SFD Report

Baglung Municipality
Nepal

Final Report

This SFD Report - SFD level 2 - was prepared by
Environment and Public Health Organization (ENPHO)

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SFD Report Baglung Municipality, Nepal, 2026

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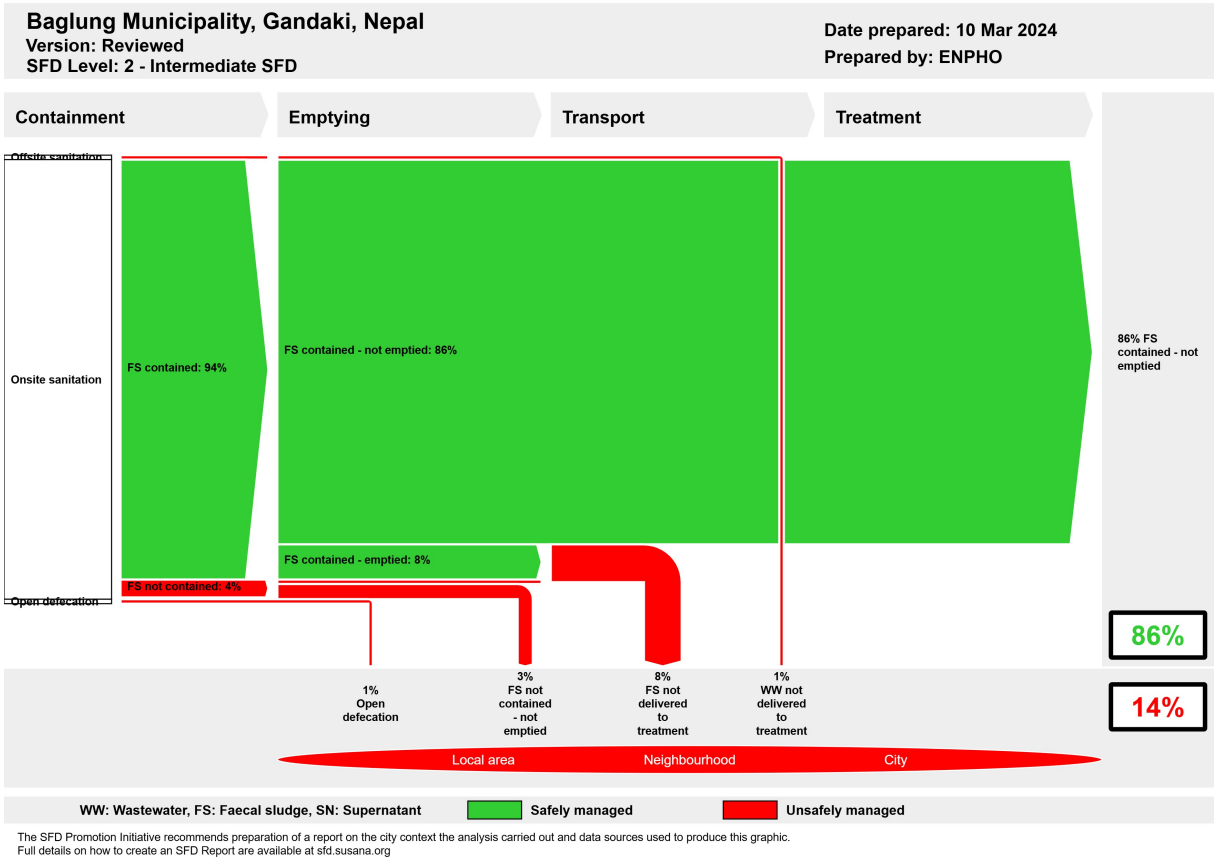
1. The SFD Graphic



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. Diagram information

SFD Level:

This SFD is level 2– Intermediate report.

Produced by:

Environment and Public Health Organization (ENPHO).

Collaborating partners:

Baglung Municipality, Municipal Association of Nepal (MuAN), United Cities and Local Governments Asia-Pacific (UCLG ASPAC).

Status:

Final SFD report.

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3. General city information

Baglung Municipality is situated in Baglung District of Gandaki Province in the western region of Nepal. It is divided into 14 wards and covers an area of 98.01 km^2.

It was established on January 31, 1997, by merging 3 Village Development Committees (VDCs) namely, Kalika, Mulpani and Laharepipal and was reformed on March 10, 2017 by merging 7 VDCs; Malika, Tityang, Bhakunde, Raya Danda, Amalachaur, Paiyupata, Narayansthan and partial wards of Sigana and Paala. It lies at 28°16' to 28°27' N latitude and 83°35' to 83°58' E longitude and at the altitude from 440 metres above sea level (masl) to 1,910 masl (Baglung Municipality, 2024).

A population of 56,102 is residing on 15,924 households in the municipality (National Statistics Office, 2023). The annual population growth rate of the municipality is -0.35%. This shows that the municipality has increasing out migration. The municipality has a temperate climate (Cwb) with warm summers and dry winters. The annual average temperature of the municipality is 14.9°C and receives 2306 mm rainfall per year (Climate-Data, 2021).

4. Service outcomes

The overview of different sanitation technologies across the sanitation value chain in the municipality is briefly explained in this section. All data in this section is from the household and institutional surveys conducted for this survey (ENPHO, 2024). Baglung district was declared Open Defecation Free (ODF) on January 30, 2014. But 1% of households do not have toilets, while 99% of households have the coverage of improved sanitation facility. The households without improved sanitation facility opt for open defecation.

Containment:

Among households with improved sanitation facilities, about 1% of households rely on an offsite sanitation system and 98% rely on onsite sanitation systems. The municipality does not have sewer network but the households that have their toilet's outlet to a stormwater drain is considered as offsite sanitation systems. Households with onsite sanitation systems have different sanitation technologies. About 3% of households have fully lined tanks, 40% have lined tanks with impermeable walls and open bottom, 1% have lined pits with semi-permeable walls and open bottom and 54% have unlined pits.

Here, all the institutional buildings have toilets with 100% onsite sanitation system. Among which, 27% of institutional buildings have fully lined tanks, 50% have lined tanks with semi-permeable walls and open bottom and 23% have unlined pits.

Five public toilets in the municipality were observed for the study. Among two toilets in *Bangechaur*, one is not functional however others were functional. The toilet located at *Buspark* was only constructed by Bus Management Committee, near *Kalika Temple* was constructed by Temple Committee and at *Bangechaur* was constructed by the Baglung Municipality. Every day, almost 120 people use these toilets. The restrooms are mostly used by temple devotees, park visitors and public bus passengers. The users are charged Rs. 5 (USD 0.03) for urination and Rs. 10 (USD 0.08) for defecation.

Emptying and Transport:

Among the buildings with onsite sanitation system, only 11% of households and 2% of institutional buildings have emptied their containment. Manual, mechanical and open emptying is practiced at households while only mechanical emptying is practice at institutional buildings in the municipality. In addition, manual emptying is prevalent at households.

The municipality has a private desludging service provider. The service provider has a vehicle with tank capacity of 4000 litres. The service charge for each trip is NRs. 18,000 (USD 135.35) to empty a containment.

Treatment and Disposal/Reuse:

Here, mechanically emptied faecal sludge (FS) is disposed in an open environment owned by the private desludging service provider. The manually emptied FS is mostly dig and dumped, disposed into farmlands and composted. Therefore, all the emptied FS is disposed unsafely into an open environment or water bodies.

Approximately 36% of households have piped drinking water supply services in the municipality. Among other service providers, Baglung Urban Drinking Water and Sanitation Users' Committee is one of the major drinking water services providers. It serves in wards 1, 2, 3 and 4. It has distributed 4048 taps to households and institutions. Among the remaining households, 11% of households have access to drinking water from community taps, 18% uses jar water and 35% of households rely on spring sources.

Spring sources are vulnerable of contamination. The vulnerability of sources depends on lateral spacing between sanitation systems and the sources. However, sample water from flocculator of Baglung Urban Drinking Water and Sanitation Users' Committee showed absence of *E. coli* contamination concluding, drinking water from private taps are at less risk of contamination.

The SFD graphic shows that excreta generated from 86% of the population are safely managed while 14% of the population are unsafely managed. The safely managed FS generated from 86% of population is temporary as the FS has not been emptied. With the current practice of faecal sludge management (FSM), the proportion of safely managed FS will soon become unsafely managed once the containments start filling up.

5. Service delivery context

Access to drinking water and sanitation has been defined as fundamental rights to every citizen by the constitution of Nepal. To respect, protect and implement the rights of citizen embedded in the constitution the Government of Nepal (GoN) has enforced the Water Supply and Sanitation Law 2022 which emphasized on a right to quality sanitation services and prohibited direct discharge of wastewater and sewage into water bodies or public places.

Several policies have been in place to accomplish the sanitation needs of people. Particularly, NSHMP 2011 has proved to be an important strategic document for all stakeholders to develop uniform programs and implementation mechanisms at all levels. It strengthened institutional set up with the formation of Water and Sanitation Coordination Committee (WASH-CC) to actively engage in sanitation campaigns. The sanitation campaign was implemented throughout the country mainly focusing on achieving universal access to improved sanitation.

Ministry of Water Supply through its Department of Water Supply and Sewerage Management (DWSSM) articulated and endorsed Institutional and Regulatory Framework (IRF) for Faecal Sludge Management in Urban Areas of Nepal in 2017. The main objective of the IRF is to define the specific roles and responsibilities of key institutions for the effective management and regulation of Faecal Sludge Management (FSM).

6. Overview of stakeholders

Based on the regulatory framework for Faecal Sludge Management (FSM), the major stakeholders for effective and sustaining service delivery as presented in Table 1.

Table 1: Overview of Stakeholders.

Key Stakeholders	Institutions / Organizations
Public Institutions at Federal Government	Ministry of Water Supply
Public Institutions at Provincial Government	Ministry of Energy, Water Resources and Water Supply
Public Institutions at Local Government	Baglung Municipality
Non-governmental Organizations	Environment and Public Health Organization (ENPHO)
Private Sector	Water Supply Users Committee Private Desludging Service Provider
Development Partners, Donors	MuAN, BMGF, UCLG ASPAC

7. Process of SFD development

Data on sanitation situation were collected through household and institutional surveys (ENPHO, 2024) Enumerators of the municipality were mobilized after orientating on sanitation technologies and proper use of mobile application (KOBOCOLLECT) to collect data for survey. The Key Informant Interviews (KIIs) were conducted with WASH focal person of the municipality, Water and Sanitation Users' Committee and caretakers of public toilets. Types of sanitation technologies used in various locations have been mapped using ARCGIS. For the Shit Flow Diagram (SFD) graphic production, initially, a relationship between sanitation technology used in questionnaire survey and Shit Flow Diagram Promotive Initiatives (SFD PI) methodology was made. Then, data were fed into SFD graphic generator to produce the SFD graphic.

8. Credibility of data

The major data were collected from random household sampling. Altogether, 374 households and 44 institutions were surveyed from 14 wards of Baglung Municipality. Primary data on emptying, transportation and current sanitation practices in the municipality were validated from KII with public toilet management, municipal representatives, and water service providers. The overall data and findings were shared with the stakeholders of the municipality and validated through a sharing program.

9. List of data sources

The list of data sources to produce this executive summary is as follows:

- Baglung Municipality, 2024. Baglung Municipality. [Online] Available at: https://baglungmun.gov.np/ne [Accessed 23 May 2024].
- Climate-Data, 2021. Climate-Data. [Online] Available at: https://en.climate-data.org/asia/nepal/western-development-region/baglung-53907/ [Accessed 23 May 2024]
- ENPHO, 2024. Sanitation Situation Assessment of Baglung Municipality. Unpublished, s.l.: s.n.
- MoWS, 2020. Open Defecation Free Nepal: Narration of the Journey, Kathmandu: Secretariat of National Sanitation and Hygiene Coordination Committee, Nepal.
- National Statistics Office, 2023. National Population and Housing Census 2021 National Report, Kathmandu: National Statistics Office.

SFD Baglung Municipality, Nepal, 2026

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Abbreviations

DWSSM	Department of Water Supply and Sewerage Management
DUDBC	Department of Urban Development and Building Construction
ENPHO	Environment and Public Health Organization
FS	Faecal Sludge
FSM	Faecal Sludge Management
FSTP	Faecal Sludge Treatment Plant
GoN	Government of Nepal
HH	Household
IRF	Institutional and Regulatory Framework
KII	Key Informant Interview
KM	Kilometre
masl	metres above sea level
mm	Millimetre
MoWS	Ministry of Water Supply
MuAN	Municipal Association of Nepal
NPC	National Planning Commission
NSHMP	National Sanitation and Hygiene Master Plan
NWSSP	National Water Supply and Sanitation Policy
ODF	Open Defecation Free
PPP	Public Private Partnership
RWSSNP	Rural Water Supply and Sanitation National Policy
SDG	Sustainable Development Goal
SDP	Sector Development Plan
SFD	Shit Flow Diagram
SFD PI	Shit Flow Diagram Promotion Initiative
SuSanA	Sustainable Sanitation Alliance
UCLG ASPAC	United Cities and Local Governments Asia-Pacific
VDC	Village Development Committees
WASH	Water, Sanitation and Hygiene
WSUC	Water and Sanitation Users Committee
WW	Wastewater
WWTP	Wastewater Treatment Plant

1 City context

Baglung Municipality is situated in Baglung District of Gandaki Province in the western region of Nepal. It was established on January 31, 1997 by merging 3 Village Development Committees (VDCs) namely, Kalika, Mulpani and Laharepipal. Later, on March 10, 2017, additional 7 VDCs namely, Malika, Tityang, Bhakunde, Raya Danda, Amalachaur, Paiyupata, Narayansthan and partial wards of Sigana and Paala were merged to reform the municipality. It is divided into 14 wards. It shares its boundary with Parbat district and Kaligandaki River on the east, Kanthekhola Rural Municipality on the west, Myagdi district on the north and jaimuni Municipality on the south (Baglung Municipality, 2024). Figure 1 shows the ward boundary map of Baglung Municipality.

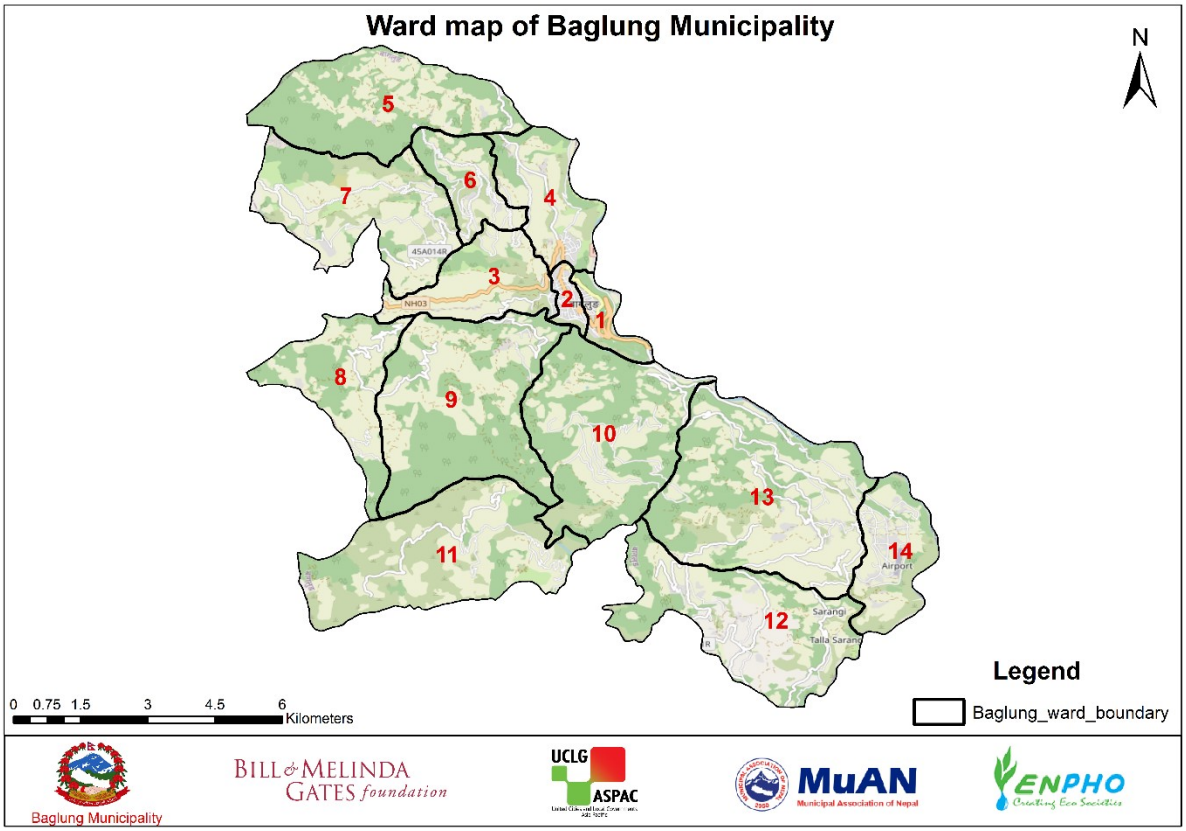


Figure 1: Ward boundary map of Baglung Municipality.

1.1 Population

As per the national population and housing census conducted in 2021, Baglung Municipality has a total population of 56,102 with 26,080 male and 30,022 female population. There are altogether 15,924 households. The average household size is 3.52 and population density is 572.41/km^2 (National Statistics Office, 2023) . The annual population growth rate of the municipality is -0.35%. This shows that the municipality has increasing out migration deceasing the overall population size.

1.2 Topography and Geography

Baglung Municipality lies at 28°16' to 28°27' N latitude and 83°35' to 83°58' E longitude. The altitude of the municipality ranges approximately from 440 metres above sea level (masl) to

1,910 masl. It covers a total area of 98.01 km^2. in the western region of Nepal (Baglung Municipality, 2024). The municipality lies in the Midlands based on the physiographic division of Nepal. Thus, it has the topography based on the range. The region has a composition of Phyllites, Schist, gneiss, quartzite, granite and limestone along with alluvial sediments i.e. sand, silt and clay along-with coarse gravels in the nearby rivers in the municipality (Upreti, 1999).

1.3 Climate

Köppen–Geiger classification is one of the most used systems for climatic categorization. This classification is a widely used method for portraying climates worldwide, based on monthly air temperature and precipitation. The climatic condition of Baglung Municipality falls on temperate climate (Cwb) based on Köppen–Geiger classification. This climatic condition has warm summers and dry winters (Karki, et al., 2015). The warmest month of the year is July with an average temperature of 19.8°C and coldest month is January with average temperature of 7.7°C. The annual average temperature of the municipality is 14.9°C. It receives 2306 mm rainfall an average annually. The most rainfall occurs in July and the least in December (Climate-Data, 2021). Figure 2 shows the graph of the monthly average for precipitation and temperature of Baglung Municipality.

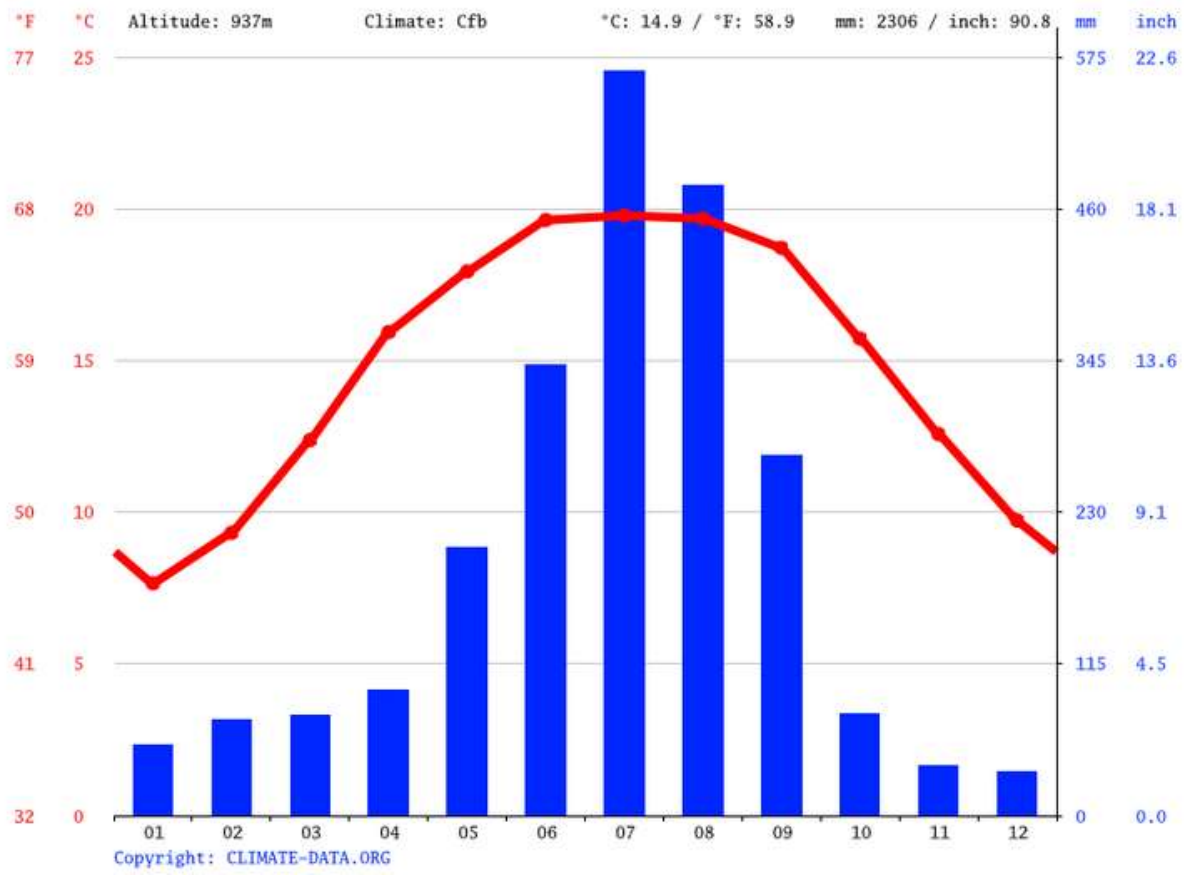


Figure 2: A graph showing the monthly average for precipitation and temperature of Baglung Municipality.

2 Service Outcomes

2.1 Overview

Data on sanitation situation were collected through household and institutional surveys (ENPHO, 2024) . A total of 374 households were sampled from 15,924 households distributed in 14 wards (further details are presented in section 4). The results obtained after the triangulation and validation of the data with all the data sources including secondary data, Key Informant Interviews (KIIs) and a validation workshop is presented in this section.

Sanitation is defined as infrastructures, facilities or services provided for safe management of human excreta emanating from toilet while handling, storage, and treatment onsite or offsite conveying it safely to the end use or disposal to protect human health and environment (Affam & Ezechi, 2021).

2.1.1 Sanitation System in Household Buildings

Baglung district was declared Open Defecation Free (ODF) on January 30, 2014 (MoWS, 2020). The status of ODF indicates accessibility to basic sanitation on each household (HH). In Baglung Municipality, still 1% of the households do not have toilets and practice open defecation. Figure 3 shows sanitation technologies present at households in Baglung Municipality.

Figure 3: Sanitation technologies at households of Baglung Municipality.

The remaining 99% of the households have improved sanitation facilities either with offsite or onsite sanitation systems. Offsite sanitation refers to a sanitation system in which excreta (referred to as wastewater) is collected and transported away from the plot where they are generated. An offsite sanitation system relies on sewer technology for transport. Onsite sanitation refers to a sanitation technology or sanitation system in which excreta (referred to as faecal sludge) is collected and stored and emptied from or treated on the plot where they are generated (SuSanA, 2018) . In the municipality, 1% of the households have offsite sanitation systems whereas 98% have onsite sanitation systems. Figure 4 presents the location map of households with status of access to improved sanitation.

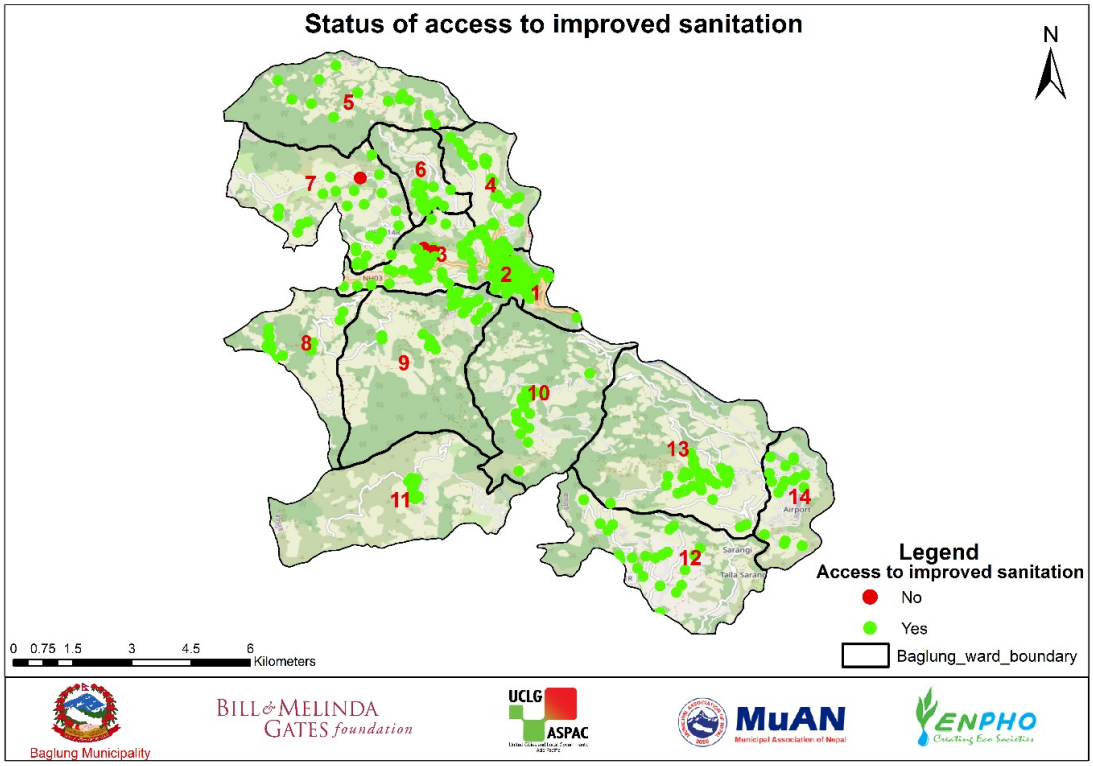


Figure 4: Location map of households with status of access to improved sanitation.

Types of Offsite Sanitation Systems

Baglung Municipality does not have a sewerage network, however 1% of the households have offsite sanitation systems. Here, households that have the outlet of toilet directly to stormwater drain is considered as offsite sanitation system. It is taken as toilet with no onsite container for the SFD graphic. Figure 5 shows the stormwater drain in the municipality.

Figure 5: The stormwater drain in Baglung Municipality.

Types of Onsite Sanitation Systems

In the municipality, 98% of the households have onsite sanitation systems. Table 1 shows the types of onsite sanitation technologies and percentage of households using it at Baglung Municipality.

Table 1: Types of onsite sanitation technologies at households of Baglung Municipality.

Containment	Wall construction materials	Bottom of containment	Chamber	Number	Connected to	Percentage
Fully Lined Tank	Concrete walls OR Cemented brick/stone walls	PCC or plastered	One or Two	NA	Soak pit Sewer Open drain/open ground No outlet/overflow	3%
Lined tank with impermeable walls and open bottom	Concrete walls OR Cemented brick/stone walls	Soiling or Nothing	one two More than two	NA	Soak pit Sewer Open drain/open ground No outlet/overflow	40%
Single pit	Concrete rings piled one after other	Soiling or Nothing	NA	One	NA	1%
Unlined pit	Mud mortar brick wall/Mud mortar cement wall/No lining/Dry stone wall	Nothing	NA	NA	NA	54%

Fully lined tank is a rectangular tank with impermeable walls and base to safely store FS. It does not have outlet for the discharge of effluent (Strande, et al., 2014). 3% of households have fully lined tanks.

Lined tank with impermeable walls and open bottom is a rectangular onsite technology where the walls of the tank are lined and sealed, and a permeable base. The facility allows infiltration of effluents which could contaminate groundwater (Peal, et al., 2020). 40% of households have these types of containments in the municipality.

Single Pit is a circular onsite technology made from concrete rings. There is no lining between rings, and it allows infiltration of effluents from walls and as well as bottom of the pit. No outlet or overflow for effluent is observed in this type of containment (SuSanA, 2018). 1% of households have single pits in the municipality. Figure 6 shows pictures of a single pit found in the municipality.

Figure 6: Single pit found in the Baglung Municipality.

Unlined Pit is a dug pit in the ground. It has no lining in walls and a permeable base. It allows infiltration of effluents from walls and as well as bottom of the pit (SuSanA, 2018). 54% of households have unlined pits.

Table 2 shows the types of sanitation technologies recategorized according to SFD PI.

Table 2: Types of sanitation technologies recategorized according to Shit Flow Diagram Promotion Initiative (SFD PI).

Sanitation System	Percentage
No toilet/Open defecation (T1B11 C7 TO C9)	1%
No onsite container (T1A1C6)	1%
Onsite Sanitation System	
Fully lined tank (T1A3C10)	3%
Lined tank with impermeable walls and open bottom (T1A4C5 and T1A4C10)	40%
Lined pit with semi-permeable walls and open bottom (T1A5C10)	1%
Unlined pit (T1A6C10 and T2A6C10)	54%
Grand Total	**100%**

According to Shit Flow Diagram Promotion Initiative (SFD PI), single pits and twin pits are recategorized as lined pits with semi-permeable walls and open bottom, but Baglung Municipality does not have twin pits. Thus, 1% of households have have lined pits with semi-permeable walls and open bottom.

Figure 7 shows location map of households with different types of containment at Baglung Municipality.

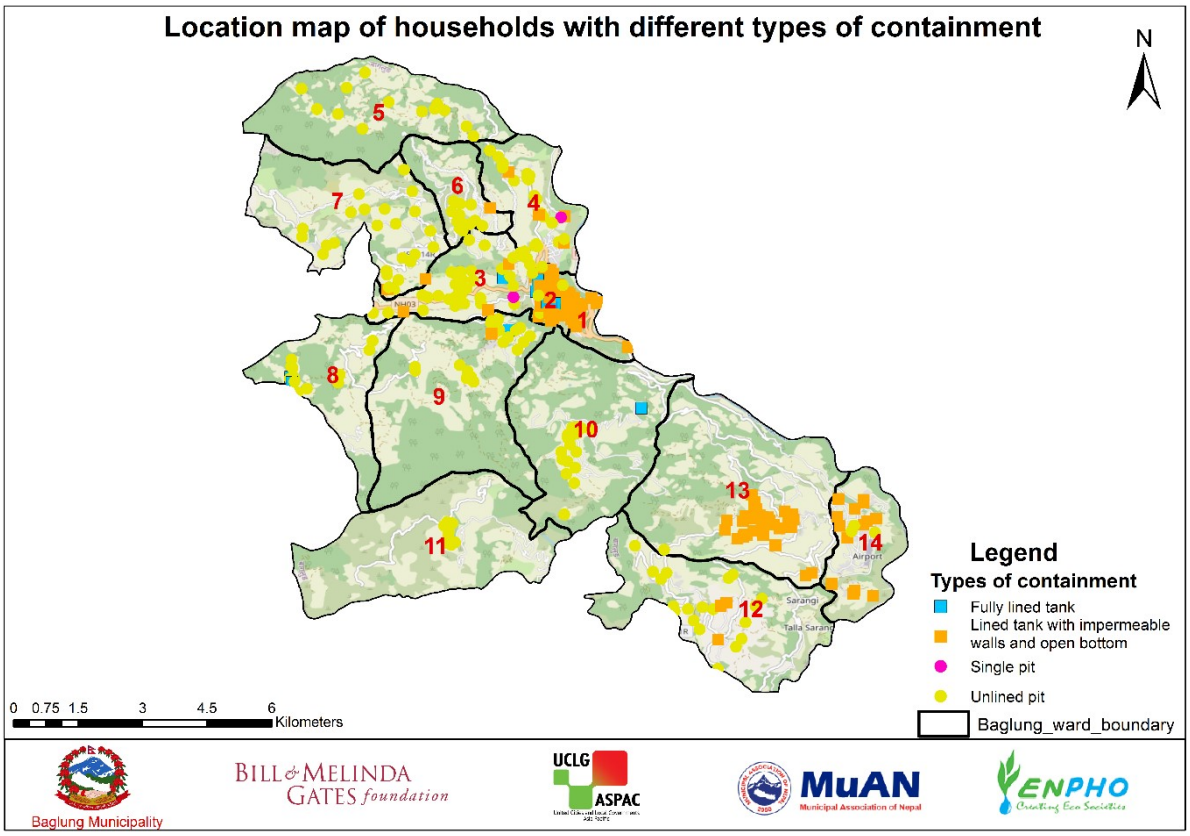


Figure 7: Location map of household with different types of containment.

2.1.2 Sanitation Systems in Institutional Buildings

Altogether 54 institutional buildings were surveyed. The sanitation data of institutional buildings were obtained from different types of institutions. Table 3 shows the types and number of surveyed institutions.

Table 3: Type and number of surveyed institutions.

Type of Institution	Number of Surveyed Institutions
Educational Institution	19
Government /Non-government Office	16
Health care centre	7
Commercial Buildings	2
Grand Total	**44**

All the institutional buildings in the municipality have toilets with 100% onsite sanitation systems. About 27% of the buildings have fully lined tanks, 50% have lined tanks with impermeable walls and open bottom and 23% have unlined pits. The data shows that only 21% of the institutional buildings have safer FS collecting containments whereas 79% of the institutional buildings have improperly built containments that possesses risk to groundwater contamination. Figure 8 shows the location map of institutional buildings with different types of containments in Baglung Municipality.

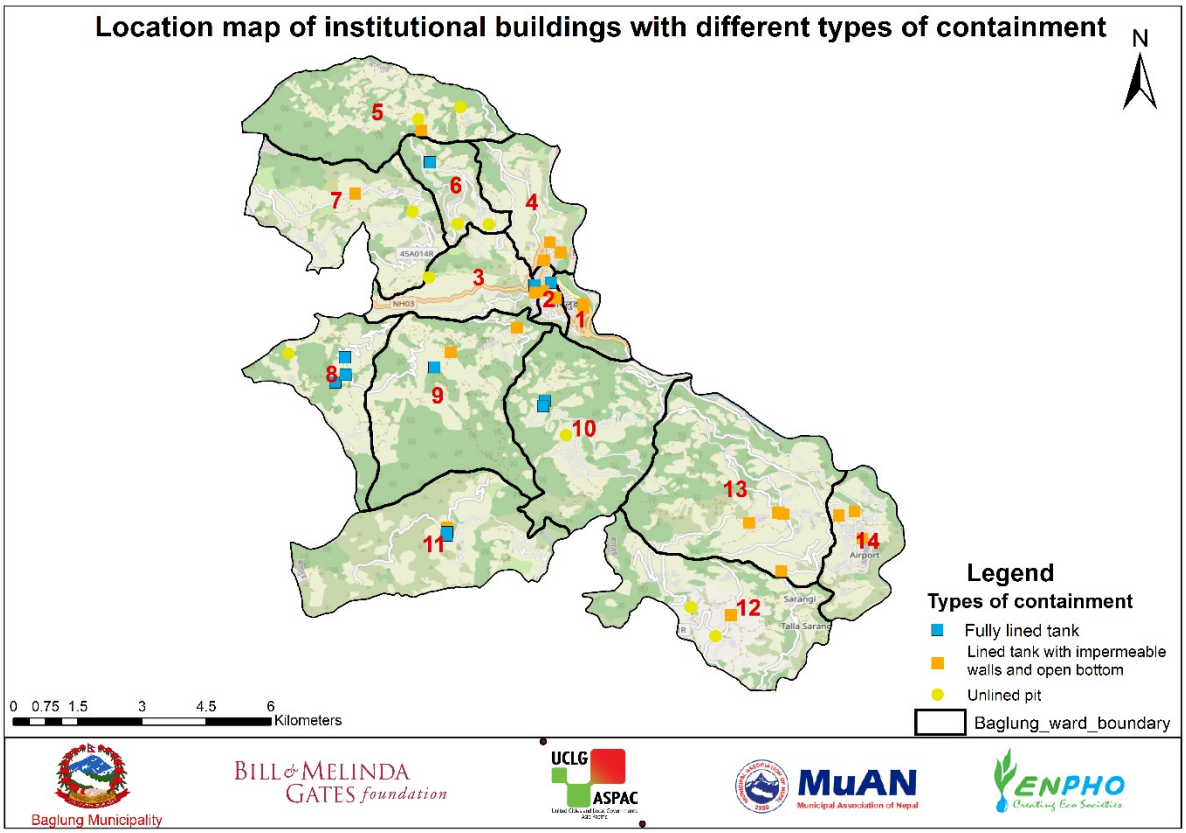


Figure 8: Location map of institutional buildings with different types of containment.

2.1.3 Public Toilets

There are six public toilets in Baglung Municipality (KII-1, 2023) among which five of them were observed for the study. Among which, one public toilet at *Bangechaur* was not functional. The information about public toilets obtained during KII and observation are fed in this report.

Public toilet at *Buspark*

The toilet located at *Buspark* in ward 3 was constructed by Bus Management Committee on 2012 A.D. It has a separate male and female compartment. It serves 7 users at a time with 3 pans in male compartment and 2 pans and 2 urinals in female compartment. The local bus passengers are the major service recipients of this toilet. About 50 users uses the toilet per day. The users are charged Rs. 5 (USD 0.03) for urination and Rs. 10 (USD 0.08) for defecation.

The outlet of the toilet is connected to a rectangular containment. The containment has not filled from past 6 years. The toilet is cleaned regularly. Water required for the toilet is supplied from a 500 litres overhead tank on the taps of each compartment. The toilet compartments have a ventilation. Each compartment has a basin for handwashing facility. A caretaker is responsible for overall management of the toilet and receives NRs. 4000 (30 USD) per month (KII-4, 2023).

Public toilet near *Kalika Temple*

The toilet located near *Kalika temple* in ward 1 was constructed by Temple Committee. It has separate male and female compartments as well as 2 bathing compartments. It serves 6 users at a time with 3 pans in male compartment and 3 pans in female compartment. The devotees of Kalika temple are the service recipients of the toilet. In an average 50 users uses the toilet per day. The users are charged Rs. 5 (USD 0.03) for urination and Rs. 10 (USD 0.08) for defecation.

The outlet of the toilet is connected to a rectangular containment. The containment has not filled in past 2 years. The toilet is cleaned regularly. Water required for the toilet is supplied from 4 overhead tanks of sizes one 2,000 litres, one 1,000 litres and two 500 litres in all compartments. A basin is placed in the premises of the toilet for the handwashing facility. The toilet compartments have proper ventilation (KII-4, 2023). A caretaker is responsible for the overall management of the toilet and receives salary every month.

Public toilet at *Kalika Temple*

Based on the observation, the toilet located at *Kalika Temple* does not have separate compartments for male and female. It serves 3 users at a time with 3 available pans. Each compartment has a tap fitted for the supply of water. Water is supplied from a 500 litres overhead tank. The toilet is clean, and each compartment has a ventilation.

Public toilet at *Bangechaur*

The toilet located at *Bangechaur* in ward 2 was constructed by Baglung Municipality. It has separate male and female compartments. It serves 8 users at a time with 3 pans and 1 commode in male compartment and 3 urinals and 1 pan in female compartment. The park visitors are the service recipients of the toilet. Each compartments have 2 basins for the handwashing facility.

Figure 9 shows the public toilets located in different places of Baglung Municipality and their status.

Figure 9: Public toilets and their status in Baglung Municipality.

2.1.4 Emptying and Transport

Emptying is one of the key elements of sanitation service chain. It basically assures the proper operation of containment. Regular emptying of the containment prevents sludge overflow and blockages (Strande, et al., 2014) . Moreover, emptying of containment is determined by the number of users, duration of years and types and size of containment.

Among the households with onsite sanitation systems, only 11% of the households have emptied their containment whereas 89% have not emptied yet. Similarly, only 2% of the institutional buildings have emptied their containments. The emptying ratio of single pits are higher than other containment types followed by unlined pits. The average size of single pits and unlined pits are 6 m^3 and the maximum sizes are 7 m^3 and 25 m^3 respectively (ENPHO, 2024). The size of the containments also affects the emptying frequency. This is one of the reasons for the greater emptying ratio of single pits and unlined pits than other containment types. Figure 10 shows emptying status of different types of containment at households.

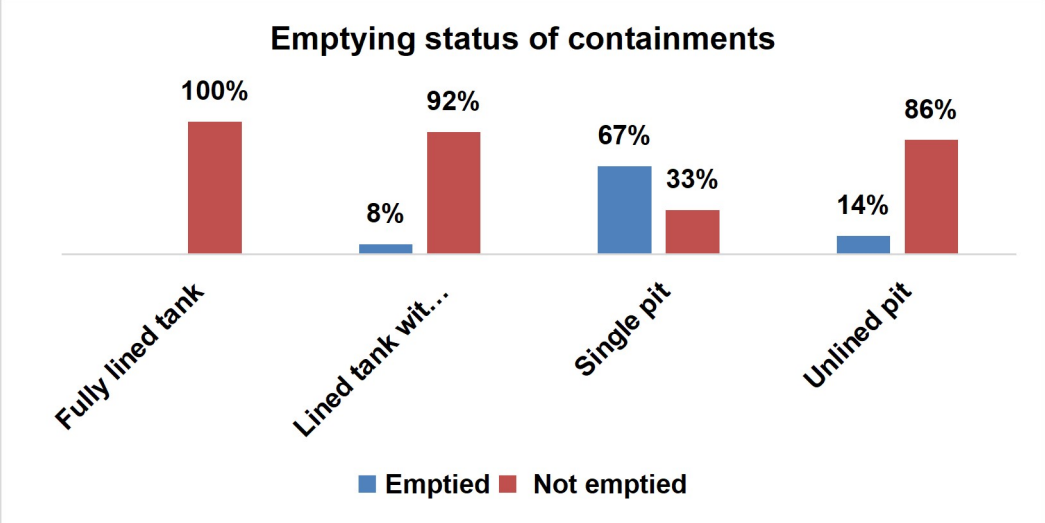


Figure 10: Status of emptying of different types of containment.

The municipality does not have regular containment emptying practice as most containment, i.e. almost 62%, gets filled over a span of 10 years (ENPHO, 2024). The frequent emptying is challenging due to topography of the municipality. Thus, on-demand emptying practice is found the municipality (KII-2, 2023) . Manual emptying is more prevalent although manual and mechanical emptying is practiced at households. Among the households that have emptied their containments, 76% of households emptied manually while only 21% of households emptied mechanically. Moreover, 3% of households practiced open emptying. Open emptying method is the practice of discharging effluent into an open/stormwater drain during rainy season. Unlike the emptying practice at households, only mechanical emptying is practiced at institutional buildings (ENPHO, 2024) . The inadequate desludging vehicle, high service charge and lack of motorable road networks are the reasons for practicing manual emptying at households.

The municipality has a private desludging service provider. It started the desludging service on 2010. however is not registered in any governmental agencies. The service provider has desludging vehicle with a tank capacity of 4,000 litres. The service charge for each trip is NRs. 18,000 (USD 135.34). On average, there are 40-50 trips per month, but the service is

not limited in Baglung Municipality. A driver and a helper are assigned for the desludging service (KII-2, 2023).

2.1.5 Treatment and Disposal/Reuse

Baglung Municipality does not have a Faecal Sludge Treatment Plant (FSTP). Here, mechanically emptied FS is disposed in an open environment owned by the service provider (KII-2, 2023) while manually emptied FS is mostly dig and dumped, disposed into farmlands and composted. Thus, in the municipality, all the emptied FS is disposed of unsafely and untreated in an open environment.

2.1.6 Risk Assessment of Water Source Pollution

The risk of water source pollution was assessed based on source of drinking water, secondary data on water quality and the vulnerability of water source with regards to lateral spacing between sanitation system and the sources.

a. Sources of drinking water and water production

Approximately 36% of households in the Baglung Municipality have piped drinking water supply services while 11% of households get drinking water from community taps, 18% uses jar water and 35% of households rely on spring sources. Almost 28 Water and Sanitation Users' Committees (WSUCs) are providing drinking water supply service at households and institutions in the municipality (ENPHO, 2024). Figure 11 shows different types of drinking water sources in the municipality.

Figure 11: Picture showing spring source and community tap in Baglung Municipality.

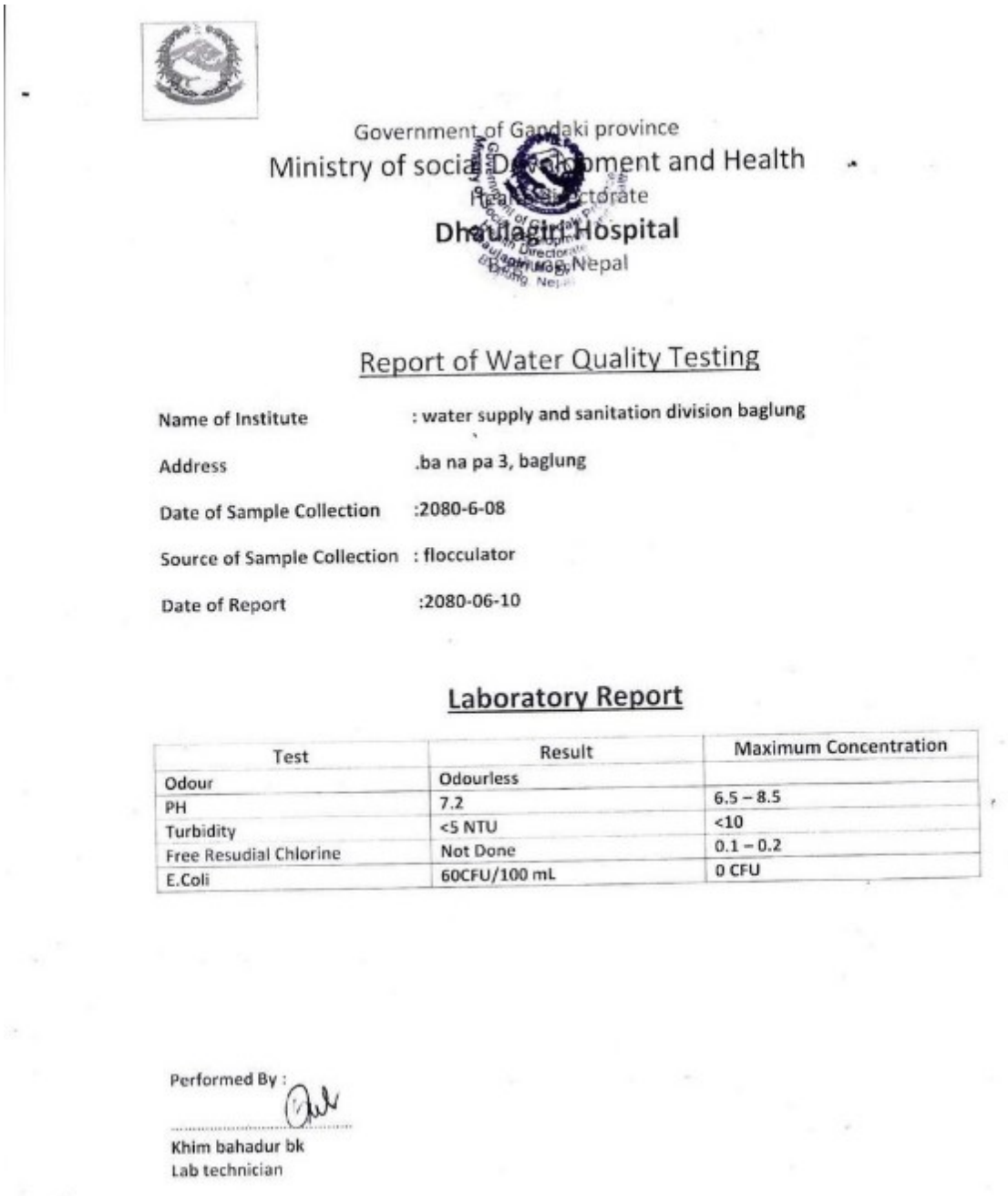
Baglung Urban Drinking Water and Sanitation Users Organization is one of the major water service providers. It was established on 2007. and has been providing water supply services in the municipality. The service has reached 4048 households in wards 1, 2, 3 and 4. The water supply scheme lifts water from 5 sump wells installed in Kathe khola, Bhudi khola, Rithe khola and Resa khola. The lifted water from sources are processed through treatment systems including sedimentation tanks, flocculator, sedimentation filter, roughing filter, slow sand filter and chlorine dosing. Water is collected in 3 reservoir tanks of capacities 42 m^3, 500 m^3 and 500 m^3 which are distributed in the taps of households and institutions of the municipality. Water quality of this system is also performed (KII-3, 2023).

Apart from this water service provider, Albari Basbot, Narayansthan, Pakhathar, Malika and Ratamate are some WSUC among others in the municipality (ENPHO, 2024) . The water supply service is not uniformly distributed in the municipality; thus locals are obliged to rely on spring sources for drinking water supply.

b. The vulnerability of spring source and water pollution

The households using drinking water directly from spring source have their source located in less than 5 metres to more than 25 metres horizontally from their containment. A study suggests that *E. coli* can travel up to hundreds of metres horizontally in fractured rocks and gravels (Krishnan, 2011). As the geology of Baglung Municipality consists of rocky landscape, such as quartzite, granite and limestone (Upreti, 1999) , there is a possibility of *E. coli* contamination in groundwater and spring sources. The water quality test report showed presence of *E. coli* on sample water tested from source, reservoir tanks, taps and drinking water in Baglung (ENPHO, 2023) . But spring water contamination is low in Baglung Municipality. Many study suggests that humic matter such as microorganisms in water can be removed naturally, in a period of time and in continuous flow of water (Balke & Zhu, 2008) (Odling, et al., 2020) . Furthermore, the test report of water quality provided from Baglung Urban Drinking Water and Sanitation Users Organization showed the absence of *E. coli* (Figure 12). Thus, it can be said that population consuming water from private taps are at insignificant risk of *E. coli* consumption while population accessing water directly from spring sources can be at possible risk of it.

Therefore, 1% of the population relies on lined tanks with impermeable walls and an open bottom connected to a soak pit (T1A4C5, low risk); 39% depends on lined tanks with impermeable walls and an open bottom, with no outlet or overflow (T1A4C10, low risk); 1% uses lined pits with semi-permeable walls and an open bottom, with no outlet or overflow (T1A5C10, low risk); 50% relies on unlined pits (T1A6C10, low risk); and 4% utilizes unlined pits (T2A6C10, high risk).



Government of Gandaki province
Ministry of social Development and Health
Health Directorate
Dhaulagiri Hospital
Baglung, Nepal

Report of Water Quality Testing

Name of Institute : water supply and sanitation division baglung
Address .ba na pa 3, baglung
Date of Sample Collection :2080-6-08
Source of Sample Collection : flocculator
Date of Report :2080-06-10

Laboratory Report

Test	Result	Maximum Concentration
Odour	Odourless	
PH	7.2	6.5 – 8.5
Turbidity	<5 NTU	<10
Free Resudial Chlorine	Not Done	0.1 – 0.2
E.Coli	60CFU/100 mL	0 CFU

Performed By :
Khim bahadur bk
Lab technician

Figure 12: Picture of water quality test report from flocculator of Baglung drinking water supply scheme.

2.2 SFD Selection Grid

Figure 13 shows the types of sanitation technologies present in the Baglung Municipality selected in the Shit Flow Diagram (SFD) selection grid. The vertical column on the left side of grid represents sanitation technologies to which toilet is connected to, and horizontal row at top is connection of the technologies. The households with single pit and twin pits are selected as lined pit with semipermeable walls and open bottom in this selection grid.

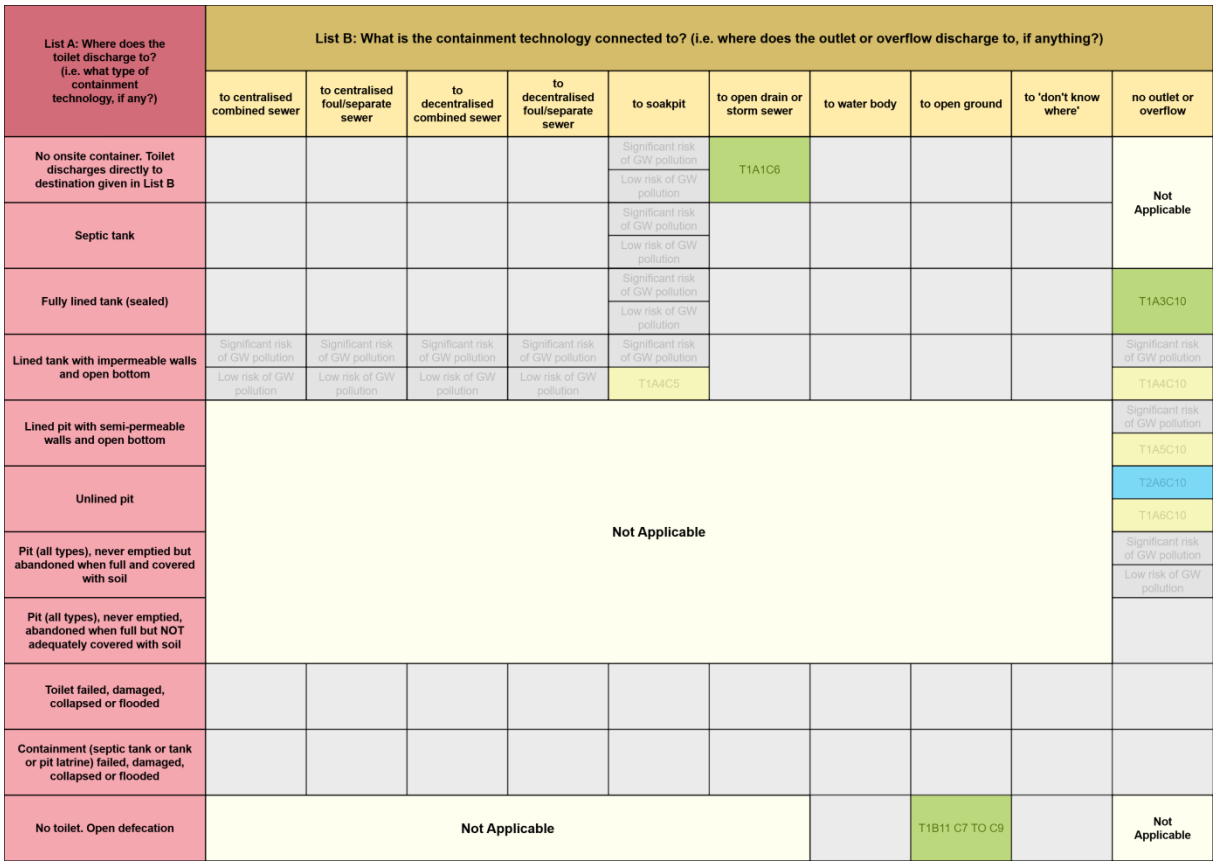


Figure 13: SFD selection grid for Baglung Municipality.

The detail description of selected terms in the selection grid is provided in Table 4:

Table 4: Explanation of terms used to indicate different frame selected in the SFD selection grid in Figure 13.

T1A1C6	A fully functioning toilet discharging directly to an open drain or storm sewer. The excreta is raw, untreated and hazardous and since it discharges directly to an open drain or storm sewer, all the excreta in this system is considered NOT contained.
T1A3C10	A correctly designed, properly constructed and well maintained fully lined tank with impermeable walls and base. It includes poorly designed and/or constructed and/or maintained septic tanks that, because of these faults or deficiencies, are NOT performing as septic tanks, instead they are acting as sealed vaults. However, since the tank is NOT fitted with a supernatant/effluent overflow this system is considered contained.
T1A4C5	A correctly designed, properly constructed and well maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur. It includes wall-lined but open bottomed tanks and containers which are sometimes mistakenly referred to as septic tanks. Since the tank is fitted with an effluent overflow connected to a correctly designed, properly constructed and fully functioning soak pit the excreta in this system is considered contained.
T1A4C10	A correctly designed, properly constructed and well maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur. It includes all lined but open bottomed tanks and containers which are sometimes mistakenly referred to as septic tanks (e.g. cubluks in Indonesia). However, since the tank is NOT fitted with a supernatant/effluent overflow this system is considered contained.

T1A5C10	A correctly designed, properly constructed and well-maintained pit with semi-permeable, honeycombed lined walls and an open, permeable base, through which infiltration can occur. The tank is NOT fitted with a supernatant/effluent overflow, so this system is considered contained.
T1A6C10	A correctly designed, properly constructed and well maintained unlined pit with permeable walls and base, through which infiltration can occur. The tank is NOT fitted with a supernatant/effluent overflow so this system is considered contained.
T2A6C10	This is a correctly designed, properly constructed and well maintained unlined pit with permeable walls and base, through which infiltration can occur. The tank is NOT fitted with a supernatant/effluent overflow but since there is a 'significant risk' of groundwater pollution this system is considered NOT contained.
T1B11C7 to C9	With no toilet, users defecate in water bodies, on open ground and to don't know where; consequently, the excreta is NOT contained.

2.3 SFD Matrix

2.3.1 Proportion of Faecal Sludge from types of sanitation technologies

The second step in the process of developing the SFD graphic is the calculation of the proportion of contents of each type of onsite container which is faecal sludge. SFD matrix calculates the proportion of people using each type of system and the proportion of each system, from which FS and supernatant is emptied, transported and treated. A detailed instruction on how to calculate SFD proportion in SFD PI was used as guide to calculate SFD proportion. As stated on SFD PI, the default "100%" value is used for onsite containers which are connected to soak pits, water bodies or to open ground. This will model the contents as 100% faecal sludge and a proportion of this may be emptied periodically. The remaining not emptied fraction is made up of one or more of the following: faecal sludge which remains in the container, supernatant (when discharging to water bodies or to open ground), and infiltrate. The value for onsite containers that are connected to a sewer network or to open drains is used as "50%" which means half of the contents are modelled FS and a proportion of this may be emptied periodically. The remaining not emptied fraction will comprise faecal sludge which remains in the container and, in the case of open-bottomed tanks, infiltrate. The other half of the contents is modelled as supernatant discharging into the sewer network or to open drains. The formula obtained from SFD PI used for FS proportion calculation is shown below:

$$\frac{(Onsite\ container\ connected\ to\ soak\ pit, no\ outlet, water\ bodies\ or\ open\ ground) * 100 + (Onsite\ container\ connected\ to\ sewer\ network\ or\ open\ drain) * 50}{Onsite\ Container}$$

The calculated FS proportion in each type of sanitation technologies are:

i. The proportion of FS in septic tank is 0%, since there are no septic tanks in the municipality.

ii. The proportion of FS in fully lined tank is 100%, as none of the fully lined tanks are not connected to an open/stormwater drain.

iii. The proportion of FS from lined tanks with open bottom and all types of pit is 100%, as the lined tanks with impermeable walls and open bottom and any pits are not connected to an open/stormwater drain.

Upon calculation of proportion of FS in each type of sanitation technologies, the population using the system selected in the SFD selection grid are fed in. The column Population (Pop) gives the proportion of population using type of sanitation system.

Figure 14 shows the SFD matrix of Baglung Municipality.

Baglung Municipality, Gandaki, Nepal, 10 Mar 2024. SFD Level: 2 - Intermediate SFD
Population: 56102
Proportion of tanks: septic tanks: 0%, fully lined tanks: 100%, lined, open bottom tanks: 100%

Containment						
System type	Population	WW transport	WW 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	1.0	0.0	0.0			
T1A3C10 Fully lined tank (sealed), no outlet or overflow	3.0			0.0	0.0	0.0
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	39.0			6.0	0.0	0.0
T1A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit	1.0			0.0	0.0	0.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	1.0			54.0	0.0	0.0
T1A6C10 Unlined pit, no outlet or overflow	50.0			10.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	1.0					
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	4.0			15.0	0.0	0.0

Figure 14: SFD Matrix of Baglung Municipality.

2.3.2 Proportion of Faecal Sludge Emptied (F3)

The proportion of faecal sludge emptied (F3) is calculated based on percentage of containment emptied (ENPHO, 2024) and amount of FS emptied during the process (KII-2, 2023) . The information on FS emptied from containment is obtained from the survey and sanitation workers of the municipality designated for the desludging service. In an average

20% of the FS in the containment which is very thick and does not dissolve in water, is not removed during emptying (KII-2, 2023). Hence, actual proportion of FS emptied from each containment is calculated as:

$$Actual\ Proportion\ of\ FS\ emptied\ (F3) = percentage\ of\ containment\ emptied \times proportion\ of\ FS\ removed\ during\ emptying$$

Table 5 shows the actual proportion of FS emptied from each containment.

Table 5: Sanitation technologies and proportion of emptied faecal sludge (ENPHO[1], 2024; KII-2, 2023[2]).

Sanitation Technologies	SFD Reference Variable	Percentage of Population using[1]	Empited Proportion of FS[2]	FS Empited from Containment	Actual Proportion of Empited FS (F3)
Toilet discharges directly to open drain or storm sewer	T1A1C6	1%	0%	0%	0%
Fully lined tank (sealed), no outlet or overflow	T1A3C10	3%	0%	0%	0%
Lined tank with impermeable walls and open bottom, connected to a soak pit	T1A4C5	1%	0%	0%	0%
Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	39%	8%	80%	6%
Lined pit with semi-permeable walls and open bottom, no outlet or overflow	T1A5C10	1%	67%	80%	54%
Unlined pit, no outlet or overflow	T1A6C10	50%	14%	80%	11%
Unlined pit, no outlet or overflow (high risk)	T2A6C10	4%	19%	80%	15%
Open defecation	T1B11 C7 TO C9	1%	0%	0%	0%

2.3.3 Proportion of WW transported which is delivered to Treatment Plant (W4c and W5c)

The variable W4c is the proportion of wastewater in open sewer or stormwater drain that is delivered to treatment plant and variable W5c is the proportion of wastewater delivered to treatment plant and treated. Since, the amount of wastewater (WW) generated could not be measured and municipality does not have a wastewater treatment plant (WWTP). The wastewater is not treated and thus, the value for variables W4c and W5c is set to 0%.

2.3.4 Proportion of FS emptied which is delivered to Treatment Plant (F4 and F5)

The municipality does not have a Faecal Sludge Treatment Plant (FSTP). Also, there are no biogas digester or twin pits, which treats FS at households. Hence, the portion of FS delivered to treatment plant (F4) and treated (F5) is 0%.

2.4 SFD Graphic

Figure 15 shows the SFD graphic of Baglung Municipality. The graphic shows that excreta generated from the proportion of the population that are safely managed is shown in green coloured arrowhead whereas unsafely managed excreta are shown in red coloured arrowhead. It shows that excreta from 86% of the population are safely managed and excreta from 14% of the population are unsafely managed. It also represents the sanitation value chain going from left to right.

Offsite Sanitation

Baglung Municipality does not have a sewer network, however, 1% of households have offsite sanitation systems. The wastewater generated from these households is discharged directly to stormwater drain in the municipality. Therefore, wastewater from 1% of the population is not treated and is unsafely managed.

Onsite Sanitation

In the municipality, 98% of households rely on onsite sanitation systems. Of the total households having an onsite sanitation system, FS from 94% of the population is contained, while FS from 4% of population is not contained.

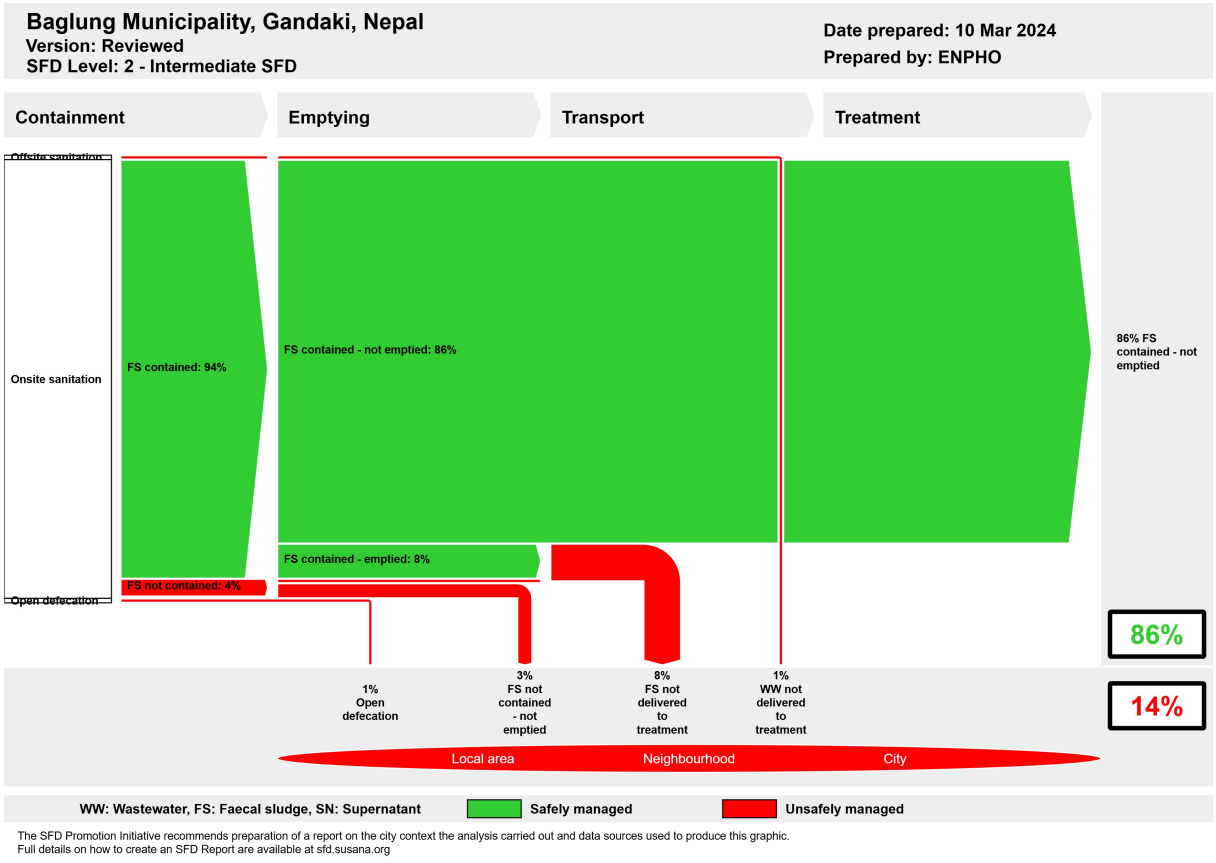


Figure 15: SFD Graphic of Baglung Municipality.

FS contained

The definition of 'FS contained' is faecal sludge contained within an onsite sanitation technology which ensures safe level of protection from excreta i.e. pathogen transmission to the user or general public is limited. These are tanks or pits that are correctly designed, properly constructed, fully functioning, and/or are causing no risk- or only a 'low' risk- of polluting groundwater used for drinking (SuSanA, 2018). The value of FS contained i.e. 94% is obtained from the summation of population using fully lined tanks with no outlet or overflow (T1A3C10), lined tanks with impermeable walls and open bottom connected to soak pit and with no outlet or overflow (T1A4C5 and T1A4C10), lined pits with semi-permeable walls and open bottom with no outlet or overflow (T1A5C10) and unlined pit with no outlet or overflow (T1A6C10) without posing a significant risk to groundwater.

FS not contained

The definition of 'FS not contained' is faecal sludge contained within an onsite sanitation technology which does not ensure safe level of protection from excreta i.e. pathogen transmission to the user or general public is likely. These are tanks or pits that are incorrectly designed, or poorly constructed, or poorly functioning, and/or are causing a 'significant' risk of polluting groundwater used for drinking (SuSanA, 2018).

The value of FS not contained i.e. 4% is obtained from the population using unlined pit with no outlet or overflow with 'significant risk' to groundwater (T2A6C10).

FS contained - not Emptied

The value of 86% is obtained from the proportion of the population using sanitation systems where the FS is contained and have not emptied their containment.

FS contained - Emptied

The value of 8% is obtained from the proportion of population using sanitation systems where the FS is contained and have emptied their containment.

FS not contained - Emptied

The value of 1% is obtained from the proportion of the population using sanitation systems where the FS is not contained and have emptied their containment.

FS not contained - not Emptied

The value of 3% is obtained from the proportion of the population using sanitation systems where the FS is not contained and have not emptied their containment.

FS not delivered to treatment

The proportion of FS not delivered to treatment, i.e. 8%, is the FS contained emptied and FS not contained emptied. Since Baglung Municipality does not have FSTP, emptied FS is disposed of untreated to farmlands. Therefore, this proportion of disposed FS possesses risk to local area and neighbourhood.

Open Defecation

Despite Open Defecation Free (ODF) status, people residing in 1% of households still go for open defecation. Mostly, people living in poverty and who do not own land, do not have toilets.

3 Service delivery context

3.1 Policy, legislation, and regulation

The constitution of Nepal 2015 has established right to access to clean drinking water and citizen as fundamental right. In Article 35 (4) related to right to health recognizes citizen's rights to access to clean drinking water and sanitation. In addition, Right to Clean Environment, Article 30 (1) recognizes that every person shall have the right to live in a healthy and clean environment (GoN 2015). To respect and promote the right of citizens to wards accessing clean drinking water and sanitation services, the government has promulgated and amended necessary laws. The most relevant legislation for promotion of safe sanitation services is discussed here.

Local Government Operation Act, 2017

Local Governance Operation Act 2017 has promulgated to implement the rights of local government and promote co-operation, co-existence, and co-ordination among federal, provincial, and local government. The act defined roles and responsibility of municipalities along with provision and procedure for approving laws and regulations at local level. Regarding the management of sanitation, the act entitles local government to conduct awareness campaigns, design and implement sanitation programs at the local level.

Environment Protection Act, 2019

Environment protection act 2019 is promulgated to prevent and control pollution from different development activities. It defines "Pollution" as the activities that significantly degrade, damage the environment, or harm the beneficial or useful purpose of the environment, by changing the environment directly or indirectly because of wastes, chemical, heat, noise, electrical, electro-magnetic wave, or radioactive ray. It provides the mechanism for appointing environmental inspector to control pollution by federal, provincial, and local government.

Water Supply and Sanitation Act, 2022

The act was promulgated to ensure the fundamental right of citizen to easy access on clean and quality drinking water, sanitation services and management of sewerage and wastewater. It defines sewerage and wastewater management as construction of sewer networks and treatment plants to preserve sources of water. It has entitled federal, provincial, and local level for the operation and management of water and sanitation services. The act also explicitly defines the responsibility of every citizen to preserve, conserve and maintain the sources of water and use responsibly.

Environment Friendly Local Governance Framework 2013

The environment-friendly local governance framework 2013 has been issued to add value to environment-friendly local development concept encouraging environmental protection through local bodies. The framework has set basic and advanced indicators for households, settlement, ward, village, municipality, and district levels for declaration of environment friendly. The use of water sealed toilets in households as basic indicators for sanitation and health. Provision of toilet with safety tank and use as advanced indicators for sanitation. Provision of gender, children and disabled friendly public toilets in parks, petrol pumps and main market as basic indicator for municipal level. Advance indicators such as drainage

discharged only after being processed through biological or engineering technique. While it has failed to identify the necessity of faecal sludge treatment plants as it has assumed safety tank in the households is sufficient for treating faecal sludge.

Institutional and Regulatory Framework for Faecal Sludge Management, 2017

Ministry of Water Supply through its Department of Water Supply and Sewerage Management (DWSSM) articulated and endorsed Institutional and Regulatory Framework (IRF) for Faecal Sludge Management in Urban Areas of Nepal in 2017. The main objective of the IRF is to define the specific roles and responsibilities of key institutions for the effective management and regulation of faecal sludge management (FSM). The framework primarily envisioned featuring FSM in the national policy and issuing policy directives into local government to incorporate FSM in their urban planning along with strengthening and enhancing the capacity of the local government to deliver effective services. A local government has been endowed with overall responsibility to plan, implement, and regulate the FSM services within its jurisdiction. The provision of the ability to engage the private sector and other relevant stakeholders such as the Water and Sanitation Users Committee (WSUC) in the framework reflects a participatory approach that would help in sustaining the interventions.

Total Sanitation Guideline, 2017

Total Sanitation Guideline was promulgated by the Ministry of Water Supply in April 2017 after the successful implementation of National Sanitation and Hygiene master Plan (NSHMP) 2011. It provides guidelines for sustaining ODF outcomes and initiating post-ODF activities through an integrated water, sanitation and hygiene plan at municipalities and districts. The guideline redefined sanitation as management of services and facilities to safely dispose of/reuse faecal sludge, collection and treatment of solid waste and wastewater to establish a hygienic environment and promote public health. Indicators are set to guide total sanitation movement with an arrangement for resource management, monitoring and evaluation, capacity building.

3.2 Policies

Historically, the National Sanitation Policy (1994) was the guideline for the planning and implementation of sanitation programs. The policy had promoted sanitation issues together with issues on water supply in rural communities. Also, Rural Water Supply and Sanitation National Policy (RWSSNP) 2004, has set a new target to provide safe, reliable, and affordable water supply with basic sanitation facilities. The policy focused on delivering quality services on water and sanitation to the marginalized and vulnerable groups. However, it was unable to address the complex operational issue of urban water supply and sanitation service delivery. Thus, the National Urban Water Supply and Sanitation Sector Policy (NUWSSSP) was formulated and enforced in 2009. It focused on achieving coherent, consistent, and uniform approaches of development in urban areas with the involvement of different agencies and institutions. Both these policies were limited to addressing emerging issues and challenges in the rural and urban areas. Thus, the National Water Supply and Sanitation Policy (NWSSP) was formulated in 2014 by GON to address the emerging challenges and issues with the adoption of new approaches and resolve the inconsistency in RWSSNP and NUWSSSP.

The goal of the NWSSP was to reduce urban and rural poverty by ensuring equitable socio-economic development, improving health and the quality of life of the people and protection of environment through the provision of sustainable water supply and sanitation services. It adopted innovative technologies and knowledge emerged in the sector. Remarkably, it was the first official document that recognized discharge of untreated wastewater and dumping of septic sludge heavily polluted the surface water sources in urban areas.

Nepal is a signatory of the historical resolution of 2010 United Nations General Assembly on the Human Right to Water and Sanitation. Nepal committed to Millennium Development Goals (MDGs) for 2000- 2015. The goal was accomplished through declaration of the country as free from open defecation on 30th September 2019. After the MDGs, United Nations General Assembly set 17 global goals as Sustainable Development Goals (SDGs). Sanitation is prioritized on SDG 6. The target 6.2 of SDG 6 majorly focuses on sanitation. It mentioned to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations by 2030. In line with SDG 6.2, Nepal has targeted to provide improved sanitation to 95% households that are not shared and urban households with toilets connected to sewer system or proper FSM to 90% by 2030 (NPC, 2017). National Sanitation and Hygiene Master Plan, 2011 was developed for coordinated planning and implementation of National Sanitation Campaign. The campaign strengthened institutional setup tier of government in a participatory approach. In an alignment total sanitation campaign was initiated formally to sustain ODF. The guideline set various indicators to assess the sustainability of sanitation services. Remarkably, it extended sanitation definition as management of services and facilities to safely dispose of/reuse faecal sludge, collection and treatment of solid waste and wastewater to establish the hygienic environment and promote public health (NPC, 2017).

Similarly, Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (SDP 2016-2030) was formulated in 2016 for sector convergence, institutional and legal reforms, capacity development and establishing coordination and harmonization in the sector. The SDP classified service system and delineated roles and responsibilities for effective and sustainable service delivery. The SDP highlighted that majority of households rely on onsite sanitation system (70%) that requires effective treatment of faecal sludge. However, there is lack of concrete policies, guidelines, and indicators on Faecal Sludge Management in the sector for effective planning, implementation, and service delivery. Nepal was declared ODF nation on September 23, 2019 (MoWS, 2020) however, the target of 90% households with toilets connected to sewer system or proper FSM is yet to be achieved.

3.3 Institutional roles

Federal, provincial, and local government are entitled for implementation of water and sanitation programs to ensure the rights on access to safe water and sanitation.

At Federal Government

National Planning Commission: At the federal government, the National Planning Commission is the specialized and apex advisory body for formulating a national vision, developing policy, periodic plans, and sectoral policies. The NPC assesses resource needs,

identifies sources of funding, and allocates budget. It serves as a central agency for monitoring and evaluating development policy, plans and programs. It supports, facilitates, and coordinates with federal, provincial, and local government for developing policy plans and implementation.

Ministry of Water Supply: Ministry of Water Supply is the lead ministry responsible for planning, implementation, regulation, and monitoring and evaluation of sanitation programs in the country (GoN, 2015). Under the MoWS, Department of Water Supply and Sewerage Management (DWSSM) plan and implement water and sanitation projects funded by foreign donors or inter provincial projects or serves at least 15,000, 5,000 and 1,000 people in terai, hilly and mountain region respectively (GoN, 2015). The organizational structure of DWSSM is shown in Figure 16.

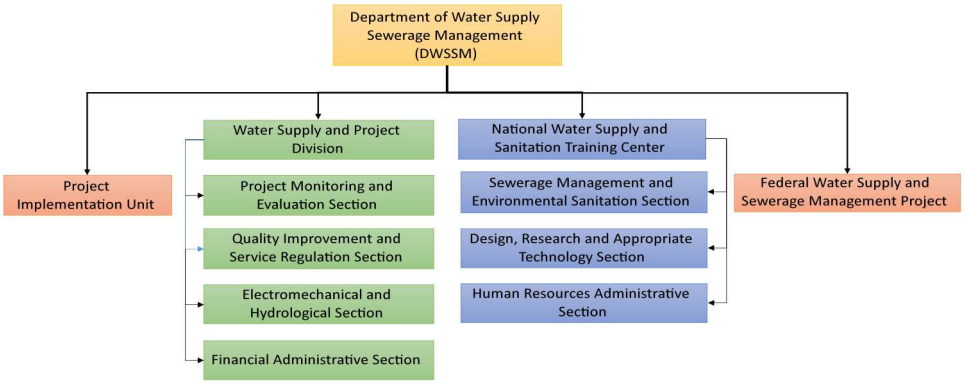


Figure 16: Organizational Structure Department of Water Supply and Sewerage Management (DWSSM).

Ministry of Urban Development: The Ministry of Urban Development (MoUD) works on integrated urban planning and development in municipalities, including faecal sludge management. Department of Urban Development and Building Construction (DUDBC) under MoUD is implementing body and sets the standards for safe, affordable building construction and implementation for managed residential environment.

At Provincial Level

Ministry of Energy, Water Resources and Water Supply: Ministry of Energy, Water Resources and Water Supply of provincial government in Gandaki Province is major executing body in the province for planning, developing, and implementing water supply and sanitation programs. Planning and implementation of water supply and sanitation infrastructure in the province is executed through Water Supply and Sanitation Division Office (WSSDO), Baglung. WSSDO implements the water and sanitation programs meeting the following criteria:

i. Inter local government projects.

ii. Beneficiaries between 5,000 to 15,000 in terai region, 3,000 to 5,000 in hilly region and 5,00 to 1,000 in Himalayan region.

At Local Level

Baglung Municipality has an Environment Unit under Administration Section. The unit manages all the activities related to sanitation.

3.4 Service provision

Urban Water Supply and Sanitation Policy 2009 has emphasized the Public-Private Partnership (PPP) in water supply and sanitation to improve service delivery (MoPIT, 2009). Also, Public-Private Partnership Policy, 2015 encourages private sector investment in the development and operation of public infrastructure services for comprehensive socioeconomic development. The policy has aimed to remedy challenges such as structuring of projects, land acquisition, coordination and approval, payments to private sectors and approval for environment impact (MoF, 2015).

The municipality does not have a sewer network. The toilet system is directly connected to open drain, water bodies or open ground. The toilets that are connected to containments are emptied mechanically by desludging suction truck from municipality or private service providers whereas manually emptied by traditional desludgers.

3.5 Service standards

The sanitation service standards have been set by Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (2016-2030). It classifies sanitation services as high, medium, and basic based on sanitation facilities in place. The sanitation service levels with indicators are shown in Table 6. However, FSM specific standards have yet to be developed and implemented.

Table 6: Sanitation Service Level and its Components.

S.N.	Service Components	Service Level		
		High	Medium	Basic
1	Health and Hygiene Education	✓	✓	✓
2	Household Latrine	✓	✓	✓
3	Public and School Toilets	✓	✓	✓
4	Septic tank sludge collection, transport, treatment, and disposal	✓	✓	✓
5	Surface drains for collection, transmission, and disposal of greywater	✓	✓	✓
6	Small-bore sewer collection for toilet and septic tank effluent, low-cost treatment and disposal		✓	
7	Sanitary sewers for wastewater collection, transmission, non-conventional treatment, and disposal	✓		
8	Sanitary sewers for wastewater collection, the transmission of conventional treatment and disposal	✓		
9	Limited solid waste collection and safe disposal	✓	✓	✓

4 Stakeholder Engagement

4.1 Key Informant Interview

The Key Informant Interviews (KIIs) and objective sharing of the study were conducted with major stakeholders of the sanitation sector in the municipality. The focal person at the municipality was interviewed on current sanitation services with respect to technical, institutional, and financial aspects. Also, the KII was performed with the sanitation worker of Baglung Municipality to understand the emptying practice, disposal and treatment of FS as well as finance requirement. Similarly, information related to drinking water supply was obtained from Water Supply Users' Committee Also, an interview was performed with caretaker of public toilet along with observation to find sanitation status and management practice of public toilet (Table 7 and Figure 17).

Table 7: List of Key Informant Interviewed personnel.

S.N.	Name	Designation	Organization/ Company	Purpose of KII	Date
1.	Hari Narayan Upadhyaya (KII-1)	WASH Focal Person	Baglung Municipality	Sanitation status, ongoing projects on sanitation, policies and plan for sanitation development	5 October, 2023
2.	Rudra Mahat (KII-2)	Owner	Private Desludging Service Provider	Emptying practices, finances requirement, disposal and treatment	5 October, 2023
3.	Jay Ram Bhari (KII-3)	Manager	Baglung Urban Drinking Water and Sanitation Organization	Water supply services and water quality in Baglung Municipality	5 October, 2023
4.	Bimala Kishan (KII-4)	Caretaker	Public toilet-Buspark	Quantitative and qualitative management on public toilet and public toilet operation	5 October, 2023
5.	Sangita Pariyar (KII-4)	Caretaker	Public toilet-near Kalika Temple	Quantitative and qualitative management on public toilet and public toilet operation	5 October, 2023

Figure 17: KII with municipal representatives and caretaker of public toilet.

4.2 Household Survey

A random household survey was conducted in all wards of the municipality. The local enumerators selected from the municipality were oriented prior to the survey and were mobilized for data collection. A mobile application "KOBOCOLLECT" was used for data collection from the households. In the orientation, enumerators were clarified on survey objectives, technical terms concerning sanitation, use of the mobile application and procedure of random sampling survey based on the provided map (Figure 18).

Figure 18: SFD orientation to local enumerators for data collection.

4.2.1 Determining Sample Size

The number of households to be sampled in the municipality was determined by using Cochran (1963:75) sample size formula $no = \frac{z2pq}{e2}$ and its finite population correction for the proportion $n = n_o/(1 + (n_o-1)/N)$.

Where,

Z^2	1.96	At the confidence level of 95%
p	0.5	Assuming that about 50% of the population should have some sanitation characteristics that need to be studied (this was set at 50% since this percentage would yield the maximum sample size as the percentage of the population practising some form of sanitation is not known at the intervention sites).
q	1-p	
e	+/-5%	Level of precision or sampling error.
N		A total number of population (households in the municipality).

This is followed by proportionate stratification random sampling such that each ward in the municipality is considered as one stratum. The sample sized required in each ward is calculated as

$n_h = (N_h/N)*n$, where N_h is a total population in each stratum.

A total of 374 households were sampled from 15,924 households distributed in 14 wards with proportionate stratification random sampling. The household samples surveyed in the municipality is shown in Figure 19.

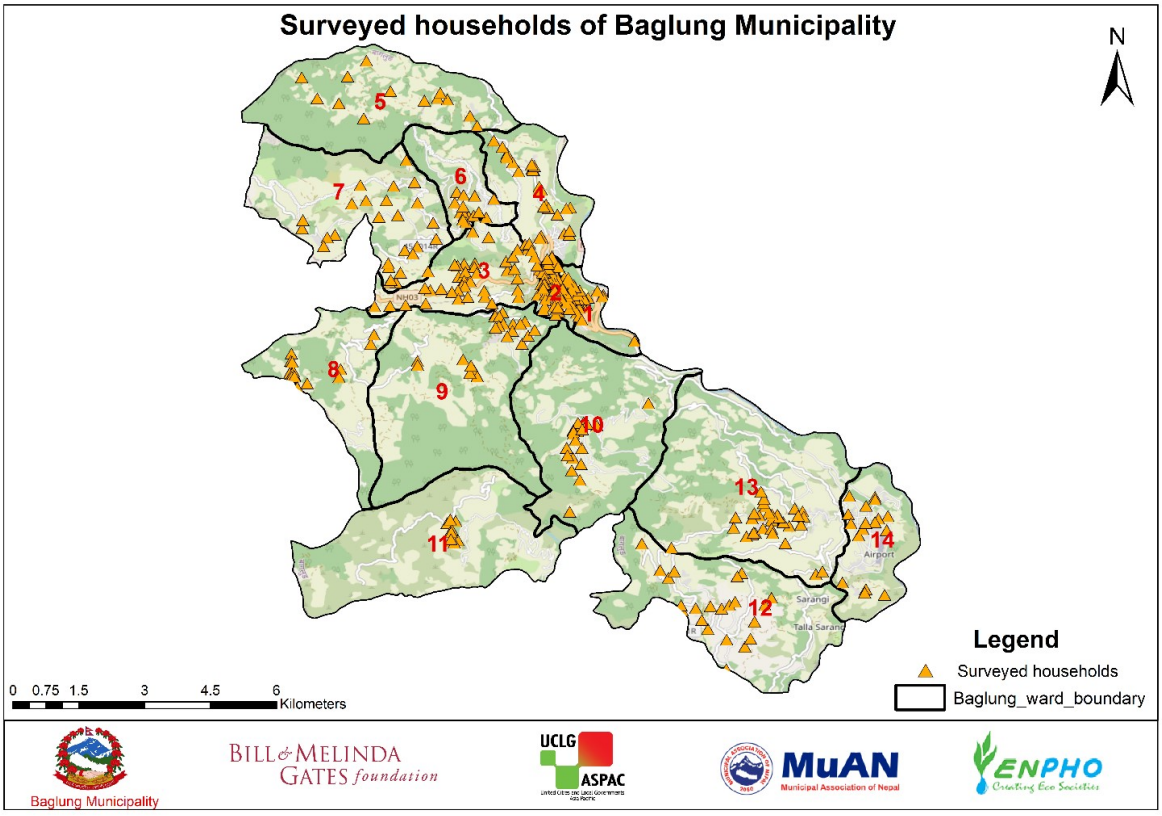


Figure 19: Location map of surveyed households.

4.3 Direct Observation

Various sanitation technologies in the households were observed and visual references were kept. Also, observation of the toilet, water source and containments were carried out. Figure 20 shows observing public toilet status at Baglung Municipality.

Figure 20: Observation of public toilet at Baglung Municipality.

4.4 Sharing and Validation of Data

The Shit Flow Diagram Sharing and Validation Workshop was conducted at Baglung Municipality to share the findings on sanitation situation survey and receive the suggestions from the municipal stakeholders. Altogether, 36 participants including mayor, deputy mayor, CAO, ward chairpersons, municipal council members, sectoral staffs and other relevant stakeholders actively participated on the workshop and provided valuable suggestions. Mayor expressed his interest on improving FSM by constructing FSTP and FSM policy in the municipality. Figure 21 shows the picture of SFD findings sharing to the participants. The list of participants with their designation is attached in Appendix 4.

Figure 21: Sharing of findings during validation workshop.

5 Acknowledgements

We would like to acknowledge the executing agency, United Cities and Local Governments Asia-Pacific (UCLG ASPAC) and implementing agency Municipal Association of Nepal (MuAN) of the Municipalities Advocacy on Sanitation in South Asia – II (MuNASS-II) for coordination with the municipality.

We offer sincere acknowledgement to Mr. Basanta Kumar Shrestha, Mayor, Mr. Hari Datta Kandel, CAO, and Mr. Hari Narayan Upadhyaya, WASH Focal Person of the municipality for providing valuable time and information during study. Similarly, we would like to thank all the respective staffs of the municipality and key stakeholders involved during the study, without whose help this study would not have been completed.

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7 Appendix Annexes

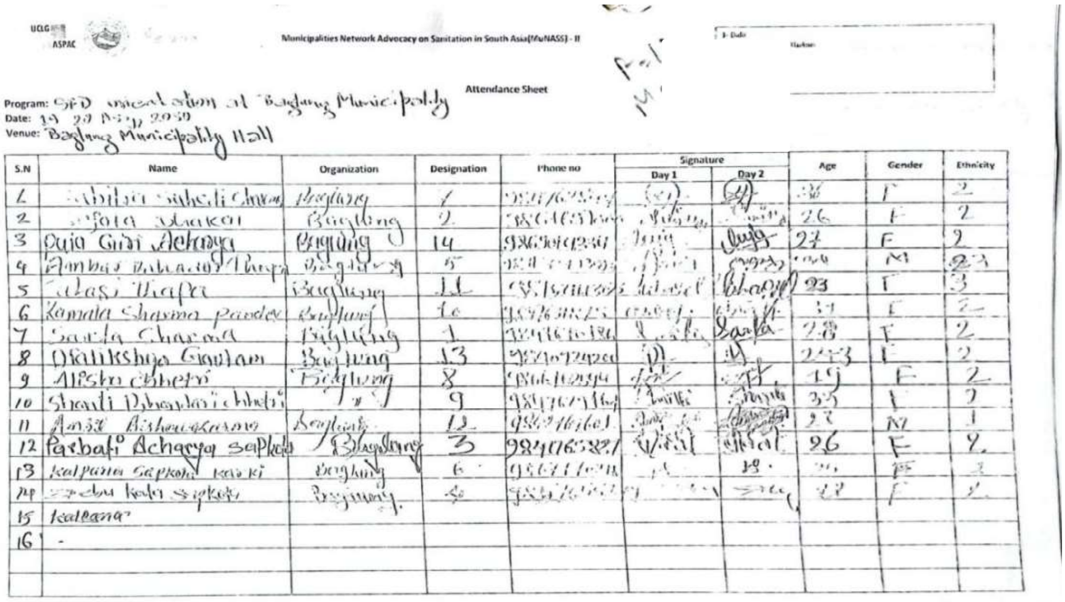
7.1 Appendix 1: Roles and Responsibility of Various Tiers of Governments Delineated in Drafted SDP 2016 – 2030

System Classification		Minimum Key HR Required	Regulation & Surveillance	Financing & Construction	Ownership of System	Service Delivery	
Size	Sanitation					Provision	Production
Small	Onsite sanitation	Water Supply and Sanitation Technician (WSST)	Federal and or Provincial Government	User+/ community+/ other			
Medium	Septage Management	Sub-engineer	Federal and or Provincial Government	Provincial+/ Local Govt+/ Community+/ Private Sector		Local Govt	Users committee/ Utility manager
Large	Septage or FSM Management	WASH Engineer + finance & admin staff	Federal and or Provincial Government	Provincial+/ Local Govt+/ Community+/ Private Sector		Local Govt	Utility Manager
Mega	Septage/ FSM Management	WASH Engineer + finance & admin staff	Federal and or Provincial Government	Provincial+/ Local Govt+/ Community+/ Private Sector		Local Govt	Utility Manager

7.2 Appendix 2: Total number of population and household in each ward and number of surveyed households

Wards	Total Population	Total Household	No. of Surveyed Households
1	4,746	1,361	32
2	7,318	2,216	52
3	9,829	2,782	65
4	4,892	1,313	31
5	2,005	538	13
6	2,489	667	15
7	3,092	871	21
8	2,292	664	16
9	3,323	930	22
10	3,077	848	20
11	1,587	442	10
12	3,933	1,144	27
13	4,547	1,336	31
14	2,972	812	19
Total	**56,102**	**15,924**	**374**

7.3 Appendix 3: List of Participants on SFD Survey Orientation


Municipalities Network Advocacy on Sanitation in South Asia(MuNASS) - II

Attendance Sheet

Program: SFD orientation at Baglung Municipality
Date: [illegible]
Venue: Baglung Municipality Hall

S.N	Name	Organization	Designation	Phone no	Signature Day 1	Signature Day 2	Age	Gender	Ethnicity
1	[illegible]	Baglung	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	F	2
2	[illegible]	Baglung	2	[illegible]	[illegible]	[illegible]	26	F	2
3	Puja Giri Acharya	Baglung	14	[illegible]	[illegible]	[illegible]	27	F	2
4	[illegible] Bahadur Thapa	Baglung	5	[illegible]	[illegible]	[illegible]	[illegible]	M	[illegible]
5	[illegible] Thapa	Baglung	11	[illegible]	[illegible]	[illegible]	23	F	3
6	Kamala Sharma Pandey	Baglung	10	[illegible]	[illegible]	[illegible]	[illegible]	F	2
7	Sarita Sharma	Baglung	1	[illegible]	[illegible]	[illegible]	28	F	2
8	Pratikshya Gautam	Baglung	13	[illegible]	[illegible]	[illegible]	[illegible]	F	2
9	Alisha Chhetri	Baglung	8	[illegible]	[illegible]	[illegible]	19	F	2
10	Shanti Bhandari Chhetri	"	9	[illegible]	[illegible]	[illegible]	[illegible]	F	2
11	[illegible] Bishwakarma	Baglung	12	[illegible]	[illegible]	[illegible]	[illegible]	M	1
12	Parbati Acharya Sapkota	Baglung	3	[illegible]	[illegible]	[illegible]	26	F	2
13	Kalpana Sapkota Karki	Baglung	6	[illegible]	[illegible]	[illegible]	[illegible]	F	[illegible]
14	[illegible] Kala Sapkota	Baglung	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	F	[illegible]
15	Kalpana								
16	-								

7.4 Appendix 4: List of Participants in Sharing and Validation Workshop

आज मिति २०२० साल फाल्गुन ३० गतेका दिन बागलुङ नगरपालिकामा नेपाल नगरपालिका संघको आयोजनामा वातावरण र जनस्वास्थ्य संस्था (एन्फो) को प्राविधिक सहयोग, The United cities-Local Government Asia Pacific (UCLG-ASPAC) को सहकार्यमा र Bill and Mellanda Gates Foundation (BMGF) को आर्थिक सहयोगमा मानव मलमुत्र रेखा प्रवाह चित्र (Shit-flow Diagram-SFD) सम्बन्धि छलफल तथा प्रमाणिकरण कार्यक्रममा निम्न अनुसारको सरोकारवालाहरुको उपस्थिती रहेको छ ।

उपस्थिती :

क्र.सं	नाम	पद	कार्यलय	फोन नं.	हस्ताक्षर
१.	बसन्त कुमार श्रेष्ठ	नगर-प्रमुख	बागलुङ न.पा	9857620066	
२.	राजु खड्का	नगर-उपप्रमुख	बागलुङ न.पा	9857600001	
३.	हरी दत्त कंडेल	प्र.प्र.अ	बागलुङ न.पा	9857620416	
४.	जय बहादुर खत्री	वडा-अध्यक्ष १	बा.न.पा	9857620311	
५.	सुरज बोसल	व-अ-२	बा.न.पा	9847634372	
६.	सनी के.सी (लक्ष्मण)	वडा अध्यक्ष २	बा.न.पा	9847620746	
७.	कुमार विक्रम क्षेत्री	वडा-अध्यक्ष ४	बा.न.पा	9857667777	
८.	हरि प्रसाद शर्मा	वडा-अध्यक्ष ५	"	9857655713	
९.	रुद्र बहादुर के.सी	वडा-अध्यक्ष ६	"	9857620561	
१०.	मेघनाथ गौर शर्मा	वडा अध्यक्ष ७	"	9857620357	
११.	धर्म बहादुर के.सी	वडा-अध्यक्ष ८	"	9857632050	
१२.	राजु थापा	वडा-अध्यक्ष ३	"	9857631661	
१३.	तिल बहादुर थापा मगर	वडा-अध्यक्ष १०	"	9857676008	
१४.	ज्ञानेन्द्र गौतम	वडा-अध्यक्ष ११	"	9857620035	
१५	कोपिला मणि शर्मा	वडा-अध्यक्ष १२	"	9847628208	
१६.	नारायण शर्मा पौडेल	वडा अध्यक्ष १३	"	9857620422	
१७.	चक्र बहादुर के.सी	वडा-अध्यक्ष १४	"	9857622794	
१८	हाका व. परियार	उ.पा. (सदस्य)	बा.न.पा. १२	9867680488	
१९.	ज्योती के.सी बिष्ट	" "		9857620990	
२०	धनमाया शर्मा	" "		9847622508	

क्र.सं	नाम	पद	कार्यालय	फोन नं	हस्ताक्षर
21	[illegible]	का. स.	का. न. पा.	9847622364	
22	[illegible] देवी शर्मा	" "	"	9847726078	
23	शान्ती पोखरेल	" "	"	9847654605	Shanti
24	सीता थापा	" "	"	9857677059	
25	[illegible]	" "	"	9847660341	
26	धनप्रसाद पोखरेल	अधिकृत छैठौं	"		
27	राम प्रसाद [illegible]	स्वास्थ्य अ.	"	9857020217	
28	भिमसेन पन्त	अधिकृत छैठौं	"	9857624611	
29	हरि नारायण उपाध्याय	[illegible]	"	9857620501	
30	लक्ष्मी श्रेष्ठ	का. स	"	9844736799	
31	[illegible]	[illegible]		[illegible]	
32	[illegible]	[illegible]		[illegible]	
33	[illegible]	[illegible]		[illegible]	
34	[illegible]	" "		[illegible]	
35	[illegible]	[illegible]		[illegible]	
36	[illegible]	का. स		[illegible]	
37	अस्मिता श्रेष्ठ	A.P.O	ENPHO	9861960577	
38	[illegible] श्रेष्ठ	Engineer	"		
39	बुद्ध वज्राचार्य	PC	"	9849132020	

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