil conditioner (KII, 2). As noted in an SNV Nepal report, tanker operators and farmers are unaware of the health hazards of using untreated faecal sludge directly on fields. Nor are the tanker operators aware of the adverse effects of pollution in rivers resulting from the direct discharge of untreated faecal sludge (SNV, 2018). However, the municipal tankers dispose of the septage into an open pool located inside the municipality's solid waste management site. The site is located on the banks of the Khutti River and often floods during the rainy season, when septage stored in the open pool near the river bank is frequently swept away, risking water sources downstream (Accessing microbial safety of drinking water: 111-124).

4.6 Groundwater contamination

There is no specific data available on the Lahan city groundwater table. A study conducted by WaterAid on water table depletion in the project area of Siraha (30 km West of Lahan) revealed that the depth of the shallow aquifer water table varies between 1.5 meters and 40 meters (WA, 2017). The unsaturated zone is made up of clay, silt and fine sand. About 16 percent of households have access to piped drinking water supplied from deep boreholes, lifted and distributed through overhead tanks. The rest of the population get their drinking water from shallow aquifers. Since most toilet pits are constructed with an open bottom, the groundwater pollution risk is high for the population using shallow aquifers for drinking water extracted through protected boreholes and protected dug wells.

4.7 Discussion of SFD Graphic

The SFD graphic shows that 77 percent of faecal sludge is unsafely managed and 23 percent is safely managed. The 77 percent of faecal sludge not properly managed consists of: 39 percent of faecal sludge emptied from onsite systems but not delivered to treatment; 30 percent of faecal sludge not contained and not emptied coming from pits and holding tanks constructed with impermeable walls and open bottoms in areas of high risk of groundwater pollution; three percent of sludge coming from toilets connected to open drains which is not treated and 7 percent from people practicing open defecation. The 23 percent of the faecal sludge that is safely managed comes from sludge contained and not emptied in areas of low risk of ground water pollution.

5 Data and assumptions

There is no published data on types of containment in Lahan city. During the ODF campaign, only the number of houses with toilets were monitored and recorded. Therefore, the data of containments are based on information available from various sources (KII 1, 2018).

Containment (on-site and off-site sanitation)		**% of Household**	**System Label**
Total Population of Lahan Municipality = 32,990			
Total number of households in Lahan Municipality (Wards 1 to 10) = 6,264			
1	Septic tank	20%	T1A2C5
2	Fully lined tank (sealed)	25%	T1A3C5
3	Lined tank with impermeable walls and open bottom	20%	T2A4C5
4	Lined pit with semi-permeable walls and open bottom	27%	T2A5C10
5	No toilet. Open defecation	5%	T1B11 C7 TO C9
6.	Toilet discharge directly to open drain	3%	T1A1C6

Table 2: On-site containment data assumptions

Assumptions:

1) Based on the desk review and data from the ODF campaign, about 20 percent of houses, institutions, hotels and commercial complexes have septic tanks that are emptied regularly (KII 1, 2018).
2) In the city core area, 25 percent of houses have fully lined tanks (sealed at the bottom) (KII 1, 2018).
3) About 20 percent of houses in the peri-urban area have lined tanks with impermeable walls and open bottoms (KII 1, 2018).
4) About 27 percent of houses in the municipality have pit toilets with semi-permeable walls and open bottoms. This assumption is based on promotional activities conducted by municipality and on support to NGOs during ODF campaigns to build pit toilets of this type (KII 1, 2018).
5) About three percent of household toilets discharge directly into open drains. This assumption is based on data from the key informant interview with the municipal Social Development Officer.
6) Although the municipality has been declared ODF, it is assumed that about five percent of the population still practices open defecation. Ultra-poor households do not have toilets or they use shared toilets, and are therefore assumed to practice open defecation. Lahan city hosts a twice-weekly local market (Haat Bazaar) visited by hundreds of customers from surrounding areas. Customers visiting the market area are forced to defecate in the open because there are insufficient public toilets (KII 1, 2018).
7) Numbers and percentages mentioned in this report are from face-to-face interviews with municipal staff in June 2018, and from telephone interviews with the same informants in August 2018 to obtain additional information. In the absence of any documented or published data, the information used in this report was provided by key informants based on field observations during ODF campaign monitoring. The key

informants were the focal persons leading the ODF campaign monitoring on behalf of Lahan Municipality, therefore the information provided is considered to be reliable.

6 Stakeholders' engagement

The social development officer of Lahan municipality was contacted by telephone and information was collected using semi-structured questionnaires. Other relevant data was collected via email from the municipality and NGOs working in Lahan. Another key informant was the private vacuum tanker service provider, who was interviewed to obtain information about the services and sustainability of the business.

WaterAid Nepal plans to discuss the SFD with the Lahan municipality and stakeholders in November 2018, through the ongoing WaterAid project in Lahan.

7 Supplementary information

There is no separate policy on faecal sludge management in Nepal but there are other policies that spell out proper management of solid and liquid waste for on-site/off-site systems. The Environment Protection Act 1996, and Environmental Protection Regulation 1997 mention prevention and control of pollution that is harmful to environment. The National Building Code for Sanitation (NBC:2003) gives guidelines for construction of septic tanks, but there is no provision for sludge removal, treatment or safe disposal of faecal sludge.

Recently in 2017, a faecal sludge management (FSM) institutional and regulatory framework was endorsed by the Ministry of Water Supply and Sanitation, which clearly spells out the roles and responsibilities of the various stakeholders regarding FSM. Similarly, the 2017 total sanitation guideline describes the proper management of solid, liquid waste and human excreta. These legal documents have encouraged municipalities to manage solid waste, and as a result, all municipalities designated after state restructuring in Nepal have prioritized to establish and operate solid waste management sites and sanitary landfill sites. However, the urban municipalities designated in the previous governance setting have established and operated solid waste management sites and sanitary landfill sites. However, very few municipalities have constructed and operate proper faecal sludge treatment plants and waste water treatment plants. In the absence of proper management of faecal sludge, groundwater is at significant risk of contamination, particularly in the Terai plain areas where GW table is high and therefore, the population that depends on groundwater in these areas for drinking will face huge challenges in the near future.

The state restructuring of Nepal created three layers of governments; federal, provincial and local. The number of local governments has been reduced to 753 municipalities (i.e. Urban Municipalities – 293 (including sub-metropolitan and metropolitan cities) and Rural Municipalities – 460) from more than 4,000 plus (Municipalities and Village Development Committees previously). There have also been changes to the authority of the national, district and local level government offices. The Department of Water Supply and Sanitation (DWSS) at national level and Divisional Water Supply and Sanitation Office (DWSSDO) at provincial level now have a support role, providing technical assistance to the municipalities in planning, drafting local level policy, capacity building, and monitoring and implementation of projects. The municipalities play lead roles in managing all types of waste, including solid, liquid and faecal sludge, produced within their geographical boundaries.

WaterAid Nepal has been implementing a water project in Lahan municipality in the last two years. From this year, a new project has been intervened in this municipality for enhancing the utility managed water systems integrating sanitation and hygiene as added components to the project. The project will carry out awareness-raising, capacity building of utility (i.e. NWSC

Lahan Branch), improve water network systems with water optimization and leakage minimization to improve quantity and quality of the services. The SFD results will be used to lobby and advocate for increased investment in sanitation improvement in Lahan municipality and undertake activities related to faecal sludge management with the Municipality.

8 List of data sources

WaterAid Nepal, 2017, Study on groundwater depletion in Siraha district.

WaterAid Nepal, June 2018, Field visit report of Lahan

Lahan Municipality, December 2017, Lahan ODF monitoring report

Lahan municipality profile data, http://lahanmun.gov.np/

Nepal water supply corporation, 2017, water supply coverage in Lahan. www.nwsc.gov.np

KII 1, June 2018, Interview with Social Development Officer, Lahan Municipality.

KII 2, June 2018, Interview with private vacuum tanker service provider, Lahan Municipality

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SNV Nepal, 2018, Estimating safely managed sanitation in Nepal, http://www.snv.org/public/cms/sites/default/files/explore/download/180508-snv-nepal-learning-brief.pdf