

# Investigation for Urban-Rural FSSM Linkages in Maharashtra under Urban-Rural Linkages in Service Delivery / addressing challenges with Peri-Urban Areas



**Research Study  
2021-22**



**RCUES  
Mumbai**

**Regional Centre for Urban & Environmental Studies  
All India Institute of Local Self-Government, Mumbai**

Established in the year 1968, is fully supported by the Ministry of Housing and Urban Affairs, Government of India



## Preface

The launch of Swachh Bharat Mission on 2nd October, 2014 had set an ambitious target of making India clean and open defecation free with a special focus on construction of toilets and behaviour change. A number of urban Faecal sludge and Septage Treatment Plants (FSTP) were also constructed under this phase. The second phase of SBM is now focused on management of waste i.e., increasing the access to safely managed sanitation.

According to a preliminary survey of FSTP carried out by Maharashtra Urban WASH and Environmental Sanitation Coalition (Maha-UWES-Coalition) of All India Institute of Local Self Government (AIILSG), Mumbai, many FSTPs constructed under the GR No. SMM 2019/C.R.124/UD-34 issued by Government of Maharashtra are currently underutilized. Looking at the underutilization of these FSTPs and proximity of villages to the urban local bodies, FSSM linkages was identified as a possible option to optimize the resources. Therefore, to analyze the viability of linkages, an analysis was required for identifying the scope and complexities associated with it. Hence, the study aims at understanding the potential of Urban-Rural linkages and preparing recommendations for the establishment of the linkages.

The study was conducted in 16 villages in Indapur tehsil in Pune District of Maharashtra. The identified villages had byroad distance of less than 10 Km from the FSTP. For the purpose of the study, data in the areas of Health, Water, Sanitation and Hygiene was collected in the form of household surveys, Key Informant interviews and Gram Panchayat questionnaire. The questionnaire consisted of quantitative as well as qualitative inquiries. Respondents were selected through random sampling technique. A total of 400 responses were obtained as a part of the household surveys. 12 Gram Sevak surveys and 4 KIIs were performed during data collection.

The obtained data was analyzed and the results obtained were studied to determine the possibilities of the linkages. Discussion on various aspects of the linkages have been presented in the Inferences Section. A list of recommendations is then presented in order to successfully establish the linkages. Furthermore, the same recommendations may be used to prepare Action Plans for establishing the linkages.

## Acknowledgement

I take this opportunity to put on record our deep appreciation for the Ministry of Housing & Urban Affairs (MoHUA), Government of India (GoI) for providing us an opportunity to working on this study.

I also take this opportunity to express my gratitude towards Shri. Ranjit Chavan, President, All India Institute of Local Self Government for providing valuable guidance and support to complete this report. We also express my sincere thanks to Dr. Jairaj Phatak, IAS (Retd.), Director General, All India Institute of Local Self Government for his continued support in completing this report.

This Research Study was undertaken by Ecosan Services Foundation (ESF) with RCUES, AILSG, Mumbai. I would like to acknowledge Urban Development Department (UDD) and Water Supply and Sanitation Department (WSSD) for the granting permissions required for undertaking this research project. I truly appreciate the sincere efforts of Mr. Milind Tonpe, Deputy CEO, Zilla Parishad, Pune and Mr. Ranjit Kapre, Chief Officer, Indapur Municipal Council for their cooperation during the course of the project. I would also like to express our gratitude towards Mr. Vijaykumar Parit, Block Development Officer, Panchayat Samiti Indapur and Mr. Solapuri, Block Coordinator Indapur for their constant support and co-ordination during the data collection phase. I would like to thank other ULB and RLB officials who gave their valuable inputs through key informant interviews. I would also like to acknowledge Maharashtra Urban WASH and Environmental Sanitation Coalition (Maha-UWES-Coalition) and UNICEF Maharashtra for their valuable insights during the course of the project.

I am thankful to the RCUES's Research team for their continued support in completion of this research study report.

**Director**  
**RCUES, AILSG, Mumbai**

## Executive Summary

Safe Sanitation can be defined as the safe management of solid, liquid and sludge which is vital in maintaining health, hygiene and wellbeing of communities and their surrounding environment. Urban Maharashtra with total 50 million population with 384 ULBs was declared ODF in 2017 within 3 years of inception of Swachh Bharat Mission. Considering the criticality of safe sanitation and strive nation towards ODF+ and ODF++, Government of Maharashtra in 2019 issued the Government Resolution on setting up an FSTPs in urban local bodies of Maharashtra envisaged the sustainability status of ODF and safe disposal of generated faecal sludge and septage in towns. National sanitation program, a flagship program of government of India are being implemented in urban and rural areas with the support of Ministry of Housing and Urban Affairs (MoH&UA) and Ministry of Jal Shakti (Department of Drinking Water and Sanitation). Swachh Bharat Mission Urban and AMRUT with the support of MoH&UA are focusing on liquid and solid (including plastic) waste management in urban areas whereas Swachh Bharat Mission Rural phase II are focusing on liquid and solid (including faecal sludge and plastic) waste management in rural areas.

In September 2021, a letter (D.O. No. S-18011/6/2021-SBM-DDWS)<sup>1</sup> was issued to by Gol to Chief Secretaries, Administrators and Advisors to Lt. Governors of all states and UTs regarding adopting the approach of urban rural linkage for liquid and solid waste management including faecal sludge and septage management in both urban and rural areas.

This study was carried out to understand current condition of sanitation chain of Indapur ULB and its adjacent villages. Indapur is a class III ULB situated at the bank of river Bhima, near Ujjani dam in Pune district of Maharashtra. Urban Indapur has 100% access to toilets, out of which 20.7% of the population depends on community toilets and remaining have individual household toilets. 100 % of households have pour flush toilets connected to septic tanks followed by underground drainage. The wastewater i.e., mixture of septic effluent and grey water from drain is disposed in the Bhima River without treatment.

Indapur District has 142 villages out of which 16 villages which are around peripheral distance of 10KM from FSTP were surveyed in this study. Village identification and sampling strategy was decided on the basis of driving distance from FSTP and number of households in village. 67.3% households have flush toilets connected to septic tanks, 30.1% of households have toilets connected to soak pits and 2.6% are using pit latrines. The outlet of septic tanks is connected to soak pits, open drains, open grounds and no outlets. The septic tanks do not follow the IS Code 2470 Bureau of Indian Standards and are significantly larger in size. As a consequence of this, demand desludging with average desludging frequency of 10 to 15 years is being practiced across the district. The demand estimation based on the data collected suggests that the FSTP having capacity of 10 KLD can cater to current demand desludging of both Indapur ULB and its neighboring 16 villages.

SFD suggests that there is urgent need of STP in Indapur as the wastewater flowing through underground drainage disposing in nearby Bhima River without treatment, which is further used by farmers in their agriculture land. Indapur is bounded with two major rivers Bhima and Nira. As Indapur is dependent on surface water, wastewater management becomes essential part to avoid water

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<sup>1</sup> D.O. Letter for implementation of SBM U&R regarding waste management ([Urban Rural Linkage](#))

pollution. The current need of rural Indapur is provision of desludging services on demand basis with affordable price for safe disposal of FS. The provision of desludging services to villages is possible if urban rural linkages is established. Administrative willingness plays very important role for linkages which is seen lacking in Indapur. Urban rural linkage is possible if Indapur has enabling environment and acceptance towards linkages and its benefits. Urban rural linkage is a feasible and viable option while practicing demand desludging. Immediate construction of STP with cotreatment facility will fulfil the demand of desludging and will reduce the pollution of water body in Indapur. Urban rural linkage will be successful and become sustainable model for FSSM in ULBs if timely administrative measures, regular sensitization and awareness are undertaken which will also help to achieve ODF+ and ODF ++ status by 2030.

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## Abbreviations

|        |  |
|--------|--|
| AIIISG | All India Institute of Local Self Government           |
| AMRUT  | Atal Mission for Rejuvenation and Urban Transformation |
| BDO    | Block Development Officer                              |
| CBO    | Community Based Organization                           |
| CEO    | Chief Executive Officer                                |
| CO     | Chief Officer  |
| DMA    | Director of Municipal Administration                   |
| ESF    | Ecosan Services Foundation                             |
| FSSM   | Faecal Sludge and Septage Management                   |
| FSTP   | Faecal sludge and Septage Treatment Plant              |
| GoI    | Government of India                                    |
| GR     | Government Resolutions                                 |
| HH     | Household  |
| IEC    | Information, Education and Communication               |
| IMC    | Indapur Municipal Council                              |
| KII    | Key Informant Interview                                |
| KLD    | Kilo Liters per Day                                    |
| MLD    | Million Liters per Day                                 |
| NA     | Not Applicable   |
| NGO    | Non-Governmental Organization                          |
| NMCG   | National Mission for Clean Ganga                       |
| ODF    | Open Defection Free                                    |
| QCI    | Quality Council of India                               |
| RLBs   | Rural Local Bodies                                     |
| SBM    | Swachh Bharat Mission                                  |
| SFD    | Shit Flow Diagram                                      |
| STP    | Sewage Treatment Plant                                 |
| UDD    | Urban Development Department                           |
| ULBs   | Urban Local Bodies                                     |
| UTs    | Union Territory  |
| WASH   | Water, Sanitation and Hygiene                          |
| WSSD   | Water Supply and Sanitation Department                 |
| WSSO   | Water and Sanitation Support Organization              |
| ZP     | Zilla Parishad   |

## Glossary

|                          |   |
|--------------------------|---|
| Bylaws                   | Regulation made by a local governing authority.   |
| Co-composting            | Co-composting is the controlled aerobic degradation of the organics using more than one material (faecal sludge and organic municipal solid waste)  |
| Community toilets        | Community toilets are toilets located in or near the community area and used by defined users residing in the community.  |
| Compost                  | It is decomposed organic matter that results from a controlled aerobic degradation of organic solid waste.  |
| Containment Unit         | It is a unit which collects, stores and sometimes treats the products generated at the user interface.  |
| Conveyance               | It describes the technology used for transport of products between the functional groups. (User interface/containment unit to treatment facility)   |
| Deep row entrenchment    | It is a technique used for safe disposal of faecal sludge and septage. It consists of digging deep trenches, filling them with sludge and covering them with soil.  |
| Desludging               | The process of removing the accumulated sludge or septage from a septic tank  |
| Drains                   | A channel carrying off liquid discharge such as septic effluent from septic tank, grey water or stormwater. Drains can be lined, unlined, closed or open.   |
| Effluent                 | It is a general term for a liquid that leaves the treatment unit, in this context it is used for blackwater or sludge after it has undergone solids separation.   |
| Enumerator               | Person responsible for conducting survey using survey tool such as tablet or a physical survey form.  |
| Faecal sludge            | It is a raw or partially digested, a slurry or semisolid sludge as a result from the collection and storage/treatment of excreta or blackwater, with or without greywater.  |
| IEC activities           | Information, Education and Communication (IEC) activities are public health system approach aiming at changing behaviors in a target audience, concerning a specific problem and within a pre-defined period of time, through communication methods and principles. |
| Onsite sanitation system | A sanitation system in which excreta and wastewater are collected, stored and/or treated on the plot where they are generated.  |
| Pit latrine              | It is a type of toilet that collects human feces in a hole in a ground. Urine and feces enter the pit through a drop hole in the floor, which might be connected to a toilet seat or a squatting pan for user comfort.  |
| Septic tank              | A septic tank is a watertight chamber made of brick work, concrete, fibre glass, PVC or plastic, through which blackwater from cistern or pour-flush toilets and greywater through a pipe from inside a building or an outside toilet flows for primary treatment.  |
| Sewerage system          | A sewerage system, or wastewater collection system, is a network of pipes, pumping stations, and appurtenances that convey sewage from its points of origin to a point of treatment and disposal.   |
| Shared toilet            | A toilet facility shared by more than one household.  |
| Shit Flow Diagram        | A shit flow diagram is an illustration used to display how excreta moves through a location, and functions as a tool to identify where improvements are needed. The diagram has a particular focus on treatment of waste, and its final disposal or use.            |

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|                |   |
|----------------|---|
| Sludge         | It is a mixture of solids and liquids, containing mostly excreta and water, in combination with sand, grit, metals, trash and/or various chemical compounds.    |
| Soak pits      | A soak pit, also known as a soak away or leach pit, is a covered, porous-walled chamber that allows water to slowly soak into the ground.                       |
| Supernatant    | The layer of liquid overlaying the settled solid which have separated from it.  |
| Survey         | It is a research methodology used for collecting data from a predefined group of respondents to gain information and insights into various topics of research.  |
| User Interface | It describes the type of toilet, pedestal, pan, or urinal with which the user comes in contact; it is the way by which the user accesses the sanitation system. |

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Section

01

# BACKGROUND

## 1 Background

The launch of the Swachh Bharat Mission on 2nd October 2014 had set an ambitious target of making India clean and Open Defecation Free (ODF). According to a report of an independent survey released by the Quality Council of India (QCI), phase I of this mission increased the household access of toilet coverage to 62.5 % and usage of the toilet to 91.3%.

Before initiation of Swachh Maharashtra Mission, 2009 to 2014 were the years when Performance Assessment System (PAS) for urban water and sanitation was implemented in all the cities of Maharashtra through Center for Water and Sanitation in support of Government of Maharashtra and AILSG, Mumbai. Performance improvement plans was made across for urban water and sanitation cities keeping ODF component into consideration and drive Maharashtra towards open defecation free. Swachh Maharashtra Mission for urban areas was launched on 15<sup>th</sup> May 2015 along with the launch of Swachh Bharat Mission. On 1<sup>st</sup> October 2017, urban Maharashtra was declared ODF. Sustainability charter was launched by government of Maharashtra which was emphasizing on the faecal sludge and septage management for sustaining ODF status in Maharashtra. The government has recognized a gap in safe and proper sanitation coverage which made India the first country to announce national policy on FSSM in 2017. By 2018 many states and UTs had adopted the policy and, many state governments had made their guidelines according to the current status of their states and UTs. In 2019, the government launched ODF+ and ODF++ protocols emphasizing FSSM in Swachh Survekshan and allocated certain financial budgets under AMRUT and NMCG missions. In continuation with following this protocols government of Maharashtra had issued a Government Resolution (GR) in 2019 to set up FSTPs in urban Maharashtra. Several urban FSTPs have been constructed under this phase. Out of 384 cities/towns in the state of Maharashtra, 73 cities have regular and safe disposal treatment facilities. In the remaining 311 cities, FSTPs have been constructed as per guidelines, the capacities of FSTPs were decided as per the administrative population of the respective ULBs.

Swachh Bharat Mission (SBM) Grameen had a special focus on the construction of toilets and behavior change to achieve the goal of making the India Open Defecation Free. The second phase of SBM 2.0 is now focused on the management of this waste generated from the constructed toilet i.e., increasing the access to safely managed sanitation facilities and improving sanitation value change of urban and rural India.

### 1.1 Introduction to the study

Government of India passed a D.O. in 2021 issuing directions to Chief Secretaries, Administrators and Advisors to Lt. Governors of all states and UTS which focuses on achieving economy of scale and efforts through adoption of a co-ordinate approach to deal with faecal septage which covers the entire district, without being hinder by urban-rural divide. An emphasis has been given for co-treatment at existing or planned STPs/FSTPs in the neighbouring urban area in the district, where onsite management of faecal waste is not possible and where the village is situated within a radius of 10-15 kms from the urban area.

FSSM plays a critical role in proper and safe sanitation value chain of any city or town. As per a preliminary survey of FSTPs carried out by Maharashtra Urban WASH and Environmental Sanitation Coalition (Maha-UWES-Coalition) and All India Institute of Local Self Government (AILSG), Mumbai,

FSTPs constructed under ULBs in Maharashtra are underutilized as several ULBs are still practicing demand desludging. The performance and efficiency of FSTPs gets affected due to the underutilized status of the plant and it might help to manage rural FSSM.

Considering the above aspects, AILSG of RCUES, Mumbai, and ESF, Pune decided to carry out a pilot study to understand and investigate the possibilities of urban-rural FSSM linkages in Maharashtra. The pilot study in Indapur can lead to insights on feasibility on urban rural linkages through optimal utilization of existing underutilized FSTPs. To conduct the pilot study for Indapur, department of drinking water and sanitation (WSSD), GoM had given permission letter to support the survey and carry out various activities in rural Indapur.

## 1.2 Objectives

The objectives of the study are as follows:

- Investigate the potential of urban-rural linkages of FSSM in Maharashtra.
- Investigate its affordability to households, ULBs and Gram Panchayats
- Business viability check of FSSM including occupational health and safety.

## 1.3 Indapur Profile

As per census 2011, Indapur tehsil has an approximate population of 3,83,183 out of which town population is 25515 (5228 households) and rural population is around 3,57,668 (74455 households) from 142 villages. The percentage decadal increase in population from 2001 to 2011 census of the ULB is 18.2% and for the villages is an average of 9.4%.

Indapur has dry climate as it receives scanty rainfall. The average temperature in Indapur ranges from 20°C to 30°C with May being the hottest month having temperature of up to 40°C, and January being the coldest with temperature going down to 13°C. The average relative humidity in Indapur is 54.5%. August has the highest relative humidity of 83% and the least humid is March at 28%<sup>2</sup>. Figure 1 shows the temperature variation for Indapur tehsil.

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<sup>2</sup> <https://wanderlog.com/weather/9242/1/indapur-weather>



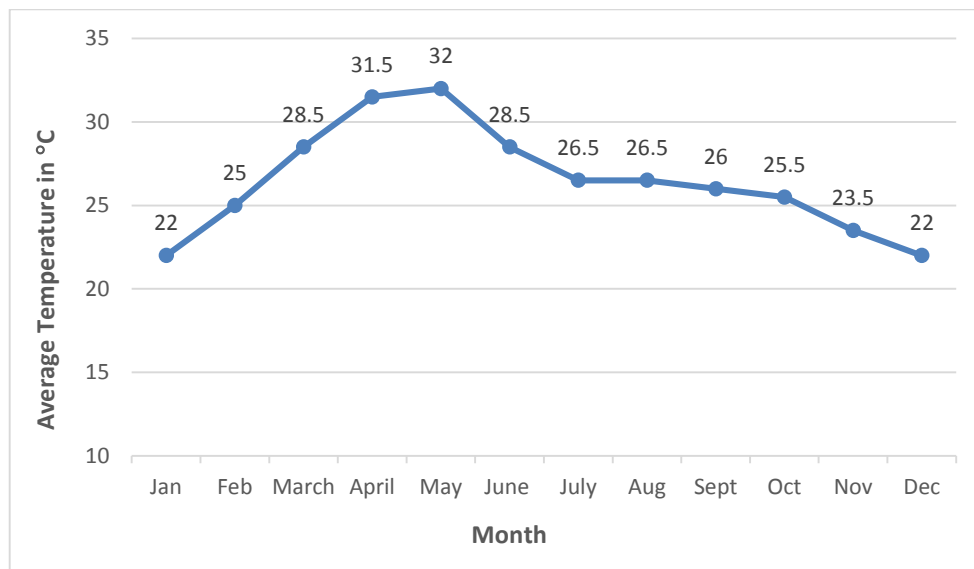
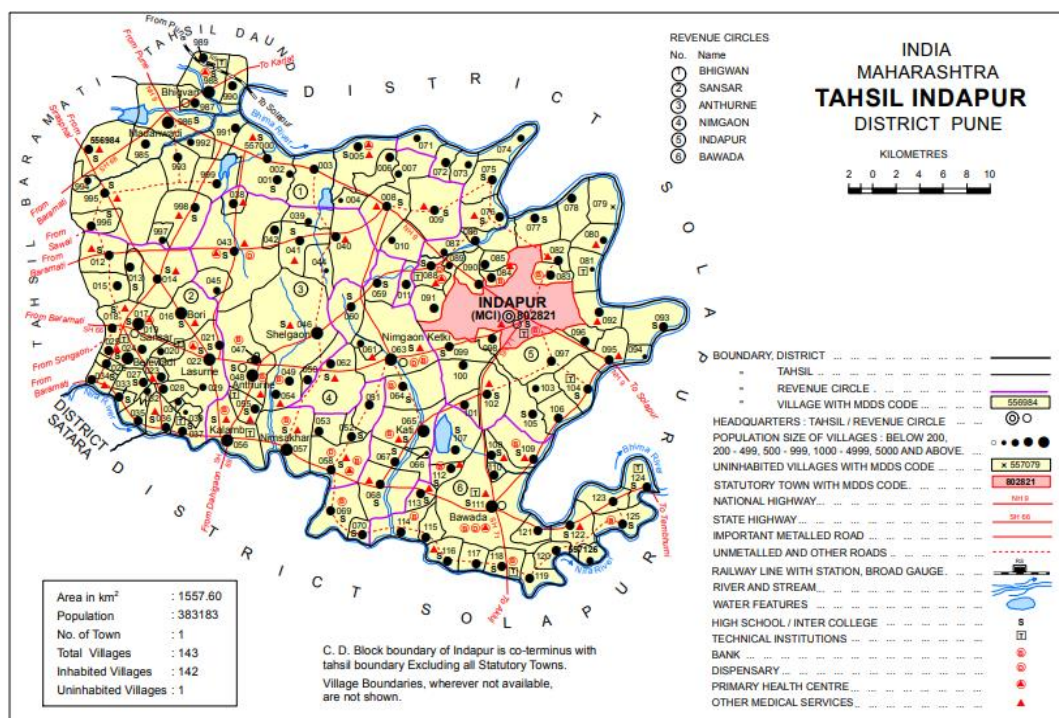


Figure 1 Temperature Variation for Indapur Tehsil

The Indapur tashil is bound between the two rivers Bhima and Nira. The major irrigation and water supply source to Indapur ULB is Ujjani dam backwater along with Nira left canal and Khadakwasla canal system.



(Source: District Census Directory, Census 2011)

Figure 2 Map of Administrative Boundary of Indapur

## 1.4 Sanitation Profile

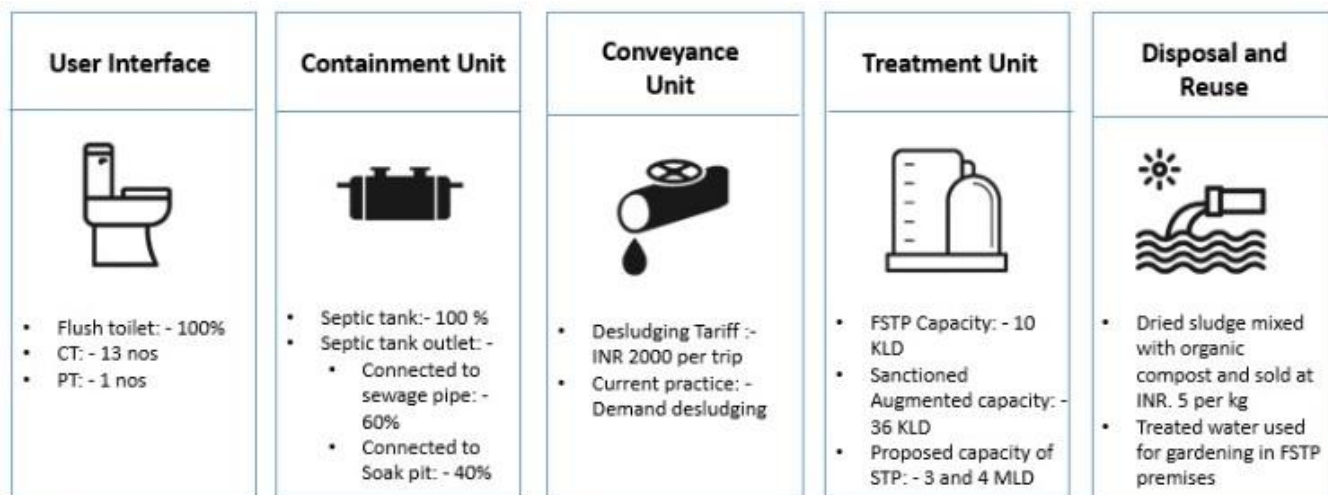


Figure 3 Sanitation Chain: Indapur ULB

(Source: KII with ULB Officials)

Indapur ULB was declared ODF in September 2016<sup>3</sup> since Indapur ULB has 100% access to toilet and safe sanitation facilities. According to the KII with an ULB official the ULB has 13 community toilets which serves approximately 800 households i.e., 5300 population. A public toilet is located at bus stand. Out of the 13 community toilets, 6 are located in slum, which is cleaned everyday by sanitation worker appointed by Indapur Municipal Council. As informed by the ULB officials, all toilets in the ULB are connected to septic tanks. 60% of the septic tanks in ULB are connected to underground drainage network whereas 40% are connected to soak pits. Indapur has 100% underground drainage network to which grey water from bathrooms, kitchen and septic tank effluents and outlet of septic tanks are connected. The wastewater carried by this underground drainage network is disposed without treatment into Bhima River. Currently, there is no STP installed in town to cater to this generated wastewater. As per information provided by the engineer of council, two STPs are proposed to urban development department of capacity 3 MLD and 4 MLD.

Indapur council has 2 desludging vehicles, a trailer-mounted suction machine of 3000 L capacity and a suction truck of 4000 L capacity. Households contact municipal council for desludging services at a charge of INR 2000 per trip. A digital log book at FSTP is maintained by the ULB. The O&M cost of FSTP is recovered from multiple sources- (a) sanitation tax collected from each household which is INR 100 per W.C., (b) desludging fee paid by households and (c) Sale of compost at INR 5 per Kg. Farmers buy the compost and use it in their farms whereas the treated wastewater from FSTP is been reused for gardening in the FSTP premises. Currently, the farmers are also using untreated wastewater from underground drainage for farming which is not permissible as per Indian standards<sup>4</sup>.

<sup>3</sup> [ODF declared cities, MoUD- 2016](#)

<sup>4</sup> The Environment (Protection) Rules, 1986



Figure 4 Desludging Vehicle- Indapur

### 1.5 FSTP Profile

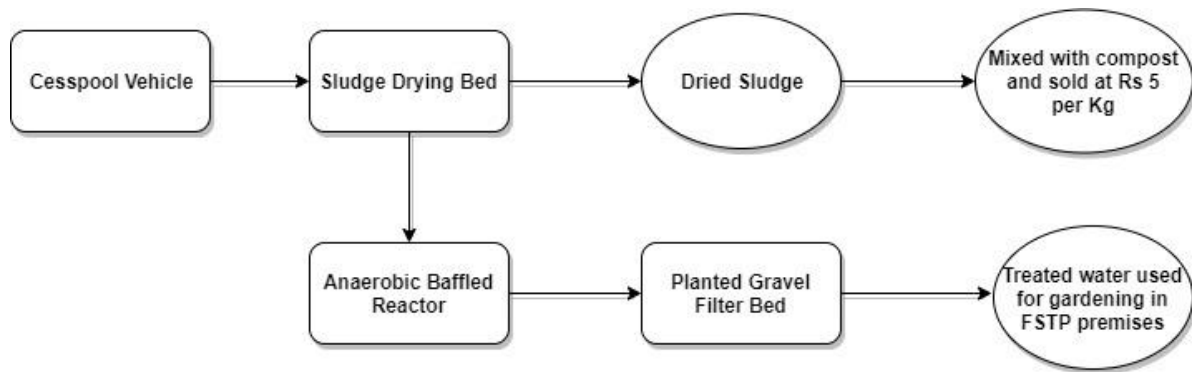


Figure 5 Treatment Chain: Indapur FSTP

The design capacity of Indapur FSTP is 10 KLD. It is situated at the outskirts of town beside the solid waste management plant. The Figure 6 shows the location of Indapur with respect to the boundary of the town. The construction of FSTP was as per Government of Maharashtra GR (GR No. SMM 2019/C.R.124/UD-34)<sup>5</sup>. An augmented capacity of 36 KLD has been sanctioned for Indapur as per UDD GR (GR No. SMM-2020/C.R.85/UD-34)<sup>6</sup>. It is a natural treatment process with sludge drying beds for solid-liquid separation and drying of sludge whereas liquid after separation flows to anaerobic baffled tanks and constructed wetland for treatment.

<sup>5</sup> Maharashtra Government Resolution for setting up of FSTP: [GR No. SMM 2019/C.R.124/UD-34](#)

<sup>6</sup> Maharashtra Government Resolution for augmentation of existing FSTP capacities: [GR No. SMM-2020/C.R.85/UD-34](#)

Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra

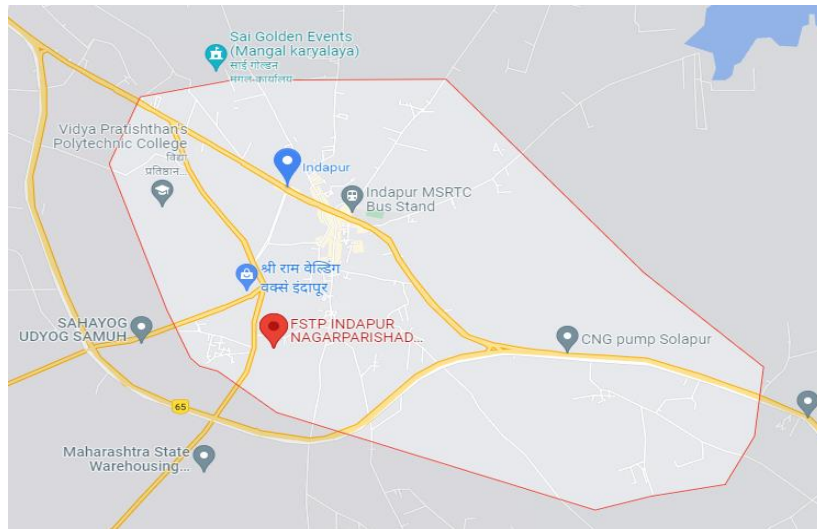


Figure 6 Location of FSTP



Figure 7 Treatment Unit: Indapur FSTP

Section

02

# APPROACH & METHODOLOGY

## 2 Approach and Methodology

The project methodology is indicated below in Figure 6. Desk research was conducted to understand the stakeholders' profile and determine their engagement in the system. To carry out the household surveys, villages' identification and mapping activity was undertaken. The sampling strategy was decided considering the number of households in the village and the distance of village from FSTP. Secondary and primary data was collected from urban and rural Indapur. After data collection and data cleaning, data analysis was performed to assess the sanitation service delivery. The gaps in the service delivery were identified to draw conclusions and recommendations for urban and rural FSSM linkage in Indapur Tehsil.

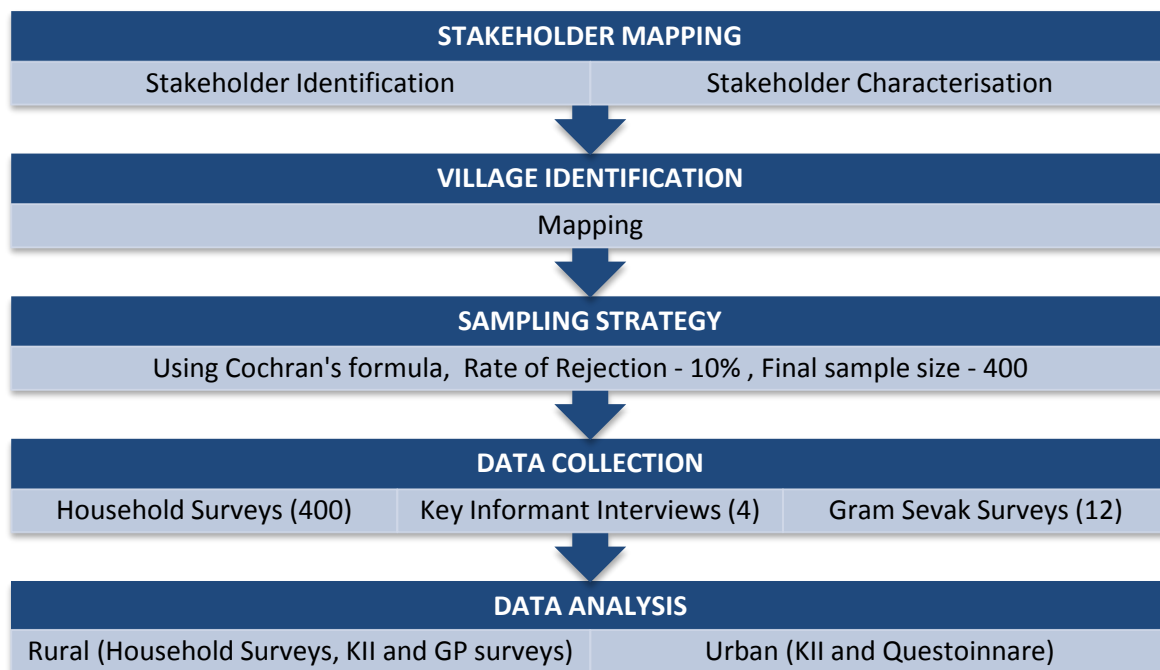


Figure 8 Methodology adopted for the project.

The progress of the project is shown in the below Gantt chart.

Table 1 Project Progress

| Sr. No. | Activities   | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | W13 | W14 | W15 | W16 | W17 | W18 | W19 | W20 |
|---------|--|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1       | Stakeholder mapping and characterization                     |    | ■  |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |
| 2       | Preparations of maps and secondary data survey questionnaire |    |    | ■  | ■  |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |
| 3       | Designing Household Survey, KII and sampling strategy        |    |    |    | ■  | ■  |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |
| 4       | Permissions from UDD and WSSD                                |    |    |    |    |    | ■  | ■  | ■  | ■  | ■   |     |     |     |     |     |     |     |     |     |     |
| 5       | Communication with ULB officials                             |    |    |    |    |    |    |    |    | ■  | ■   |     |     |     |     |     |     |     |     |     |     |
| 6       | Visit to ULB and FSTP  |    |    |    |    |    |    |    |    |    | ■   |     |     |     |     |     |     |     |     |     |     |
| 7       | Identification and Trainings of Enumerators                  |    |    |    |    |    |    |    |    |    | ■   | ■   |     |     |     |     |     |     |     |     |     |
| 8       | Household Survey   |    |    |    |    |    |    |    |    |    |     |     | ■   | ■   | ■   |     |     |     |     |     |     |
| 9       | KII with Gram sevak  |    |    |    |    |    |    |    |    |    |     |     | ■   | ■   | ■   |     |     |     |     |     |     |
| 12      | KII with government officials                                |    |    |    |    |    |    |    |    |    |     |     | ■   | ■   | ■   |     |     |     |     |     |     |
| 13      | KII with desludging operators                                |    |    |    |    |    |    |    |    |    |     |     |     |     | ■   |     |     |     |     |     |     |
| 14      | Data analysis and Feasibility assessment report              |    |    |    |    |    |    |    |    |    |     |     |     |     | ■   | ■   | ■   |     |     |     |     |
| 15      | Submission of draft report                                   |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     | ■   | ■   |     |     |
| 16      | Final submission of the report                               |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     | ■   | ■   |

## 2.1 Stakeholder Mapping & Characterization

Key factors for successful implementation of FSSM services are efficient desludging services provided to the households addressing the key stakeholders involved in advocacy, design, implementation and operation of the sanitation service chain. A stakeholder mapping exercise was performed to understand the administrative landscape pertaining to sanitation in urban and rural Maharashtra. Table 2 shows the output of the stakeholder mapping exercise at a glance.

The Urban Development Department (UDD), Director of Municipal Administration (DMA), and Urban Local Body (ULB) are collectively responsible for the appropriate functioning of urban sanitation and wastewater system. The ULB is responsible for planning of urban water and wastewater projects. Technical review and financial sanctioning of the project is done by UDD. The UDD also looks after policy formation, regulation and actual implementation of schemes and plans of state and central government at the urban level. As per the municipal acts<sup>7</sup>, ULBs have a dual role of service provision for public services (construction of drains, sewerage systems, community toilets, etc.) and regulations of activities of households (construction of household latrines, service connections, etc.). DMA is responsible for the monitoring, supervision, coordination, and governance of the system whereas service provision is the responsibility of the ULB.

Table 2 Stakeholder Mapping

| Stages                                    | Containment / Connection                                | Collection & Conveyance  | Treatment                                 | Reuse and Disposal  |
|---|---|--|---|---|
| <b>Stakeholders in FSSM</b>               | UDD<br>Municipal councils/Nagar Panchayat<br>Households | Municipal councils/Nagar Panchayat<br>Desludging Operators<br>Households | UDD<br>Municipal councils/Nagar Panchayat | Maharashtra Pollution Control Board<br>Municipal councils/Nagar Panchayat |
| <b>Stakeholders in Sewered Sanitation</b> | Municipal councils/Nagar Panchayat<br>Households        | Construction: DMA & O&M: Municipal Council/ Nagar Panchayat              |   | Municipal councils/Nagar Panchayat  |

<sup>7</sup> [The Maharashtra Municipal Council Nagar Panchayat and Industrial Township Act, 1965](#)



The Water Supply and Sanitation Department (WSSD) is the institution at the apex for sanitation projects in rural Maharashtra. They look after the policy formation, regulation, coordination, and governance of the rural sanitation system. The Water and Sanitation Support Organization (WSSO) is responsible for planning whereas the Zilla Parishad (ZP) and Rural Local Body (RLB) are responsible for implementation and service provision.

Stakeholder characterization helps to derive the engagement model for different stakeholders. For characterization of stakeholders, the influence - interest matrix was used to determine the engagement level.

Table 3 informs us whom to consult, inform and with whom one should collaborate during the project to improve FSSM in urban and rural Maharashtra.

Table 3 Stakeholder Characterization

|                | High Interest   | Low Interest  |
|----------------|---|---|
| High Influence | <p><b>KEY STAKEHOLDERS   ENGAGE actively</b><br/>Municipal Councils, Gram Panchayat (Gram Sevak)<br/>Desludging Operators, Households</p> <p><b>CONSULT   COLLABORATE   EMPOWER</b></p> | <p><b>Meet their needs   Keep Satisfied</b><br/><br/>DMA/ZP</p> <p><b>CONSULT AND INFORM</b></p>                  |
| Low Influence  | <p><b>Show consideration   Keep informed</b><br/><br/>UDD/ZP</p> <p><b>CONSULT AND EMPOWER</b></p>  | <p><b>Least Important   Minimal Efforts</b><br/><br/>Maharashtra Pollution Control Board</p> <p><b>INFORM</b></p> |

## 2.2 Village Identification

Travel distance and access to roads are the major factors affecting the desludging services. The distance of the village from the treatment facility inversely affects the financial viability of the desludging services. Therefore, the road distance of a village from FSTP was an essential factor for the identification of a village for the study. Villages located within the 10 km of aerial distance were filtered out from the 142 villages. Villages having a driving distance of less than 10 km were identified and selected for the part of the study. Out of 142 villages in Indapur Tehsil, 16 villages were selected to carry out the household

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surveys, and are shown in Figure 9. These 16 villages were under 12 different Gram panchayats having a total population of around 30,336 with a total number of households of 6,243.

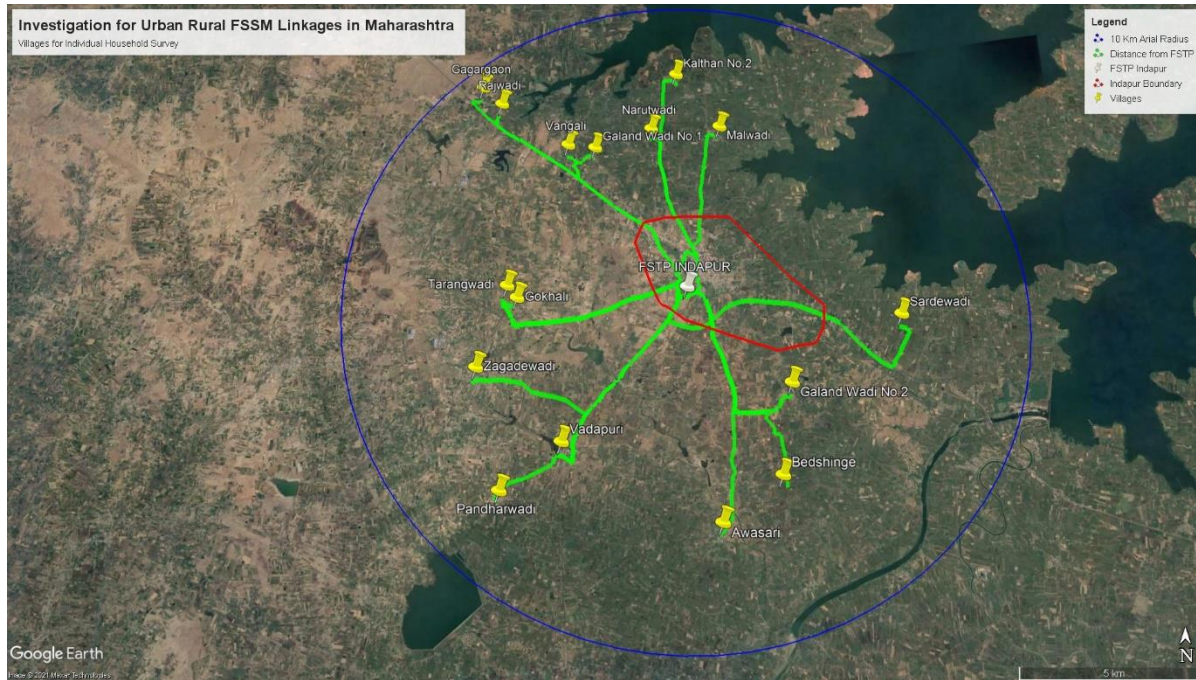


Figure 9 Villages for Individual Household Surveys

Table 4 List of Villages

| Sr. No. | Villages     | Population | Households | Driving Distance from FSTP (Km) |
|---------|--------------|------------|------------|---------------------------------|
| 1       | Awasari      | 2011       | 496        | 8.10                            |
| 2       | Bedshinge    | 759        | 183        | 8.20                            |
| 3       | Gagargaon    | 709        | 152        | 10.10                           |
| 4       | Galandwadi 1 | 1873       | 370        | 6.70                            |

|    |                 |              |             |              |
|----|-----------------|--------------|-------------|--------------|
| 5  | Galandwadi No.2 | 2299         | 470         | 5.10         |
| 6  | Gokhali         | 1608         | 373         | 7.00         |
| 7  | Kalthan No.2    | 1188         | 256         | 9.00         |
| 8  | Malwadi         | 4263         | 848         | 6.70         |
| 9  | Narutwadi       | 1331         | 224         | 6.50         |
| 10 | Pandharwadi     | 1198         | 235         | 9.20         |
| 11 | Rajwadi         | 508          | 104         | 8.90         |
| 12 | Sardewadi       | 3187         | 604         | 10.20        |
| 13 | Tarangwadi      | 2557         | 513         | 6.80         |
| 14 | Vadapuri        | 4401         | 919         | 6.70         |
| 15 | Vangali         | 1251         | 265         | 6.50         |
| 16 | Zhagadewadi     | 1193         | 231         | 8.50         |
|    | <b>Total</b>    | <b>30336</b> | <b>6243</b> | <b>124.2</b> |

### 2.3 Sampling Strategy

The total number of households and driving distance from FSTP is a known factor, so the sample size for the survey is found using Cochran's formula. The Cochran formula is generally used to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population. Cochran's formula is considered appropriate in situations where large populations and households need to be surveyed. Using Cochran's formula, we could find out the sample size for the survey as the number of households is a known variable in the formula.

$$n_0 = \frac{Z^2 pq}{e^2}$$

were

$n_0$  = Proportion for unknown population = 384

Z = constant coefficient of confidence level of 95% = 1.96 (From Z-table)

p = Standard deviation

q = 1-p

e = desired level of precision (margin of error) = ±5%

So, a random sample of 384 households in our target population should be enough to give the confidence level needed.

**Cochran's formula: -**

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

were

n = Cochran's sample size of unknown population = 361.80 household

n<sub>0</sub> = number of populations for known households = 384

N = Total number of households known = 6243

The sample size for individual household surveys using Cochran's formula was calculated as 361.80, 10% rate of rejection was added to the determined value. The sample size was finalized as 400. Distance from FSTP and the number of households in 16 villages are the two main factors considered while distributing 400 sample sizes for household survey. Selection of villages near Indapur Municipal Council's FSTP will be more economical and affordable for operators and households to carry out a desludging activity, so higher sample sizes in villages closer to the FSTP were chosen for household surveys as a strategic sampling strategy. The allocation of sample size for each village was carried out based on proportional allocation with 70% to the distance of the village from FSTP and 30% weightage to the number of households per village.

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*Higher weightage has been assigned to distance as only one household is covered per trip. Thus, distance of the village impacts and leads to increase in the cost-of-service. Irrespective of high demand for the service, the service charges would not reduce and remain high, hampering the feasibility of urban rural linkages.*

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Table 5 provides the distribution of the number of households to be surveyed per village based on the weightage assigned based on distance and population.

Table 5 Sample size for Individual household survey

| Sr. No. | Villages        | Sample Size allocation   |
|---------|-----------------|--|
|         |                 | (70% Distance as a major factor and 30 % number of households as a minor factor) |
| 1       | Awasari         | 26   |
| 2       | Bedshinge       | 20   |
| 3       | Gagargaon       | 15   |
| 4       | Galandwadi 1    | 27   |
| 5       | Galandwadi No.2 | 32   |
| 6       | Gokhali         | 26   |
| 7       | Kalthan No.2    | 20   |
| 8       | Malwadi         | 36   |
| 9       | Narutwadi       | 25   |
| 10      | Pandharwadi     | 19   |
| 11      | Rajwadi         | 17   |
| 12      | Sardewadi       | 24   |
| 13      | Tarangwadi      | 30   |
| 14      | Vadapuri        | 38   |
| 15      | Vangali         | 25   |
| 16      | Zhagadewadi     | 20   |
|         | <b>Total</b>    | <b>400</b>   |

## 2.4 Data Collection

The modes of data collection were household surveys, survey of the Gram Sevaks of Gram Panchayats and key Informant Interview with stakeholders. The data collection methods aimed to understand the on-ground sanitation system and practices in the urban and rural context of Indapur Tehsil.

### 2.4.1 Household Surveys

The survey questionnaire was aimed to understand the sanitation practice in the villages and the willingness of households to pay for the FSSM services. The survey questionnaire was related to water, sanitation, and waste management practices at household level. Six local enumerators were identified to conduct the surveys. The surveys were conducted with the help of M-water platform. A one-day online workshop was organized, to train the enumerators, familiarize them with sanitation systems, and questions and options in the questionnaire. The slide deck used for training is available in Annexure 4: Enumerator Training Slide deck.

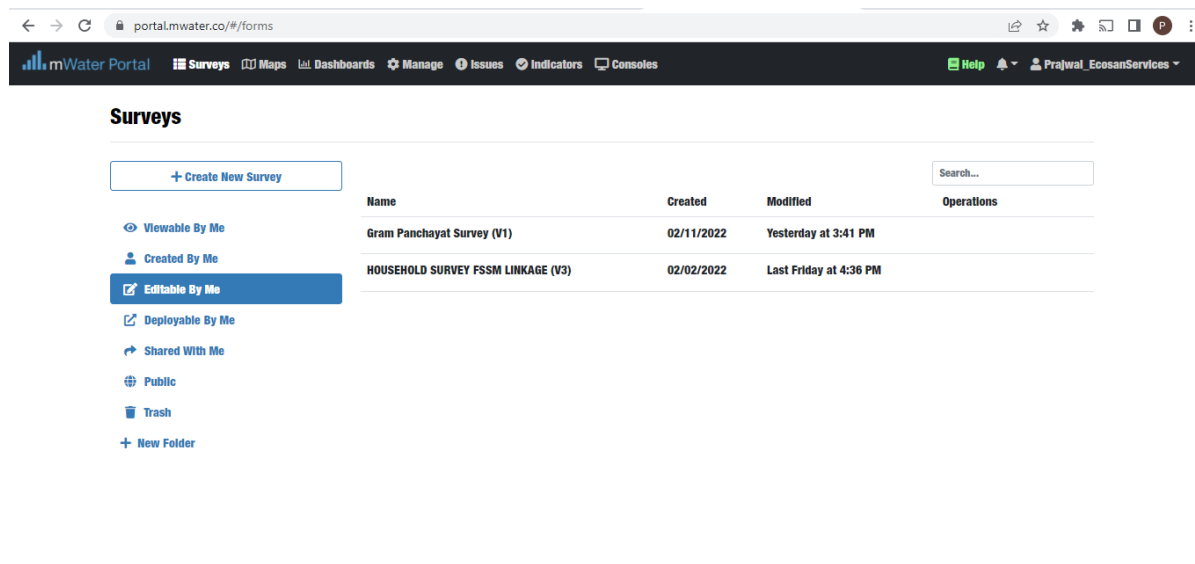


Figure 10 M-water Platform

M-water surveyor app was used for conducting household surveys. Data like GPS location of the house, photos of toilets, containment unit and roads were included in the questionnaire to keep a quality check of received survey forms. A complete household questionnaire is attached in Annexure 5: Household Survey Questionnaire. To avoid any biases in the data collected, the enumerators were instructed to avoid selecting adjacent households for the survey.

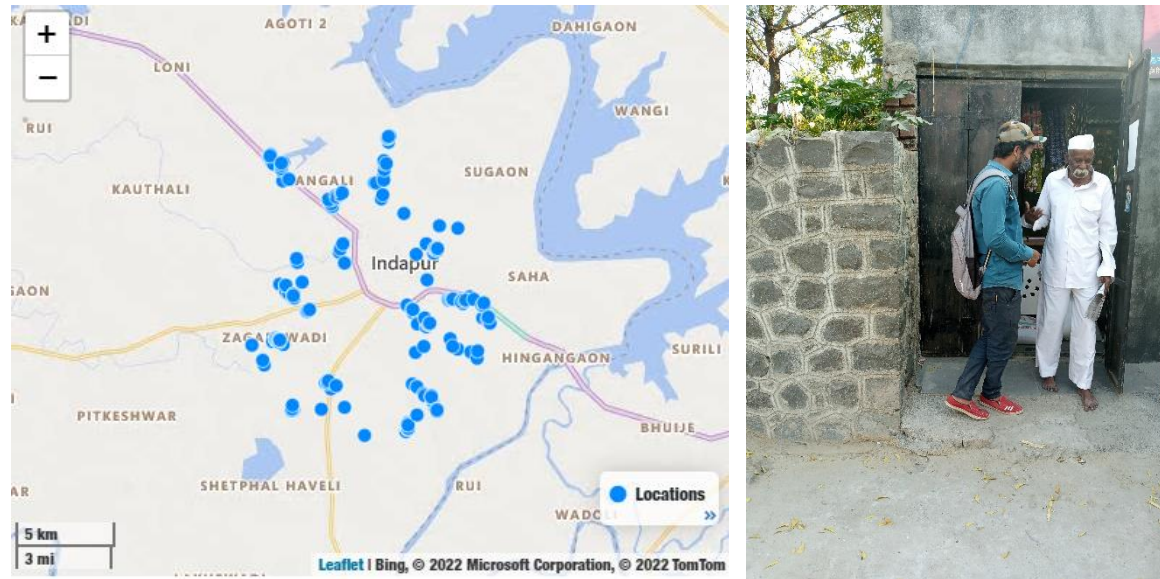


Figure 11 Household Survey

#### 2.4.2 Gram Sevak Surveys

The process of rural data collection was undertaken with active engagement of Mr. Milind Tonpe, Deputy CEO, Zilla Parishad, Mr. Kudve, SBM Officer, ZP, Mr. Vijaykumar Parit, Block Development Officer, Panchayat Samiti Indapur and Mr. Solapuri, Block Coordinator, Panchayat Samiti Indapur. The contact details of gram sevaks were provided by Panchayat Samiti officials. All the gram sevaks were contacted to carry out the household surveys in villages.

The Gram Panchayat surveys were conducted simultaneously during the household surveys. A total of 12 Gram Sevaks of 16 villages were surveyed. The M-water platform and M-water surveyor app was used for conducting the surveys. Results obtained from the survey helped to cross verify the results obtained from the household surveys. The data obtained from Gram Panchayats is available in Annexure 6: Gram Panchayats Data.

#### 2.4.3 ULB Data Collection

A meeting was held with Mr. Ranjit Kapre, CO, Indapur Municipal Council to brief on the scope of the research study. Permission and cooperation for data collection and FSTP visit were provided by ULB officials. A questionnaire was developed to obtain the urban data. The questionnaire aimed to understand



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the current sanitation practice in the town. It consisted of data regarding access to toilet, type of toilet, containment unit, means of wastewater disposal etc. A filled ULB data sheet is available in

Annexure 7: Indapur Urban Data.

#### 2.4.4 Key Informant Interviews

Four key Informant Interviews were conducted with various stakeholders to understand the current sanitation system of Indapur. The willingness of stakeholders to establish urban-rural linkages was also studied. ULB officials, a Panchayat Samiti official, Gram Sevaks, and the council appointed desludging operator were interviewed to collect data, understand the current scenario, future FSSM plans and the overall activities conducted by them. The KIIs were performed in form of detailed qualitative discussions with the stakeholders. KII discussions and outcomes are available in Annexure 8: Key Informant Interview.

Section

03

DATA ANALYSIS

### 3 Data Analysis

3.1 The household and gram panchayat data filled through M-Water tool which helps to analyze and visualize collected data in required format. After rural data analysis through M-Water, urban and rural data combined analysis was carried out through weighting technique which helped to generate SFD of Indapur urban and 16 villages considered under the study. Household Surveys

Household surveys were conducted in 16 villages covering 400 households. Out of the received responses, 10 were rejected during data cleaning due to incompetent data. As the number of accepted responses is greater than the sample size of 362, the strategy of adding 10% of sample size as the rate of rejection helped to achieve statistically adequate data for data analysis and research.

Quantitative analysis was performed on the data collected through household surveys to understand the sanitation infrastructure in the villages. Percentages of components of sanitation service chain were determined to analyze the scope of FSSM in the surveyed villages. Quantitative analysis of responses to questions regarding IEC, water treatment and water borne diseases etc. helped to understand the awareness of FSSM and the effect of improper FSSM on ground water, environment etc. was a huge part of the household survey analysis. The findings from data analysis are presented in Section 4.1 to 4.5.

#### 3.2 Faecal Sludge Treatment Plant

The household survey served its purpose to identify the scope of FSSM but the analysis would have been incomplete without evaluating the demand of desludging, quantity of septage to be managed daily and capacity of FSTP under various possibilities of linkages. Therefore, to understand the sustainability of linkages under various conditions based on the capacity of the FSTP the following analysis was undertaken: -

Based on type of desludging three various approaches of the linkages are possible. The possible approaches are;

- a. Demand Desludging in Urban and Rural
- b. Scheduled Desludging in Urban and Demand Desludging in Rural
- c. Scheduled Desludging in Urban and Rural

#### 3.3 Shit Flow Diagram

The main aim of establishing an Urban-Rural linkages is for safe management of faecal sludge for Indapur Municipal Council and the 16 neighboring villages thereby improving the economics of sanitation service chain. To analyze the current situation and identify the gaps in the service chain, a comprehensive SFD of Indapur Municipal Council and its neighboring villages was made. To prepare a combined SFD, weighted analysis of all the components of rural and urban sanitation chain was important so that the generated SFD will show reliable picture of current sanitation ground situation.

The required sanitation data for weighted calculations was found out from the household survey data analysis, KII and from urban questionnaire. For obtaining the SFD, weighted calculations were considered for parameters such as percentage of various containment units connected to various conveyance or disposal units. The SFD is presented in the results in Section 4.6.

Section

04

RESULTS

## 4 Results

This section presents the findings based on data collected from households pertaining to the current water, sanitation and environment statutes of the villages.

### 4.1 General Information

The major occupation of people residing in villages in Indapur is farming. Approximately 83.10% population in village having farming as a main source of income. Some other occupations in which the village population is involved are salary jobs, traders/shopkeepers and daily wage employee.

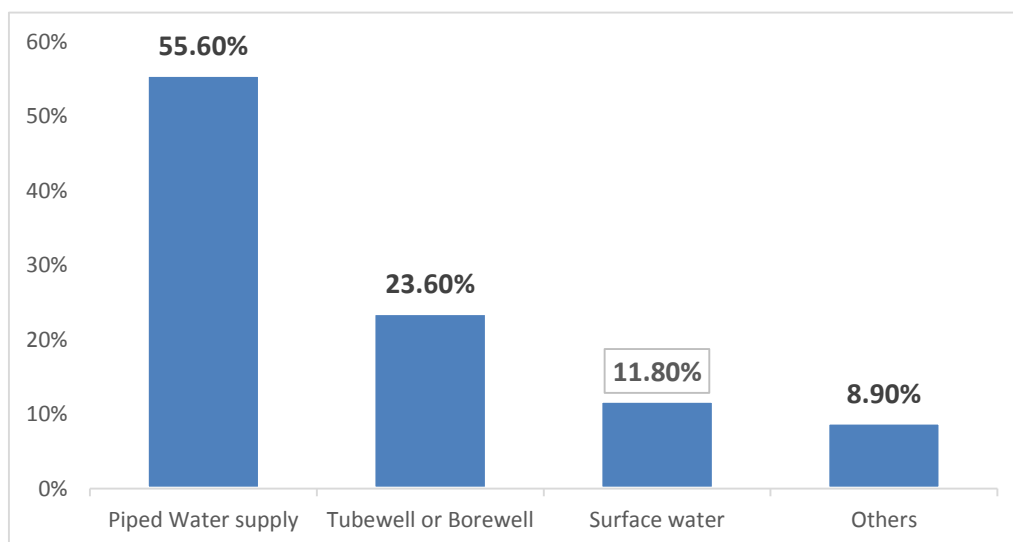


Figure 12 Source of Water for Villages

The main source of water for people in villages is piped water connections whose raw water source is dug wells and bore wells. Another 23.60% households have tube well or borewell in the household premise. Therefore, more than 79.2% of the households depends on ground water. Water from these sources is available throughout the year. Use of water filter at household level before consuming is the most common practice of the villagers, 81.2 % of households have filters installed in their houses and some of them are dependent on RO treatment plant installed by the Gram Panchayats. As per aquifer maps and ground water management plan 2018 <sup>8</sup>, ground water in Indapur has chemical parameters which are beyond the maximum permissible limit for drinking indicating that such water is not fit for drinking if directly consumed without further treatment. 11.78% of the people consume water directly without treatment. Nevertheless, no outbreak of water borne disease have been experienced in the 16 surveyed villages.

### 4.2 User Interface

Almost 97% of households in villages have access to individual household toilets. Flush toilets either bucket flush or cistern flush are preferred and prevalent. The usage of pit latrines is also observed in Vangali, Galandwadi No 1, Galandwadi No 2, Sardewadi, Tarangwadi, Gokhali and Zhagadewadi villages. In absence of individual household toilets, the residents use shared toilets.

<sup>8</sup> [Aquifer Maps and Ground Water Management Plan, Ministry of Water Resources, River Development And Ganga Rejuvenation Government Of India, 2018](#)

### 4.3 Containment Unit

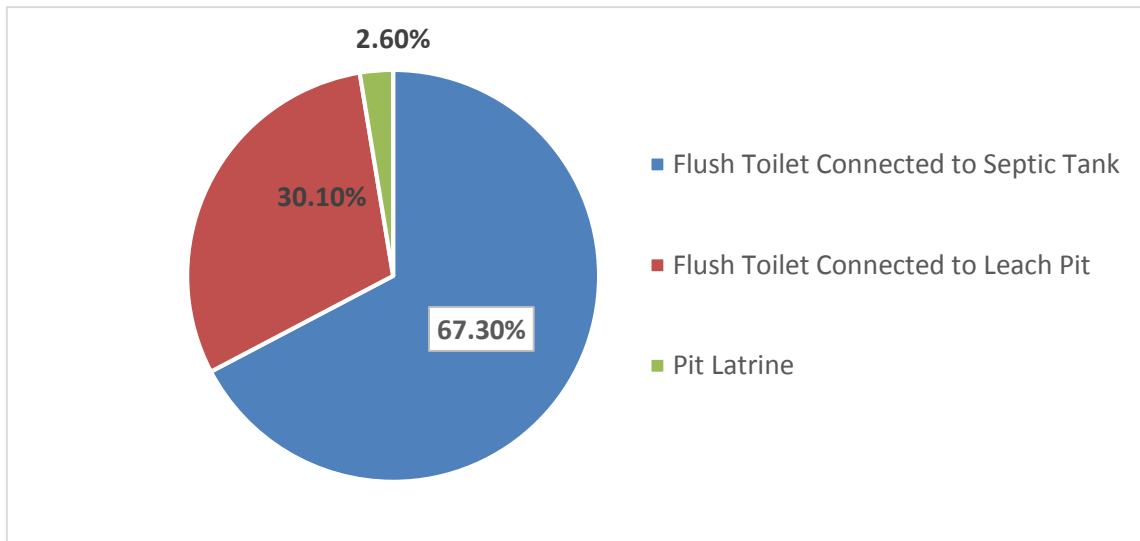


Figure 13 User Interface and Containment/Disposal Unit Distribution

The most prominent on-site sanitation system found in villages are flush toilet connected to septic tank. Approximately 67.3 % of households have flush toilets connected to septic tanks. 30.1% households have toilets connected to soak pits. Approximately, 2.6% of the households still use pit latrines.



Figure 14 Containment and Disposal Unit



Figure 15 Septic Tank (Rural)

The most common type of containment unit found in villages are three chambers septic tank. They account for 90% of the septic tanks found in the villages. The average dimensions of the septic tank are 2.5m length X 2m width X 2.5m depth. The average dimensions of the leach pits in villages are 1.2m diameter and 2.1m depth.

During the survey, it was observed that the septic tanks are not build according to the standards and are constructed oversized. The inlets of septic tank are given inappropriately. No vent pipes are provided to the septic tanks.

#### 4.4 Conveyance/Transport

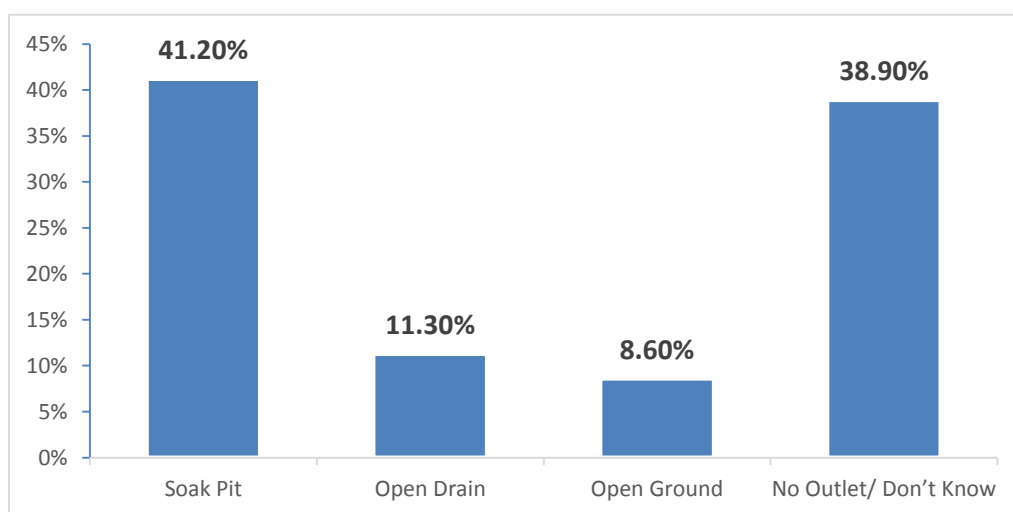


Figure 16 Septic Tank Outlet Connection

The above Figure 16 shows an illustration of how the supernatant of septic tank are conveyed/disposed. The supernatant from the septic tank is disposed in soak pit, open drains or on open ground. 41.2% of the outlet of septic tanks are connected to soak pit. 38.9 % of the households surveyed are unaware of the mode of disposal of the septic tank effluent.





Figure 17 Mode of Disposal (Septic Tank Effluent)

Only 0.01% which is 4 households responded that they had emptied the containment unit. Out of these 4 households, 2 households emptied the soak pit. The average cost of desludging was INR 4800. The household had contacted Municipal Council for availing the desludging service.

**Households expressed their willingness to opt for desludging services in near future.**

#### 4.5 Reuse/Disposal

There are no treatment facilities available for the treatment of faecal sludge or supernatant at the village level. Households having twin leach pits have been instructed by the gram panchayats to use the content after 2 years as a manure. Households are willing to use the content as manure. The disposal of supernatant is unhygienic and not environment friendly when disposed in open drains, open grounds and water bodies impacting health in the village due to breeding of flies and mosquitoes.

#### 4.6 Shit Flow Diagram

Currently, Indapur and all 16 villages completely depend on on-site sanitation system. To generate SFD, weighted calculation was conducted for ULB and 16 villages. In urban Indapur, toilets connected to septic tanks and then connected to underground drainage are 27% whereas septic tank connected to soak pits for both rural and urban are 29%. The septic tanks connected to open drains, open ground and no outlet are 3%, 3% and 21% respectively. In villages toilets connected to soak pits and pit latrines are 17%. The generated SFD shows that 60% of total faecal sludge in the study area is contained but not emptied. This can be co-related to the fact that 29% of the septic tanks in the study area are connected to soak pits and 27% are connected to underground drainage system. It can be observed that 26% of generated faecal sludge is neither contained nor disposed of safely.

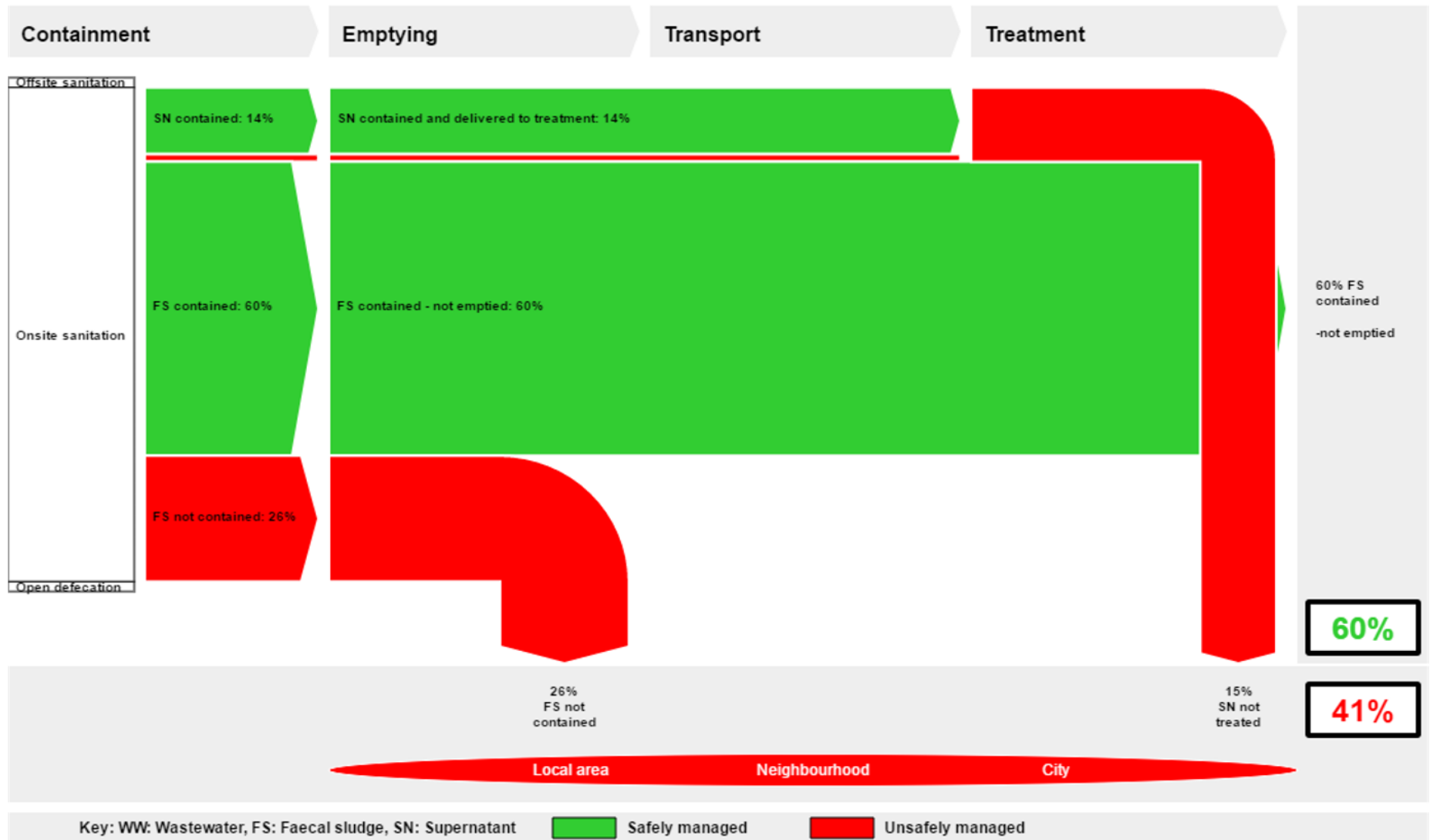


Figure 18 Shit Flow Diagram

Almost 100% of the urban supernatant flows through the undergoing drainage network constructed in Indapur. Although the supernatant is transported safely it does not reach any treatment facility resulting in contamination of water body at the city level. The rural supernatant flows through open drains or is disposed on open ground and hence is neither safely managed nor treated. To ensure a successful Urban-Rural linkages it is of utmost importance to contain and safely manage and treat supernatant and faecal sludge. The suggestions and recommendations to safely manage the supernatant and faecal sludge are provided in the Section 6.

#### 4.7 Desludging Options for Linkages

To evaluate the load received under various scenarios of linkages mentioned in Section 3.2, technical calculations were performed on the population data derived from the census 2011. According to the Census on India, the decadal population growth rate for Indapur Municipal Council were taken as 18% whereas 10% for rural Indapur. Considering the decadal growth, population projection for next 15 years were calculated with base year as 2020. The amount of sludge received per day was calculated for the projected years, considering the desludging frequency for demand desludging as 15 years, this frequency was found out from Gram Sevak surveys and KII. For schedule desludging, frequency was considered as 3 years as per government resolutions<sup>9</sup>. The number of working days was considered as 300. Table 6, Table 7 and Table 8 provides a summary of the load received at FSTP per day under various approaches and the capacity required to sustain the load. The below calculation is on the basis of current population.

**Table 6 Scenario A: Demand desludging in urban and rural habitat**

| <b>Demand Desludging (U&amp;R)</b>  |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Septage to be managed: 10.8 KLD</li> <li>• Septic tanks to be serviced: 3/day</li> <li>• Vehicles required: 1</li> </ul> | <ul style="list-style-type: none"> <li>• Most suitable option in long run due to oversized septic tanks</li> </ul> |

#### **Scenario A: Demand desludging is practiced in urban and rural habitat**

Currently, urban and rural are practicing demand desludging and considering the current rate of desludging as 15 years, a maximum load of 10.8 KLD per day is expected at the FSTP. According to this capacity, three septic tanks per day can be desludged. Assuming that the desludging truck can perform three trips per day, only one vehicle is needed to fulfill the requirement of demand desludging in urban and rural habitat. So as per the exiting situation, the current capacity of FSTP will cater to the rural desludging demand for few more years until ULBs start practicing scheduled desludging.

**Table 7 Scenario B: Scheduled desludging in urban and demand desludging in rural habitat**

| <b>Scheduled (U) – Demand (R) Desludging</b>  |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Septage to be managed: 32.8 KLD</li> <li>• Septic tanks to be serviced: 9/day</li> <li>• Vehicles required: 3</li> </ul> | <ul style="list-style-type: none"> <li>• Possible only under augmented capacity of 36 KLD with a need of next augmentation after 6 years</li> </ul> |

<sup>9</sup> Maharashtra Government Resolution for setting up of FSTP: [GR No. SMM-2020/C.R.85/UD-34](#), 2020

**Scenario B: Scheduled (U) – Demand (R) Desludging**

When scheduled desludging is practiced in urban habitat, the total septage to be managed per day will be 32.8 KLD. This load cannot be sustained by the current 10 KLD FSTP capacity. Hence to establish this form of linkages, augmentation of FSTP is needed. Under this approach septic tanks from eight urban households and one rural household needs to be desludged every day. To cater to this demand three desludging vehicles of capacities 3000L or 4000L will be needed.

Table 8 Scenario C: Scheduled desludging in urban and rural habitat

| <b>Scheduled Desludging (U&amp;R)</b>  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Septage to be managed: 54.2 KLD</li> <li>• Septic tanks to be serviced: 15/day</li> <li>• Vehicles required: 5</li> </ul> | <ul style="list-style-type: none"> <li>• Very challenging to achieve scheduled desludging due to need of very efficient management of resources.</li> </ul> |

**Scenario C: Scheduled Desludging (U&R)**

When the desludging frequency for both urban and rural habitant is considered as 3 years, a daily load of 52.4 KLD will be received at the FSTP. Eight septic tanks in urban habitant and seven septic tanks in rural habitant needs to be desludged per day. Five desludging vehicles of capacities 3000L or 4000 L will be required to fulfill the demand. For complete discussion on the suitability of the various scenarios of linkages for Indapur refer Section 5.1.

Section

05

INFERENCES

## 5 Inferences

FSSM in urban Indapur is largely affected by construction of oversized septic tanks which affect the desludging frequency and coming load at FSTP. In data analysis it was observed that oversized septic tanks are seen in both urban and rural settings. As the tanks are not as per Indian standards ideally, they cannot be called as septic tanks but a collection tank. It is also important to understand why construction of septic tanks are comparatively more in rural area than construction of twin pits. Construction of twin pits in rural areas will reduce the need and demand of FSSM.

The SFD in Section 4.6 gives a clear picture of the current sanitation value chain of urban and rural Indapur. Shit Flow Diagram (SFD) of Indapur ULB and 16 villages indicates that regular emptying and treatment of faecal sludge and wastewater need attention.

During discussion with Panchayat Samiti officials, Zilla Parishad Pune under District Planning and Development Council allotted funds for the current year and are planning to run a pilot project in rural areas of Pune district by providing trailed mounted suction machine to bigger Gram Panchayats for desludging. Disposal of FS is to be done safely by constructing deep row entrenchment facility in village or gram panchayat boundary. This pilot is being undertaken to check the feasibility of such project in near future to achieve ODF++ protocols of rural India. This project is a feasible option in rural areas as it will reduce the cost of fuel for carrying FS from village to urban FSTP but might increase the OPEX cost of vehicle, salary of the driver and helper as rural areas are practicing demand desludging. According to the current situation of rural Indapur the average desludging frequency of septic tanks is 10 to 15 years, the trucks will become a liability to gram panchayat which they have to look for the operation and maintenance of the trucks, paying salary to truck driver and operator. Hence, this is not a feasible option on individual gram panchayat basis but if clustering of gram panchayats with one treatment facility might help to reduce this cost. Figure 19 shows factors that affects urban rural FSSM linkages in Indapur.

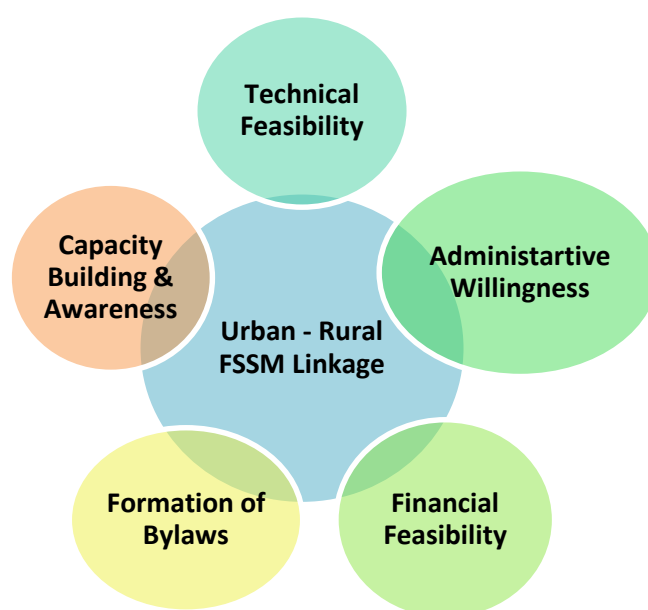


Figure 19 Factors affecting urban rural FSSM linkages

## 5.1 Technical feasibility

Data collection and analysis shows that urban Indapur has 100% access to toilet facilities with 100% septic tanks connected to underground drainage or soak pits. As per the information provided by the operator during KII, the FSTP is currently receiving a load of one truck per month. Hence, the FSTP is currently underutilized. This underutilized capacity of FSTP can be utilized at the fullest if desludging services are provided to nearby villages. In rural Indapur, the launch of SBM has not only increased the construction of toilets but also increased the usage which led to increase in accumulation of faecal sludge and septage.

Currently, 16 surveyed villages has 67.3 % of households connected to septic tanks which need desludging in near future. Therefore, substantial amount of faecal sludge will be generated in rural areas which will need safe disposal and treatment. The generated faecal sludge from villages can be treated at urban FSTP instead of having new treatment facility for rural areas.

The analysis performed in Section 3.2 indicates that establishing of urban-rural linkages in Indapur is technically feasible. From the results obtained in Section 4.7 it can be inferred that the most suitable option of establishing the linkages is by Scenario A which shows practicing demand desludging in both urban and rural habitat is a feasible option and current capacity of FSTP can cater to the need of demand desludging in both the urban and rural Indapur. According to results presented in Table 6, a single desludging vehicle is needed for sustaining the need of the linkages. Indapur currently has a trailer mounted desludging machine of 3000L and hence no CapEx will be required. The existing treatment technology is quite robust to sustain the fluctuation of load of faecal sludge and can cater to occasional increase of sludge load at FSTP. Hence, the council currently satisfies all the technical requirements needed for establishing demand-based linkages.

Establishing linkages as per Scenario B stated in Section 4.7 will need augmentation of FSTP. According to the calculations presented in Table 7, nine households need to be desludged per day under Scenario B which is impossible with two desludging vehicles the council currently owns. Therefore, an extra desludging vehicle will be needed to cope up with the demand. This will increase the CapEx and OpEx cost associated with the linkages. Other factors like time needed for augmentation, lack of awareness among households regarding scheduled desludging and the large size of septic tank can have a negative effect on establishing linkages under the stated scenario. This type of linkages will also require frequent augmentation of FSTP with the next augmentation in six years.

The third scenario of establishing linkages based on schedule desludging in both urban and rural habitant will be challenging as the size of required FSTP to cater the demand and the number of required desludging resources for the service delivery is large. It will require proper management and availability of resources. The CapEx and OpEx cost associated with the scenario also increases. Currently the council lacks municipals byelaws and the household are unaware of the need of scheduled desludging and thus functioning of this scenario of linkages will be a challenge. Considering scheduled desludging in rural area, it would be efficient and economically viable to set up the treatment infrastructure within the boundary of gram panchayat.

## 5.2 Administrative Willingness

For linkage administrative responsibilities and willingness will play an important role to make linkage sustainable. Currently, lack of administrative willingness was observed from both the departments. Administrative feasibility is possible if roles and responsibilities of each department can be made clear during planning for the linkages which will help to balance a smooth administration between two department. Financial clarity for managing FSSM resources and agreement by both the administrative bodies during planning of linkages is essential to avoid internal conflicts.

## 5.3 Financial Feasibility

Linkages is possible if the cost of desludging is affordable for rural and urban households. Linkages is beneficial for ULBs if they can recover the cost of O&M of vehicles, FSTP, salary of operators and drivers. ULBs can make a revenue generation model out of linkages if planned properly during formation of bylaws stage.

Currently, ULB is charging INR 2000 per trip per household for providing desludging service in ULB. Currently the charges for desludging are high and need revision to make desludging service affordable for households. Hence, for establishing linkages the base price can be fixed and can be kept common to urban and rural which will vary depending upon the distance from Indapur ULB. The total cost for desludging should be around INR 600 to INR 1000 per trip depending upon the distance. As per calculation in Annexure 8.9 regarding fixing the base price for desludging services. It can be fixed at INR 600 per trip for urban habitant. Tariff for rural desludging can be calculated using below formula.

$$\text{Desludging Tariff} = \text{Base price} + (\text{distance of village from FSTP} * \text{diesel price per Km})$$

Currently, the compost is made from organic waste and mixed with dried sludge and sold to farmers at the cost of INR 5 per kg bag, likewise council can also sell these bags to rural farmers considering the regular monitoring of that compost as per FCO standards. Rural households have willingness to pay for the desludging services whether it is for desludging service from council or from any private operator. Rural household survey analysis gave clear idea on affordability of villagers to pay for desludging service. Council should have their own bylaws for charging fixed tipping fees from households depending upon the distance of households, number of trips or cost per 1000 L.

## 5.4 Capacity building and awareness of stakeholders

It is important to conduct extensive IEC campaigns in Indapur to create awareness amongst rural households regarding the regular use of toilet, suitable type of containment and collection unit, desludging of septic tanks, use of compost for farming etc.

Capacity building of officials will help to keep FSSM facilities functional, operational and useable for households. During KII it is found that desludging operators are not trained on operation of truck, occupational safety and health hazards and importance of use of PPE during desludging. Enforcement of bylaws will also help to keep occupational safety of these operators and workers work in confined spaces.



## 5.5 SWOT Analysis

SWOT analysis is a technique which is used to analyze the collected data and drive the study towards proper steps to be taken during planning, implementation and monitoring stage. SWOT analysis gives a clear picture on strengths, weaknesses, opportunities and threats and factors affecting urban rural linkages in near future.

The below Figure 20 is result of SWOT analysis done after analyzing the possibilities of urban rural FSSM linkage in Indapur after considering all the outcomes from data collection and KIIs and considering the above factors that might affect the linkages.

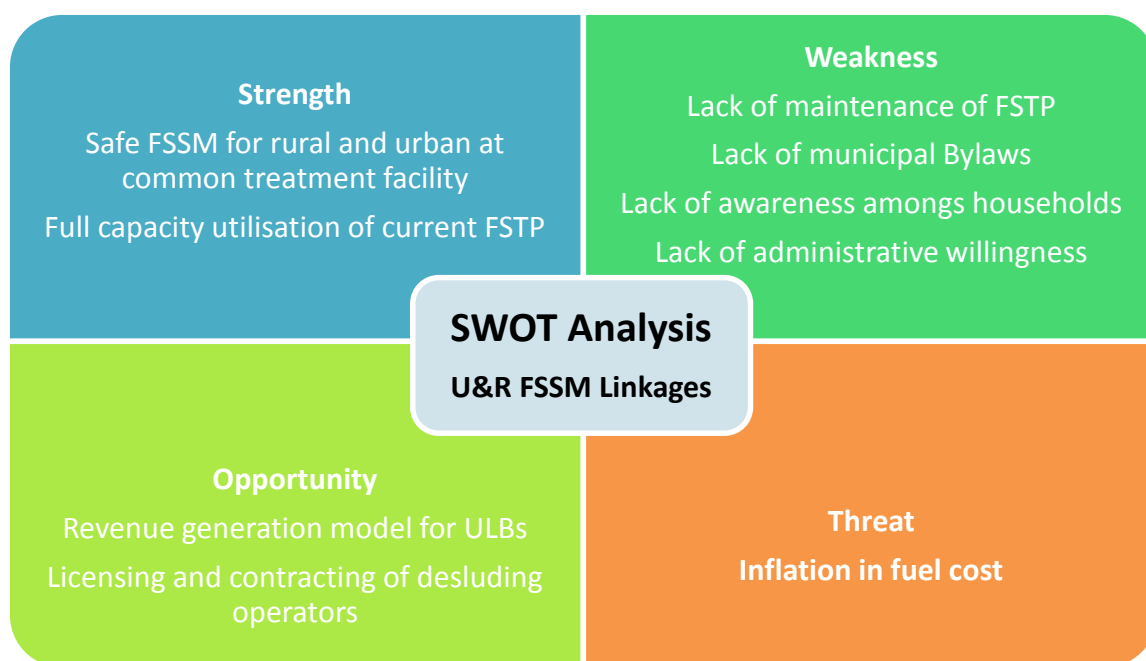


Figure 20 SWOT Analysis of Urban – Rural Linkage for Indapur Taluka

### Strength

If linkages are established between rural and urban then the FS which is not contained, not being emptied and unsafely managed seen in SFD can be safely managed and treated. Desludging services provided by ULB will help to manage rural FS safely and will create enabling environment for villagers to sustain ODF status. Currently, FSTP is underutilized which affects the treatment efficiency. This FSTP will be fully utilized if urban rural linkage is established as mention in section 5.1. Capital investment of augmentation of current FSTP can be avoided if ULB are going to practice demand desludging in tehsil.

### Weakness

Currently, ULB is lacking in maintaining FSTP and enforcing bylaws. To establish the linkages, maintaining FSSM infrastructure will be an essential factor. So, O&M of FSTP and maintaining records will play important role. During data collection and analysis, it is observed that lack of awareness and communication gap between households and RLBs led to improper FSSM in rural. During KII with ULB official, it is observed that they are not in favor of linkage and as their willingness is the major factor for linkage this can become biggest weakness and can affect linkage in near future.

**Opportunity**

As mentioned in section 5.3 linkage will not only increase demand but will equally increase revenue of ULB. If demand increases, ULB can give license to private operators and can make a contract with the operator on demand basis.

**Threat**

Increase in fuel price can be threat to the linkage. An increase in fuel price will increase the cost of desludging which can affect the can affect the affordability of the service to the households.

Section

06

# RECOMMENDATIONS

## 6 Recommendations

The study highlighted some very important factors that might affect the sanitation value chain of urban and rural Indapur. Figure 21 is a prioritization matrix which shows urgent and important actions that should be taken by administrative bodies to establish FSSM linkage in Indapur. This section describes the short term, mid-term and long-term actions which need to be taken by decision makers and governing bodies.

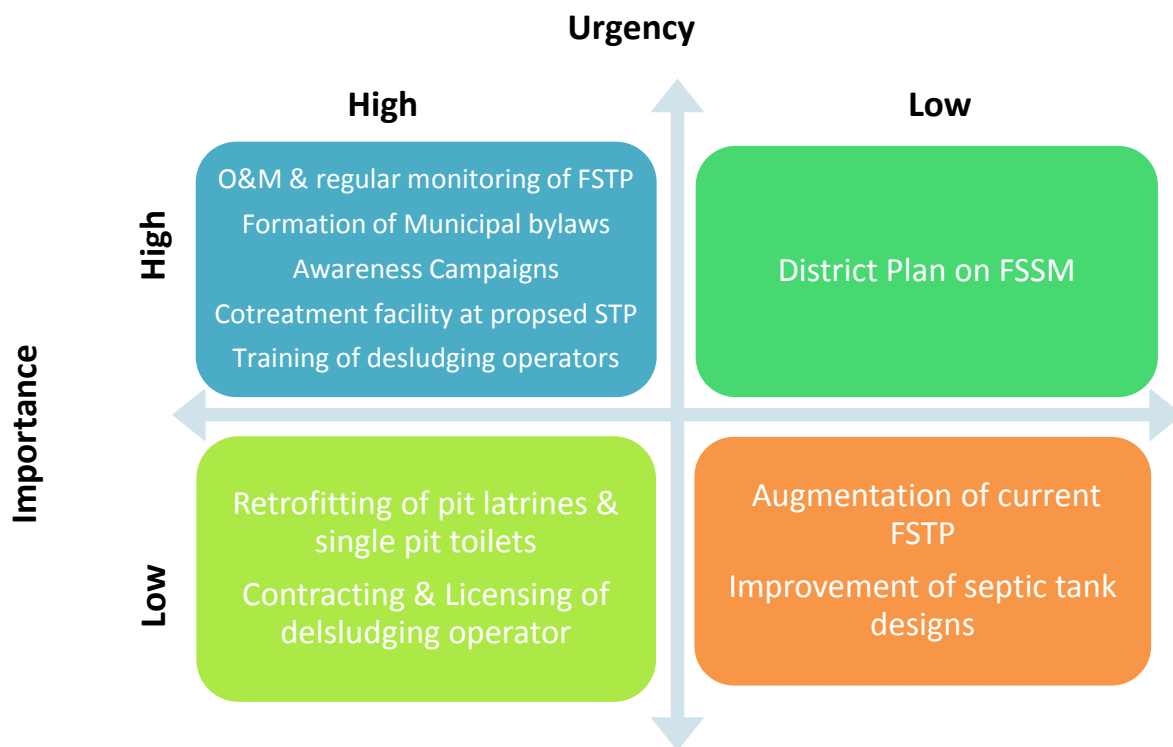


Figure 21 Prioritization matrix

### 6.1 Short Term actions

- Formation and enforcement of municipal bylaws for sanitation service delivery in ULB and RLBs will play an important role for sustainability of FSSM facilities, to keep FSTP functional at full capacity and will help households to avail to the desludging services at affordable cost.
- Currently, the FSTP is underutilized and can take additional septage for treatment. It also needs more attention in terms of operation and maintenance and monitoring of byproducts to reach to the Indian standards of reuse.
- While planning for urban rural linkages, involvement of relevant stakeholders and decision makers during planning stage will be crucial for sustainability and appropriate management of services.
- Tipping fees need to be fixed for desludging services depending upon the distance of the household or cost per thousand liter can be charged.
- Urgent need of STP as the supernatant from septic tanks flows through underground drainage get dispose of in water body which is further used by local farmers. The STP should be constructed with cotreatment facility to cater the irregular demand of desludging.
- Implementation of STP will solve the problem of unsafe disposal of wastewater but will also cater to irregular demand of desludging if constructed with cotreatment facility.

- Regular capacity building of ULB and RLB officials will help to make them understand the importance and need of FSSM.
- Frequent IEC campaigns must be conducted by Gram Panchayats and Councils to convey the need and importance of desludging to the households.
- Training of desludging and plant operators need to be undertaken with provision of appropriate PPE kits to help operators understand the importance of using PPE and how to keep themselves safe and healthy.

## 6.2 Midterm actions

- Linkages will need improved desludging services rural areas in terms of availability of desludging operators with affordable costs. Licensing and contracting of private operators should be adopted to cater to the demand of irregular desludging.
- In rural survey analysis it is observed that around 20% toilets in rural areas are single pit/ pit latrines. Retrofitting of such pit latrines/single pit toilets to twin pit toilets is necessary to make the surrounding safe and environment friendly and will not need desludging activity.
- Promoting implementation of twin pit toilets will help to reduce load of rural desludging.
- Formulation of district level FSSM plan which will help in making strategy, planning, implementation and monitoring of sanitation facilities in town and villages, considering urban rural linkages as a viable option for villages near urban FSTPs.

## 6.3 Long term action

- Creating awareness on improving septic tank designs and retrofitting of septic tanks as per Indian standards.

Section

07

CONCLUSION

## 7 Conclusion

The report suggests that urban rural FSSM linkages is a feasible, viable, adoptable and replicable model to cater to the current demand of desludging in urban and rural areas.

As also suggested in D.O. No. S-18011/6/2021-SBM-DDWS issued by Government of India for all the states, to undertake integrated Sewage Treatment Plant with co-treatment facility for faecal sludge from septic tanks. In SBM Grameen phase II, the focus is given on co-treatment facility development at existing STP or FSTP where onsite management of faecal sludge is not possible and consider villages situated with 10 to 15 KMs from urban FSTP. Whereas for those villages which are outside the range of KMs where urban rural linkage is not a feasible option for those villages individual standalone FSTPs with easy maintenance and operation technology can be adopted. The letter also suggested that engaging private operators for transportation of faecal sludge/septage to nearby treatment facility in urban areas for mechanical cleaning of septic tanks and single pits in rural areas can be adopted.

This report also suggests the similar solution which can be adopted as per the existing situation of respective towns and villages as mentioned in the above letter. To adopt the solution mentioned in the letter, in-depth study of the area is important to suggest the feasible option depending upon the current status of infrastructure facilities available.

Linkages will also save capital investment and operational cost of augmented FSTP and will utilize current FSTP with full capacity. This can also serve as a revenue generation model for ULBs. The success of this model will depend on effective communication and formal agreements between both urban and rural administrations with set roles and responsibilities. Overall, urban rural linkages are sustainable and environmentally impactful option for FSSM in the near future.

Section

08

ANNEXURES



## 8 Annexures

### 8.1 Annexure 1: Permission Letter From WSSD

**महाराष्ट्र शासन**  
पाणी पुरवठा व स्वच्छता विभाग,  
७ वा मजला, गोकुळदास तेजपाल रुग्णालय संकुल इमारत,  
मंत्रालय, लोकमान्य टिळक मार्ग, मुंबई-४०० ००१.

दुरध्वनी क्रमांक ०२२-२२६ १७९४२ ई-मेल:- smita.rane@nic.in  
क्रमांक:- रवगामि २०२१/प्र.क्र.१६/पापु-१६ दिनांक:- २४/०१/२०२२.

प्रति,  
मुख्य कार्यकारी अधिकारी  
जिल्हा परिषद, पुणे.

**विषय :-** शहरी-ग्रामीण भागातील मैलागाळ व्यवस्थापनामध्ये समन्वय (Linkages) च्या संदर्भात करण्यात येणाऱ्या संशोधन अभ्यासांतर्गत कुटुंबांची पाहणी करण्यासाठी परवानगी देणेबाबत.

**संदर्भ :-** अखिल भारतीय स्थानिक स्वराज्य संस्था, मुंबई यांचे पत्र दिनांक २२/१२/२०२१

महोदय,

उपरोक्त विषयी संदर्भाधीन पत्राची प्रत सहपत्रासह सोबत जोडली आहे.

२. तत्कालीन मा.अपर मुख्य सचिव (पा पु व स्व वि), यांची युनिसेफ व अखिल भारतीय स्थानिक स्वराज्य संस्था, मुंबई यांच्या समवेत दिनांक १८ जानेवारी, २०२१ रोजी बैठक झाली. सदर बैठकीमध्ये नागरी स्वराज्य संस्थेच्या कार्यरत FSTPs यंत्रणेमध्ये प्रकल्प केंद्राच्या जवळील ग्रामीण भागातील शौचालयांतील मैलाचे व्यवस्थापन करण्याच्या अनुषंगाने शक्यतेची पडताळणी करण्याबाबत तत्का. अपर मुख्य सचिव (पा पु व स्व) यांनी दिले होते.

३. सदर निर्देशाच्या अनुषंगाने अखिल भारतीय स्थानिक स्वराज्य संस्था, मुंबई यांनी त्यांच्या स्थानिक सहयोगी संस्था "इकोसॅन सर्व्हिसेस फाउंडेशन (ESF), पुणे यांच्यामार्फत संशोधन अभ्यास हाती घेतला आहे. या अभ्यासामध्ये नागरी- ग्रामीण भागातील मैलागाळ व्यवस्थापनातील समन्वय (Linkages) बाबत व्यवहार्यता तपाराण्यात येणार आहे.


४. अखिल भारतीय स्थानिक स्वराज्य संस्था, मुंबई व त्यांच्या स्थानिक सहयोगी संस्था "इकोसॅन सर्व्हिसेस फाउंडेशन (ESF), पुणे यांनी पुणे जिल्ह्यातील नागरी आणि ग्रामीण भागातील -Cluster" चा अभ्यास केला आहे. त्या अभ्यासातून अशी शक्यता दिसून आली आहे की, इंदापूर

नगरपालिकेच्या १० KLD च्या प्रक्रिया केंद्रात, या केंद्रापासून १० कि. मी. च्या अंतरावर असणाऱ्या निवडक ग्रामपंचायतीच्या मैला गाळाचे व्यवस्थापन होऊ शकते. तरी, अखिल भारतीय स्थानिक स्वराज्य संस्था, मुंबई व त्यांच्या स्थानिक सहयोगी संस्था "इकोसेन सर्व्हिसेस फाउंडेशन (ESF), पुणे यांचेमार्फत, अशा १२ ग्रामपंचायतीमधील १६ गावांची या संशोधन अभ्यासासाठी निवड करण्यात आली आहे. (ग्रामपंचायत आणि गावांची यादी सोबत जोडली आहे). तसेच, या गावांमधील एकूण ६२४३ कुटुंबांपैकी ४०० कुटुंबांची पाहणी करण्यात येणार आहे.

५. तरी, अखिल भारतीय स्थानिक स्वराज्य संस्था, मुंबई आणि स्थानिक सहयोगी संस्था इकोसेन सर्व्हिसेस फाउंडेशन, पुणे यांच्यामार्फत घेण्यात येणाऱ्या कुटुंबांच्या पाहणीची सर्व संकलित माहिती व अनुषंगिक अभ्यास मुख्य कार्यकारी अधिकारी पुणे व पाणी पुरवठा व स्वच्छता विभागास लगेचच उपलब्ध करून देण्यास येईल, तसेच सदर प्रस्तावित पाहणीसाठी शासनामार्फत कोणताही निधी अथवा मनुष्यबळ उपलब्ध करून देण्यात येणार नाही, या अटीच्या अधीन राहून संबंधित गट विकास अधिकारी यांनी आवश्यक ते सर्व सहकार्य करण्याबाबत त्यांना आपल्यास्तरावरून निर्देश देण्यात यावेत, ही विनंती.

आपली,

सहपत्र : वरीलप्रमाणे

  
(सि. स. राणे)

कक्ष अधिकारी, महाराष्ट्र शासन

प्रत:-१) अखिल भारतीय स्थानिक स्वराज्य संस्था, एम.एन. हनुमान डेव्हलपमेंट कॅम्पस, टिर्चस कॉलनी जवळ, बांद्रा (पूर्व) मुंबई -४०००५१.

यांना विनंती करण्यात येते की, आपल्या संदर्भाधीन पत्रामध्ये नमूद केल्याप्रमाणे, संशोधन अभ्यास करताना, त्यामध्ये सोबतच्या विवरणपत्रातील, सोबतच्या प्रश्नावलीतल मुद्दे तसेच अस्तित्वातील प्रक्रिया प्रकल्पापासूनचे गावाचे अंतर, अस्तित्वातील प्रक्रिया प्रकल्पामध्ये २० ते २५% अधिभार गृहीत धरून उपलब्ध होणा-या मैल्याची प्रक्रियेची शक्यता लक्षात घेणे, अधिभारासह प्रक्रिया करणे शक्य नसल्यास, गावापासून १० ते १५ कि.मी. परिसरामध्ये नवीन प्रस्तावित प्रकल्पाकरिता जागा उपलब्धतता आहे किंवा नसे, प्रक्रियेकरिता उपलब्ध होणा-या मैल्याचे प्रमाण (कि. ली. ), मैला उपसा करण्याकरिता लागणारा कालावधी, मैला उपसा केल्यानंतर प्रक्रिया प्रकल्पापर्यंतच्या वहनाचा दर व वाहतुक व्यवस्था पद्धत हे तसेच आपणांस आवश्यक वाटतील त्या मुद्द्यांचा समावेश करून संशोधन अभ्यास करावा.

२) संग्रहार्थ, पापु-१६ कार्यासन.

४

All India institute of Local self government दि.८-१२-२१



# All India Institute of Local Self-Government

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**Ranjit S. Chavan**  
President

**Dr. Jalraj Phatak I.A.S. (Retd.)**  
Director General

AIILSG/Maha-UWES-C/FSSM/2021

Date: 22<sup>nd</sup> December 2021

To,  
Shri. Sanjiv Jaiswal  
Principal Secretary,  
Water Supply and Sanitation Department,  
Government of Maharashtra,  
Mantralaya, Mumbai

Sub: Pilot Study on "Exploring Urban -Rural Linkages In Faecal Sludge and Septage Management (FSSM)" - Indapur ULB and GPs within radius of 10 - 15 kms from Indapur FSTP.

- Ref: (1) Meeting with the Additional Chief Secretary, Water Supply and Sanitation Department on 18<sup>th</sup> January 2021.  
(2) Email dated 19<sup>th</sup> April 2021, addressed to Additional Chief Secretary, Water Supply and Sanitation Department  
(3) D.O. letter no. s-18011/6/2021-SBM-DDWS, dated 14<sup>th</sup> September, 2021 addressed to the Chief Secretary jointly by the Secretary of Department of Drinking Water & Sanitation, Ministry of Jal Shakti and Secretary of MoHUA, Gol.

Respected Sir,

Greetings from Maharashtra Urban WASH and Environmental Sanitation Coalition.

2. The meeting was held with the Addl. Chief Secretary WSSD with UNICEF, Mumbai and AIILSG, Mumbai on 18<sup>th</sup> January 2021. It was suggested by the ACS to explore the possibility to treat septage from rural septic tanks in the newly constructed urban FSTPs. Accordingly, a preliminary feasibility assessment was undertaken by Maha-Urban WASH & ES Coalition, AIILSG to understand the situation of FSTPs and viability of urban - rural linkages in FSSM. Following documents have been forwarded to the ACS, WSSD vide email dt. 19<sup>th</sup> April 2021 with a request to have joint meetings with UD/SBM (Urban) for subsequent joint effort to explore the Urban-Rural linkages for FSSM in Maharashtra and facilitation for Pilot work in selected clusters.

- A short note on feasibility assessment highlighting the approach, possibilities, and way forward.
- Presentation on detail assessment and FSTP wise potential of taking additional load of FS from the rural areas.
- An excel file with mapping of GPS/ villages and FSTP wise calculations.

All the above documents are again attached with the letter for your immediate reference.

3. In this regard we would like to refer to the D.O. letter no.s-18011/6/2021-SBM-DDWS, dated 14<sup>th</sup> September, 2021, addressed to the Chief Secretary of all states, jointly signed by the Secretary of Ministry of Housing & Urban Affairs and the Secretary of Drinking Water & Sanitation, Ministry of Jal

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23/12/21

1108/44-96  
24/12/21

REGIONAL CENTRES: Ahmedabad | Aurangabad | Bengaluru | Belagavi | Bhavnagar | Bhopal | Bhubaneswar | Bikaner | Goa | Hyderabad | Indore | Jammu | Jodhpur | Kolhapur  
Kota | Lucknow | Mumbai - Fort, Bandra & Andheri | Navi Mumbai | Nashik | Nagpur | New Delhi | Narela | Pune | Patan | Rajkot | Ranchi | Raipur | Srinagar | Surat | Solapur  
Thiruvananthapuram | Tirunelveli | Vadodra | Visakhapatnam | Warangal



## All India Institute of Local Self-Government

Head Office: M. N. Roy Human Development Campus, Behind Teachers' Colony, Near Uttar Bharatiya Sangh College, Bandra (E), Mumbai - 51  
Tel: 86576 22550 / 51 / 52 / 54 | E-mail: dg@aillsg.org | Website: www.aillsg.org

**Ranjit S. Chavan**  
President

**Dr. Jairaj Phatak I.A.S. (Retd.)**  
Director General

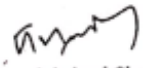
Shakti, Gol, regarding an integrated approach to be adopted by both urban and rural authorities for convergence in services provision, including preparation of convergent action plan for Faecal Sludge and Septage Management.

4. As mentioned in para 1, as a next step, we have proposed to take up Pilot Study for detailed assessment of urban – rural linkages for the ULB of Indapur in Pune district with a capacity of 10 KLD that shows potential to treat rural septage that can be desludged in the FSTP. We have also identified around GPs in the buffer of 10 kms from FSTP of Indapur ULB, some of which can be considered for this convergence based on the assessment. The study is undertaken and will be funded by the RCUES of AILLSG Mumbai and will be carried out along with a local Partner Organization viz. Ecosan Services Foundation Pune (ESF) under the guidance and supervision of Maha- UWES- Coalition. ESF will conduct household survey of 400 households from 16 GPs to get the information at the ground level that will be useful for further assessment. The format for the household survey is attached with the letter. We request your support for the same. We request you to communicate the CEO of ZP Pune about the pilot study so that Maha- UWES- C and our partner organization will get support and cooperation from the ZP and respective 16 GPs (list attached). This study will help to work out a plan to ensure that existing/under construction FSTPs in the urban areas are able to cater for treatment of faecal sludge and septage from rural areas lying within a suitable turn around distance (2-3 hrs.) from plant locations in the urban areas. The study could also identify the challenges in Urban – Rural linkages in FSSM and ways in which they can be mitigated. We have also written a letter to the PS, UDD and Dist. Collector, Pune about our initiative.

We request for a meeting with you and your support to the Pilot Study.

With Regards,

Yours sincerely,

  
Jayalakshmi Chekkala,  
Project Manager,  
(Secretariat: Maha-UWES-C)  
RCUES of AILLSG, Mumbai

Encl.: As above

Copy to: 1. Dr. Abhay Mahajan, Joint Secretary, Water Supply & Sanitation Department, GoM  
2. Shri Chandrakant More, Water Supply & Sanitation Department, GoM

## 8.2 Annexure 2: Letter to Indapur ULB



**RCUES, Mumbai**  
Enabling better cities...



**Regional Centre for Urban & Environmental Studies**  
**All India Institute of Local Self-Government, Mumbai**



(Established in the year 1968, is fully supported by Ministry of Housing and Urban Affairs, Government of India)

AIIILSG/Maha-UWES-C/WASH/ 2022/1

17<sup>th</sup> February, 2022

To,  
Mr. Rajaram Kapre,  
Chief Officer,  
Indapur Municipal Council,  
Dist. Pune.

**Sub: Pilot Study on “Exploring Urban –Rural Linkages in Faecal Sludge and Septage Management (FSSM)” – Indapur ULB and GPs within radius of 10 – 15 kms from Indapur FSTP.**

**Ref: D. O. letter no. S-18011 / 6 / 2021 – SBM – DDWS, dated 14<sup>th</sup> September, 2021 addressed to the Chief Secretary jointly by the Secretary of Department of Drinking Water & Sanitation, Ministry of Jal Shakti and the Secretary of MoHUA, Gol.**

Respected Sir,

This is in continuation of our discussions on the above subject during the meeting on 10<sup>th</sup> February, 2022 in your office.

2. As you are aware, **Regional Centre for Urban and Environmental Studies (RCUES), All India Institute of Local Self Government (AIIILSG), Mumbai** has been supporting the State and Local Governments in water-sanitation-hygiene (WASH), waste management and environment through capacity building, research and advisory. In pursuit of enhancing this support to the State Government and Urban Local Bodies and bringing all the stakeholders together to support various Government initiatives, we are pleased to inform you that AIIILSG, Mumbai with support from **UNICEF, Maharashtra** has set up ‘**Maharashtra Urban WASH and Environment Sanitation (ES) Coalition’ (Maha-UWES-C)**, with its secretariat at **RCUES of AIIILSG at Bandra, Mumbai**. It is functional from April 2021. The Coalition aims to facilitate partnerships in urban WASH & ES in support to the State and local governments of Maharashtra, in responding to the timely needs and achieving targets under various missions and initiatives of the State and local governments.

3. Maha-UWES-C has undertaken as one of its initiatives, the work on exploring Urban – Rural Linkages for Faecal Sludge and Septage Management (FSSM) in Maharashtra.

4. In this regard we would like to refer to the D.O. letter no. S-18011 / 6 / 2021-SBM – DDWS, dated 14<sup>th</sup> September, 2021, addressed to the Chief Secretary of all states, jointly signed by the Secretary of Ministry of Housing & Urban Affairs and the Secretary of Department of Drinking Water & Sanitation, Ministry of Jal Shakti, Government of India regarding an integrated approach to be adopted by both urban and rural authorities for convergence in services provision, including preparation of convergent action plan for Faecal Sludge and Septage Management (Copy enclosed).

5. We have undertaken a preliminary feasibility assessment of Urban – Rural linkages for FSSM in Maharashtra. We have proposed to take up Pilot Study for detailed assessment of urban – rural linkages for the ULB of Indapur in Pune district with a capacity of 10 KLD that shows potential to treat rural septage that can be desludged in the FSTP. We have also identified around GPs in the buffer of 10 kms from FSTP of Indapur ULB, some of which can be considered for this convergence based on the assessment. The study is undertaken and will be funded by the RCUES of AIIILSG Mumbai and will be carried out along with a local Partner Organization under the guidance and supervision of Maha-UWES-Coalition. This study will help to work out a plan to ensure that existing /under construction FSTPs in the urban areas are able to cater for treatment of

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M.N. Roy Human Development Campus, Plot No.6, 'F' - Block, Opp. Government Colony Bldg. No. 326, Near Uttar Bhartiya Sangh, Bandra (East), Mumbai - 400 051, India. ☎ : +91 22 26571713 / 14 / 8657622550 / 51 / 52 / 54  
✉ : dir.rcues@aillsg.org, rcuestraining@aillsg.org, rcuesaiilsg@yahoo.co.in, 🌐 : www.aillsg.org/rcues



**RCUES, Mumbai**  
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**Regional Centre for Urban & Environmental Studies**  
**All India Institute of Local Self-Government, Mumbai**

(Established in the year 1968, is fully supported by Ministry of Housing and Urban Affairs, Government of India)

: 2 :

faecal sludge and septage from rural areas lying within a suitable turn around distance (2-3 hrs.) from plant locations in the urban areas. The study could also identify the challenges in Urban – Rural linkages in FSSM and ways in which they can be mitigated. We have also written a letter to the Dist. Collector, Pune about our initiative.

6. The study will be conducted through our local partner organisation viz. Ecosan Services Foundation (ESF) Pune. We have prepared format for collecting the information in respect of FSSM in Indapur ULB. You are requested to please allow our local partner organisations ESF to collect the information from your office. You are also requested to please allow ESF to visit the FSTP Indapur for study / collecting the information in the format. Copy of the format is enclosed with the letter. The results of the study report will be submitted to you.

With Regards,

Yours sincerely,

Jayalakshmi Chekkala,  
Project Manager,  
(Secretariat: Maha-UWES-C)  
RCUES of AILSG, Mumbai

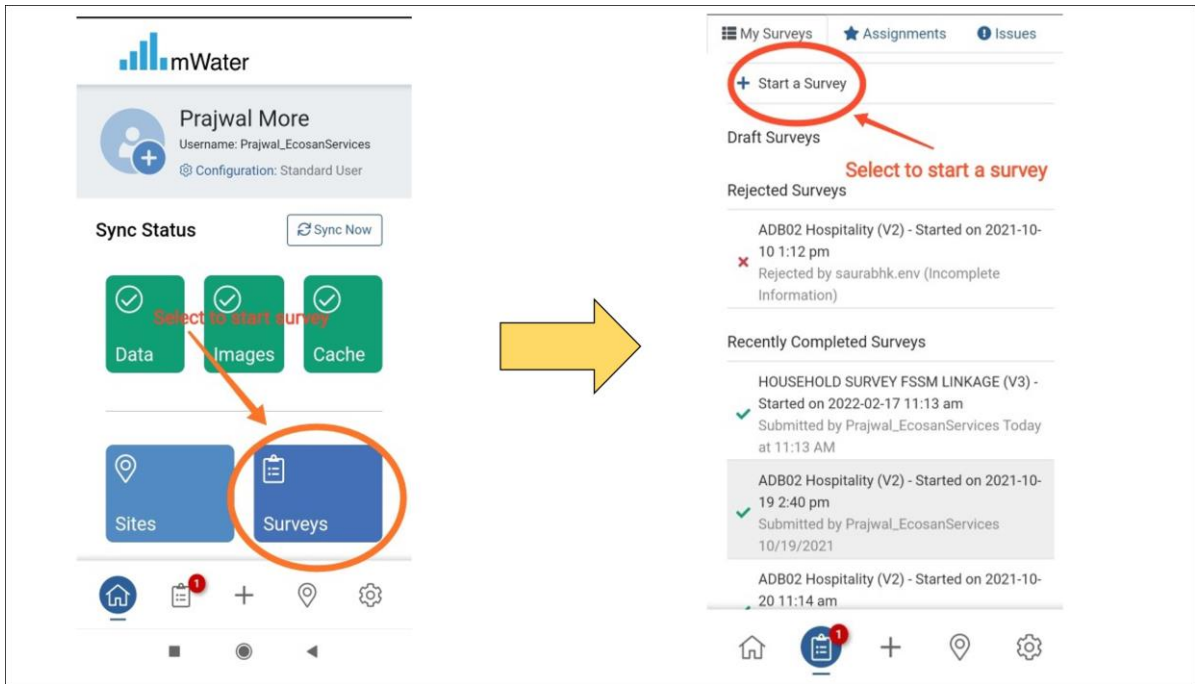
c.c. To, Mr. Dhawal Patil, General Manager, Ecosan Services Foundation, Pune.

### 8.3 Annexure 3: List of Officials

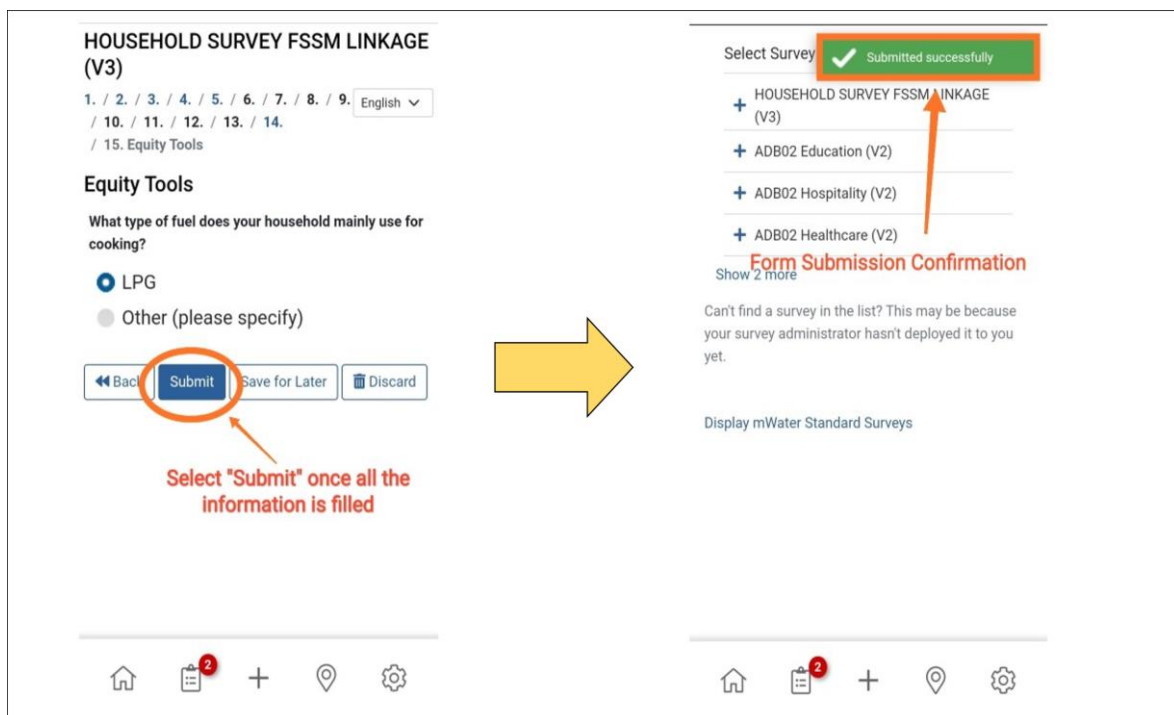
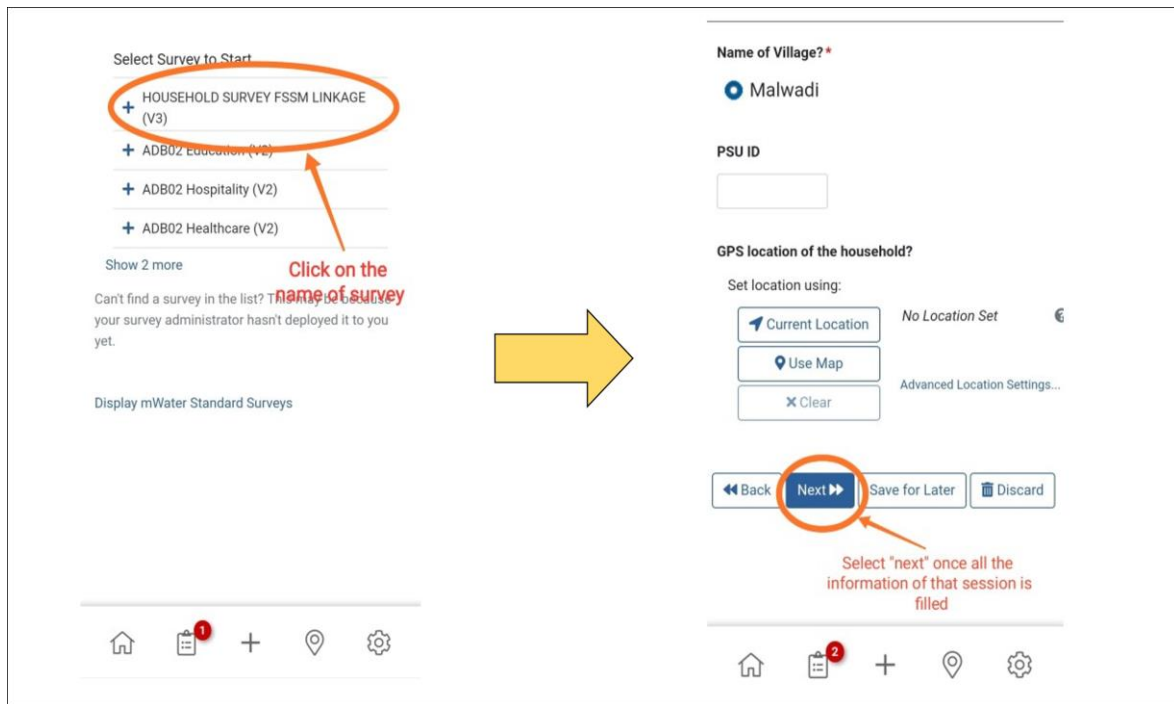
| <b>Sr. No.</b> | <b>Name of officials</b> | <b>Designation</b>                                  |
|----------------|--------------------------|---|
| 1              | Mr. Milind Tonpe,        | Deputy CEO, Zilla Parishad, Pune                    |
| 2              | Mr. Kudve,               | SBM Officer, Zilla Parishad, Pune                   |
| 3              | Mr. Ranjit Kapre         | Chief Officer, Indapur Municipal Council            |
| 4              | Mrs. Rashmi Baraskar     | Water Supply Engineer, Indapur Municipal Council    |
| 5              | Mr. Barge                | SBM officer, Indapur Municipal Council              |
| 6              | Mr. Vijaykumar Parit     | Block Development Officer, Panchayat Samiti Indapur |
| 7              | Mr. Solapuri             | Block Coordinator, Panchayat Samiti Indapur         |
| 8              | Ms. Lodhe                | Gram Sevak, Sardewadi                               |
| 9              | Mr. Atole                | Gram Sevak, Malwadi No. 1                           |
| 10             | Mr. Bhalerao             | Gram Sevak, Kaltan No. 2                            |

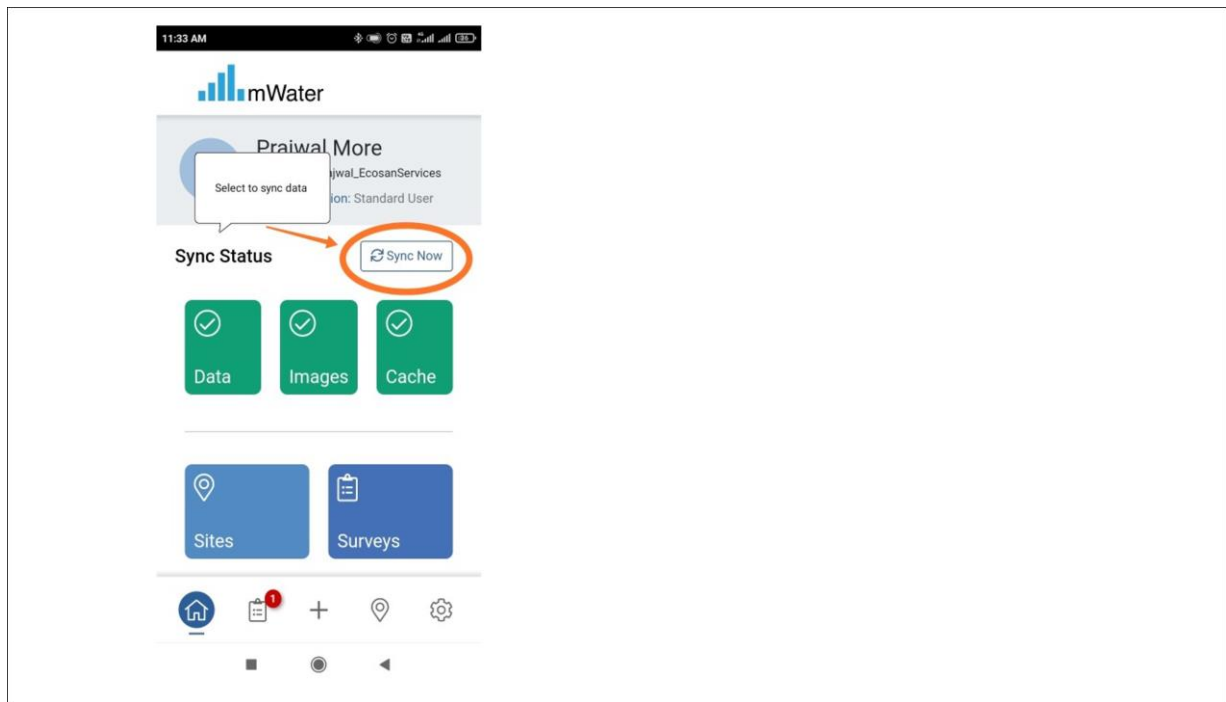
8.4 Annexure 4: Enumerator Training Slide deck

# M-WATER SURVEY PROCEDURE









## TYPE OF TOILETS (शौचालयाचा प्रकार)

## SANITATION USAGE ARRANGEMENT (स्वच्छता वापर व्यवस्था)

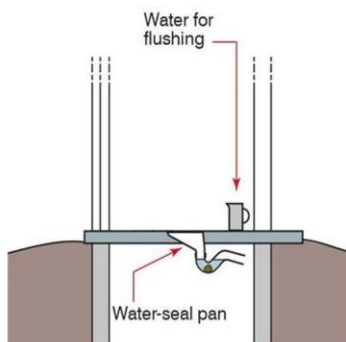


COMMUNITY TOILET (सामुदायिक शौचालय)

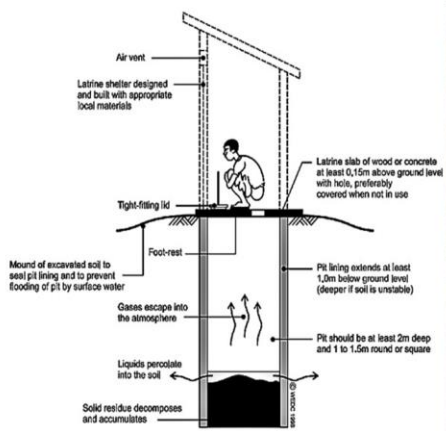


PUBLIC TOILET (सार्वजनिक शौचालय)

## FLUSH/ POUR FLUSH TOILETS



## PIT LATRINE WITH SLAB



## PIT LATRINS WITHOUT SLAB

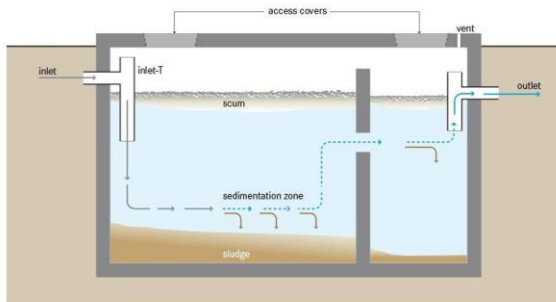


## **HANGING TOILETS**

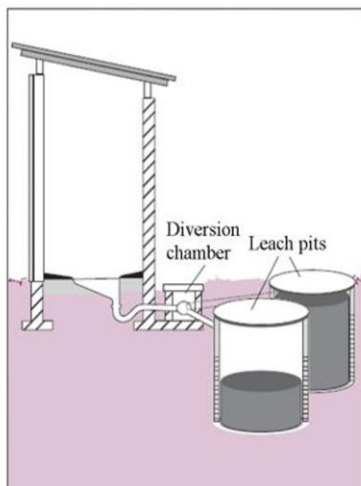


## **TYPE OF CONTAINMENT UNIT**

## SEPTIC TANK



## SOAK PITS



## **MODE OF DISPOSAL**

### **DRAINS**



## **TYPE OF DRAIN**



**Unlined, open drains**



**Lined, open drains**



**Lined, covered drains**

## **OPEN GROUND DISPOSAL**





## DESLUDGING VEHICLE

**TRUCK-MOUNTED  
SUCTION MACHINE**



**TRAILER  
SUCTION MACHINE**



**3 WHEELER MOUNTED  
SUCTION MACHINE**



## DESLUDGING VEHICLE



**Gulper**



**Vacu Tug**

## 8.5 Annexure 5: Household Survey Questionnaire

### **Questionnaire Individual Households (Rural)**

#### **1. Consent**

Do you want to participate in the interview?

- Yes
- No

#### **2. General Information**

- a. Gram Panchayat
- b. Village
- c. PSU Id
- d. GPS Location

#### **3. Socio economic demographic**

##### **a. Family Size**

Male, female (<6, 6-18, more 18)

##### **b. Main source of income/occupation**

- Farming
- Salary Job
- Daily wage employee
- Traders (small shops)
- Others (specify)

#### **4. Housing**

##### **a. Ownership of house**

- Landlord
- Tenant
- Others

##### **b. Is the HH ever been affected by natural calamities?**

- Yes
- No

(If Is the HH ever been affected by natural calamities? Is Yes)

##### **c. Which of the following natural calamities has the household been affected with?**

- Flood
- Landslides
- Earthquake
- Others (If others mention which)

(If, do you want to participate in the interview? Is Yes)

**5. Sanitation usage arrangement**

**a. Arrangement of toilets**

- Individual
- Shared
- Community toilets/ Public toilets
- No Facility
- Others (If others mention which)

(If, Arrangement of toilets isn't No Facility)

**b. Currently is toilet functional?**

- Yes
- No

(If, Arrangement of toilets is Shared)

**c. If shared toilets are used, how many households share the toilet facility? (Numerical value)**

(Arrangement of toilets isn't No Facility and Currently is toilet functional? is Yes)

**6. Toilet type**

**a. Type of toilet and connected to**

- Flush toilets with sewer network
- Flush toilets connected to septic tank
- Flush toilets connected to soak pits
- Pit latrines – one pit
- Pit latrines – twin pits
- Others(specify)

**b. When was the toilet built?**

- ----- years ago

(If, what is your toilet connected to? Is Flush toilets with Septic Tank)

**c. How many chambers does the containment unit have?**

- ----- chambers
- Don't know

(If, what is your toilet connected to? Are flush toilets connected to septic tank)

**d. What is the septic tank connected to?**

- Soak pit
- Open drains
- Open ground
- Water body
- Don't know

(If, do you want to participate in the interview? Is Yes, Arrangement of toilets is Individual or shared)

**7. Toilet Construction Cost**

a. Who paid the cost for toilet construction?

- Paid by household
- Household + Government scheme (name the scheme)
- Full funding through government Scheme (name the scheme)
- Household + Grant from NGO/CBO (name the NGO/CBO)
- Full funding through Grants (name the NGO/CBO)
- Others (Specify)

(If, do you want to participate in the interview? Is Yes, Arrangement of toilets is Individual or shared and type of toilet connected to is one of flush toilet to septic tank)

**8. Onsite Sanitation: - Construction of Septic tank**

a. Do you know if the septic tank were built according to the specification?

- Yes (if yes, who decided the specification)
- No
- Don't know

b. Why was septic tank opted?

- Budget
- Strata
- Suggested by Contractor
- Aspiration
- Others (specify)

c. What is the volume of septic tank?

- -----cu m or liters
- Don't know

d. What are the dimensions of septic tank?

- Length (for septic tank)
- Width (for septic tank)
- Depth
- Don't know

(If, do you want to participate in the interview? Is Yes, Arrangement of toilets is Individual or shared and type of toilet connected to is flush toilet to soak pit, Pit latrine- one pit, Pit latrine-twin Pit)

**9. Onsite Sanitation: - Construction of Soak pit**

a. Do you know if the soak pit were built according to the specification?

- Yes (if yes, who decided the specification)
- No
- Don't know

b. Why was soak pit opted?

- Budget
- Strata
- Suggested by Contractor
- Aspiration
- Others (specify)

c. What is the volume of soak pit?

- -----cu m or liters
- Don't know

d. What are the dimensions of soak pit?

- Depth
- Diameter (for pits)
- Don't know

(If, do you want to participate in the interview? Is Yes, Arrangement of toilets is Individual or shared and type of toilet connected to is one of flush toilet to septic tank)

**10. Maintenance of Septic tank**

a. Was the septic tank ever full?

- Yes
- No

b. When was the last time you emptied the septic tank? (If the tank was not emptied select N.A)

- ----- years/months ago
- Not applicable

(If When was the last time you emptied the septic tank isn't Not applicable)

c. How often do you empty the septic tank?

- -----years

(If When was the last time you emptied the septic tank isn't Not applicable)

d. How did you know that the septic tank needs to be emptied?

- Due to foul smell
- Flooding of septic tank
- Others (specify)

(If When was the last time you emptied the septic tank isn't Not applicable)

e. Are emptying services are affordable to you?

- Yes
- No

(If do you consider the emptying services affordable to you? is No)

f. How much you can pay for emptying service? (Range)

(If When was the last time you emptied the septic tank isn't Not applicable)

g. Do you schedule the emptying service in advance?

- Yes
- No

h. Are you willing to opt for desludging services in future?

- Yes

- No

(If, Was the septic tank ever full is Yes and When was the last time you emptied the septic tank is Not applicable)

i. If not emptied, what did you do when the containment unit is full?

- Opened for overflow
- Sealed and abandoned
- Use of bio culture
- Others (specify)

(If, Was the septic tank ever full is Yes and When was the last time you emptied the septic tank is Not applicable)

j. Why didn't you empty it instead?

- Not affordable
- Unavailability of service provider in the village
- Others (specify)

(If, do you want to participate in the interview? Is Yes, Arrangement of toilets is Individual or shared and type of toilet connected to is one of flush toilet to soak pit)

**11. Maintenance of Soak pit**

a. Was the soak pit ever full?

- Yes
- No

b. When was the last time you emptied the soak pit? (If the tank was not emptied select N.A)

- ----- years/months ago
- Not applicable

(If When was the last time you emptied the soak pit isn't Not applicable)

c. How often do you empty the soak pit?

- -----years

(If When was the last time you emptied the soak pit isn't Not applicable)

d. How did you know that the soak pit needs to be emptied?

- Due to foul smell
- Flooding of septic tank
- Others (specify)

(If When was the last time you emptied the soak pit isn't Not applicable)

e. Are emptying services are affordable to you?

- Yes
- No

(If do you consider the emptying services affordable to you? is No)

f. How much you can pay for emptying service? (Range)

(If When was the last time you emptied the soak pit isn't Not applicable)

g. Do you schedule the emptying service in advance?

- Yes
- No

h. Are you willing to opt for desludging services in future?

- Yes
- No

(If, Was the soak pit ever full is Yes and When was the last time you emptied the soak pit is Not applicable)

i. If not emptied, what did you do when the containment unit is full?

- Opened for overflow
- Sealed and abandoned
- Use of bio culture
- Others (specify)

(If, Was the soak pit ever full is Yes and When was the last time you emptied the soak pit is Not applicable)

j. Why didn't you empty it instead?

- Not affordable
- Unavailability of service provider in the village
- Others (specify)

(If, do you want to participate in the interview? Is Yes and what is your toilet connected to is one of soak pit or septic tank and if when was the last time you emptied the septic tank/soak pit isn't Not Applicable)

**12. Onsite Sanitation – Emptying services**

a. Who empty your septic tank?

- Formal Provider (desludging operators)
- Informal provider (manual scavenger)
- Government (Gram Panchayat/Panchayat Samiti/ULB)
- Others (specify)

b. How did you get the contact details of the service provider?

- Through Gram Panchayat
- Through Friends or Neighbors
- Through News Paper
- Wall Posters or paintings
- Others

c. Contact Details of service provider (Name and contact number)

d. How much did it cost to empty the tank?

-----INR

e. How did you pay for desludging service?

- Self-Funded
  - Included in Tax
  - Paid through Grant (NGO/CBO) (name the organisation)
  - Paid through Government subsidies (name the subsidy)
  - Others (specify)
- f. What tools were used to empty the septic tank/soak pit?
- Vacuum truck
  - Trailer mounted suction machine
  - VacuTug
  - Gulper (manually operated pumps)
  - Hand tools
  - Small motorized pump
  - Others (specify)
- g. Is your household satisfied with the pit emptying service?
- Yes
  - No
- h. Did you experience any problems with the pit emptying services that was hired?
- No
  - Provider did not arrive when scheduled
  - Others
- i. Access to road
- Accessible by Vacuum trucks (width of road more than 3m)
  - Accessible by VacuTug (width of road less than 3m)
  - Unavailability of proper road (pukka road)

(If, do you want to participate in the interview? Is Yes and Type of toilet and connected to is one of flush toilet soak pit or septic tank and if when was the last time you emptied the septic tank/soak pit isn't Not Applicable)

**13. Conveyance**

- a. When the septic tank was emptied, do you know where the waste was disposed? (If yes, where)
- Yes (name the point of disposal)
  - No

**14. Other Information**

- a. Do you pay sanitary tax?
- Yes (if yes, how much)
  - No
  - Others
- b. Main source of water?
- Surface water
  - Tube well or Borewell
  - Piped water connection
  - Others



c. Is water from the main source available throughout the year?

- Yes
- No

d. Water treatment at household level?

- Boiling
- Adding disinfectant (e.g., chlorine)
- Filters
- Alum treatment
- Others

e. Has the HH experienced water born disease?

- Yes
- No

(If, Has the village experienced water born disease? Is Yes)

f. How frequent do you experience these diseases?

- Only in monsoon season
- Throughout the year
- Others

g. Are any IEC activities conduct in the village?

- Yes (write the frequency, IEC activities per year)
- No

**15. Equity Tool**

a. What type of fuel does your household mainly use for cooking?

- LPG
- Others (If others mention which)

**16. Observation Assessment (Photos)**

a. Toilet

b. Containment Unit (location)

c. Road

d. Drains

Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra

8.6 Annexure 6: Gram Panchayats Data

| SR NO | GP Name         |                 | General Information               |      |                    |            |                      |   |                                      |                               | Sanitation System                |   |   |  |  |            |          |
|-------|-----------------|-----------------|-----------------------------------|------|--------------------|------------|----------------------|---|--------------------------------------|-------------------------------|----------------------------------|---|---|--|--|------------|----------|
|       |                 |                 | No of village under each panchyat |      | Ground water level | Population | Number of households | Water Supply- LPCD                                  |                                      |                               | % of HH having access to toilets | % of people having access to toilets but not using it | In absence of toilets where do people defecate? | % of population using commnity toilets | Type of Containment unit                   |            |          |
|       |                 |                 | 2011                              | 2021 |                    |            |                      | Source of Water (well, tubewell, rivers, tap water) | per day water supplied to households | %HH with tap water connection |                                  |   |   |  | (Toilets used by more than one households) | single pit | twin pit |
|       |                 |                 |                                   | ft   |                    |            |                      | lpd   | %                                    | %                             | %                                |   | %   | %                                      | %  | %          |          |
| 1     | Awsari Group    | Bedshinge       | 2                                 | 2    | 250                | 759        | 183                  | Well  | 400                                  | Don't Know                    | 100                              | 5   | Farmland  | 0                                      | 50   | 0          | 50       |
| 2     |                 | Awasari         |                                   |      | 250                | 2011       | 496                  | Well  | 400                                  | 20                            | 100                              | 5   | Farmland  | 3                                      | 50   | 0          | 50       |
| 3     | Bijwadi         | Gagargaon       | 5                                 | 3    | 200                | 709        | 152                  | Well  | 500                                  | 90                            | 99                               | 1   | Farmland  | 0                                      | 5  | 20         | 75       |
| 4     |                 | Rajwadi         |                                   |      | 200                | 508        | 104                  | Well  | 400                                  | 90                            | 90                               | 1   | Farmland  | 0                                      | 25   | 10         | 65       |
| 5     |                 | Vangali         |                                   |      | 150                | 1251       | 265                  | Well  | 500                                  | 85                            | 90                               | 10  | Farmland  | 0                                      | 20   | 20         | 60       |
| 6     | Galandwadi      | Galand Wadi 1   | 2                                 | 2    | 80                 | 1873       | 370                  | Well  | 200                                  | 81                            | 95                               | 0   | Farmland  | 5                                      | 30   | 0          | 70       |
| 7     | No.1            | Narutwadi       |                                   |      | 80                 | 1331       | 224                  | Tubewell  | 200                                  | Don't Know                    | 97                               | 0   | Farmland  | 0                                      | 5  | 0          | 95       |
| 8     | Galandwadi No.2 | Galandwadi No.2 | 1                                 | 1    | 99                 | 2299       | 470                  | Well  | 500                                  | 30                            | 100                              | 10  | Farmland  | 0                                      | 50   | 0          | 50       |
| 9     | Kalthan No.2    | Kalthan No.2    | 1                                 | 1    | 100                | 1188       | 256                  | Well  | 500                                  | 80                            | 100                              | 10  | Farmland  | 0                                      | 15   | 0          | 85       |
| 10    | Malwadi         | Malwadi         | 1                                 | 1    | 100                | 4263       | 848                  | Well  | 200                                  | 80                            | 100                              | 10  | Farmland  | 5                                      | 20   | 10         | 70       |
| 11    | Sardewadi       | Sardewadi       | 1                                 | 1    | 150                | 3187       | 604                  | Well  | 500                                  | 80                            | 100                              | 10  | Farmland  | 2                                      | 20   | 10         | 70       |
| 12    | Tarangwadi      | Tarangwadi      | 1                                 | 1    | 350                | 2557       | 513                  | Well  | 300                                  | 30                            | 90                               | 2   | Farmland  | 0                                      | 15   | 0          | 85       |
| 13    | Wadapuri        | Gokhali         | 2                                 | 1    | 150                | 1608       | 373                  | Well  | 500                                  | 85                            | 95                               | 10  | Farmland  | 0                                      | 25   | 0          | 75       |
| 14    |                 | Vadapuri        |                                   | 1    | 150                | 4401       | 919                  | Pond  | 325                                  | 40                            | 99                               | 0   | Farmland  | 0                                      | 80   | 0          | 20       |
| 15    | Pandharwadi     | Pandharwadi     | 1                                 | 1    | 125                |            |                      |   | 320                                  | 70                            | 100                              | 0   | Farmland  | 5                                      | 10   | 0          | 90       |
| 16    | Zhagadewadi     | Zhagadewadi     | 1                                 | 1    | 250                | 1193       | 231                  | Well  | 600                                  | 90                            | 95                               | 0   | Farmland  | 0                                      | 70   | 0          | 30       |

Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra

| SR NO | GP Name         |                 | Sanitation System                           |                            |                         |                          |    | Containment Unit    |          |                             |       |       | Desludging Services              |     |  |                             |            |  |      |
|-------|-----------------|-----------------|---|----------------------------|-------------------------|--------------------------|----|---------------------|----------|-----------------------------|-------|-------|----------------------------------|-----|--|-----------------------------|------------|--|------|
|       |                 |                 | Where is outlet of septic tank connected to |                            |                         |                          |    | Average size of Pit |          | Average size of septic tank |       |       | Septic tank desludging frequency |     | Are there any desludging operators in village? (mechanised, non-mechanised desludging and N.A if not applicable) | Type of desludging operator |            | Does the GP own any desludging vehicle |      |
|       |                 |                 | Drains (nalas) (% of households)            | Soak pit (% of households) | Sewer (% of households) | Others (% of households) |    | Depth               | Diameter | Length                      | Width | Depth | min                              | max |  |                             | Registered | non-registered                         |      |
|       |                 |                 | Name of unit                                | %                          | ft                      | ft                       | ft | ft                  | ft       | year                        | years |       |                                  | Nos | where  |                             |            |  |      |
| 1     | Awsari Group    | Bedshinge       | 0   | 90                         | 0                       | Open ground              | 10 | 6                   | 3        | 8                           | 5     | 8     | 15                               | 25  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 2     |                 | Awasari         | 0   | 90                         | 0                       | Open ground              | 10 | 8                   | 3        | 7                           | 5     | 7     | 15                               | 25  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 3     | Bijwadi         | Gagargaon       | 0   | 80                         | 0                       | Open ground              | 20 | 4                   | 3        | 7                           | 4     | 5     | 5                                | 7   | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 4     |                 | Rajwadi         | 0   | 25                         | 0                       | Open ground              | 75 | 7                   | 3        | 7                           | 4     | 6     | 12                               | 15  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 5     |                 | Vangali         | 0   | 15                         | 0                       | Open ground              | 85 | 7                   | 3        | 7                           | 4     | 6     | 10                               | 12  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 6     | Galandwadi No.1 | Galand Wadi 1   | 70  | 30                         | 0                       | N.A.                     | 0  | 9                   | 3        | 10                          | 8     | 8     | Don't Know                       |     | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 7     |                 | Narutwadi       | 95  | 5                          | 0                       | N.A.                     | 0  | 9                   | 4        | 11                          | 9     | 7     | Don't Know                       |     | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 8     | Galandwadi No.2 | Galandwadi No.2 | 85  | 15                         | 0                       | N.A.                     | 0  | 4                   | 3        | 5                           | 4     | 7     | 5                                | 10  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 9     | Kalthan No.2    | Kalthan No.2    | 10  | 90                         | 0                       | N.A.                     | 0  | 7                   | 4        | 5                           | 7     | 5     | 10                               | 20  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 10    | Malwadi         | Malwadi         | 70  | 30                         | 0                       | N.A.                     | 0  | 7                   | 3        | 5                           | 7     | 5     | 5                                | 15  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 11    | Sardewadi       | Sardewadi       | 10  | 90                         | 0                       | N.A.                     | 0  | 7                   | 3        | 5                           | 7     | 6     | 10                               | 15  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 12    | Tarangwadi      | Tarangwadi      | 0   | 85                         | 0                       | Open ground              | 15 | 5                   | 4        | 7                           | 4     | 10    | 15                               | 20  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 13    | Wadapuri        | Gokhali         | 80  | 20                         | 0                       | N.A.                     | 0  | 5                   | 3        | 7                           | 3     | 5     | Don't Know                       |     | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 14    |                 | Vadapuri        | 1   | 99                         | 0                       | N.A.                     | 0  | 10                  | 3        | 10                          | 7     | 9     | 10                               | 15  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 15    | Pandharwadi     | Pandharwadi     | 0   | 100                        | 0                       | N.A.                     | 0  | 5                   | 3        | 8                           | 5     | 5     | 15                               | 25  | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |
| 16    | Zhagadewadi     | Zhagadewadi     | 80  | 15                         | 0                       | Open ground              | 5  | 6                   | 3        | 10                          | 6     | 9     | Don't Know                       |     | N.A.   | N.A.                        | N.A.       | N.A.                                   | N.A. |

Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra

| SR NO | GP Name         |                 | Desludging Services          |   |                             |                  | Desludging Tariff | How is desludging done in case of narrow lanes/ areas not accessible to desludging vehicles | Width of Road |     | % of village not accessible by roads | Land Availability                               |  |
|-------|-----------------|-----------------|------------------------------|---|-----------------------------|------------------|-------------------|---|---------------|-----|--------------------------------------|---|--|
|       |                 |                 | Type of desludging vehicles. | if not, where you get the desludging vehicles | Where is the waste disposed |                  |                   |   | min           | max |                                      | Is government land available inside the village | Is government land available in outskirts of village |
|       |                 |                 |                              |   | Deep Row Entrenchment       | Land Application |                   |   | m             | m   | %                                    | If yes, how much                                | if yes, how much                                     |
|       |                 |                 |                              |   |                             |                  |                   |   |               |     |                                      |   |  |
| 1     | Awsari Group    | Bedshinge       | N.A.                         | Municipal Council                             | No                          | No               | 6000              | Roads are accessible  | 3             | 5   | 0                                    | Yes   | no   |
| 2     |                 | Awasari         | N.A.                         | Municipal Council                             | No                          | No               | 6000              | Roads are accessible  | 3             | 5   | 0                                    | Yes   | no   |
| 3     | Bijwadi         | Gagargaon       | N.A.                         | Don't Know                                    | No                          | Yes              | 7000              | N.A.  | 3             | 5   | 0                                    | No  | no   |
| 4     |                 | Rajwadi         | N.A.                         | Municipal Council                             | No                          | Yes              | 5000              | N.A.  | 4             | 5   | 0                                    | 2 hecter  | no   |
| 5     |                 | Vangali         | N.A.                         | Municipal Council                             | No                          | No               | Don't Know        | N.A.  | 3             | 5   | 0                                    | No  | no   |
| 6     | Galandwadi No.1 | Galand Wadi 1   | N.A.                         | Don't Know                                    | No                          | No               | Don't Know        | N.A.  | 2             | 4   | 2                                    | 0.7 hecter                                      | no   |
| 7     |                 | Narutwadi       | N.A.                         | Don't Know                                    | No                          | No               | Don't Know        | N.A.  | 2             | 4   | 2                                    | No  | no   |
| 8     | Galandwadi No.2 | Galandwadi No.2 | N.A.                         | Don't Know                                    | No                          | Yes              | 5000              | N.A.  | 3             | 4   | 0                                    | 6 acres   | no   |
| 9     | Kalthan No.2    | Kalthan No.2    | N.A.                         | Municipal Council                             | No                          | Yes              | 4000              | N.A.  | 3             | 6   | 10                                   | Yes   | no   |
| 10    | Malwadi         | Malwadi         | N.A.                         | Municipal Council                             | No                          | Yes              | 4000              | Roads are accessible  | 2             | 3   | 0                                    | Yes   | yes  |
| 11    | Sardewadi       | Sardewadi       | N.A.                         | Don't Know                                    | No                          | Yes              | 5000              | Roads are accessible  | 3             | 6   | 0                                    | Yes   | no   |
| 12    | Tarangwadi      | Tarangwadi      | N.A.                         | Don't Know                                    | No                          | No               | Don't Know        | N.A.  | 4             | 5   | 0                                    | 22 acres  | no   |
| 13    | Wadapuri        | Gokhali         | N.A.                         | Don't Know                                    | No                          | No               | 8000              | N.A.  | 3             | 4   | 0                                    | 16 acres  | no   |
| 14    |                 | Vadapuri        | N.A.                         | Don't Know                                    | No                          | No               | Don't Know        | N.A.  | 3             | 4   | 0                                    | 16 acres  | no   |
| 15    | Pandharwadi     | Pandharwadi     | N.A.                         | Municipal Council                             | No                          | No               | 5000              | Are not desludged   | 3             | 4   | 0                                    | No  | no   |
| 16    | Zhagadewadi     | Zhagadewadi     | N.A.                         | Don't Know                                    | No                          | No               | Don't Know        | N.A.  | 3             | 4   | 0                                    | 42 acres  | no   |

Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra

| SR NO | GP Name         |                 | Major Occupation of the village<br>(To analyse the reuse opportunity) |   | Reuse Opportunities                                 |  |  | Land use<br>% of agricultural land | What is the main message of FSSM conveyed through IEC | Name the scheme under which IEC activities are conducted | Tariff             |            |                         | Does the village receive funds for development of sanitation facilities under any government schemes |
|-------|-----------------|-----------------|---|---|---|--|--|------------------------------------|---|--|--------------------|------------|-------------------------|--|
|       |                 |                 | 1st Occupation  | % of people involved in that occupation | Are people aware of FSS use for agriculture purpose | Are people using treated FSS collected from pits and septic tanks for agriculture? | In future will people be willing to use FS for agriculture ? |                                    |   |  | Property tax       | Sanitation | Water                   |  |
|       |                 |                 |   |   | yes/no  | yes/no   | yes/no   |                                    |   | Rs   | Rs                 | Rs         | If yes name the mission |  |
| 1     | Awasari Group   | Bedshinge       | Farming   | 95                                      | No  | No   | No   | 70                                 | N.A.  | N.A.   |                    | No         |                         | No   |
| 2     |                 | Awasari         | Farming   | 95                                      | No  | No   | No   | 75                                 | N.A.  | N.A.   |                    | No         |                         | No   |
| 3     | Bijwadi         | Gagargaon       | Farming   | 100                                     | No  | No   | Yes  | 95                                 | N.A.  | N.A.   | 200                | No         | 720                     | No   |
| 4     |                 | Rajwadi         | Farming   | 100                                     | No  | No   | Yes  | 100                                | N.A.  | N.A.   | 400                | No         | 300                     | No   |
| 5     |                 | Vangali         | Farming   | 95                                      | No  | No   | Yes  | 100                                | N.A.  | N.A.   | 100                | No         | 400                     | No   |
| 6     | Galandwadi No.1 | Galand Wadi 1   | Farming   | 85                                      | No  | No   | Yes  | 80                                 | N.A.  | N.A.   |                    | No         | 360 per household       | Gram Vikas Yojana  |
| 7     |                 | Narutwadi       | Farming   | 95                                      | No  | No   | Yes  | 90                                 | N.A.  | N.A.   |                    | No         |                         | Gram Vikas Yojana  |
| 8     | Galandwadi No.2 | Galandwadi No.2 | Farming   | 75                                      | Yes   | Yes  | Yes  | 100                                | N.A.  | N.A.   | 500 per household  | No         | 500 per household       | No   |
| 9     | Kalthan No.2    | Kalthan No.2    | Farming   | 90                                      | No  | Yes  | Yes  | 90                                 | N.A.  | N.A.   | 10-20 Rs per sq ft | No         | 500 per household       | Gram Vikas Yojana, Nirmal Bharat Abhiyan   |
| 10    | Malwadi         | Malwadi         | Farming   | 90                                      | Yes   | Yes  | Yes  | 90                                 | N.A.  | N.A.   | 1-2 Rs per sq ft   | No         |                         | Gram Vikas Yojana  |
| 11    | Sardewadi       | Sardewadi       | Farming   | 80                                      | No  | No   | Yes  | 90                                 | N.A.  | N.A.   | 10-20 Rs per sq ft | No         | 500 per household       | Gram Vikas Yojana  |
| 12    | Tarangwadi      | Tarangwadi      | Farming   | 90                                      | No  | No   | No   | 60                                 | N.A.  | N.A.   | 400                | No         | 100                     | No   |
| 13    | Wadapuri        | Gokhali         | Daily Wage Employee   | 90                                      | No  | No   | Yes  | 80                                 | N.A.  | N.A.   |                    | No         |                         | No   |
| 14    |                 | Vadapuri        | Farming   | 75                                      | No  | No   | Yes  | 65                                 | N.A.  | N.A.   |                    | No         | 280 per household       | No   |
| 15    | Pandharwadi     | Pandharwadi     | Farming   | 50                                      | No  | No   | No   | 90                                 | N.A.  | N.A.   |                    | No         |                         | No   |
| 16    | Zhagadewadi     | Zhagadewadi     | Farming   | 90                                      | No  | No   | Yes  | 85                                 | N.A.  | N.A.   |                    | No         |                         | No   |

## 8.7 Annexure 7: Indapur Urban Data

## A. GENERAL DATA

| SR NO | GENERAL DATA   | 2011                                | 2021        | Units    |
|-------|--|-------------------------------------|-------------|----------|
| 1     | Population   | 25515 (Census)                      | 29000 (SLB) |          |
| 2     | No of households   | 5228                                | 7064 (SLB)  |          |
| 3     | Water supply to households per day   |                                     |             | LPCD     |
|       | % Of households having tap water supply  |                                     | 100         | %        |
| 4     | Number of Slums  |                                     | 2           |          |
|       | Percentage of Population residing in slums   |                                     | 8.4         | %        |
| 5     | Major occupation of the Town   | Farming, services, business         |             |          |
| 6     | % Of town connected with drains  |                                     | 60          | %        |
| 7     | % Of town connected with soak pits   |                                     | 40          | %        |
| 8     | Where is the water from drains disposed?   | Water body or river                 |             |          |
| 9     | Where is the water from sewer disposed?  | NA                                  |             |          |
| 10    | Is ULB planning to connect the town with sewer/open drains in future? (If yes, mention when)               | No. They already have closed drains |             |          |
| 11    | Are IEC Activities to promote desludging / FSSM management, practiced for the town                         | Yes. Once in a year                 |             | yes/no   |
|       | Type of IEC Activities adopted   | Flexes, wall paintings              |             |          |
|       | Number of IEC activities conducted   | Once in a year                      |             | per year |
|       | Did IEC helped in increasing the desludging demand.  | No                                  |             | yes/no   |
| 12    | If water and sanitation taxes are collected from the households, mention the average amount per household. |                                     |             |          |
|       | Sanitation tax   |                                     | 100/W.C     | Rs       |
|       | Water tax  |                                     | Water meter | Rs       |
|       | How regularly do the households pay the taxes? (% of households that regularly pays taxes)                 |                                     | 80          | %        |

**B. SANITATION FACILITIES**

| SR NO | Sanitation Facilities                                     | 2021 | units |
|-------|---|------|-------|
| 1     | % Of population having access to toilets                  | 100  | %     |
|       | % Of population having access to toilets but not using it | 0    | %     |
| 2     | Type of Toilets   |      |       |
|       | Pour/Flush Toilets  | 100  | %     |
|       | VIP Latrine   | 0    | %     |
|       | Pit Latrine   | 0    | %     |
|       | Others  | 0    | %     |
| 3     | Type of contamination unit                                |      |       |
|       | Septic Tank   | 100  | %     |
|       | Single Pit  | 0    | %     |
|       | Twin Pit  | 0    | %     |
|       | Others  |      |       |
| 4     | Availability of Community Toilets                         |      |       |
|       | Community Toilets (6 toilets slums)                       | 13   | nos   |
|       | Public Toilets  | 1    | nos   |
|       | % Of population using community toilets                   | 8.4  | %     |
| 5     | Where is outlet of Septic tank Connected to               |      |       |
|       | Drains (Nalas)  | 60   | %     |
|       | Soak Pits   | 40   | %     |
|       | sewers  | 0    | %     |
|       | Open ground   | 0    | %     |
|       | Others  | 0    | %     |
| 6     | Average dimensions of septic tank                         |      |       |
|       | Length  | 2.1  | m     |
|       | Breadth   | 1.5  | m     |
|       | Height  | 2.1  | m     |

**C. DESLUDGING SERVICES**

| SR NO | Desludging Services                             | value  | unit     |
|-------|---|--|----------|
| 1     | Frequency of desludging (Demand)                |  |          |
|       | min   | 10   | years    |
|       | max   | 15   | years    |
| 2     | Cost of desludging                              |  |          |
|       | min   | 2000   | Rs       |
|       | max   | 2500   | Rs       |
| 3     | How is desludging carries out?                  |  |          |
|       | Mechanised desludging                           | 7000   | 2        |
|       | Non-Mechanised Desludging                       |  |          |
|       | Sewers  |  |          |
| 4     | Number of desludging operators                  |  |          |
|       | Registered                                      | 2  | nos      |
|       | Non-Registered                                  | 0  | nos      |
|       | Informal Operator (using hand tools)            | 0  | nos      |
| 5     | Number of Desludging vehicles                   |  |          |
|       | ULB owner                                       | 2  | nos      |
|       | Private   | 0  | nos      |
| 6     | Capacities of desludging vehicle                |  |          |
| a     | Vacuum suction tractor                          | 1 nos  | 3000 lit |
| b     | Vacuum truck                                    | 1 nos  | 4000 lit |
| 7     | Where are desludging trucks emptied             |  |          |
|       | FSTP  | 100  | %        |
|       | Drains/nalas                                    | 0  | %        |
|       | Sewers  | 0  | %        |
|       | Other   |  |          |
| 8     | % Of town not connected by proper road network  | 0  | %        |
|       | Width of road                                   |  |          |
|       | Min   | 3  | m        |
|       | Max   | 6  | m        |
| 9     | How is desludging done in case of narrow lanes. | Pipes of suction trucks are long to get access to septic tanks in narrow lanes |          |



**D. FSTP DATA**

| SR NO | FSTP data   | value                      | unit         |
|-------|---|----------------------------|--------------|
| 1     | Who operates the FSTP?  | Municipal Council          |              |
| 2     | Total Capacity of FSTP  | 10                         | KLD          |
| 3     | FSTP is currently operational at  | 100                        | %            |
| 4     | Total volume of sludge received/day   | Demand desludging          | 3000 lit     |
| 5     | number of desludging vehicles trip/day  | Demand desludging          | 1            |
| 6     | Sludge Characteristics  |                            |              |
|       | pH  |                            |              |
|       | BoD   |                            |              |
|       | CoD   |                            |              |
|       | TSS   |                            |              |
| 7     | Maintenance of Log book   |                            |              |
|       | FSTP  | Digital Log Book           |              |
|       | Desludging operator   |                            |              |
| 8     | Does sludge from any nearby villages comes to FSTP? (If yes, Write the name of nearby villages the sludge is collected from and also mention volume) Through council vehicle                                    |                            |              |
|       | Initially council use to send their vehicle to villages on demand basis but currently they don't do this practise as its not economical for council and also for disposal the treatment capacity is not enough. |                            |              |
| 9     | Reuse of treated sludge and wastewater? (Mention where the by-products are used and for what) Agriculture   |                            |              |
|       | Yes. After treatment, by-products of FSTP are used by farmers   |                            |              |
| 10    | Issues faced in operation due to underutilisation of the facilities?  |                            |              |
|       | Demand desludging make plant not functional - Plant is currently dried and not functional   |                            |              |
| 11    | How is the operation and maintenance cost of the plant recovered? Also mention the O&M cost per month?  |                            |              |
|       | Cost/month: -   | Approx. 10,000/- per month |              |
|       | mode of recovery  |                            |              |
| a     | Sanitation tax, desludging charges  | 100                        | INR per W.C. |
| b     | Sale of compost + dried sludge  | 5                          | INR per kg   |

## 8.8 Annexure 8: Key Informant Interview

|                   |  |
|-------------------|--|
| Project Name      | Investigation for Urban Rural FSSM Linkages in Maharashtra' under the title 'Urban Rural Linkages in Service Delivery/ addressing challenges with Peri Urban Areas |
| Meeting Objective | KII with Panchayat Samiti official for rural data collection   |
| Attendee          | Mr. Solapuri – Panchayat Samiti Official<br>Ms. Radhika Boargaonkar – Ecosan Services Foundation, Pune<br>Mr. Prajwal More - Ecosan Services Foundation, Pune      |
| Date of meeting   | 16/02/2022 and 28/02/2022  |
| Date of report    | 01/03/2022   |
| Reference No.     | AIIISG06-KII01   |

| Item | Record of discussion   |
|------|--|
| 1.   | <p><b>Discussion – 16/02/2022</b></p> <p><b>Mr. Solapuri – Panchayat Samiti Official</b><br/><b>Ms. Radhika Boargaonkar, Project Manager, ESF</b><br/><b>Mr. Prajwal More, Project Associate, ESF</b></p> <p>Ms. Radhika explained the entire project with aim and objective and benefit of the project to rural as well as urban areas.</p> <p>Mr. Solapuri, Panchayat Samiti Official gave the information and contact details of all the gram sevaks of the selected villages under the project. He personally called all the gram sevaks and told them to cooperate with our team.</p> <p>Information collected during the KII: -</p> <ul style="list-style-type: none"> <li>• 20% of the toilets in the villages are connected to soak pits and 80% are connected to septic tanks.</li> <li>• Five shared toilets are present in the enlisted villages, these toilets are shared between 2 to 3 households who are collectively responsible for its operation and maintenance.</li> <li>• Most of toilets in rural areas are constructed under SBM. Toilet connected to septic tanks are more in densely populated area of the village whereas toilets connected to soak pits can be found more in scattered area.</li> <li>• Usage of toilet has increased after the SBM.</li> </ul> |

2.

**Discussion – 28/02/2022**

**Mr. Solapuri – Block Coordinator, Panchayat Samiti, Indapur**

**Ms. Radhika Boargaonkar, Project Manager, ESF**

**Mr. Prajwal More, Project Associate, ESF**

**Following information was collected during the KII:**

- None of the identified Gram Panchayats owned a desludging vehicle.
- No private desludging operators are present in the villages.
- Some Gam Panchayats have received trailer mounted suction machine from District Planning and Development Council, Zilla Parishad for pilot project in rural areas.
- Rural household usually construct oversized septic tanks to avoid frequent desludging.
- Tap water connections have been provided in few villages under village water supply schemes of government.
- Water ATMs connected to RO plants are constructed in almost all the villages.



|                   |   |
|-------------------|---|
| Project Name      | Investigation for Urban Rural FSSM Linkages in Maharashtra' under the title 'Urban Rural Linkages in Service Delivery/ addressing challenges with Peri Urban Areas                          |
| Meeting Objective | KII with FSTP plant incharge and operator of desludging vehicle.  |
| Attendee          | Lohire – Assistant Health Inceptor, IMC<br>Kunal Chauhan – Desludging operator<br>Radhika Boargaonkar – Ecosan Services Foundation, Pune<br>Prajwal More - Ecosan Services Foundation, Pune |
| Date of meeting   | 28/02/2022  |
| Date of report    | 01/03/2022  |
| Reference No.     | AIILSG06-KII02  |

| Item | Record of discussion  |
|------|---|
| 1.   | <p><b>Discussion</b></p> <p><b>Mr. Lohire – Assistant Health Inceptor, IMC</b><br/><b>Mr. Kunal Chauhan – Desludging operator</b><br/><b>Ms. Radhika Boargaonkar – Ecosan Services Foundation, Pune</b><br/><b>Mr. Prajwal More - Ecosan Services Foundation, Pune</b></p> <ul style="list-style-type: none"> <li>• Mr. Lohire informed that the FSTP received only one truck load in the past month.</li> <li>• A digital log book is maintained by the ULB.</li> <li>• Treated water from FSTP is reused for gardening and the organic waste from solid waste plant is mixed with dried sludge and sold to farmers at INR 5 per kg.</li> <li>• The desludging operator did not receive any training on operation of the desludging truck or on SOP to be followed during desludging.</li> <li>• The council provides the operator with a new PPE kit every six months.</li> <li>• Indapur municipal council has 2 desludging vehicles, one is trailer mounted suction machine having 3000 lit. capacity and one is suction truck having 4000 lit. capacity.</li> </ul> <p><b>Background</b></p> <p>The current capacity of Indapur FSTP is 10 KLD. It is situated at outskirts of town near solid waste treatment plant. It is a natural treatment process with sludge drying beds for solid liquid separation, the liquid after separation flows to anaerobic baffled tanks and constructed wetland for treatment.</p> |
| 2.   |   |

Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra



|                   |   |
|-------------------|---|
| Project Name      | Investigation for Urban Rural FSSM Linkages in Maharashtra' under the title 'Urban Rural Linkages in Service Delivery/ addressing challenges with Peri Urban Areas      |
| Meeting Objective | KII with Swachh Bharat Mission Officer, Indapur Municipal Council   |
| Attendee          | Mr. Barge – SBM officer, Indapur Municipal Council<br>MS. Radhika Boargaonkar – Ecosan Services Foundation, Pune<br>Ms. Prajwal More - Ecosan Services Foundation, Pune |
| Date of meeting   | 28/02/2022  |
| Date of report    | 01/03/2022  |
| Reference No.     | AIILSG06-KII03  |

| Item | Record of discussion  |
|------|---|
| 1.   | <p><b>Discussion</b></p> <p><b>Mr. Barge – SBM officer, Indapur Municipal Council</b><br/><b>Ms. Radhika Boargaonkar – Ecosan Services Foundation, Pune</b><br/><b>Mr. Prajwal More - Ecosan Services Foundation, Pune</b></p> <p>The following information was obtained from Mr. Barge during the KII: -</p> <ul style="list-style-type: none"> <li>• All households in Indapur town have access to toilet and tap water supply.</li> <li>• The water supply of town is dependent on Ujjani dam. Water is treated in water treatment plant and then provided to the households.</li> <li>• Indapur has 13 community toilets. Six of these are located in slum.</li> <li>• All toilets in Indapur are connected to septic tanks. 60% of the septic tanks are connected to underground drainage network and 40% are connected to soak pits.</li> <li>• Indapur has 100% underground drainage network. The wastewater from the underground drainage is disposed in Bhima River without treatment.</li> <li>• Construction of toilets are as per Indian standards whereas design of septic tanks is not as per standards and constructed oversized.</li> <li>• He also mentioned that desludging of septic tanks in Indapur is demand based and as septic tanks are constructed oversized, desludging happens once in a month.</li> <li>• Household has to contact municipal council for desludging of septic tank, the council charge Rs. 2000 per trip from household.</li> <li>• The council has 2 suction vehicles; a trailer mounted suction machine and a suction truck of capacities 3000 L and 4000 L respectively.</li> <li>• The operation and maintenance cost of FSTP is recovered from a. sanitation tax collected from each household which is INR 100 per W.C., b. through desludging tariff from households and c. from sale of compost at INR 5 per kg. He also mentioned that recently they got Mahacity compost brand credit.</li> <li>• Monthly monitoring of effluent and influents characteristics takes place and municipal council has given contract to private lab of Pune.</li> <li>• An augmented capacity of 36 KLD has been sanctioned to ULB under GR No. SMM-2020/C.R.85/UD-34.</li> </ul> |

- Two FSTPs of 3 and 4 KLD have been proposed to UDD.
- Municipal council charges property tax as per the type of property. Residential properties are charged INR 350 per households whereas commercial properties are charged INR 450 per property. Large Commercial properties like hotels, colleges etc. are charged INR 900 per property.
- Main occupation of people in Indapur is farming, a part of population is involved in service and businesses.



**Underground drainage in Indapur Town**

|                   |  |
|-------------------|--|
| Project Name      | Investigation for Urban Rural FSSM Linkages in Maharashtra' under the title 'Urban Rural Linkages in Service Delivery/ addressing challenges with Peri Urban Areas   |
| Meeting Objective | KII with gram sevaks of villages, Indapur  |
| Attendee          | Ms. Lodhe – Gram Sevak, Sardewadi<br>Mr. Atole – Gram Sevak, Malwadi No. 1<br>Mr. Bhalerao – Gram Sevak, Kaltan No. 2<br>MS. Radhika Boargaonkar – Ecosan Services Foundation, Pune<br>Ms. Prajwal More - Ecosan Services Foundation, Pune |
| Date of meeting   | 28/02/2022   |
| Date of report    | 01/03/2022   |
| Reference No.     | AIILSG06-KII04   |

| Item | Record of discussion   |
|------|--|
| 1.   | <p><b>Discussion</b></p> <p><b>Ms. Lodhe – Gram Sevak, Sardewadi</b><br/><b>Mr. Atole – Gram Sevak, Malwadi No. 1</b><br/><b>Mr. Bhalerao – Gram Sevak, Kaltan No. 2</b><br/><b>MS. Radhika Boargaonkar – Ecosan Services Foundation, Pune</b><br/><b>Ms. Prajwal More - Ecosan Services Foundation, Pune</b></p> <p>The following information is obtained from KII with Gram Sevaks:</p> <ul style="list-style-type: none"> <li>• The number of households in villages having access to toilets increased after SBM.</li> <li>• Usage of toilets increased after SBM.</li> <li>• 65% of toilets in the village are connected to septic tanks and 35% are connected to soak pits.</li> <li>• These toilets are constructed as per standards but the construction of containment units is not as per SBM standards.</li> <li>• Households below poverty level use precast toilets connected to pits as they can't afford the cost of construction of septic tank and the desludging tariff.</li> <li>• There exist 5% villagers who still don't use the facilities and defecate in open.</li> <li>• Water atm are installed in 60% of the villages in Indapur district which are connected to RO filters having capacity 500 lit/hrs. Villagers are charged INR 5 per 20 L of tank for the purchase of RO water.</li> <li>• Major occupation of people in villages is farming some part of populations belongs to daily wages work.</li> <li>• Many villages have received tap water connection under Payjal yojana of government. People living in farms have their separate wells, borewells or tube wells whereas households living in gaathan or hamlets depends on gram panchayat's tap water connection.</li> </ul> |



- Gram panchayat don't own desludging vehicle, if the tanks are full, the households either contact manual scavengers from Indapur town or previously council use to provide desludging service but now they stopped giving service to rural.
- Under "Mazhi Vasundhara Scheme" gram panchayat is strengthening females of villages to make village clean and make various items from waste so from waste to wealth scheme these females will earn for their survival and create livelihood in the village.
- Self Help Groups are carrying vermicomposting activity in villages under the same scheme as well.



8.9 Annexure 9: Desludging Tariff Calculation

|   | Expenditure                          | Values | Units | Total Cost |
|---|--------------------------------------|--------|-------|------------|
| 1 | Maintanance of vehicle               |        | INR   | 5000       |
| 2 | Salary (20% )                        |        | INR   | 5000       |
|   | Driver                               | 15000  | INR   |            |
|   | Helper                               | 10000  | INR   |            |
| 3 | Disel charges                        |        | INR   | 4230       |
|   | Average of vehicle                   | 5      | Km/L  |            |
|   | Cost of Diesel                       | 94     | INR   |            |
|   | Average distance (two ways) for town | 5      | Km    |            |
|   | Number of trips per month            | 45     |       |            |
| 4 | Operation and Maintanance of FSTP    |        | INR   | 4000       |
| 5 | Cost of Safety Equipments            |        | INR   | 2000       |
|   |                                      |        | INR   | 20230      |
| 6 | Others                               |        |       | 2023       |
|   | Total Monthly cost                   |        | INR   | 22253      |
|   |                                      |        |       |            |
|   | O&M cost per Trip                    |        | INR   | 495        |
|   | Base price (O&M cost + 20% Margin)   |        |       | 593        |

## 8.10 Annexure 10: List of FSTPs: Maharashtra

| Sr. No. | Name of ULB                | FSTP Size Approved by GR No. SMM-2019/C.R.124/UD-34 for FSTP Project (in KLD) | Revised Size Approved of FSTP Project (Based on Principle of Scheduled Desludging upto year 2030) in KLD |
|---------|----------------------------|---|--|
| 1       | 2                          | 3   | 4  |
| 1       | Akole (NP)                 | 5   | 25   |
| 2       | Deolali Pravara (M CI)     | 10  | 36   |
| 3       | Jamkhed (M CI)             | 10  | 11   |
| 4       | Karjat (NP)                | 3   | 19   |
| 5       | Kopargaon (M CI)           | -   | 57   |
| 6       | Newasa (NP)                | 5   | 25   |
| 7       | Parner (NP)                | 3   | 15   |
| 8       | Pathardi (M CI)            | 10  | 41   |
| 9       | Rahuri (M CI)              | 10  | 41   |
| 10      | Sangamner (M CI)           | 15  | 76   |
| 11      | Shevgaon (M CI)            | 5   | 46   |
| 12      | Shrigonda (M CI)           | 10  | 40   |
| 13      | Akot (M CI)                | 20  | 96   |
| 14      | Balapur (M CI)             | -   | 30   |
| 15      | Barshi Taklii              | 5   | 18   |
| 16      | Murtijapur                 | 10  | 42   |
| 17      | Patur (M CI)               | 5   | 16   |
| 18      | Telhara (M CI)             | 5   | 25   |
| 19      | Achalpur (M CI)            | 20  | 102  |
| 20      | Anjangaon (M CI)           | 15  | 54   |
| 21      | Bhatakuli (NP)             | -   | 9  |
| 22      | Chandur Railway (M CI)     | 5   | 22   |
| 23      | Chandurbazar (M CI)        | 5   | 19   |
| 24      | Chikhaldara (M CI)         | 3   | 8  |
| 25      | Daryapur Banosa (M CI)     | 10  | 45   |
| 26      | Dattapur Dhamangaon (M CI) | 5   | 27   |
| 27      | Dharni (NP)                | 5   | 19   |
| 28      | Morshi (M CI)              | 10  | 44   |
| 29      | Nandgaon Khandeshwar (NP)  | 3   | 17   |
| 30      | Shendurjana (M CI)         | 5   | 24   |
| 31      | Teosa NP                   | 3   | 18   |
| 32      | Warud (M CI)               | 10  | 50   |
| 33      | Kannad (M CI)              | 10  | 42   |
| 34      | Khuldabad (M CI)           | -   | 11   |
| 35      | Paithan (M CI)             | 10  | 43   |
| 36      | Phulambri (NP)             | 5   | 9  |
| 37      | Soigaon (NP)               | 3   | 11   |
| 38      | Ambejogai (M CI)           | 15  | 73   |
| 39      | Ashti (NP)                 | 3   | 13   |
| 40      | Dharur (M CI)              | 5   | 22   |
| 41      | Georai (M CI)              | 10  | 36   |
| 42      | Kaij (NP)                  | 10  | 39   |
| 43      | Manjlegaon (M CI)          | 10  | 42   |

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|    |                          |    |     |
|----|--------------------------|----|-----|
| 44 | Patoda (NP)              | 3  | 12  |
| 45 | Shirur (NP)              | 3  | 15  |
| 46 | Wadavani (NP)            | 5  | 23  |
| 47 | Bhandara (M CI)          | 20 | 104 |
| 48 | Lakhandur (NP)           | 3  | 16  |
| 49 | Lakhani (NP)             | 3  | 15  |
| 50 | Mohadi (NP)              | 3  | 12  |
| 51 | Pauni (M CI)             | 5  | 27  |
| 52 | Sakoli (NP)              | 5  | 34  |
| 53 | Tumsar (M CI)            | 10 | 53  |
| 54 | Buldana (M CI)           | 15 | 76  |
| 55 | Chikhli (M CI)           | 15 | 69  |
| 56 | Deulgaon Raja (M CI)     | 10 | 41  |
| 57 | Jalgaon (Jamod) (M CI)   | 10 | 35  |
| 58 | Khamgaon (M CI)          | -  | 78  |
| 59 | Lonar (M CI)             | 5  | 22  |
| 60 | Malkapur (M CI)          | 15 | 63  |
| 61 | Mehkar (M CI)            | 10 | 45  |
| 62 | Motala (NP)              | 3  | 12  |
| 63 | Nandura (M CI)           | 10 | 46  |
| 64 | Sangrampur (NP)          | 3  | 6   |
| 65 | Sindkhed Raja (M CI)     | 15 | 29  |
| 66 | Bhadravati (M CI)        | 15 | 73  |
| 67 | Brahmapuri (M CI)        | 10 | 61  |
| 68 | Chimur Municipal Council | 10 | 31  |
| 69 | Gadchandur(MC)           | 10 | 28  |
| 70 | Gond Pipari (NP)         | 3  | 11  |
| 71 | Jivati (NP)              | 3  | 10  |
| 72 | Korpana (NP)             | 3  | 8   |
| 73 | Mul (M CI)               | -  | 25  |
| 74 | Nagbhid (M CI)           | 10 | 33  |
| 75 | Pombhurna (NP)           | 3  | 10  |
| 76 | Rajura (M CI)            | -  | 26  |
| 77 | Saoli (NP)               | 3  | 13  |
| 78 | Sindewahi                | 3  | 17  |
| 79 | Warora (M CI)            | 10 | 50  |
| 80 | Dondaicha-Warwade        | 10 | 47  |
| 81 | Sakri (NP)               | 5  | 22  |
| 82 | Shindkheda(NP)           | -  | 24  |
| 83 | Aheri (NP)               | 3  | 21  |
| 84 | Armori (NP)              | 5  | 30  |
| 85 | Bhamaragad (NP)          | 3  | 10  |
| 86 | Chamorsi (NP)            | 5  | 23  |
| 87 | Desaiganj (M CI)         | 10 | 40  |
| 88 | Dhanora (NP)             | 3  | 11  |
| 89 | Etapalli (NP)            | 3  | 4   |
| 90 | Korchi (NP)              | 3  | 6   |
| 91 | Kurkheda (NP)            | 3  | 11  |
| 92 | Mulchera (NP)            | 3  | 5   |

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|     |                      |    |     |
|-----|----------------------|----|-----|
| 93  | Sironcha (NP)        | 3  | 16  |
| 94  | Amgaon               | -  | 28  |
| 95  | Arjuni (NP)          | 3  | 14  |
| 96  | Deori                | 3  | 16  |
| 97  | Goregaon (NP)        | 3  | 12  |
| 98  | Sadak Arjuni (NP)    | 3  | 10  |
| 99  | Salekasa (NP)        | 3  | 11  |
| 100 | Tirora (M CI)        | 10 | 33  |
| 101 | Aundha (NP)          | 3  | 16  |
| 102 | Basmath (M CI)       | 15 | 55  |
| 103 | Kalamnuri (M CI)     | 5  | 24  |
| 104 | Sengaon              | 3  | 6   |
| 105 | Bhadgaon (M CI)      | 10 | 39  |
| 106 | Bhusawal (M CI)      | 20 | 165 |
| 107 | Bodwad               | 5  | 24  |
| 108 | Chopda (M CI)        | 15 | 85  |
| 109 | Dharangaon (M CI)    | 10 | 36  |
| 110 | Erandol (M CI)       | 10 | 34  |
| 111 | Faizpur (M CI)       | 10 | 29  |
| 112 | Muktainagar          | -  | 32  |
| 113 | Parola (M CI)        | 10 | 35  |
| 114 | Raver (M CI)         | 10 | 27  |
| 115 | Savda (M CI)         | 5  | 20  |
| 116 | Shendurni            | -  | 20  |
| 117 | Varangaon (NP)       | 10 | 40  |
| 118 | Yawal (M CI)         | 10 | 41  |
| 119 | Ambad (M CI)         | 10 | 33  |
| 120 | Badnapur NP          | 3  | 18  |
| 121 | Bhokardan (M CI)     | 5  | 24  |
| 122 | Ghansawangi NP       | 3  | 9   |
| 123 | Jafrabad NP          | 5  | 20  |
| 124 | Mantha NP            | 5  | 26  |
| 125 | Ajara                | -  | 13  |
| 126 | Chandgad             | -  | 10  |
| 127 | Gadhinglaj (M CI)    | 10 | 38  |
| 128 | Hatkangale           | -  | 9   |
| 129 | Hupari               | -  | 27  |
| 130 | Kagal (M CI)         | -  | 39  |
| 131 | Kurundvad (M CI)     | -  | 21  |
| 132 | Malkapur (M CI)      | 3  | 8   |
| 133 | Panhala (M CI)       | -  | 3   |
| 134 | Shirol               | -  | 22  |
| 135 | Vadgaon Kasba (M CI) | -  | 24  |
| 136 | Ahmadpur (M CI)      | 10 | 42  |
| 137 | Ausa (M CI)          | 10 | 36  |
| 138 | Chakur (NP)          | 5  | 18  |
| 139 | Devani(NP)           | 3  | 11  |
| 140 | Jalkot (NP)          | 3  | 13  |
| 141 | Nilanga (M CI)       | 10 | 37  |

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|     |                        |    |    |
|-----|------------------------|----|----|
| 142 | Renapur                | 3  | 13 |
| 143 | Shirur Anantpal        | 3  | 6  |
| 144 | Udgir (M CI)           | 20 | 90 |
| 145 | Bhiwapur (NP)          | 3  | 17 |
| 146 | Butibori               | -  | 36 |
| 147 | Hingana (NP)           | -  | 9  |
| 148 | Kalameshwar (M CI)     | 5  | 41 |
| 149 | Kamptee (M CI)         | 20 | 93 |
| 150 | Kanhan-Pipri (MC)      | -  | 25 |
| 151 | Khapa (M CI)           | 3  | 15 |
| 152 | Kuhi (NP)              | 3  | 12 |
| 153 | Mahadula               | -  | 23 |
| 154 | Mohpa (M CI)           | 3  | 11 |
| 155 | Mouda                  | -  | 13 |
| 156 | Mowad (M CI)           | 3  | 11 |
| 157 | Narkhed (M CI)         | 5  | 25 |
| 158 | Parseoni               | 3  | 19 |
| 159 | Ramtek (M CI)          | 5  | 25 |
| 160 | Savner (M CI)          | 10 | 45 |
| 161 | Umred (M CI)           | -  | 55 |
| 162 | Wadi (MC)              | -  | 55 |
| 163 | WANADONGRI             | -  | 51 |
| 164 | Ardhapur(M CI)         | -  | 23 |
| 165 | Bhokar                 | 10 | 44 |
| 166 | Biloli (M CI)          | 3  | 14 |
| 167 | Dharmabad (M CI)       | 10 | 37 |
| 168 | Hadgaon (M CI)         | 10 | 34 |
| 169 | Himayatnagar (NP)      | 5  | 24 |
| 170 | Kandhar (M CI)         | 5  | 24 |
| 171 | Kinwat (M CI)          | 10 | 37 |
| 172 | Kundalwadi (M CI)      | 3  | 16 |
| 173 | Loha (M CI)            | 5  | 24 |
| 174 | Mahur (M CI)           | 3  | 15 |
| 175 | Mudkhed (M CI)         | -  | 15 |
| 176 | Mukhed (M CI)          | 10 | 35 |
| 177 | Naigaon (NP)           | 5  | 22 |
| 178 | Peth Umri (M CI)       | 3  | 15 |
| 179 | Dhadgaon Wadfalya (NP) | 3  | 13 |
| 180 | Nawapur (M CI)         | 10 | 30 |
| 181 | Shahade (M CI)         | 15 | 59 |
| 182 | Talode (M CI)          | 10 | 33 |
| 183 | Bhagur (M CI)          | -  | 5  |
| 184 | Chandwad (MC)          | 10 | 35 |
| 185 | Deola NP               | 3  | 13 |
| 186 | Dindori NP             | 5  | 30 |
| 187 | Igatpuri (M CI)        | 10 | 31 |
| 188 | Kalwan NP              | 5  | 26 |
| 189 | Manmad (M CI)          | 20 | 76 |
| 190 | Nandgaon (M CI)        | 5  | 23 |

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|     |                      |    |     |
|-----|----------------------|----|-----|
| 191 | Niphad NP            | 5  | 8   |
| 192 | Peth NP              | 3  | 8   |
| 193 | Satana (M CI)        | 10 | 42  |
| 194 | Surgana NP           | 3  | 7   |
| 195 | Yevla (M CI)         | 15 | 53  |
| 196 | Bhum (M CI)          | 5  | 25  |
| 197 | Kalamb (M CI)        | 10 | 34  |
| 198 | Lohara B. (NP)       | 3  | 12  |
| 199 | Murum (M CI)         | 5  | 23  |
| 200 | Naldurg (M CI)       | 5  | 21  |
| 201 | Paranda (M CI)       | 5  | 23  |
| 202 | Tuljapur (M CI)      | 10 | 37  |
| 203 | Umarga (M CI)        | 10 | 46  |
| 204 | Vashi (NP)           | 10 | 28  |
| 205 | Dahanu (M CI)        | 15 | 62  |
| 206 | Jawhar (M CI)        | 3  | 15  |
| 207 | Mokhada              | 3  | 10  |
| 208 | Palghar (M CI)       | 15 | 121 |
| 209 | Talasari             | 3  | 9   |
| 210 | Vikramgad            | 3  | 11  |
| 211 | Wada                 | -  | 18  |
| 212 | Gangakhed (M CI)     | 10 | 45  |
| 213 | Jintur (M CI)        | 10 | 43  |
| 214 | Manwath (M CI)       | 10 | 35  |
| 215 | Palam (NP)           | 3  | 16  |
| 216 | Parbhani (M CI)      | 20 | 267 |
| 217 | Pathri (M CI)        | 10 | 41  |
| 218 | Purna (M CI)         | 10 | 37  |
| 219 | Sailu (M CI)         | 10 | 46  |
| 220 | Sonpeth (M CI)       | 5  | 19  |
| 221 | Alandi (M CI)        | -  | 30  |
| 222 | Bhor (M CI)          | 5  | 21  |
| 223 | CHAKAN               | -  | 62  |
| 224 | Indapur (M CI)       | 10 | 36  |
| 225 | Jejuri               | -  | 17  |
| 226 | Junnar (M CI)        | 10 | 36  |
| 227 | Vadgaon Maval        | -  | 19  |
| 228 | Alibag (M CI)        | 5  | 29  |
| 229 | Karjat (M CI)        | 10 | 34  |
| 230 | Khalapur(NP)         | 3  | 14  |
| 231 | Khopoli (M CI)       | 15 | 86  |
| 232 | Mahad (M CI)         | 10 | 46  |
| 233 | Mangaon (NP)         | 5  | 31  |
| 234 | Matheran (M CI)      | 3  | 7   |
| 235 | Mhasala (NP)         | 3  | 14  |
| 236 | Murud Janjira (M CI) | 3  | 13  |
| 237 | Pen (M CI)           | 10 | 55  |
| 238 | Poladpur(NP)         | 3  | 9   |
| 239 | Shrivardhan (M CI)   | 5  | 24  |

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|     |                       |    |     |
|-----|-----------------------|----|-----|
| 240 | Tala (NP)             | 3  | 7   |
| 241 | Uran (M CI)           | -  | 38  |
| 242 | Chiplun (M CI)        | 15 | 61  |
| 243 | Dapoli Camp (NP)      | 5  | 20  |
| 244 | Devrukh               | 3  | 17  |
| 245 | Guhagar               | 3  | 13  |
| 246 | Khed (M CI)           | 5  | 27  |
| 247 | Lanja MC              | 3  | 23  |
| 248 | Mandangad (NP)        | 3  | 8   |
| 249 | Rajapur (M CI)        | 3  | 14  |
| 250 | Ratnagiri (M CI)      | 20 | 100 |
| 251 | Ashta (M CI)          | 10 | 39  |
| 252 | Jath                  | 15 | 46  |
| 253 | Kadegaon              | 3  | 16  |
| 254 | Kavathemahakal        | 5  | 20  |
| 255 | Khanapur              | 3  | 11  |
| 256 | Palus                 | 10 | 36  |
| 257 | Shirala               | 5  | 19  |
| 258 | Vita (M CI)           | 10 | 48  |
| 259 | Dahiwadi              | 3  | 19  |
| 260 | Khandala              | 3  | 11  |
| 261 | Koregaon              | 5  | 29  |
| 262 | Lonand                | 5  | 23  |
| 263 | Medha                 | 3  | 7   |
| 264 | Mhaswad (M CI)        | 5  | 29  |
| 265 | Patan                 | 3  | 24  |
| 266 | Rahimatpur (M CI)     | 5  | 18  |
| 267 | Waduj                 | 5  | 14  |
| 268 | Devgad - Jamsande     | 3  | 22  |
| 269 | Kankavli (NP)         | 5  | 27  |
| 270 | Kasai - Dodamarg (NP) | 3  | 8   |
| 271 | Kudal                 | 5  | 22  |
| 272 | Malwan (M CI)         | 5  | 25  |
| 273 | Sawantwadi (M CI)     | 5  | 34  |
| 274 | Vengurla (M CI)       | 3  | 10  |
| 275 | Wabhawe - Vaibhavwadi | 3  | 5   |
| 276 | Akkalkot (M CI)       | 10 | 35  |
| 277 | Dudhani (M CI)        | 3  | 10  |
| 278 | Karmala (M CI)        | 5  | 21  |
| 279 | Madha                 | 3  | 14  |
| 280 | Maindargi (M CI)      | 3  | 7   |
| 281 | Malshiras             | 5  | 22  |
| 282 | Mangalvedhe (M CI)    | 5  | 17  |
| 283 | Mohol Nagar Parishad  | 10 | 41  |
| 284 | Sangole (M CI)        | 10 | 45  |
| 285 | Murbad (NP)           | -  | 21  |
| 286 | Shahapur (NP)         | 3  | 16  |
| 287 | Ashti (NP)            | 3  | 13  |
| 288 | Deoli (M CI)          | 5  | 25  |



*Investigation of Urban-Rural Linkages in Faecal Sludge and Septage Management in Maharashtra*

|     |                        |    |    |
|-----|------------------------|----|----|
| 289 | Karanja (NP)           | 3  | 15 |
| 290 | Pulgaon (M CI)         | 10 | 31 |
| 291 | Samudrapur (NP)        | 3  | 10 |
| 292 | Selu (NP)              | 3  | 17 |
| 293 | Sindi (M CI)           | 3  | 17 |
| 294 | Karanja (M CI)         | 15 | 81 |
| 295 | Malegaon Zahangir (NP) | -  | 20 |
| 296 | Mangrulpir (M CI)      | 10 | 42 |
| 297 | Manora (NP)            | 3  | 12 |
| 298 | Risod (M CI)           | 10 | 37 |
| 299 | Arni(M CI)             | 10 | 35 |
| 300 | Babhulgaon (NP)        | 3  | 9  |
| 301 | Dhanki                 | -  | 6  |
| 302 | Digras (M CI)          | 10 | 45 |
| 303 | Ghatanji (M CI)        | 5  | 24 |
| 304 | Kalamb (NP)            | 5  | 21 |
| 305 | Mahagaon (NP)          | 3  | 10 |
| 306 | Maregaon (NP)          | 3  | 6  |
| 307 | Ner (M CI)             | 5  | 26 |
| 308 | Pandharkaoda (M CI)    | 10 | 35 |
| 309 | Pusad (M CI)           | 15 | 78 |
| 310 | Ralegaon (NP)          | 5  | 20 |
| 311 | Umardhed (M CI)        | 10 | 58 |
| 312 | Wani (M CI)            | 15 | 70 |
| 313 | Zari (NP)              | 3  | 4  |





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