# Regulatory Framework for Safe Sanitation in Nepal

A Case Study of Mahalaxmi Municipality, Lalitpur, Nepal

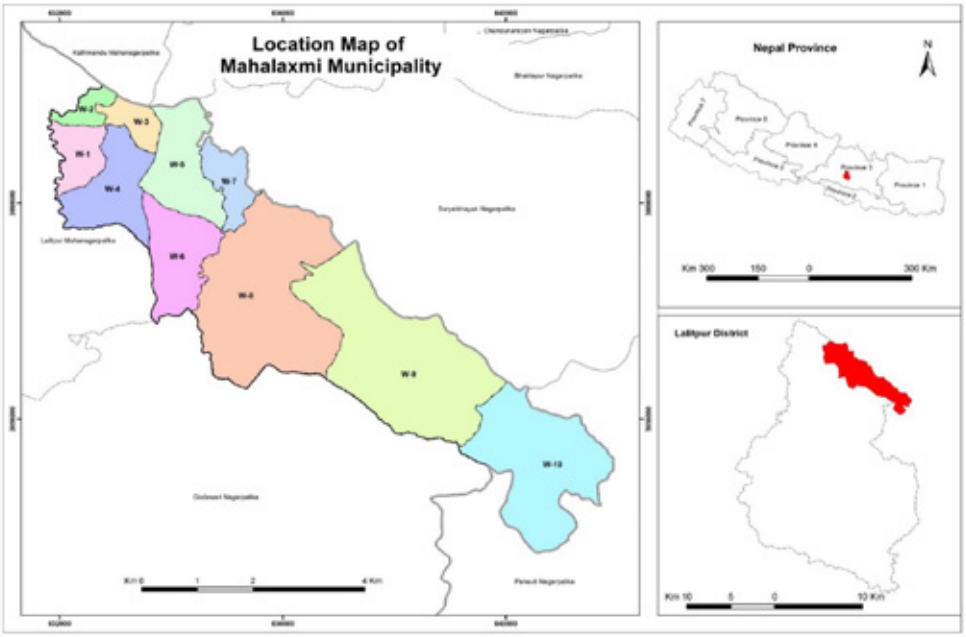
ENPHO
Creating Eco Societies

BILL & MELINDA GATES foundation

# Context and Background

The rapid urbanization and population growth in Nepal has significantly incremented waste and wastewater resulting to serious disposal problems and demand for effective management and treatment systems. With the declaration of 293 Municipalities by Nepal Government in 2015, 62 percent of people are living in urban areas. But urban sanitation has been one of the challenging issues for all the cities to deal with proper and safely managed sanitation services. The unsafe disposal of waste, wastewater and fecal sludge on one hand is polluting the water bodies and environment while on the other hand is posing the threat of water-borne diseases to public health.

Proper and safe fecal sludge management is crucial for attaining both environmental and public health. One of the sustainable solutions for fecal sludge management for households is the standard septic tank system. This article features the institutionalization of the standard septic tank in Mahalaxmi Municipality to attain safe containment, supporting policies, implementation strategies, and highlights strengthening municipal data governance mechanism through Integrated Municipal Information System (IMIS) for widespread replication of the safe containment mechanism in other Municipalities of Nepal.




*Source: Sanitation Situation Analysis of Mahalaxmi Municipality, 2019*

Established on 2 December 2014, Mahalaxmi Municipality is one of the 18 Municipalities of Kathmandu Valley. It is located along the Southern periphery of the Valley with 10 wards[1]. As per National Population and Housing Census 2021, the Municipality comprises 32,106 households with total population of 123,116.

Environment and Public Health Organization (ENPHO) with technical support from Innovative Solution Pvt. Ltd. (ISPL) conducted a detailed sanitation situation assessment in 2019 to understand the sanitation situation in Mahalaxmi Municipality. In 2019, 67.17 percent of households relied on on-site sanitation system. Households of wards 1 to 3 are served by sewer sanitation; wards 4 and 5 are gradually moving towards sewered sanitation system and wards 6 to 10 completely rely on non-sewered sanitation system (Figure 1).

1 Ward is a smallest unit of Local government in Nepal.

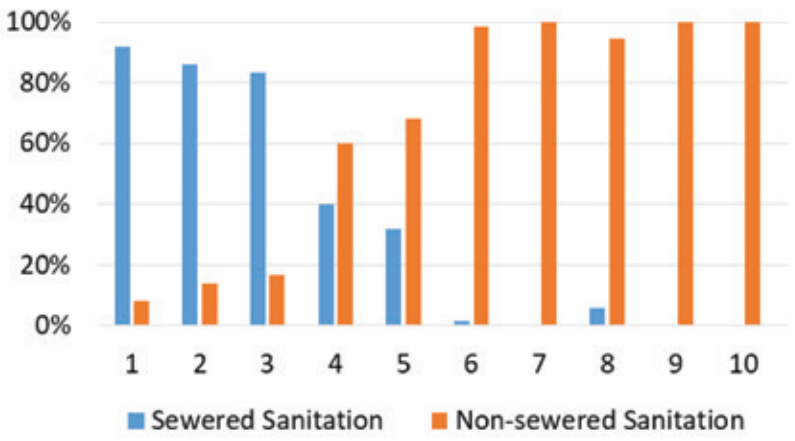



Figure 1: Sanitation system coverage in 10 wards of Mahalaxmi Municipality

The census survey revealed that 61.36 percent of households have containment, of which 55.49 percent are septic tanks, 4.31 percent holding tanks, and 1.56 percent pits. However, to ensure the properness of septic tank noted in census survey, out of 55.49 percent of the containments (which were supposed to be said as septic tanks), a sample survey with 400 households was conducted where the surveyors examined the containment physically. The sample survey then revealed that only 10.8 percent (out of the 55.49%) of the households have the actual proper septic tanks and the remaining simply have the holding tanks and rectangular pits (Figure 2).

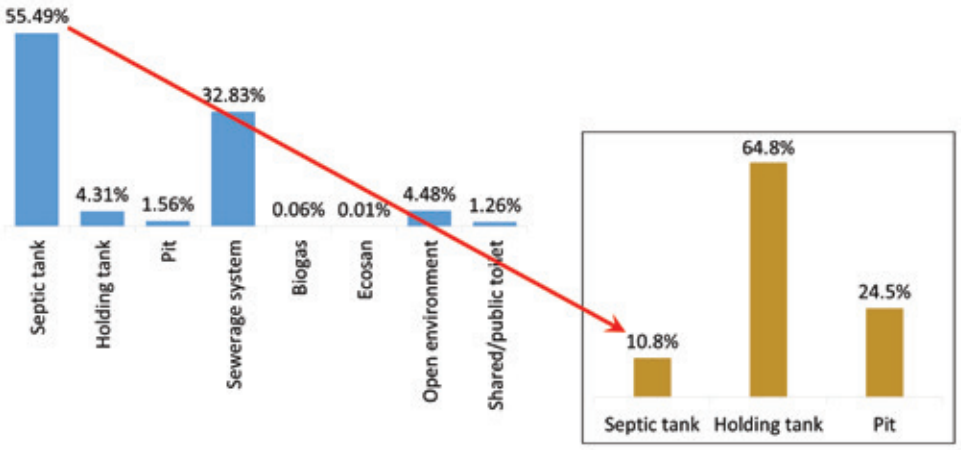



Figure 2: Type of containment and state of proper containment

In April 2017, Government of Nepal endorsed 'Institutional and Regulatory Framework for Fecal Sludge Management in Urban Areas of Nepal'. Effective enforcement of the framework is a prerequisite for successful implementation of FSM service chain. However, this remains a huge challenge for Municipalities due to multiple reasons such as lack of or inadequate capacity on septic tank design and construction, lack of public awareness and most of all, the least priority of the local government on sanitation and fecal sludge management.

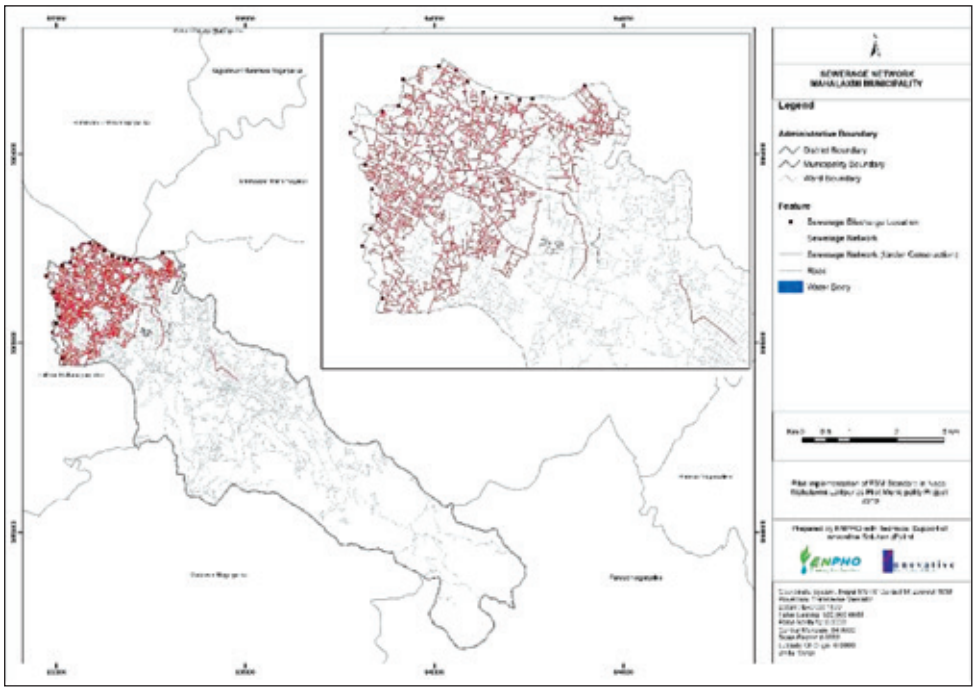
Standard septic tanks are one of the most prominent decentralized wastewater treatment systems for treating domestic wastewater. However, Municipalities are yet not being able to regulate construction of standard septic tanks. While this challenge exists, Mahalaxmi Municipality has succeeded in regulating construction of the standard septic tanks. The document describes how the Municipality has been able to achieve this.

# Strategies, Interventions and Changes

## 1. Sanitation Situation Assessment and Planning

The comprehensive sanitation situation assessment was conducted in Mahalaxmi Municipality to gather detailed information on sanitation system, building, containments and containment emptying practice. The study supported understanding the existing sanitation system of the Municipality and prioritize the intervention areas.

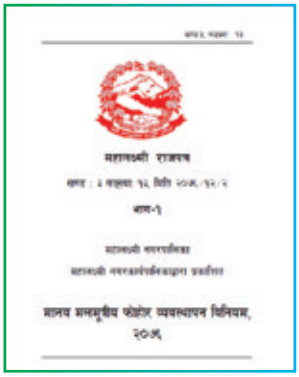
The project team then prepared a detailed plan and strategies to institutionalize the standard septic tanks in the Municipality.




*Source: Innovative Solution Pvt. Ltd.*

| Protection of Public Health and Environment | |
|---|---|
| **What** | **Strategies and Actions** |
| Wastewater should be disposed in a manner that ensures that:<br>▪ drinking water supplies are not contaminated.<br>▪ direct human exposure is not possible.<br>▪ waste is inaccessible to vectors, insects, rodents or other possible carriers.<br>▪ odour or aesthetic nuisances are not created. | ▪ Design and construction of standard septic tanks for which Municipality makes it part of new building design permits and adheres compliance while issuing new building completion certificate.<br>▪ Identifying ways through which septic tanks can be standardized in practice, which may be demonstration of Ready-to-Install (RTI) septic tanks, incentives, tax rebates etc.<br>▪ Construction of new and renovation of existing Fecal Sludge Treatment Plants (FSTPs).<br>▪ Strengthening Municipality through capacity building programs.<br>▪ Strengthening municipal data and digitalization through Integrated Municipal Information System (IMIS).<br>▪ Integration of IMIS with electronic Building Permit System (eBPS). |
| **Strengthening Institutional Mechanism** | |
| **What** | **Strategies and Actions** |
| Establishment of institutional mechanism for sustainable service delivery | ▪ Establishing a dedicated Sanitation Cell with dedicated human resource in Municipality with sanitation plan and budget and oversee sanitation activities in the Municipality.<br>▪ Communication, coordination, and capacity building activities conducted through the Sanitation Cell.<br>▪ Development of institutional and monitoring mechanisms for implementation and monitoring of standard septic tank construction.<br>▪ Development and implementation of eBPS Field App and Sanitation App for monitoring.<br>▪ Dedicated human resource for the monitoring of the standard septic tank construction at household level. |

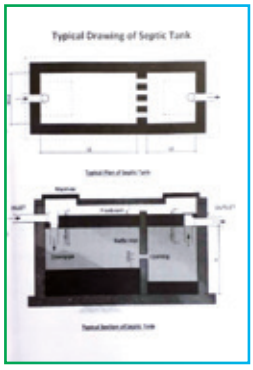

## 2. Development of Regulatory Tool



The first and foremost requirement for the Municipality to regulate construction of the standard septic tank is the existence of municipal policies, guidelines, or the By-Laws pertinent to FSM. Realizing this need, Mahalaxmi Municipality approved and published its Fecal Sludge Management (FSM) By-Laws through its 7th Council Meet on 11 March 2020 and is the first ever on-site sanitation legal instrument in Nepal – *"Mahalaxmi Rajpatra"* publication.

This By-Laws provided the strong foundation for the operationalization and regulation of sanitation services in Mahalaxmi Municipality and for the safe management of on-site domestic sanitary waste thereby reducing risk to the public health and the environment.

## 3. Institutionalization of Standard Septic Tank in Building Design Permit




The construction of standard septic tanks has been made mandatory in all new house design permits. Mahalaxmi Municipality has included a two-page guideline on standard septic tank and soak away system as an integral component to the new house design permits. Building completion certificates are provided only to those households which have constructed standard septic tanks.


## 4. Dedicated Sanitation Cell to Oversee Sanitation Activities

Mahalaxmi Municipality has established a dedicated 'Sanitation Cell' to oversee all the sanitation related activities in the Municipality. The cell is up and running with a dedicated team, information system, and logistics. The cell is also providing various sanitation services to the public through various programs including training programs, awareness campaigns etc.

## 5. Training Programs to Capacitate Human Resource

Various capacity building programs were conducted to capacitate key stakeholders involved in design, construction, regulating and monitoring of the standard septic tanks. ENPHO supported Mahalaxmi Municipality in capacitating municipal staff, engineers, registered consultant designers, masons and the fecal sludge desludgers in the Municipality. More than 40 municipal staff and engineers and 55 registered consultant designers were trained in standard septic tank and its design. Total 19 masons were trained in construction of standard septic tanks and 34 sanitation workers on occupational health and safety. All department chiefs and municipal engineers have also been trained in the eBPS Field App and Sanitation App.

Training programs for registered consultant designers/engineers on standard septic tank design

Training to masons on construction of standard septic tanks


Occupational Health and Safety Training to Sanitation Workers

## 6. Campaigns to Make the City-dwellers Aware on Septic Tanks

It is equally important to make the community people aware of standard septic tank and its importance thereby well informing them to construct it properly. Hence, with the support of youth volunteers, a door-to-door campaign was conducted in the Municipality to spread awareness in non-sewered wards 6, 7, 8, 9 and 10 of Mahalaxmi Municipality.

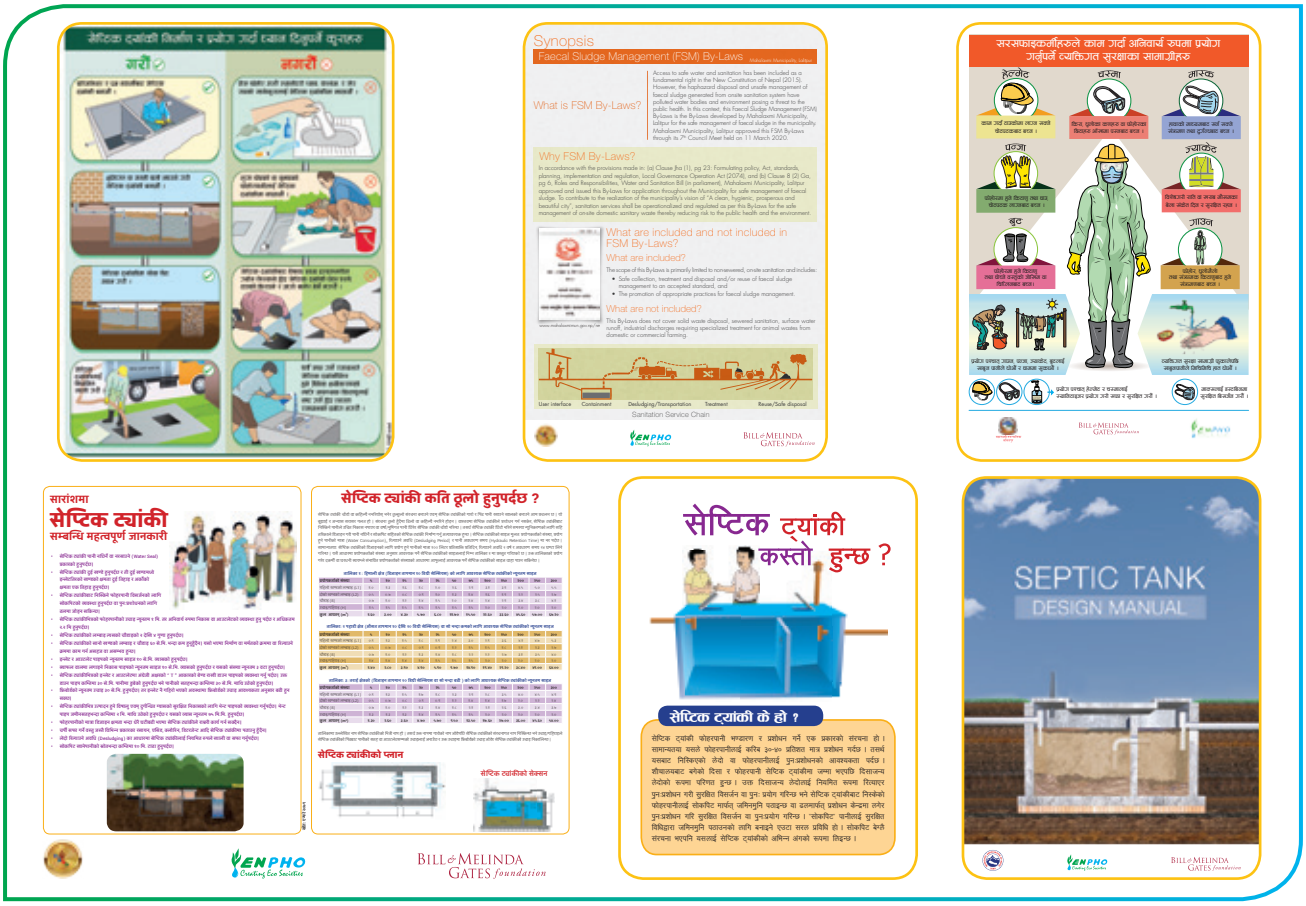
Door-to-door Campaign

After successful completion of door-to-door campaign, 'Mobile Booth Campaign' was organized in the Municipality to raise awareness on the safe containment and construction of standard septic tanks. The campaign was organized in wards under the leadership of respective Ward Chairpersons where they encouraged the residents to visit the booth, get detailed information and construct the standard septic tanks.

Mobile Booth Campaign

## 7. IECs and Publications

To support and promote proper design and construction of standard septic tanks, ENPHO produced and disseminated various Information, Education and Communication materials to the relevant stakeholders. Manuals, posters, booklets on septic tanks have been displayed and disseminated through awareness campaigns, mobile booths, trainings and sanitation cell in the Municipality.




## 8. Containment Improvement and Demonstration

For the containment improvement and demonstration of proper septic tanks in the Municipality, the partnership and collaboration with private sectors have been strengthened thereby Ready-to-Install (RTI) Septic Tanks have been installed in vulnerable households and public toilets in the Municipality. This innovative technology of RTI septic tanks helped the communities in improving their existing improper containments as well as providing them alternative solutions for containment improvements.

## 9. Development and Establishment of IMIS


"Functional Module of IMIS"

*Source: Innovative Solution Pvt. Ltd.*

To address the data and information limitations for sanitation planning and implementation, ENPHO, with support from ISPL introduced and established Integrated Municipal Information System (IMIS) in Mahalaxmi Municipality which is the first in Nepal. IMIS is an Information System developed to catalyze the City-wide Inclusive Sanitation (CWIS) approach and contribute to achieving SDG 6.2 outcomes. It is a convergence of web, mobile and GIS technologies developed on an open-source software platform.

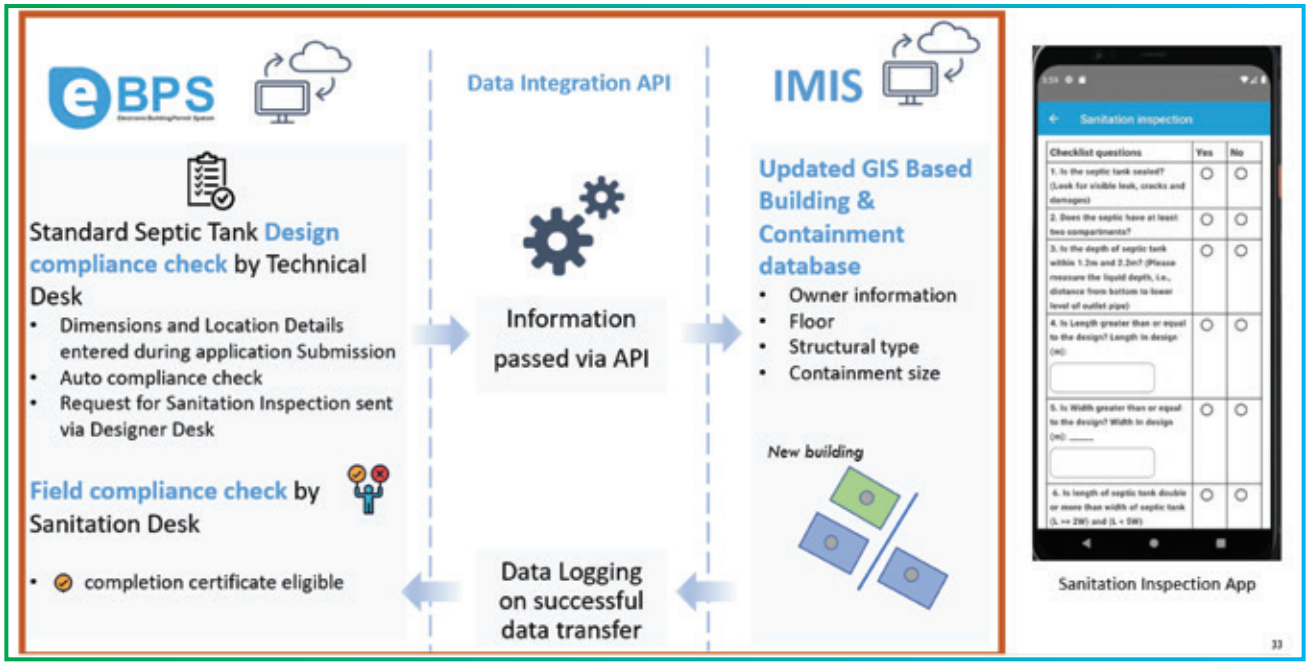
The IMIS now facilitates Mahalaxmi Municipality in planning, management and monitoring and evaluation of standard septic tanks construction along with other sanitation systems and services. It also serves as a one common platform for sharing data and information amongst all departments of the Municipality.

## 10. Development of Institutional and Monitoring Mechanism for Construction of Standard Septic Tank

Earlier, the septic tank design was submitted during building permit application but there was no verification and monitoring of septic tank design both in the submitted document and in the field in the building permit process. Hence, the Municipality developed its institutional and monitoring mechanism for regulating and monitoring of standard septic tank construction. The Municipality has a dedicated human resource for the monitoring of constructed standard septic tanks in the field.

## 11. Integration of IMIS with eBPS

Mahalaxmi Municipality with the technical support from ISPL and ENPHO developed an additional module in eBPS to ensure the conformity of septic tank with standard design. In addition to this module, a mobile application was also developed to verify that the constructed septic tank in the field is as per the design. Mahalaxmi Municipality established a separate sanitation field desk for this verification. Application Programing Interface (API) has been developed and implemented to integrate IMIS with eBPS, so that when a new building is constructed in the municipality, the building as well as containment information in IMIS will be updated in real-time. With this, Mahalaxmi Municipality also becomes the first Municipality in Nepal to formally endorse the septic tank inspection mechanism in its building permit approval process.




*Source: Innovative Solution Pvt. Ltd.*

### Sanitation Inspection Flow

**1 Designer Desk submits new application**

- Fills Sanitation Information (no. of users, dimensions, outlet connection and location)
- Compliance is checked by system and non-compliant data fields are highlighted for designers to update.
- Points of compliance: Volume according to number of users, ratio of length width, depth within range, ratio of first compartment to second compartment length

**2 Designer Desk requests for sanitation inspection**

- Once septic tank construction is completed (up to all plumbing activities, and septic tank is not covered by slab), inspection is requested.

**3 Sanitation Field Desk Supervisor visits field for inspection**

- Sanitation Field Desk Supervisor visits field with mobile application for inspection.
- If fails to meet the criteria of standard septic tank, call for re-inspection is done, and same process is followed again.

**4 Technical Desk checks compliance status before providing completion certificate**

- Technical Desk ensures containment is compliant before issuing the completion certificate.

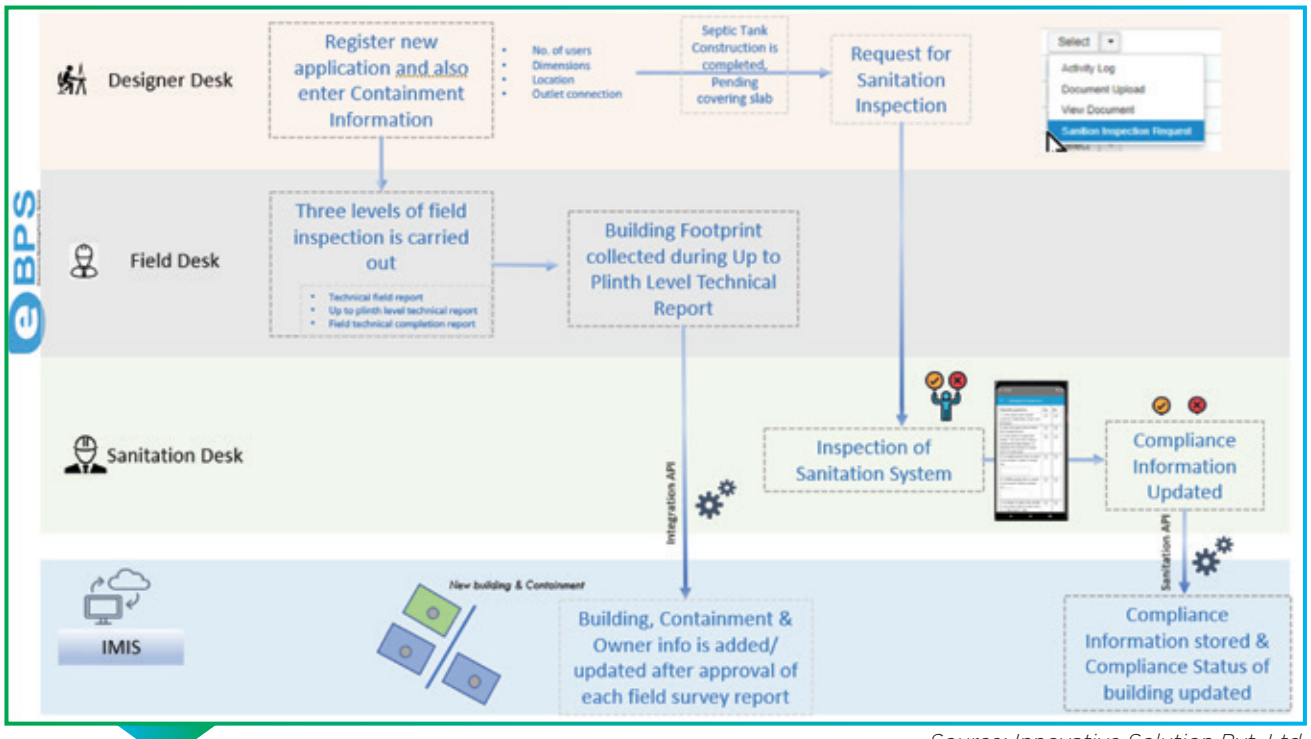
*Source: Innovative Solution Pvt. Ltd.*

## eBPS - IMIS Information Flow Mechanism

- **Technical field report through mobile application**
  - Building, Containment, Owner, and Location (Point [1]) information sent to IMIS [2]
- **Up to plinth level technical report through mobile application**
  - Building, Containment, Owner, and Footprint (Polygon) information updated to IMIS [2]
- **Sanitation Field Inspection through mobile application**
  - Sanitation Inspection result information sent to IMIS.
  - Compliance Status of building updated.
- **Field technical completion report through mobile application**
  - Building, Containment and Owner information updated to IMIS [2]

[1] Building footprint is not available yet, so point information is used as basis.
[2] Information is sent at every step to ensure updated information is stored in IMIS.

*Source: Innovative Solution Pvt. Ltd.*

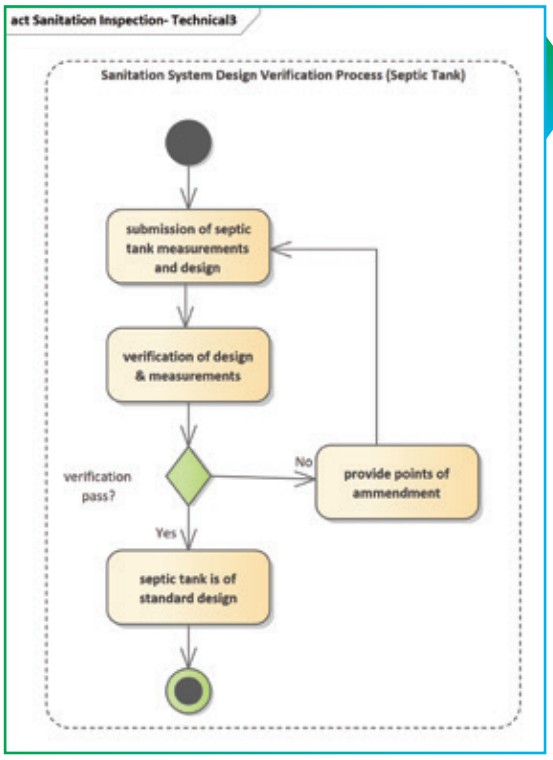



*Source: Innovative Solution Pvt. Ltd.*

eBPS - IMIS Information Flow Diagram

# Summary: Steps for Regulating Construction of Standard Septic Tank

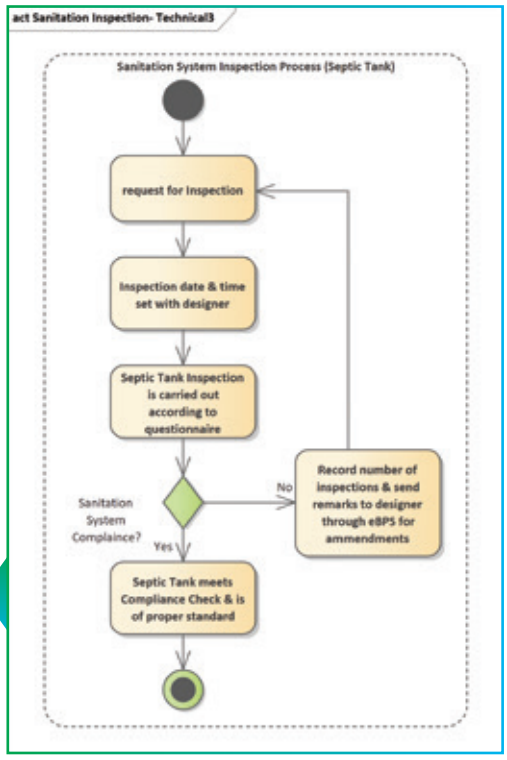
1. Consultations and meetings with Municipality.
2. Sanitation Situation Assessment and Planning.
3. Development of Regulatory Tool- FSM By-Laws.
4. Institutionalization of Standard Septic Tank in Building Design Permit.
5. Establishment of dedicated Sanitation Cell to oversee sanitation activities.
6. Production of IECs and publications for awareness raising and capacity building.
7. Capacity building programs for municipal engineers, consultant designers and masons on septic tank design and construction.
8. Capacity building programs for sanitation workers on occupational health and safety.
9. Public awareness campaigns.
10. Wide dissemination of IEC materials.
11. Containment improvement and demonstration e.g. RTI septic tanks installation.
12. Development and establishment of IMIS.
13. Development of Institutional and Monitoring Mechanism for Construction of Standard Septic Tank.
14. Integration of IMIS with eBPS.
15. Development of Sanitation and eBPS field survey Apps.
16. Implementation of Sanitation App and monitoring of constructed septic tank in field.




Flowchart of standard septic tank design inspection

Source: Innovative Solution Pvt. Ltd.

Flowchart of constructed septic tank monitoring in field




Source: Innovative Solution Pvt. Ltd.

Monitoring of septic tank construction in field

# Major Challenges

- The major challenge in this project has been the change in leadership and municipal staff members after the local level election in May 2022. Due to lack of institutional memory, additional effort was required for frequent and series of meetings with newly elected municipal leaders and staff members to onboard all in this project.
- Due to the established practices, containment improvement and retrofitting of the existing improper containments were the other major challenge.
- Acquiring the land for the construction of Fecal Sludge treatment plant was the most challenging due to lack of the social acceptance from the community people for the treatment plant.

# Key Drivers of Change

**Strong Leadership and Commitment**: One of the key drivers for change is the strong leadership of Mayor, Deputy Mayor and the Ward Chairpersons of Mahalaxmi Municipality. The support and commitment from them helped in enforcement of FSM By-Laws on safe containment.

**Participation:** All the municipal department chiefs, engineers, consultant designers/ engineers, and masons actively participated throughout the process and provided support from their respective ends at each step of regulating the safe containment.

**Evidence-based Planning and Interventions:** The data and information of the Municipality were gathered during the sanitation situation assessment of the Municipality. Thus, the data and information considerably supported in evidence-based planning and implementation of the activities.


Launching Program of Sanitation App

# Key Milestones

**May 2019**
Signing of MoU between Mahalaxmi Municipality, Kathmandu Valley Water Supply Management Board and ENPHO

**November 2019**
Sanitation Situation Assessment of Municipality

**March 2020**
Endorsement of FSM By-Laws

**June 2020**
Development of CWIS Plan of Mahalaxmi Municipality

**June 2021**
RTI Septic Tanks installation and demonstration

**March 2022**
Launching of IMIS

**September 2022**
Development of Institutional and Monitoring Mechanism

**May 2023**
Launching of Sanitation App and eBPS Field App

**June 2023**
Implementation of eBPS Field App and Sanitation App

**June 2023**
Regulating and monitoring of septic tank construction in Municipality

Training on eBPS Field App and Sanitation App to Municipality Staff Members

## Lessons Learnt

- As sanitation is the least prioritized issue, there has to be strong leadership, willingness and support from the Municipality to bring change to the sanitation sector.
- Capacity building of the key stakeholders is a must to enable them to understand the issues and capacitate them with adequate knowledge and skills to work in the sanitation sector.
- Public awareness is crucial to make the citizens aware of fecal sludge management and convince them of the consequences of unsafe management of fecal sludge as this is a completely new topic for them.
- If the public is aware and municipality has capacitated human resource both in terms of knowledge and skill, change is possible.

## Conclusion and Way Forward

Mahalaxmi Municipality becomes the first Municipality in Nepal not only in developing and endorsing the FSM By-Laws but also in enforcement of By-Laws by regulating design and construction of standard septic tanks in the Municipality. Its replication is gradually visible in other Municipalities of Nepal as many Municipalities are developing FSM By-Laws and preparing itself for its implementation. With this achievement, Mahalaxmi Municipality should not stop here. It must continue strengthening robust institutional and monitoring mechanisms. Further to addressing the entire sanitation service chain, it's now necessary for the Municipality to expedite the renovation of existing Fecal Sludge Treatment Plant and act on solutions for treatment of Fecal Sludge for its safe disposal or reuse.

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