SFD Report

Resunga 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 Resunga Municipality, Nepal, 2026

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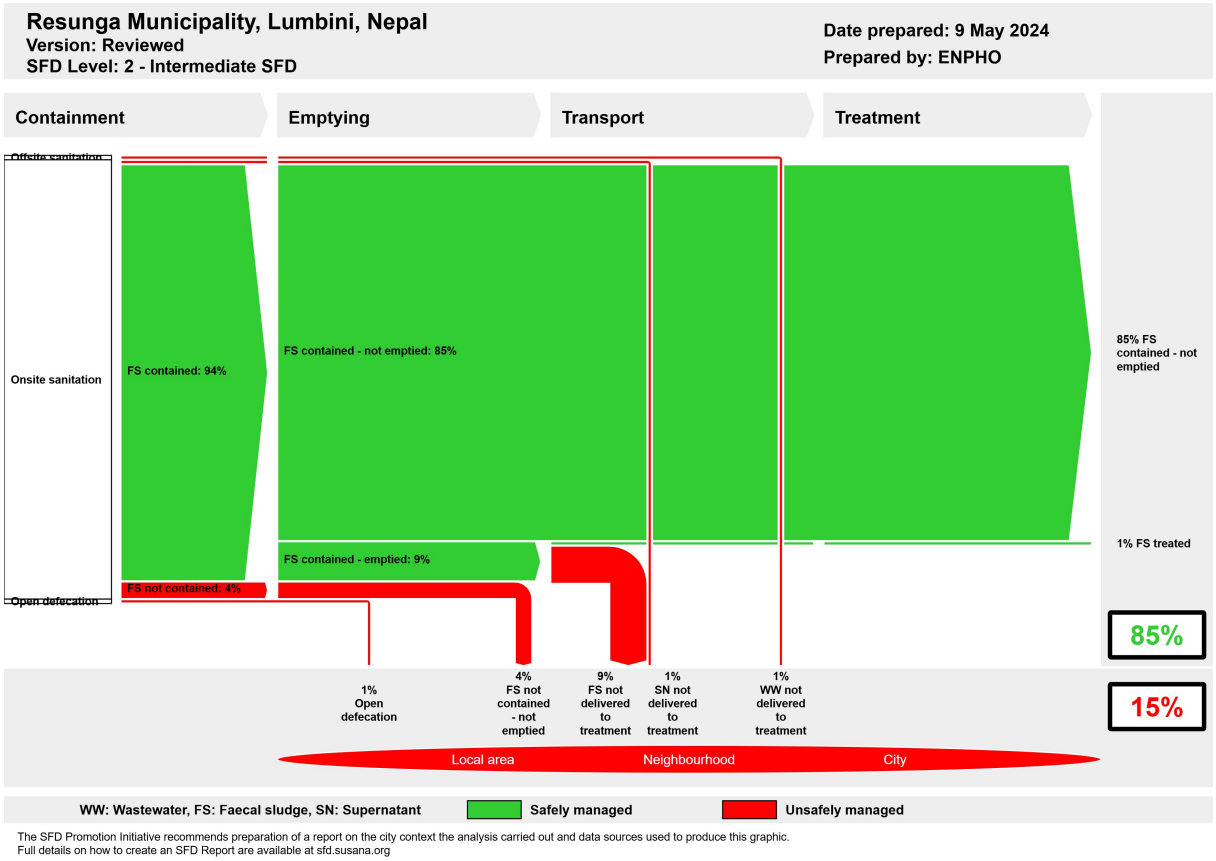
1. The SFD Graphic



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:

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

Status:

Final SFD report.

Date of production: 07/05/2024

3. General city information

Resunga Municipality is situated in Gulmi District of Lumbini Province in the western region of Nepal. It is divided into 14 wards and covers an area of 83.74 sq. km.

It was established on May 8, 2014, by merging 4 Village Development Committees (VDCs) namely, Tamghas, Arkhale, Simichaur and Dubuchaur. It lies at 27°59' to 28°7'N latitude and 83°12' to 83°19'E longitude and at the altitude from 645 metres above sea level (masl) to 2,325 masl (Resunga Municipality, 2023).

A population of 31,551 is residing on 9,015 households in the municipality (National Statistics Office, 2023). The annual population growth rate of the municipality is -0.3%. This shows that the municipality has increasing out migration. The municipality has a temperate climate (Cwa) with hot summers and dry winters. The annual average temperature of the municipality is 18.8°C and receives 2,540 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, 2023). Gulmi district was declared Open Defecation Free (ODF) on July 11, 2015. 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 an open environment is considered as offsite sanitation systems. Households with onsite sanitation systems have different sanitation technologies. About 4% of households have fully lined tanks, 61% have lined tanks with impermeable walls and open bottom, 5% have lined pits with semi-permeable walls and open bottom and 28% have unlined pits.

Here, all the institutional buildings have toilets with 100% onsite sanitation system. Among which, 13% of institutional buildings have fully lined tanks, 67% have lined tanks with semi-permeable walls and open bottom, 3% have lined pit with semi-permeable walls and open bottom and 15% have unlined pits.

Three public toilets in the municipality were observed for the study. Among these toilets, one located at Sahid Chowk was constructed by the Resunga Municipality while toilet at Buspark was constructed by On-test Youth Club and one located near Bhagwati Temple was constructed by Lekbesi Mothers' Group. Every day, almost 200 people use these toilets where toilet at Buspark is mostly used. The restrooms are mostly used by local shopkeepers, travellers 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 9% of institutional buildings have emptied their containment. Both manual and mechanical emptying is practiced in the municipality while manual emptying is prevalent. Moreover, some institutions also practice open emptying.

The municipality has only municipal desludging service. The desludging vehicle has a tank capacity of 2,500 litres and serves in wards 1, 2, 7, 8 and 9. The service charge is NRs. 5,000 (USD 37.6) for each trip.

Treatment and Disposal/Reuse:

Here, mechanically emptied faecal sludge (FS) is disposed in a deep hole of a hill as there is no faecal sludge treatment plant (FSTP). The manually emptied FS is disposed to farmlands, water bodies, open/stormwater drain, composted, or dig and dumped. Therefore, all the emptied FS is disposed unsafely into an open environment or water bodies.

Approximately 79% of households have piped drinking water supply services in the municipality. Among other service providers, Tamghas Brihat Water Supply Users' Committee is one of the major drinking water services providers. It serves in wards 1, 2, 7, 8 and 9. It has distributed 724 taps at households and institutions. Among the remaining households, 9% of households access drinking water from community taps while 12% still rely on spring sources.

Spring sources are vulnerable to contamination. The vulnerability of sources depends on lateral spacing between sanitation systems and the sources. Here, the water quality test report shows that sources, reservoir tanks, taps and drinking water in the municipality are contaminated with *E. coli*.

However, since the population does not rely on groundwater sources for drinking purposes, the sanitation systems in use were assumed to be located in areas with a low risk of groundwater contamination.

The SFD graphic shows that excreta generated from 85% of the population are safely managed while 15% of the population are unsafely managed. The safely managed FS generated from 85% of population is temporary as the FS has not been emptied. The FS generated from 1% of population is only treated from biogas digester at households. 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 Urban Development and Water Supply
Public Institutions at Local Government	Resunga Municipality
Non-governmental Organizations	Environment and Public Health Organization (ENPHO)
Private Sector	Water Supply Users Committee
Development Partners, Donors	MuAN, BMGF, UCLG ASPAC

7. Process of SFD development

Data on sanitation situation were collected through household and institutional surveys (ENPHO, 2023) . Enumerators of the municipality were mobilized after orientating on sanitation technologies and proper use of mobile application (KOBOCOLLECT) to collect data for the 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, 368 households and 54 institutions were surveyed from 14 wards of Resunga Municipality. Primary data on emptying, transportation and current sanitation practices and drinking water services in the municipality were validated from KII with municipal representatives, sanitation workers, public toilet management, 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:

- Climate-Data, 2021. Climate-Data. [Online] Available at: https://en.climate-data.org/asia/nepal/western-development-region/tamghas-968662/ [Accessed 08 May 2023].
- ENPHO, 2023. Sanitation Situation Assessment of Resunga 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.
- Resunga Municipality, 2023. Resunga Municipality. [Online] Available at: https://resungamun.gov.np/en

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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
SN	Supernatant
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

1 City context

Resunga Municipality is situated in Gulmi District of Lumbini Province in the western region of Nepal. It was established on May 8, 2014 by merging 4 Village Development Committees (VDCs) namely, Tamghas, Arkhale, Simichaur and Dubichaur. It is divided into 14 wards. It shares its boundary with Gulmi Darbar Rural Municipality on the east, Isma Rural Municipality and Musikot Municipality on the north and Arghakhanchi district on the west and the south (Resunga Municipality, 2023). Figure 1 shows the ward boundary map of Resunga Municipality.

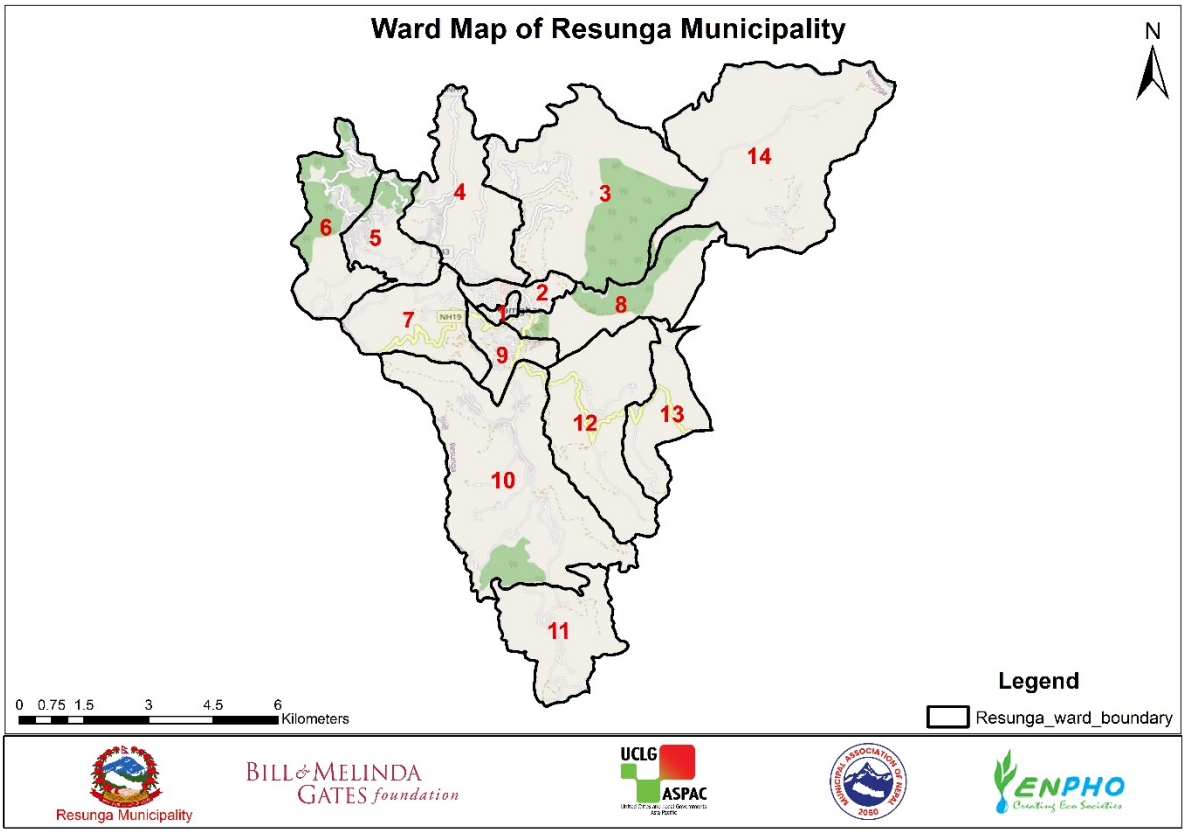

Figure 1: Ward boundary map of Resunga Municipality.

1.1 Population

As per the national population and housing census conducted in 2021, Resunga Municipality has a total population of 31,551 with 14,550 male and 17,001 female population. It has altogether 9,015 households (National Statistics Office, 2023). The annual population growth rate of Resunga Municipality is -0.3%. This shows that the population of the municipality is out migrating, and population size is decreasing.

1.2 Topography and Geography

Resunga Municipality lies at 27°59' to 28°7'N latitude and 83°12' to 83°19'E longitude, with elevations ranging approximately from 645 metres above sea level (masl) to 2,325 masl. It covers a total area of 83.74 sq. km. in the western region of Nepal (Resunga Municipality, 2023) . 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 major 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 Resunga Municipality falls on temperate climate (Cwa) based on Köppen–Geiger classification. This climatic condition has hot summers and dry winters (Karki, et al., 2015). The warmest month of the year is June with an average temperature of 23.5°C and coldest month is January with average temperature of 11.1°C. The annual average temperature of the municipality is 18.8°C. It receives an average 2,540 mm rainfall 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 Resunga Municipality.

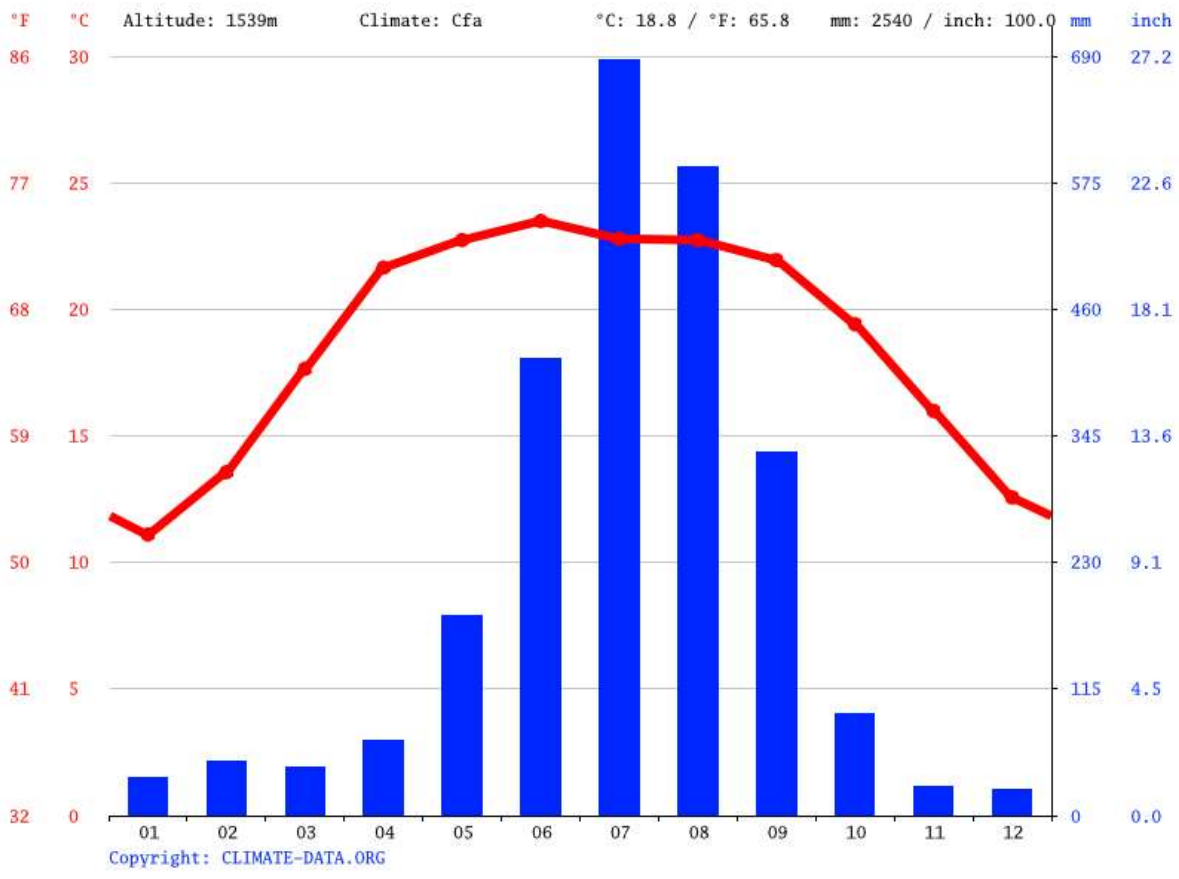

Figure 2: A graph showing the monthly average for precipitation and temperature of Resunga Municipality.

2 Service Outcomes

2.1 Overview

Data on sanitation situation were collected through household and institutional surveys (ENPHO, 2023). A total of 368 households were sampled from 9,015 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

Gulmi district was declared Open Defecation Free (ODF) on July 11, 2015 (MoWS, 2020). The status of ODF indicates accessibility to basic sanitation on each household (HH). In Resunga Municipality, still 1% of the households do not have toilets and practice open defecation. The households practising open defecation goes to an open space. Figure 3 shows the place of an open defecation.

Figure 3: A place for an open defecation.

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.

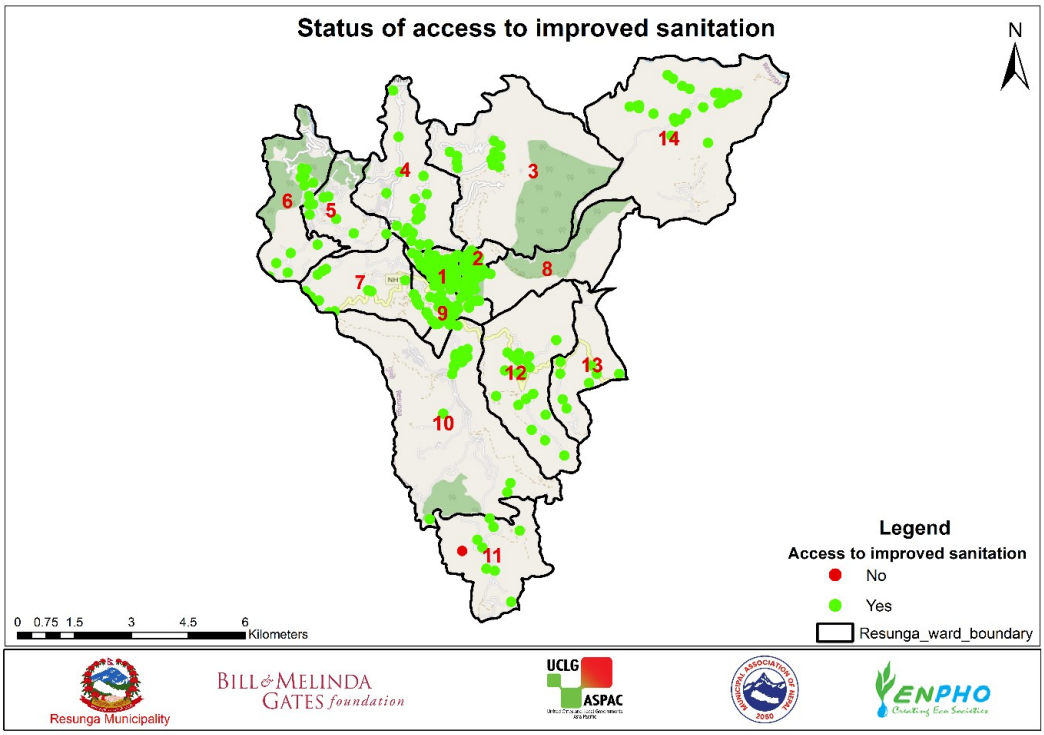

Figure 4: Location map of households with status of access to improved sanitation.

Types of Offsite Sanitation Systems

Resunga 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 an open environment is considered as offsite sanitation system. It is taken as toilet with no onsite container for the SFD graphic. Figure 5 shows the outlet of a toilet to an open environment.

Figure 5: The outlet of a toilet in the forest.

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 Resunga Municipality.

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

Containment	Wall construction materials	Bottom of containment	Chamber	Number	Connected to	Percentage
Biogas digester	NA	NA	NA	NA	No outlet/overflow	1%
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	61%
Twin pit	Concrete rings piled one after other	Soiling or Nothing	NA	Two	NA	1%
Single pit	Concrete rings piled one after other	Soiling or Nothing	NA	One	NA	4%
Unlined pit	Mud mortar brick wall/Mud mortar cement wall/No lining/Dry stone wall	Nothing	NA	NA	NA	28%

Biogas Digester is a waste to energy conversion technology designed to treat household organic waste and Faecal Sludge (FS) to generate biogas. 1% of households have built biogas digester in their houses. Alternative Energy Promotion Centre (AEPC) have promoted biogas technology at households in 77 districts of Nepal. The installation of biogas at households have supported in improving situation of health status and sanitation status in Nepal (AEPC, 2018). Figure 6 shows the types of biogas digesters in Resunga Municipality.

Figure 6: Biogas digester at household of Resunga Municipality.

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) . However, the containments with impermeable walls and bottom with any kind of outlets are taken as fully lined tanks for this municipality. 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) . 61% of households have these types of containments in the municipality.

Twin Pit is a circular onsite sanitation technology with two sets of concrete rings. It has semi-permeable walls and a permeable base (SuSanA, 2018). Each pit is used alternatively after filled. This technology is ideally designed to safely store and treat FS. It effectively treats FS if there is no exfiltration of water (Saxena & Den, 2022). The facility consists of two sets of pits with the minimum horizontal distance of 1.2m. Both the pits are connected from diversion box. However, most twin pits installed by the households are not as per the design. 1% of households have twin pits. Figure 7 shows the inappropriate design of twin pits in the municipality.

Figure 7: Inappropriate design of twin pits, the distance between two pits is less than 1.2m and without diversion box.

Single Pit is also 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). 4% of households have single pits in the municipality. Figure 8 shows pictures of a single pit found in the municipality.

Figure 8: Single pit found in the Resunga Municipality.

Unlined Pit is a dug pit in the ground. It has no lining in the walls and a permeable base. It allows infiltration of effluents from walls and as well as bottom of the pit (SuSanA, 2018). 28% 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 (SFD) Promotion Initiative (PI).

Sanitation System	Percentage
No toilet/Open defecation (T1B11 C7 TO C9)	1%
No onsite container (T1A1C8)	1%
Onsite Sanitation System	
Fully lined tank (T1A3C10)	4%
Lined tank with impermeable walls and open bottom (T1A4C6, T1A4C8, and T1A4C10)	61%
Lined pit with semi-permeable walls and open bottom (T1A5C10)	5%
Unlined pit (T1A6C10)	28%
Grand Total	**100%**

According to Shit Flow Diagram (SFD) Promotion Initiative (PI), biogas digesters and fully lined tanks are recategorized as fully lined tanks, and single pits and twin pits are recategorized as lined pits with semi-permeable walls and open bottom. Thus, 4% of households have fully lined tanks and 5% of the households have lined pits with semi-permeable walls and open bottom.

Figure 9 shows location map of households with different types of containment at Resunga Municipality.

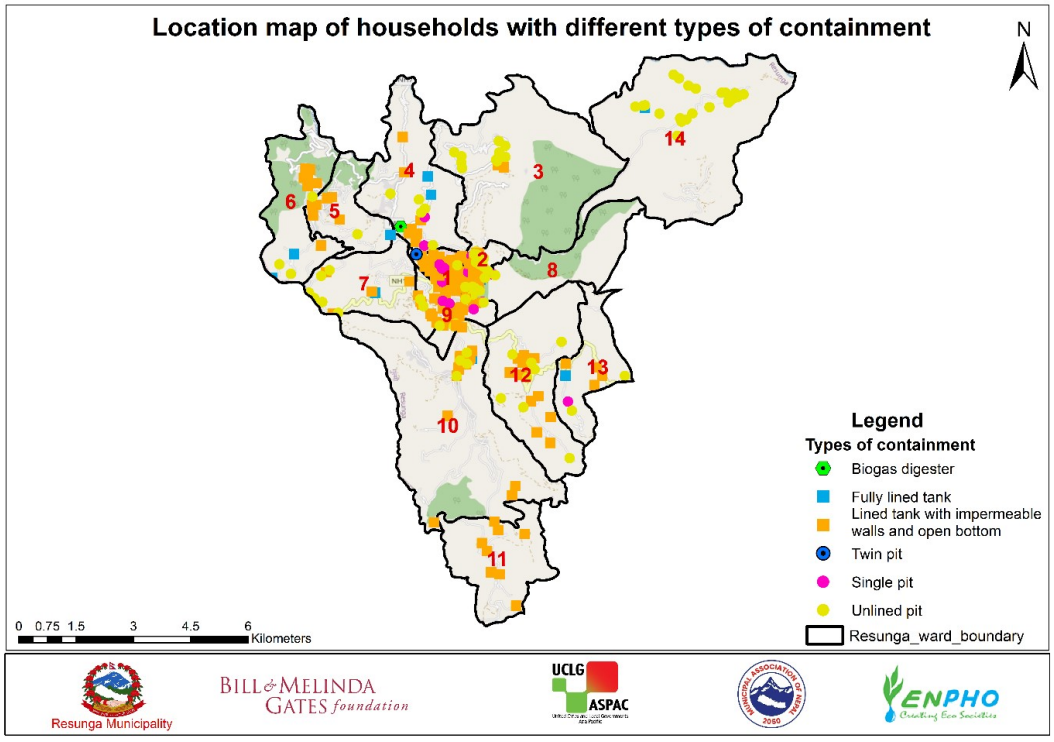

Figure 9: Location map of household with different types of containment.

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	20
Government /Non-government Office	20
Health care centre	8
Hotel/ Home Stay	**6**
Grand Total	**54**

All the institutional buildings in the municipality have toilets with 100% onsite sanitation systems. About 13% of the buildings have fully lined tanks, 67% have lined tanks with impermeable walls and open bottom, 3% have lined pit with semi-permeable walls and open bottom and 15% 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 10 shows the location map of institutional buildings with different types of containments in the Resunga Municipality.

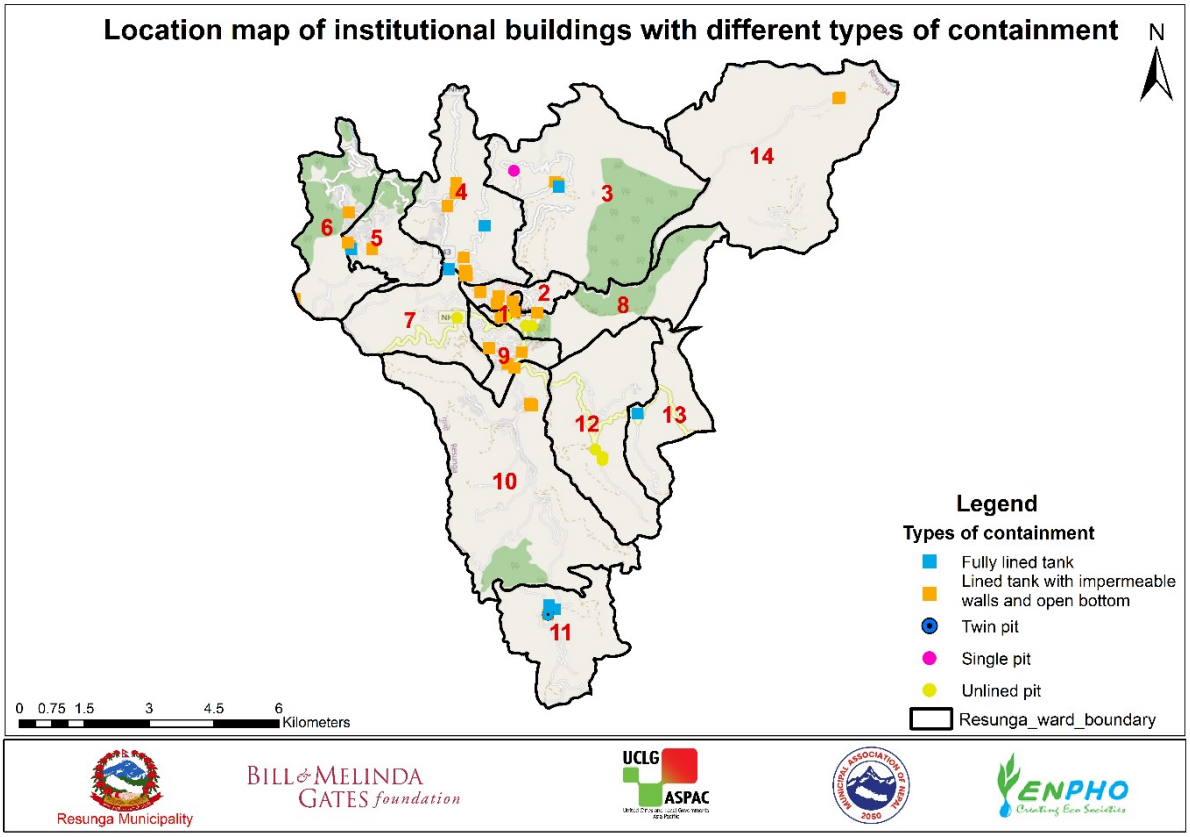

Figure 10: Location map of institutional buildings with different types of containment in Resunga Municipality.

2.1.3 Public Toilets

There are four public toilets in the Resunga Municipality, of which, three of them were observed for the study. The information about public toilets obtained during KIIs and observation are fed in this report.

Public toilet at *Sahid Chowk*

The toilet located at *Sahid Chowk* in ward 1 was constructed by Resunga Municipality. It has a separate male and female compartment. It serves 12 users at a time with 4 urinals and 2 pans in each compartment. The local shopkeepers and city dwellers are the service recipients of this toilet. About 50 users uses this toilet per day however only 15-20 users pay for the service. 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. According to a caretaker, who has been overseeing it from past seven months, the containment has not filled. The toilet is cleaned regularly. Water required for the toilet is supplied from two 200 litres overhead tanks on the taps of each compartment. The toilet compartments have a ventilation. Each compartment has a basin on lobby for handwashing facility (KII-4, 2023).

Public toilet at *Buspark*

The toilet located at *Budathoki Buspark* in ward 8 was constructed by On-test Youth Club in 2011 A.D. It has separate male and female compartments. It serves 11 users at a time with 3 pans in male compartment and, 4 urinals and 4 pans in female compartment. The local shopkeepers and public bus passengers are the service recipients of the toilet. In an average 150 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 yet. The toilet pans are regularly cleaned. Water required for the toilet is supplied from a 500 litres overhead tank on the taps in each compartment. A basin is placed in the premises of the toilet for the handwashing facility. The toilet compartments have proper ventilation. A caretaker is responsible for the overall management of the toilet and receives NRs. 4,800 (USD 36) salary per month (KII-4, 2023).

Public toilet near *Bhagwati Temple*

The toilet located near *Bhagwati temple* in ward 8 was constructed by Lekbesi Mothers' Group on December 6, 2008 A.D. It was reconstructed on 2021 A.D. It does not have separate male or female compartments. It serves 3 users at a time with available 3 pans. The public bus passengers and city dwellers are the service recipients of the toilet. In an average 25 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 with a tank size of about 40,000 litres. The containment of toilet has not been emptied yet. The toilet is regularly cleaned. Water required for the toilet is supplied from a 1,000 litres overhead tank on the taps in each compartment. A basin is placed outside toilet compartment for the handwashing facility. The toilet compartments have proper ventilation (KII-4, 2023) . A caretaker is responsible for the management of the toilet and uses the money received from charges for

the management. Figure 11 shows the public toilets located in different places of Resunga Municipality and their status.

Figure 11: Public toilets and their status in Resunga 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, 9% of the institutional buildings have emptied their containments. The emptying ratio of circular containment types is higher than rectangular containment types. The size of circular containments is generally smaller than rectangular containments (KII-2, 2023). The average volume of circular containments is 4 m^3 whereas that of rectangular containments is 7 m^3. 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 twin pits than other containment types. Figure 12 shows emptying status of different types of containment at households.

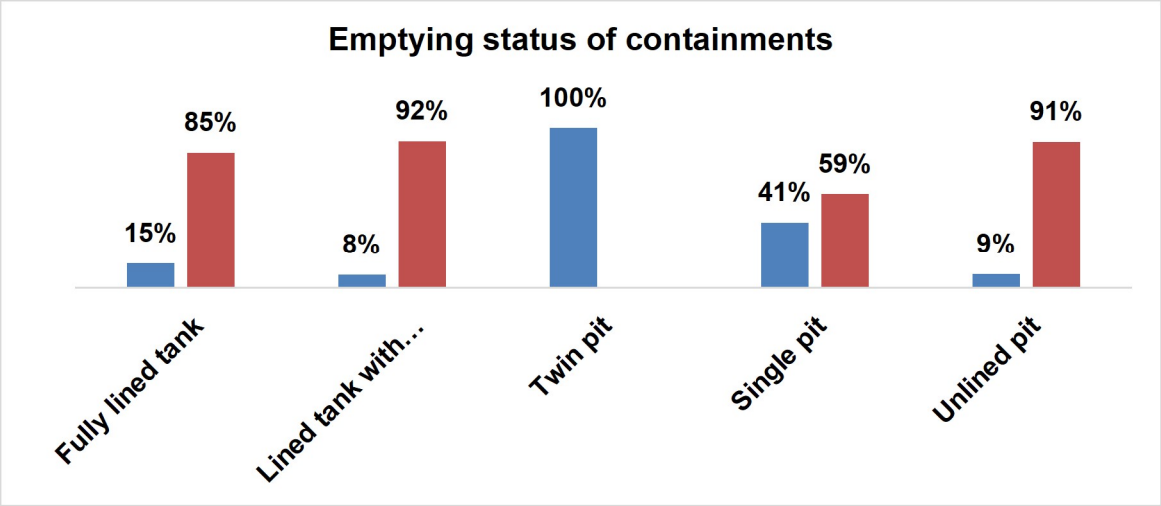

Figure 12: Status of emptying of different types of containment.

The municipality does not have regular containment emptying practice as most containment gets filled over a span of 10 years. Thus, on-demand emptying practice is found in the municipality. Manual emptying is more prevalent in the municipality although both manual and mechanical emptying is practiced at households. Among the households that have emptied their containments, 63% of households have emptied manually and only 37% of households have emptied mechanically. Unlike the emptying practice at households, most institutional buildings practice mechanical emptying. Almost 60% of institutional buildings that have emptied their containments, emptied mechanically while only 20% emptied manually and 20% practiced open emptying method. Open emptying method is the practice of discharging effluent into an open/stormwater drain, open environment or water bodies during rainy season. The inadequate desludging vehicle, high service charge and lack of motorable road networks are the reasons for practicing manual emptying at households. Moreover, the municipality has its own desludging vehicle for the service.

The municipality started the desludging service on 2017 A.D. and has been serving in wards 1, 2, 7, 8 and 9. The municipal desludging vehicle has a tank capacity of 2,500 litres. The service charge for each trip is NRs. 5,000 (USD 37.6). On average, there are only about 3-4

trips per month. The municipality has assigned 2 staffs, a driver and helper for the desludging service (KII-2, 2023) . Figure 13 shows the desludging vehicle of the Resunga Municipality.

Figure 13: The desludging vehicle owned by Resunga Municipality.

2.1.5 Treatment and Disposal/Reuse

Resunga Municipality does not have a Faecal Sludge Treatment Plant (FSTP). Here, mechanically emptied FS is disposed inside a deep hole in the hill (KII-1, 2023) while manually emptied FS is disposed into farmlands, water bodies, open/stormwater drain, composted, or dig and dumped. 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 79% of households in the Resunga Municipality have piped drinking water supply services while 9% of households get drinking water from community taps and 12% of households rely on spring sources. Almost 42 Water and Sanitation Users' Committee (WSUCs) are providing drinking water supply service at households and institutions in the municipality (ENPHO, 2023) . Tamghas Brihat WSUC is one of the major water service providers in the municipality serving 724 households in wards 1, 2, 7, 8 and 9. The WSUCs, Upallo Tamghas serves 400 households in ward 9, Padherithari serves 350 households in ward 1 and 2, Bhujel Kharka and Arkhe khola each serves 125 households in ward 7 among others (KII-3, 2023). Since water supply service is not uniformly distributed in the municipality, locals are obliged to rely on spring sources for drinking water supply.

Figure 14: Reservoir tank of Tamghas Water Supply Scheme and Community tap at Resunga Municipality.

Tamghas Brihat water supply scheme was established in 2000 A.D. and supplied drinking water to the community right away after completion of the scheme construction. The scheme lifts water from Chare khola and Okhareni khola which are collected in 3 reservoir tanks of capacities 125 m^3, 300 m^3 and 500 m^3. The collected water is then supplied to taps of households and institutions. In this scheme, currently, there are no treatments being conducted to improve the quality of water obtained from the source (KII-3, 2023).

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 and have a community located above some sources. A study suggests that *E. coli* can travel up to 1.5 meters vertically and 10.7 metres horizontally in sandy, silty and sandy clay soil (Krishnan, 2011). As the geology of Resunga Municipality consists of alluvial sediments i.e. sand, silt and clay along-with coarse gravels in the areas nearby river (Upreti, 1999), the *E. coli* contamination is high in the areas of the municipality. In addition, the water quality test report showed presence of *E. coli* on sample water tested from source, reservoir tanks, taps and drinking water of the municipality (ENPHO, 2023). Thus, population of Resunga Municipality are at risk of *E. coli* consumption from drinking water contaminated by poorly managed containments.

However, since the population does not rely on groundwater sources for drinking purposes, the sanitation systems in use were assumed to be located in areas with a low risk of groundwater contamination. Consequently, it was estimated that, in terms of groundwater contamination risk, 57% of the population relies on lined tanks (T1A4C10, low risk), 5% uses lined pits (T1A5C10, low risk), and 28% depends on unlined pits (T1A6C10, low risk).

2.2 SFD Selection Grid

Figure 15 shows the types of sanitation technologies present in the Resunga 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.

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution			T1A1C8		Not Applicable
Septic tank					Significant risk of GW pollution Low risk of GW pollution					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					T1A3C10
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	T1A4C6		T1A4C8		Significant risk of GW pollution T1A4C10
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution T1A5C10
Unlined pit										Significant risk of GW pollution T1A6C10
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										
No toilet. Open defecation	Not Applicable							T1B11 C7 TO C9		Not Applicable

Figure 15: SFD selection grid for Resunga 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 18.

T1A1C8	A fully functioning toilet discharging directly to open ground. The excreta is raw, untreated and hazardous and since it discharges directly to open ground, 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.
T1A4C6	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 a supernatant/effluent overflow connected to an open drain or storm sewer, the excreta in this system is considered NOT contained.
T1A4C8	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 a supernatant/effluent overflow connected to open ground, the excreta in this system is considered NOT 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.
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 tanks is 0%, since there are no septic tanks in the municipality.

ii. The proportion of FS in fully lined tanks is 100%, as 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 99%, as the proportion of lined tanks with impermeable walls and open bottom connected to open drain is only 2%.

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 16 shows the SFD matrix of Resunga Municipality.

Resunga Municipality, Lumbini, Nepal, 9 May 2024. SFD Level: 2 - Intermediate SFD
Population: 31551
Proportion of tanks: septic tanks: 0%, fully lined tanks: 100%, lined, open bottom tanks: 99%

Containment						
System type	Population	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	F3	F4	F5	S4e	S5e
System label and description	Proportion of population using this type of system (p)	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated	Proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A1C8 Toilet discharges directly to open ground	1.0					
T1A3C10 Fully lined tank (sealed), no outlet or overflow	4.0	22.0	50.0	99.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	57.0	8.0	0.0	0.0		
T1A4C6 Lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer	2.0	0.0	0.0	0.0	0.0	0.0
T1A4C8 Lined tank with impermeable walls and open bottom, connected to open ground	2.0	0.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	5.0	35.0	0.0	0.0		
T1A6C10 Unlined pit, no outlet or overflow	28.0	7.0	0.0	0.0		
T1B11 C7 TO C9 Open defecation	1.0					

Figure 16: SFD Matrix of Resunga 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, 2023) 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:

$$\begin{aligned} &Actual\ Proportion\ of\ FS\ emptied\ (F3) \\ &\quad = percentage\ of\ containment\ emptied \\ &\quad \times proportion\ of\ FS\ removed\ during\ emptying \end{aligned}$$

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

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

Sanitation Technologies	SFD Reference Variable	Empited Proportion of FS	FS Empited from Containment	Actual Proportion of Empited FS (F3)
Toilet discharges directly to open ground	T1A1C8	0%	0%	0%
Fully lined tank (sealed), no outlet or overflow	T1A3C10	27%	80%	22%
Lined tank with impermeable walls and open bottom, connected to an open drain or storm sewer	T1A4C6	0%	0%	0%
Lined tank with impermeable walls and open bottom, connected to open ground	T1A4C8	0%	0%	0%
Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	10%	80%	8%
Lined pit with semi-permeable walls and open bottom, no outlet or overflow	T1A5C10	44%	80%	35%
Unlined pit, no outlet or overflow	T1A6C10	10%	80%	8%
Open defecation	T1B11 C7 TO C9	0%	0%	0%

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

The municipality does not have a Faecal Sludge Treatment Plant (FSTP) but FS from 1% of population is treated. The value for FS treated is obtained from the biogas digesters which is reclassified as fully lined tanks with no outlet or overflow (T1A3C10). The emptying proportion of FS for the system is 22% (F4 = 22%) and the capacity of fully functioning biogas digester is taken to 99% (F5 = 99%). Apart from biogas digester, FS emptied from other sanitation technologies is disposed in an open environment. Hence, the portion of FS delivered to treatment plant for the remaining technologies (F4) and treated (F5) is 0%.

2.3.4 Proportion of Supernatant in Open Drain or storm sewer delivered to treatment (S4e and S5e)

The variable S4e is the proportion of supernatant disposed in an open drain or storm sewer that is delivered to treatment plant and S5e is the proportion of supernatant that is delivered to treatment plant that is treated. The actual proportion of supernatant from the containment to open drain and stormwater drain is not able to observe. Thus, the proportion is estimated at 50% of the faecal sludge in the containment connected to open drain and storm sewer. While the proportion delivered to treatment plant (S4e) and treated (S5e) is nil as there is no treatment facility.

2.4 SFD Graphic

Figure 17 shows the SFD graphic of Resunga 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 85% of the population are safely managed and excreta from 15% of the population are unsafely managed. It also represents the sanitation value chain going from left to right.

Offsite Sanitation

Resunga Municipality does not have a sewer network, however, 1% of households have offsite sanitation systems. The wastewater generated from these households is disposed of untreated to open/stormwater drain. 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, 94% of the population uses containment where FS is contained and 4% of the population uses containment where FS is not contained.

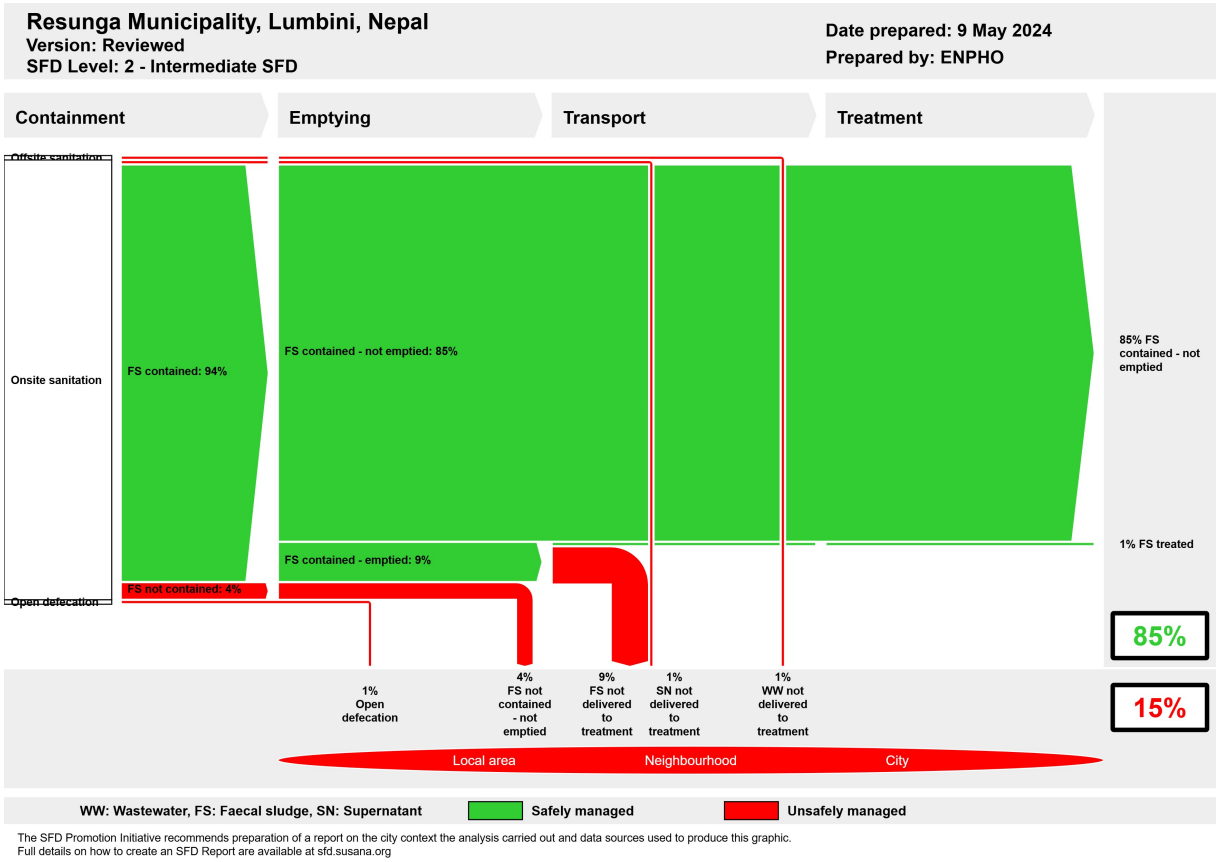

Figure 17: SFD Graphic of Resunga Municipality.

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 with no outlet or overflow (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 summation of population using lined tanks with impermeable walls and open bottom connected to an open/stormwater drain and an open ground (T1A4C6 and T1A4C8).

FS contained not Emptied

The value of 85% 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 9% is obtained from the proportion of population using sanitation systems where the FS is contained and have emptied their containment.

FS not contained - not Emptied

The value of 4% 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. 9%, is the summation of FS contained emptied and FS not contained emptied. Since Resunga Municipality does not have FSTP, emptied FS is disposed of untreated to farmlands and forest. Therefore, this proportion of disposed FS possesses risk to local area and neighbourhood.

FS treated

About 1% of households in the municipality have biogas digester. The biogas digester here is considered as fully lined tank with no outlet or overflow. Despite the lack of treatment plant, the amount of FS delivered to biogas digester are treated at households. Thus, the proportion of FS treated i.e. 1% is obtained from the containment type fully lined tank with no outlet or overflow (T1A3C10).

WW not delivered to treatment

The proportion of wastewater is obtained from toilet discharged directly to an open drain which are taken as offsite sanitation. Here, 1% of households have offsite sanitation. Since the municipality does not have wastewater treatment plant (WWTP), wastewater (WW) generated from 1% of population is not delivered to treatment plant.

Supernatant (SN) not delivered to treatment

The proportion of supernatant is obtained from containments connected to open drain or stormwater sewer calculated as 50% of FS contained in each containment. The total proportion of supernatant (SN) is 1% of FS generated by the total population. Since the municipality lacks the sewer network and treatment plant, the supernatant is disposed directly into water bodies. Hence the proportion of SN not delivered to treatment is 1%.

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 and despite having toilets, lack in behaviour change have led to open defecation in the municipality.

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 18.

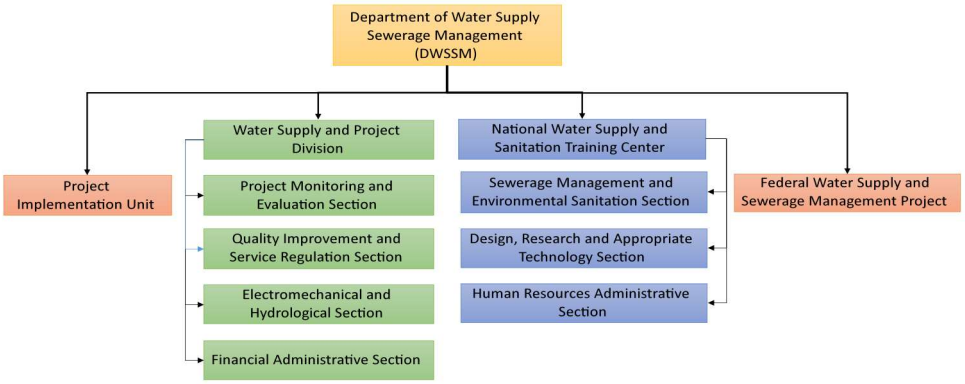

Figure 18: Organizational Structure Department of Water Supply and Sewerage Management (DWSSM).

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 Urban Development and Water Supply: Ministry of Urban Development and Water Supply of provincial government in Lumbini 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), Gulmi. 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

There is no specific section or unit to oversee the activities and planning of sanitation in the Resunga Municipality. However, the activities specifically for sanitation management is

supervised under administrative section in close coordination with all the ward-chairperson of the municipality.

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 Resunga 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 19).

Table 7: List of Key Informant Interviewed personnel.

S.N.	Name	Designation	Organization/ Company	Purpose of KII	Date
1.	Shankar Prasad Gautam (KII-1)	Program Officer	Resunga Municipality	Sanitation status, ongoing projects on sanitation, policies and plan for sanitation development	10 May, 2023
2.	Babu Ram Gautum (KII-2)	Driver (Municipal desludging vehicle)	Resunga Municipality	Emptying practices, finances requirement, disposal and treatment	10 May, 2023
3.	Nawaraj Shrestha (KII-3)	Manager	Tamghas Brihat Water Supply Users' Committee	Water supply services and water quality in Resunga Municipality	11 May, 2023
4.	Kamala B.K. (KII-4)	Caretaker	Public toilet-Sahid Chowk	Quantitative and qualitative management on public toilet and public toilet operation	10 May, 2023
5.	Rita Gurung (KII-4)	Caretaker	Public toilet-Buspark	Quantitative and qualitative management on public toilet and public toilet operation	10 May, 2023
6.	Mera Parajuli (KII-4)	Caretaker	Public toilet-Bhagwati temple	Quantitative and qualitative management on public toilet and public toilet operation	11 May, 2023

Figure 19: 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 20).

Figure 20: Enumerators practicing survey questionnaire on Kobo Collect during SFD orientation.

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 368 households were sampled from 9,015 households distributed in 14 wards with proportionate stratification random sampling. The household samples surveyed in the municipality is shown in Figure 21.

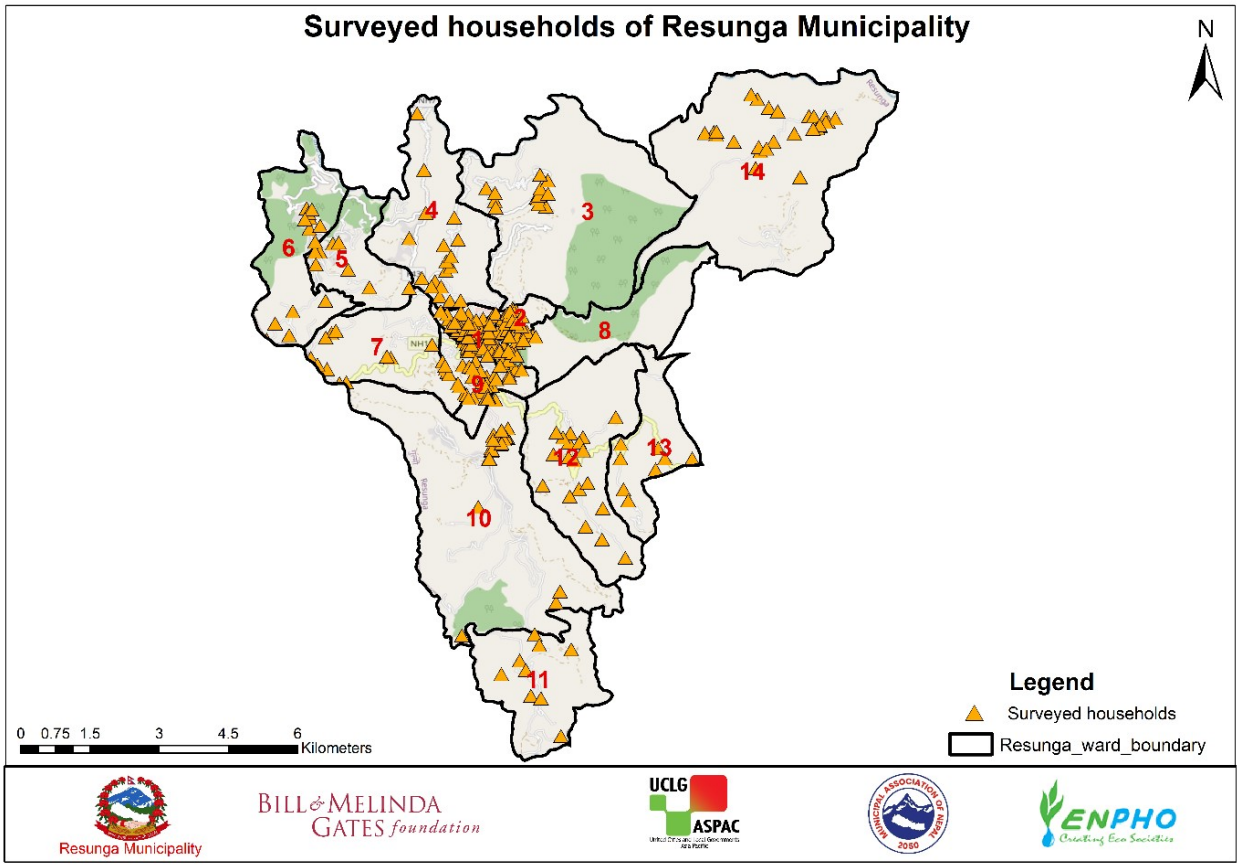

Figure 21: Location map of surveyed households.

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 22 shows the sanitation facility and drinking water supply at Resunga Municipality.

Figure 22: Common sanitation facility and drinking water supply at Resunga Municipality.

4.4 Sharing and Validation of Data

The Shit Flow Diagram Sharing and Validation Workshop was conducted at Resunga Municipality to share the findings on sanitation situation survey and receive the suggestions from the municipal stakeholders. Altogether, 41 participants including mayor, ward chairpersons, municipal council members, sectoral staffs and other relevant stakeholders actively participated on the workshop and provided valuable suggestions. Participants appreciated the evidence-based data of Resunga Municipality and discussed for further improvement of FSM in the municipality. Figure 23 shows the picture of SFD findings sharing to the participants. The list of participants with their designation is attached in Appendix 4.

Figure 23:Sharing of findings during validation workshop.

5 Acknowledgements

We would like to acknowledge the executing agency, United Cities Local Government – 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. Khildhoj Panthi, Mayor, Mr. Hari Prasad Aryal, CAO, and Mr. Shankar Prasad Gautam, Program Officer of the municipality for providing valuable time and information during study and Mr. Suresh Khanal for the coordination of the program. 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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6 References

AEPC, 2018. *Biogas technology.* [Online]
Available at: https://www.aepc.gov.np/biogas-technology

Affam, A. C. & Ezechi, H. E., 2021. Sanitation Systems and Technology Options. In: *Clean Water and Sanitation.* Cham: Springer, pp. 1-16.

Climate-Data, 2021. *Climate-Data.* [Online]
Available at: https://en.climate-data.org/asia/nepal/western-development-region/tamghas-968662/
[Accessed 08 May 2024].

ENPHO, 2023. *District-wise Water Quality Assessment,* Kathmandu: ENPHO.

ENPHO, 2023. *Sanitation Situation Assessment of Resunga Municipality. Unpublished,* s.l.: s.n.

ENPHO, 2023. *Sanitation Situation Assessment of Resunga Municipality. Unpublished,* s.l.: s.n.

GoN, 2015. *Constitution of Nepal: Goverment of Nepal.* [Online]
Available at: https://lawcommission.gov.np/en/wp-content/uploads/2021/01/Constitution-of-Nepal.pdf

Karki, R., Talchabhadel, R. & Aalto, J., 2015. New climatic classification of Nepal. *Theoretical and Applied Climatology,* pp. 799-808.

KII-1, 2023. *Sanitation and Drinking Water Supply Status of Resunga Municipality.* Resunga: s.n.

KII-2, 2023. *FS Emptying, Disposal and Treatment Practice in Resunga Municipality.* Resunga: s.n.

KII-3, 2023. *Water Supply and quality of water in Resunga Municipality.* Resunga: s.n.

KII-4, 2023. *Public toilet operation, management and services data of Resunga Municipality.* Resunga: s.n.

Krishnan, S., 2011. *On-Site Sanitation and Groundwater Contamination: A Policy and Technical Review,* Anand, India: INREM Foundation.

MoF, 2015. Public-Private Partnership Policy. In: Kathmandu, Nepal: Goverment of Nepal.

MoPIT, 2009. National Urban Water Supply and Sanitation Sector Policy. In: s.l.:Ministry of Physical Infrastructure and Transport.

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.

NPC, 2017. *Nepal Sustainable Development Goals, Status and Roadmap: 2016-2030.* s.l.:National Planning Commission.

Peal, A. et al., 2020. Estimating Safely Managed Sanitation in Urban Areas; Lessons Learned From a Global Implementation of Excreta-Flow Diagrams. *Frontiers in Environmental Science,* Volume 8, pp. 1-13.

Resunga Municipality, 2023. *Resunga Municipality.* [Online]
Available at: https://resungamun.gov.np/en
[Accessed 22 December 2023].

Saxena, S. & Den, W., 2022. In situ treatment technologies for pit latrines to mitigate groundwater contamination by fecal pathogens: a review of recent technical advances. *Journal of Water, Sanitation and Hygiene for Development,* 12(1), pp. 102-115.

Strande, L., Ronteltap, M. & Brdjanovic, D., 2014. *Faecal Sludge Management: Systems Approach for Implementation and Operation,* London: IWA Publishing.

SuSanA, 2018. *Shit Flow Diagram Manual; Volume 1 and 2;SFD promotion initiatives.* 2 ed. s.l.:SDF Pomotion Initiatives.

Upreti, B. N., 1999. The Physiography and Geology of Nepal and Their Bearing on the Landslide Problem. In: L. Tianchi, S. R. Chalise & B. N. Upreti, eds. *Landslide Hazard Mitigation in the Hindu Kush-Himalayas.* Kathmandu(Bagmati): Internationl Centre for Integrated Mountain Development, pp. 31- 49.

7 Appendix Annexes

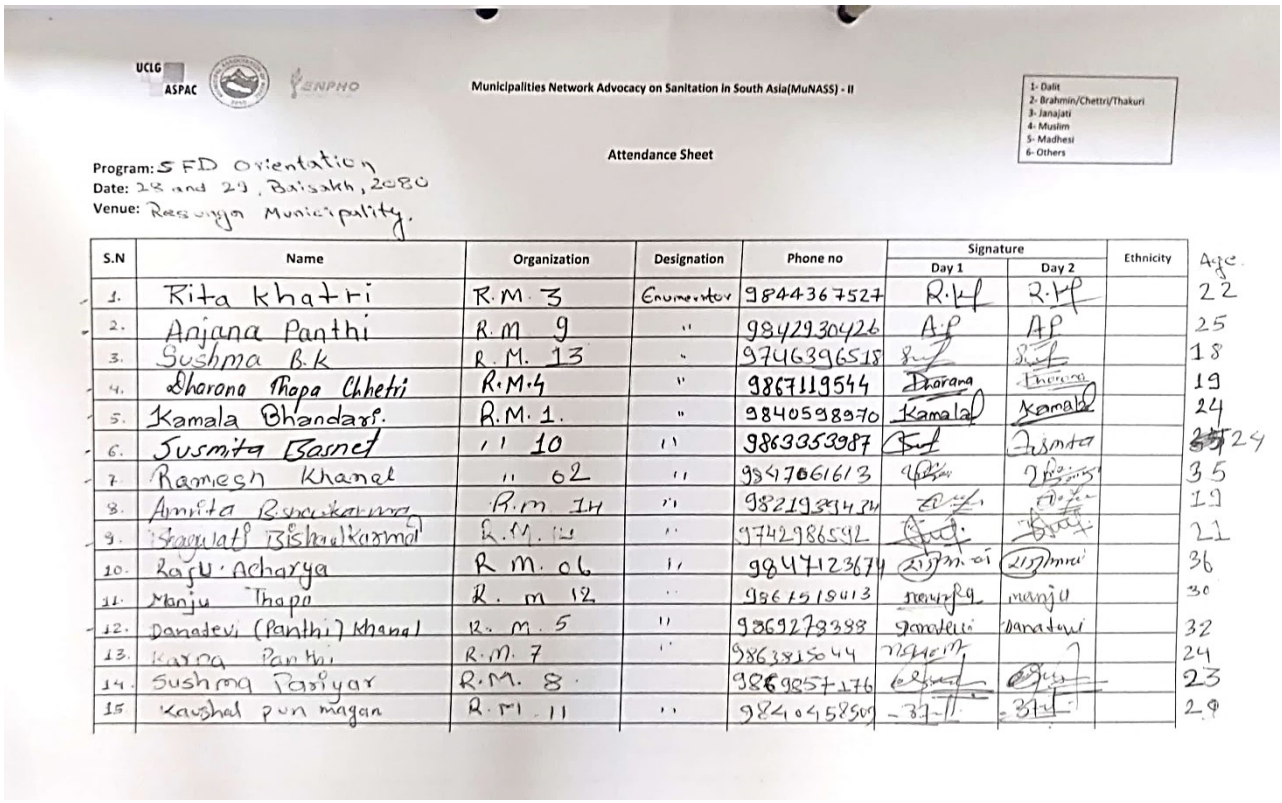
7.1 Appendix 1: Roles and Responsibility of Various Tiers of Governments Delineated in Drafted SDP 2016 – 2030

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	4,270	1,311	54
2	3,556	1,031	42
3	1,321	374	15
4	1,946	508	21
5	1,273	358	15
6	1,544	449	18
7	1,906	491	20
8	4,283	1,313	54
9	2,058	591	24
10	3,054	842	34
11	1,394	396	16
12	1,700	420	17
13	720	215	9
14	2,526	716	29
Total	**31,551**	**9,015**	**368**

7.3 Appendix 3: List of Participants on SFD Survey Orientation



UCLG ASPAC | ENPHO

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

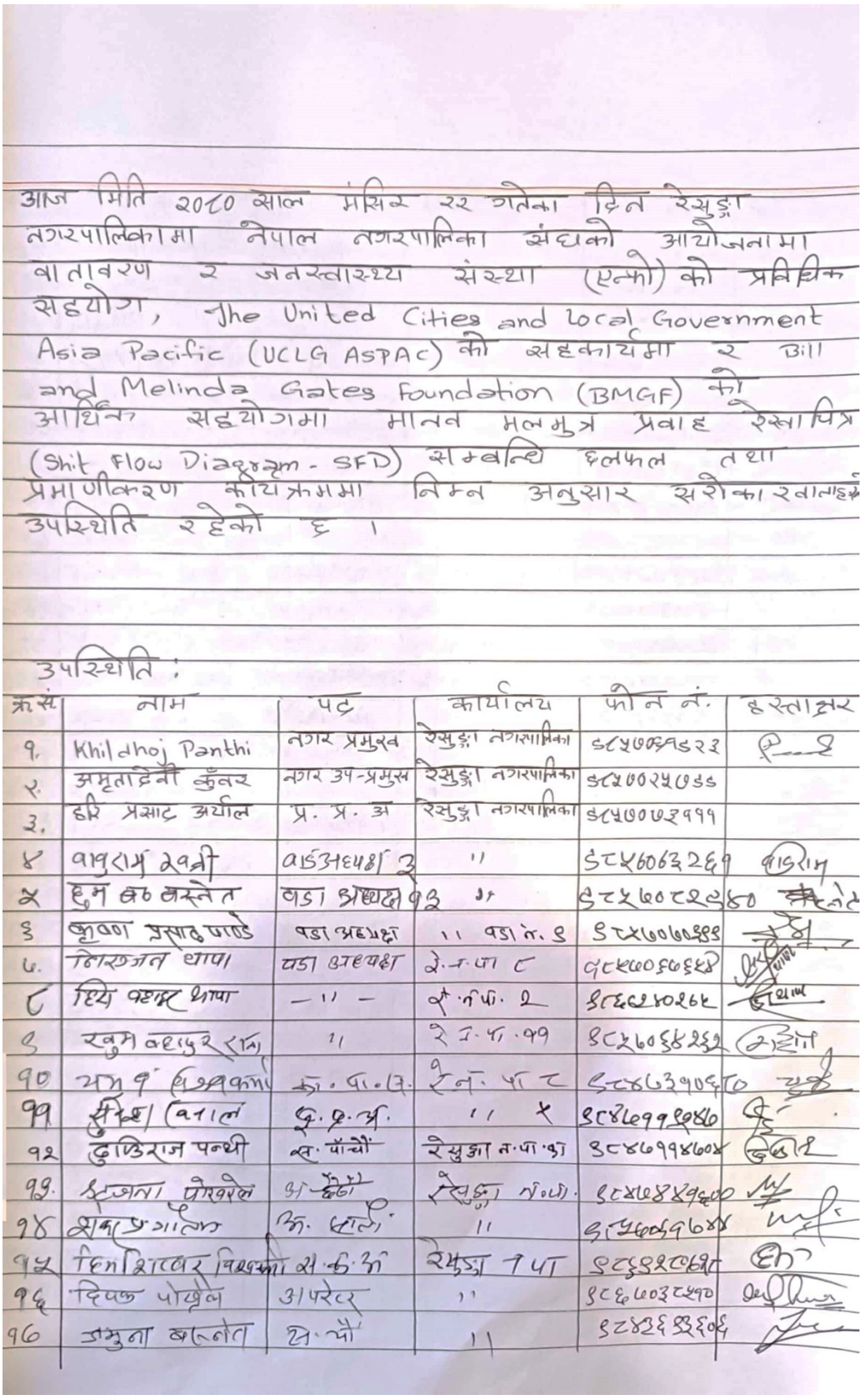
1- Dalit
2- Brahmin/Chettri/Thakuri
3- Janajati
4- Muslim
5- Madhesi
6- Others

Attendance Sheet

Program: 5 FD Orientation
Date: 28 and 29, Baisakh, 2080
Venue: Resunga Municipality.

S.N	Name	Organization	Designation	Phone no	Signature		Ethnicity	Age
					Day 1	Day 2		
1.	Rita khatri	R.M 3	Enumerator	9844367527	R.K	R.K		22
2.	Anjana Panthi	R.M 9	"	9842930426	A.P	AP		25
3.	Sushma B.K	R.M. 13	"	9746396518				18
4.	Dharana Thapa Chhetri	R.M.4	"	9867119544	Dharana	Dharana		19
5.	Kamala Bhandari.	R.M. 1.	"	9840598970	Kamala	Kamala		24
6.	Jusmita Basnet	" 10	"	9863353987		Jusmita		24
7	Ramesh Khanal	" 02	"	9847061613				35
8.	Amrita Bishwakarma	R.M 14	"	9821939424				19
9.	Bhagulati Bishwakarma	R.M. 14	"	9742986592				21
10.	Rafu Acharya	R.M. 06	"	9847123674				36
11.	Manju Thapa	R. M 12	"	9865515013	manju	manju		30
12.	Danadevi (Panthi) Khanal	R. M. 5	"	9869279398	Danadevi	Danadevi		32
13.	Karna Panthi	R.M. 7	"	9863815044				24
14.	Sushma Pariyar	R.M. 8		9869857176				23
15	Kaushal pun magar	R.M. 11	"	9841045850				29

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



आज मिति २०८० साल मंसिर २२ गतेका दिन रेसुङ्गा नगरपालिकामा नेपाल नगरपालिका संघको आयोजनामा वातावरण र जनस्वास्थ्य संस्था (एन्फो) को प्राविधिक सहयोग, The United Cities and Local Government Asia Pacific (UCLG ASPAC) को सहकार्यमा र Bill and Melinda Gates Foundation (BMGF) को आर्थिक सहयोगमा मानव मलमुत्र प्रवाह रेखाचित्र (Shit Flow Diagram - SFD) सम्बन्धि छलफल तथा प्रमाणीकरण कार्यक्रममा निम्न अनुसार सरोकारवालाहरु उपस्थिति रहेको छ ।

उपस्थिति :

क्र.सं.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
१.	Khildhoj Panthi	नगर प्रमुख	रेसुङ्गा नगरपालिका	९८५७०९५८२३	
२.	अमृतादेवी कुँवर	नगर उप-प्रमुख	रेसुङ्गा नगरपालिका	९८५७००२५७९९	
३.	हरि प्रसाद अर्याल	प्र. प्र. अ	रेसुङ्गा नगरपालिका	९८५७००३२१११	
४	वायुराम [illegible]	वार्ड अध्यक्ष ३	"	९८५६०६३२६१	
५	[illegible]	वडा अध्यक्ष १३	"	९८५६०८२५४०	
६	कृष्ण प्रसाद पाण्डे	वडा अध्यक्ष	" वडा नं. ६	९८५६००७९९९	
७.	निरञ्जन थापा	वडा अध्यक्ष	रे.न.पा ८	९८४७०९०६६४	
८	दिपेन्द्र थापा	— " —	रे.न.पा. २	९८६८५४०२७८	
९	रबुम बहादुर रावल	"	रे.न.पा.११	९८५६०६४२६१	
१०	[illegible]	रे.न.पा.८	रे.न.पा ८	९८४६३१०९८०	
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१२	[illegible]	स.पाँचौं	रेसुङ्गा न.पा.१३	९८४७११४७०४	
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१४	[illegible]	अ. इन्जी.	"	९८५७०९१७४४	
१५	[illegible]	रे.न.पा.	रेसुङ्गा न.पा	९८६५३८७१४	
१६	दिपक पोखरेल	अपरेटर	"	९८६०७३८४१०	
१७	[illegible]	स.चौ	"	९८४६६३६९९६	

क्र.सं.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
18.	अनिता खत्री	कार्यपालिका स.		9867143199	
19.	रोशना नेपाली साकि	५५ कार्य पालिका	कार्यालय	फोन नं 9766544690	हस्ताक्षर रोशना
20	सावित्रा [illegible]	कार्यपालिका	"	9866846588	
२१	सीता विश्वकर्मा	कार्यपालिका	"	९८४७९८६८४२०	
२२	कमला घिरैल	कार्यपालिका	"	९८४६२९८५३८	कमल
२३	[illegible]	अध्यक्ष	रे.न.पा. ६	९८५६०३६२२६	
२४	दुर्गा प्र. खनाल	वडा अध्यक्ष	रे.न.पा. ५	९८६३९८०३०२	
२५	राम कृ. बस्नेत	वडा अध्यक्ष	" —१०	९८४६९०६१४८	
२६	लीलाधर आचार्य	वडा अध्यक्ष	रे.न.पा.-४	९८५६०३४०९७	
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२८	राम प्रसाद पन्थी	वडा अध्यक्ष	रे०न०पा० ९	९८५[illegible]	
२९	मन्जु घर्ती मगर	स्वास्थ्य शाखा प्रमुख	रे०न०पा०	९८४६५२३३८९	
३०	कृष्ण कोइराला	इन्जिनियर	"	९८५३०३६६५३	
३१	नेत्र प्र. खनाल	सब-इन्जिनियर	"	९८५७०३६९९९	
३२	राजमन श्रेष्ठ	प्र. स.	रे.न.पा.	९८४६५६०३३३	
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३४	मीना ओपाली	शो. शाखा	"	9847133897	
३५	सुर्य ब. थापा	लेखा शाखा	"	9869475891	
३६	हरि प्रसाद [illegible]	[illegible]	"	[illegible]	
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४०	नविन [illegible]	इ.वि.वि.	"	९८[illegible]	
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४३	प्रविण मरासिनी	सर्वेक्षक	"	9843702168	
४४.	अनिता भुजु	A.P.O.	ENPHO	9849358197	
४५	बुद्ध बज्राचार्य	PC	ENPHO	9849132020	

SFD Resunga Municipality, Nepal, 2026

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SFD Promotion Initiative