Optimisation of Existing Resources for Sustainability of Used Water Management Systems in Maharashtra through Urban Rural Convergence and upgradation of existing facilities

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(Secretariat, Maha Urban WASH & ES Coalition)

Global South Academic Conclave on WASH and Climate 2025

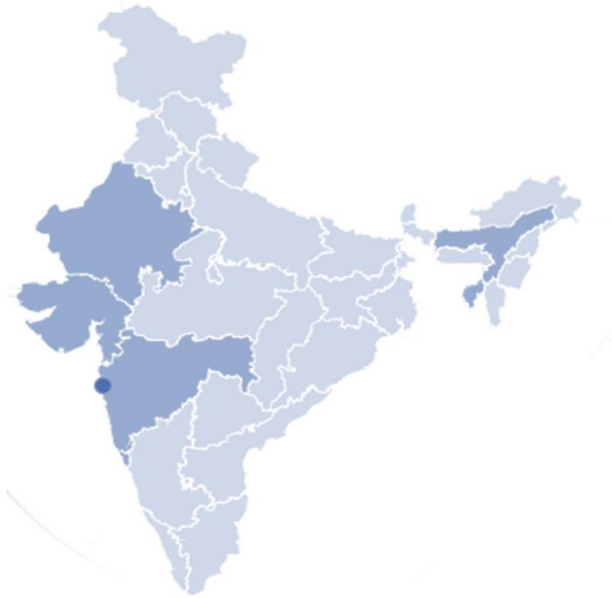
21st - 23rd February 2025, Ahmedabad

All India Institute of Local Self Government , Mumbai

The Regional Centre for Urban & Environmental Studies (RCUES) of
All India Institute of Local Self Government (AIILSG), Mumbai
established and supported by the Ministry of Housing and Urban Affairs, Government of India (GoI)

AIILSG

a premier, Government recognized Institute working in close association with States and Central Government, National and International Agencies in the field of - Education, Training Research, Advisory, Advocacy, Consultancy



RCUES

Serving primarily to – Rajasthan, Gujarat, Maharashtra, Goa, Assam, Tripura, Lakshadweep, Diu, Daman, Dadra- Nagar Haveli

- **Empanelled as 'Swachhata Knowledge Partner (SKP)' under SBM 2.0 by MoHUA, GoI**
- **Empanelled by MoHUA for providing Technical and Capacity Building Support to State and Local Governments. Also, partner with NSDC**
- **Partnership with Urban Development Department, Department of Environment and Climate Change and Water Supply and Sanitation Department, GoM, for providing technical, capacity building and research support in waste management**
- Member of the **Sector Expert Group** for **SBM 2.0, established by MoHUA**

Maharashtra Urban WASH-ES Coalition

A joint initiative of RCUES of AIILSG Mumbai and UNICEF Maharashtra

www.mahawashcoalition.com

Rooted in

Collaboration, Colocation & Cocreation

towards achieving sustainability, equity & community engagement in urban WASH & Environmental Sanitation

- Create **a platform for stakeholders** as a mutual space for engagement.
- Facilitate **partnerships** and collaborations
- **Strengthen capacities** of local stakeholders. Primarily, Municipal Councils and Nagar Panchayats (Less than 100 thousand population)
- Encourage and facilitate **innovations** in the sector
- **Co-create and co-locate** resources, knowledge and skills

Government of India's Commitment to achieve safe sanitation – SDG 6

Last Decade – Shift from Sewered Sanitation Systems (**Conventional**) to mix of **Sewered and Non-Sewered Sanitation Systems (NSS)**

Existing STPs in India: 1400+ | Existing FSTPs: 1500+ *

Criteria	Atal Mission for Rejuvenation and Urban Transformation 2.0 (*AMRUT 2.0*)	Swachh Bharat Mission – Urban 2.0 (SBMU 2.0) Clean India Mission – Urban 2.0
Launched on	01/10/2021 for all **4700+ Urban Local Bodies (ULBs)**	
Eligibility	Cities with > 100 Thousand population	Cities with < 100 Thousand population
Components	1. Universal coverage of **water supply** 2. **Sewerage, FS management and recycle/ reuse** of treated used water 3. Rejuvenation of water bodies 4. Creation of green Spaces	**1. Open Defecation Free (ODF), ODF+ ODF++** **2. Complete Liquid Waste Management** (LWM) including **Faecal Sludge and Septage Management** (FSSM) 3. Solid Waste Management – Garbage Free Cities
Fund allocation	₹ 2,97,000 Crores (**around USD 36 Billon**)	₹ 1,41,600 Crores (**around USD 17 Billion**)
Completion status	1. 85 Lakhs (8.5 Million) Sewerage connections 2. Cumulative capacity of 1800 MLD STPs	1. 4,576 cities ODF 2. 3,913 cities ODF+ 3. 1,429 cities ODF++ 4. 64 Water+ Cumulative capacity of 49,865 KLD FSTPs
Monitoring	***Swachh Survekshan***, the world's largest urban **cleanliness survey**	

*Source: 2021-23 (http://surl.li/nktza)

Urban Used Water Management in Maharashtra state

- **Maharashtra: Largest economy** of the Country
- Around **50 % urbanisation** (No. of ULBs: 416)
- Leading in development of sanitation infrastructure
- **Existing STPs: 154** (CPCB, 2021)
- **Existing FSTPs: 227** (UDD, 2023) – **Pioneering state in FSSM service delivery** across the state (urban)

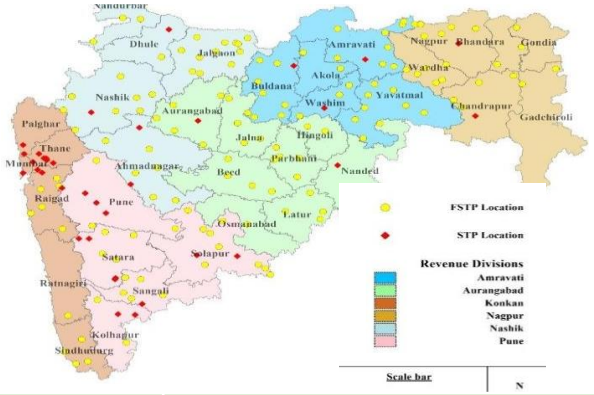
Sl. No.	Components under AMRUT 2.0 and SMMU 2.0	Proposed	Mission Allocation Cost (INR. in Cr.)
1	STP (Cumulative capacity) for all ULBs	1,656 MLD	1938 (USD 235 Million)
2	Sewer Network infrastructure	12,000 Km	4245(USD 516 Million)
3	Desludging Vehicles	479 Units	120 (USD 14 Million)
	Total		**6,303 (765 Million USD)**

- **Huge investments** on capital costs in both conventional and non-sewered sanitations systems
- Need equal attention to **sustainable O&M plan, Business Model, IEC and CB**
- **Major challenges –**
  1. **Land availability**
  2. **Achieving 100 % coverage of sewer network**
  3. **High O&M requirement**
- Existing infrastructure: Scope for **optimum utilization**, Improvement in **treatment efficiency**, reduction in **Life Cycle Cost** and **Resource Recovery**

Problem Statement

Challenges: Urban and rural area in Maharashtra

Urban FSSM (2021):	**Investment in FSTPs in 227 ULBs / 411 (SBM)**



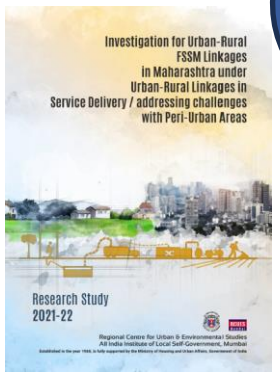
Rural FSSM (2021):	**40,255 villages – No treatment facility**

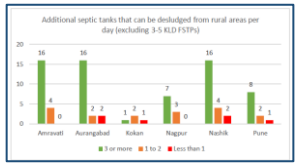
- **Struggling to initiate FSSM**
- **Lack of awareness**
- **No infrastructure**
- **Limited design and O&M capacities**

- **Irregular and insufficient sludge received in FSTPs**
- **Design limitations** leading to reduced efficiency and non compliance of treatment norms
- **Inefficiency of O&M cost recovery**

Rectify and utilize existing infrastructure for safe FSSM service to communities

Theory of Change





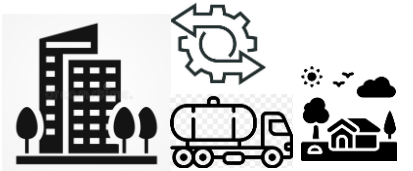
feasibility assessment

Advocacy and decision making at State level

A pilot project – evidence building

Strategic Interventions with focus on Infrastructural and Environmental Sustainability

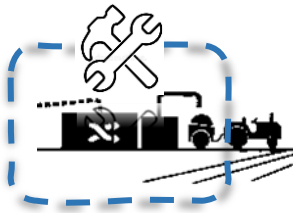
1 **Institutional Intervention**



Urban - Rural Convergence

Ensuring regular input of faecal sludge and moving towards self sustainability of O&M

2 **Technological Intervention**



Refurbishment of existing FSTP or STP

Addressing design limitations for achieving desired **quality of treatment** of water and biosolids

Urban Rural Linkages in FSSM- recommended by GoI, Sept. 2021

Jointly Signed letter by Secretaries- Ministry of Jal Shakti and Ministry of Housing and Urban Affairs, GoI

D.O. No. S-18011/6/2021-SBM-DDWS September 14, 2021

Dear Chief Secretary/Administrator/Adviser,

As you are aware, flagship national sanitation programmes are being implemented under aegis of Ministry of Housing and Urban Affairs (MoH&UA) and Ministry of Jal Shakti, [Department of Drinking Water and Sanitation (DDWS)] in urban and rural areas of the country, respectively. MoH&UA, through the Swachh Bharat Mission (Urban) [SBM(U)] and AMRUT programs has been focusing, on making arrangements for comprehensive management of liquid and solid waste (including plastic waste) in urban areas. Similarly, DDWS, through Swachh Bharat Mission (Grameen) [SBM(G)] Phase-II is focusing on solid and liquid waste management (including faecal sludge and plastic waste) in rural areas. At the State level, these programs are being coordinated generally by the Departments concerned with urban affairs and rural development. Depending on the State level implementation strategies, the actual project execution is taken up by respective Urban Local Bodies (ULBs) and Rural Local Bodies (RLBs) or in a cluster approach.

2. Under SBM(U), 2.0 and AMRUT (Jal Jeevan Mission(U)) programs, it has been planned to undertake construction of integrated Sewage Treatment facilities with arrangements for co-processing of feacal septage from onsite units (septic tanks). Under SBM(G) Phase-II, emphasis has been given on low-cost toilet technologies for onsite management of faecal matter and for co-treatment at an 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 villages is situated within a radius of 10-15 kms from the aforestated urban areas. For those villages, where these options are not feasible, stand-alone faecal septage management systems which are

---2

- 4 -

7. You are, therefore, requested to issue necessary directions to all the concerned to ensure that an integrated approach may be adopted by both urban and rural authorities for preparation of convergent action plan for implementation of faecal septage and plastic waste management in both rural and urban areas in a district.

Best regards,

(Pankaj Kumar)
Secretary
Dept. of Drinking Water & Sanitation
Ministry of Jal Shakti
Government of India

(Durga Shanker Mishra)
Secretary
Ministry of Housing & Urban Affairs
Government of India

To

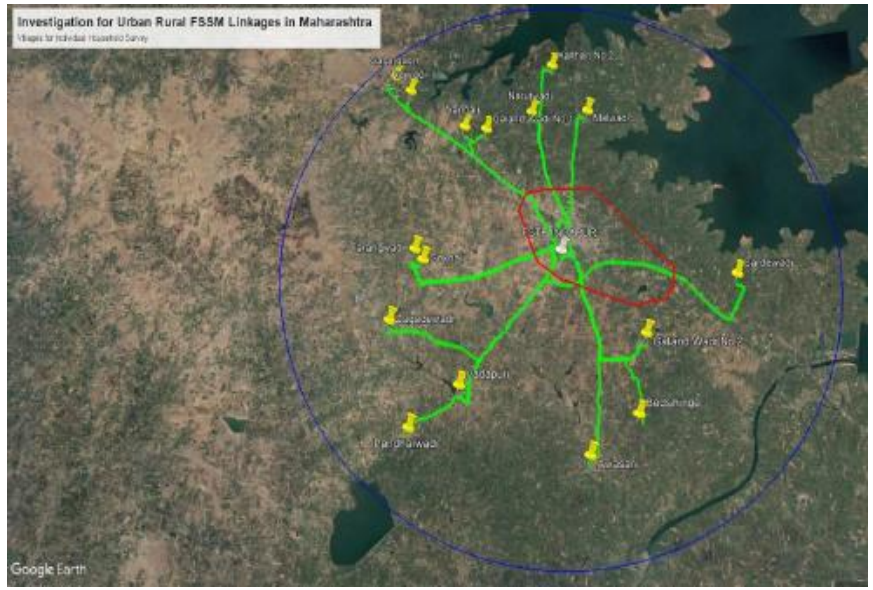
Chief Secretaries /Administrators/Advisors to Lt. Governors
All States/UTs

- **Coordinated approach between urban and rural authorities** at cluster level to deal with transportable waste
- **Existing FSTPs in urban areas to cater to treatment of septage from rural areas** within suitable turnaround distance (2-3 hours) from plant locations in the urban areas

Incorporated in SBM 2.0 and SMM 2.0 – Urban and Rural

Intervention in FSSM at Indapur (Pune District, Maharashtra)

Moving towards Achieving Sustainability of FSSM through Urban- Rural Convergence and Refurbishment of Existing Infrastructure



- **140 km** from Pune city
- **5.62 km²** of Urban Area
- **25,515** City Population
- **27,945** Rural Population
- **5,228** of Urban Households
- **6,008** of Rural Households

1 A model that represents all the potential clusters of Maharashtra: Urban- Rural and Rural -Rural

MoUs signed
Indapur Municipal Council
Ensuring regular input through desludging of STs in villages

12 Gram Panchayats (16 villages)
Having FSSM in place, as mandated under SBM-G

2 Refurbishment of existing FSTP

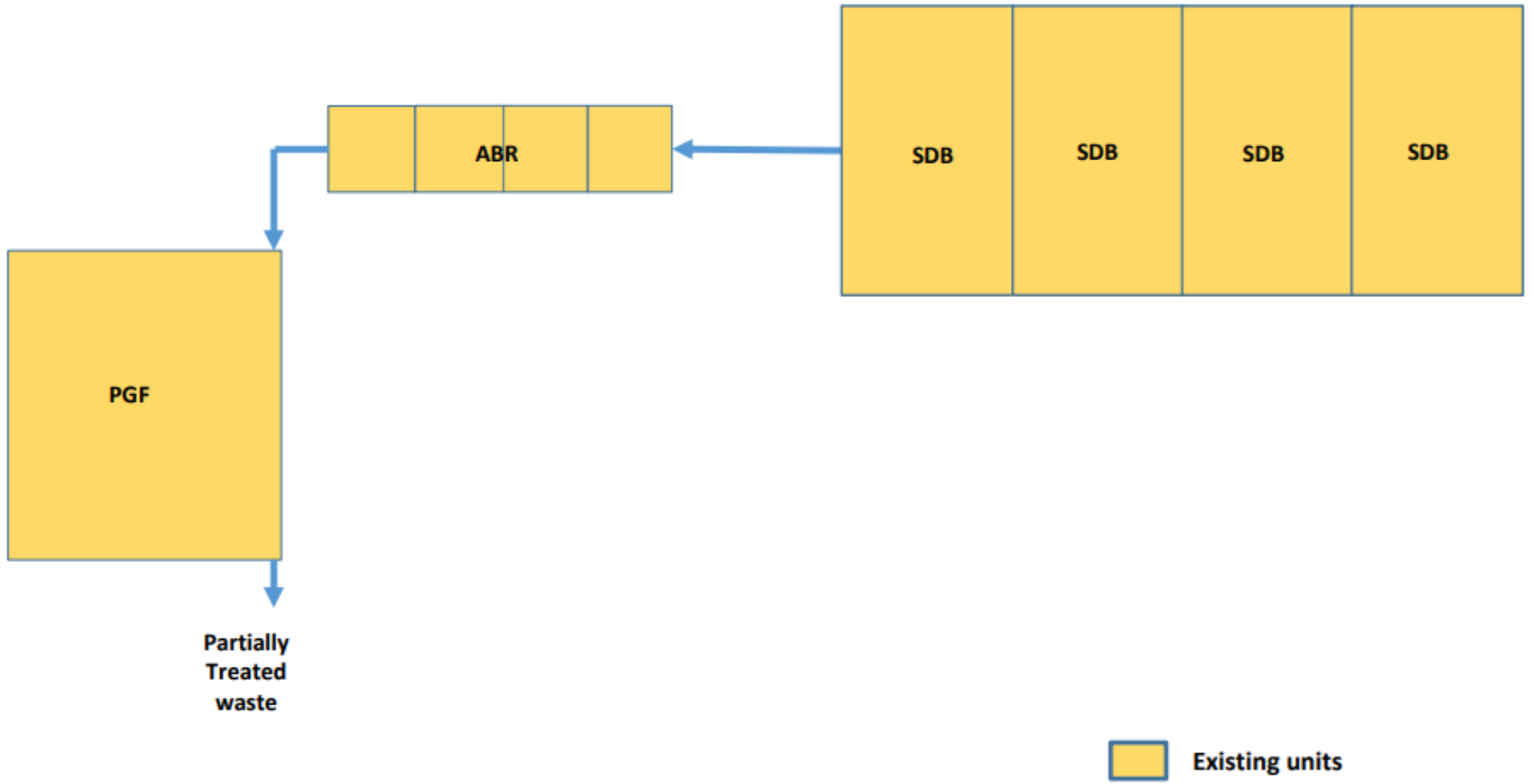
IEC activities

FS unloading at FSTP

Design improvements for achieving desired quality of treatment for environmental sustainability

Refurbishment of existing FSTP - Indapur

Indapur FSTP Represents more than **200 existing FSTPs in Urban** Maharashtra



Refurbishment of existing FSTP - Indapur

O&M break-even: Minimum 20 trips/month

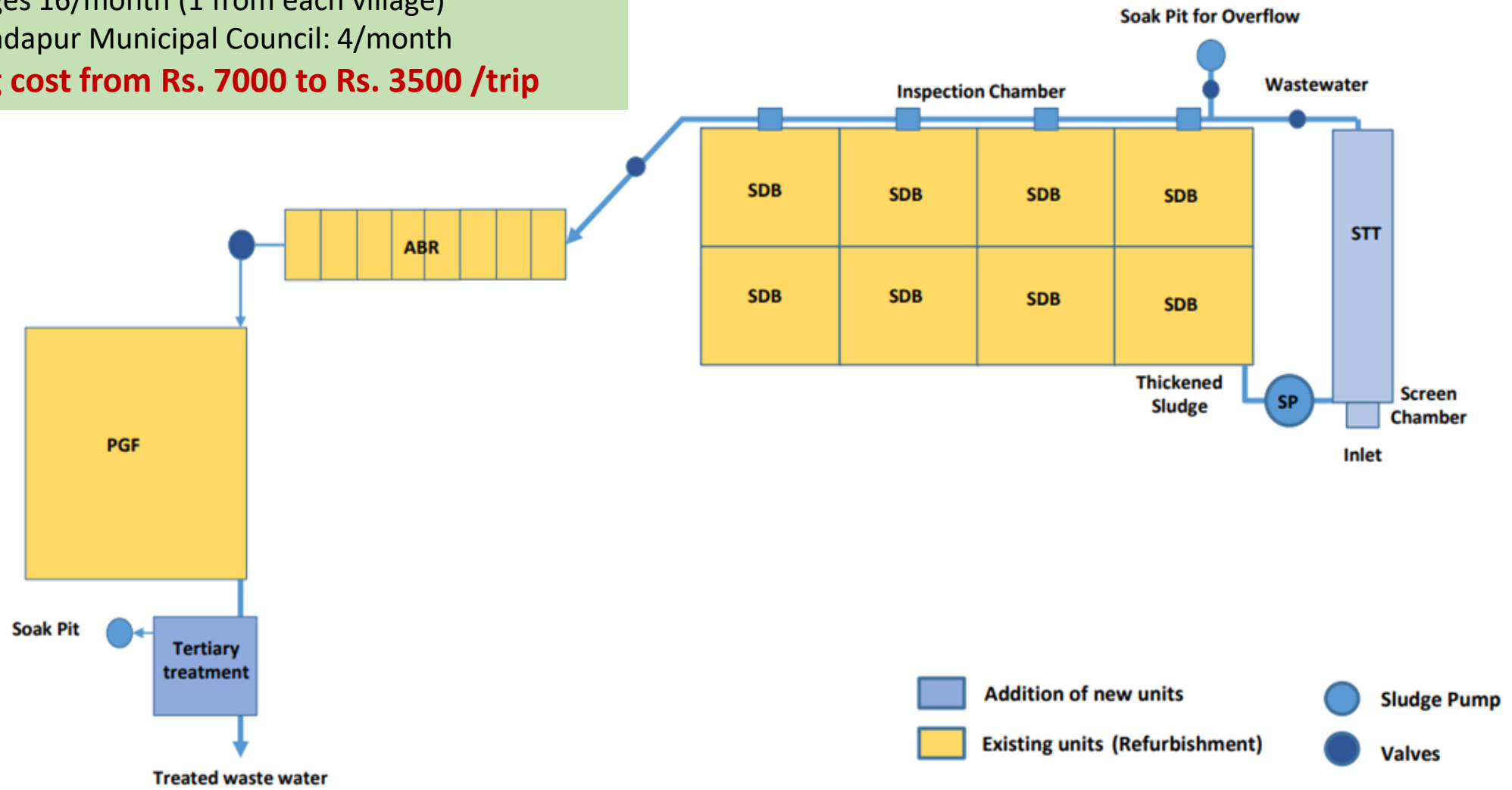
Trips from villages 16/month (1 from each village)

Trips from the Indapur Municipal Council: 4/month

Reduced desludging cost from Rs. 7000 to Rs. 3500 /trip

Highlights

- Technology improvement: **Hybrid approach**
- Convectional electro-mechanical + Nature Based Solutions
- **Higher treatment efficiency**
- **Lower O&M cost**
- **Treated water reuse: Land applications**
- **Bio-solids reuse: Co-composting with solid (wet) waste**

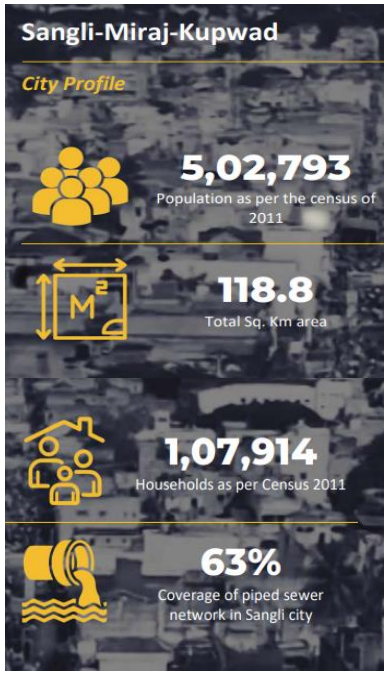


Implementation partner:
Saniverse Environmental Solutions, Pune

Intervention in FSSM at Sangli (Dist. Sangli, Maharashtra)

FSSM in Sangli Miraj Kupwad before intervention

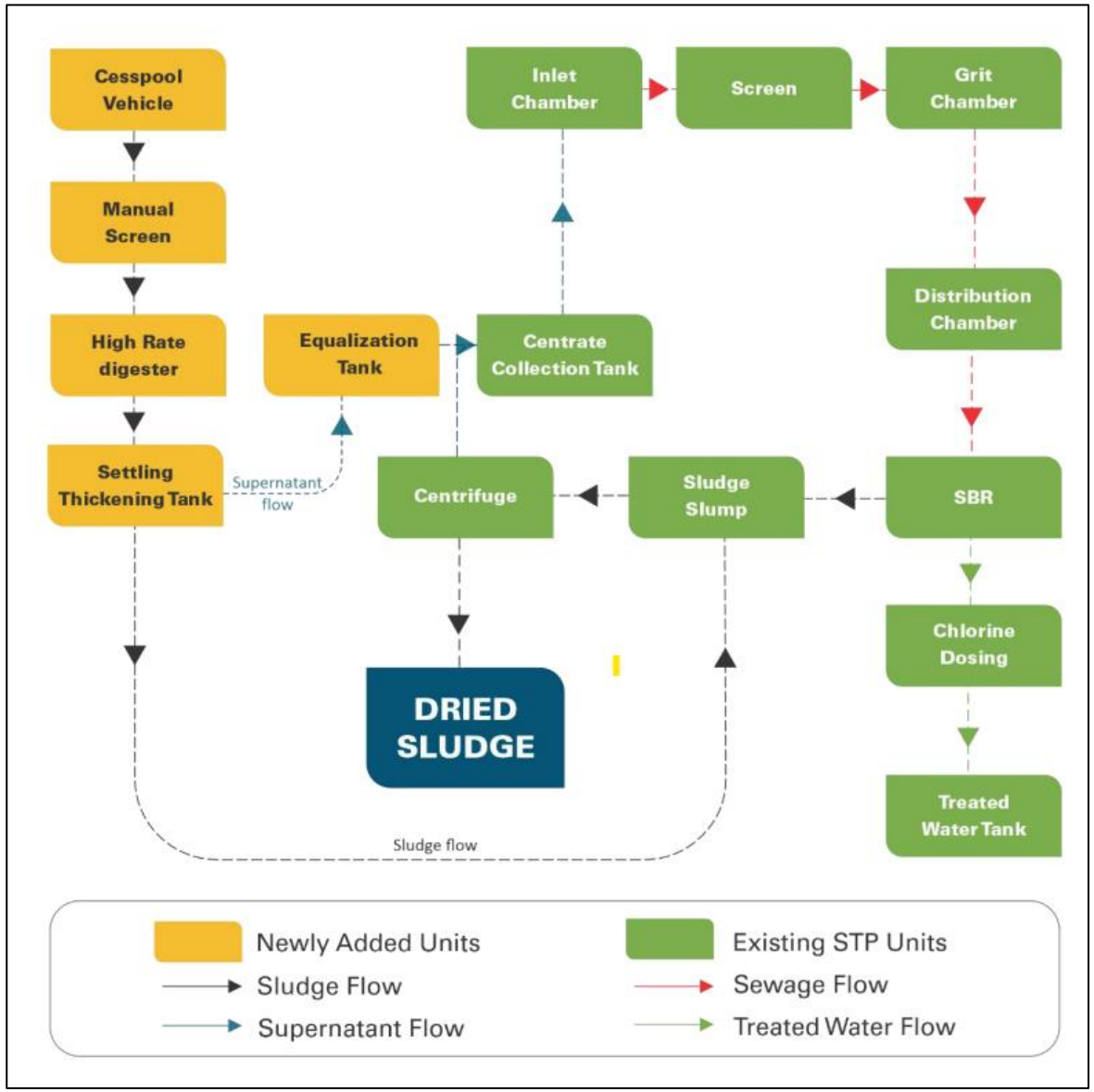
S.N	Description	Values
1	Underground **Sewer network** in the in the Sangli city	**60 – 70 %**
2	**Capacity** of existing STP	**23.5 MLD (SBR)**
3	**Current utilization** rate of the STP	**50 %**
4	Number of **pumping stations**	**3**
5	Number of **desludging vehicles** with the SMKC	**10**
6	**Service area** of these desludging vehicles	**Non – sewered area (25 – 30 % population)**
7	**Desludging demand** within the city	**6 – 10 trips per day**
8	**Emptying of the faecal sludge** before this intervention	**In the machine hole at last pumping station without any pre – treatment**



Need for the project

1. Location of the **pumping station (Emptying of FS): flood prone area**
2. **Sewer lines blockages** during flood events
3. Spread of **water borne diseases**
4. To achieve **optimum utilization of the STP**
5. **Safe sanitation service delivery** in FSSM to **non sewered area** – SBM U 2.0

Refurbishment of existing STP – Scientific Co-treatment of FS at STP



Sl. No.	Description	Values
1	Treatment capacity of the Co-treatment Unit	**50 KLD (15 – 16 trips per day)**
2	Components of the Co-treatment Unit	**1. Screen Chamber 2. High Rate Digester 3. Settling and Thickening Tank 4. Equalization Tank**

First Scientific co-treatment of FS at STP project in the state

100 Thousand population connected with FSSM service delivery

Saved Rs. 1 Crore (100 Million) for standalone FSTP

Lower O&M cost & optimum resource utilization


पुढारी

राज्यातील पहिला शास्त्रोक्त मल:निस्सारण प्रकल्प हस्तांत

महापालिकेची दीड कोटींची बचत : वक्षिसाच्या ३० लाखांतून साकारला प्रकल्प

राजकीय ने

First of its kind initiative featured in the newspaper

Journey of Urban Rural Convergence in Maharashtra

Joint efforts of Urban Development Department (UDD) and Water Supply and Sanitation Department (WSSD)

Under SBM- U , under ODF++ framework, around 227 FSTPs constructed by ULBs in Maharashtra by the end of 2020

Jan 2021

RCUES, AIILSG Mumbai and UNICEF Maharashtra conceptualized and proposed **Urban Rural Convergence As a potential solution for sustainable FSSM**

Ideation

Oct 2021 - March 2022

- Multiple consultations with local authorities and other Stakeholders for onboarding
- Detailed feasibility assessment with individual Households surveys
- Formal consent from Indapur Mun. Council (IMC)

Planning for Pilot

June 2023

- **Handover of FSTP to the local authorities** (1 June 2023)
- **Training conducted for FSTP operators** for operating the plant efficiently demonstrating necessary Do's and Don'ts.
- **Awareness campaigns undertaken**

Handover and Monitoring

December 2023

Meeting on 28th Dec. 23 for joint policy decisions of WSSD and UDD for creating enabling framework for scaling up URC

Feb – Sept 2021

Guidelines from GOI & GOM

- **Consultations** with GoM
- **District wise preliminary feasibility assessment** of FSTP in Urban Areas
- **Letter** from GoI, jointly signed by MoHUA and MoJS, emphasizing urban rural linkages in FSSM
- **Indapur Municipal Council** selected as **pilot** based on assessment and consultations.

March 2022 – May 2023

Implementation of Pilot – Indapur URC in FSSM and Refurbishment of the FSTP

- **Participatory** approach in finalizing the model
- **Designing and refurbishment of existing FSTP**
- **Formalization of mechanisms - Signing of MoU** between IMC and 12 GPs clearly defining roles and responsibilities
- IEC activities

Replication of Model at other Divisions in Maharashtra

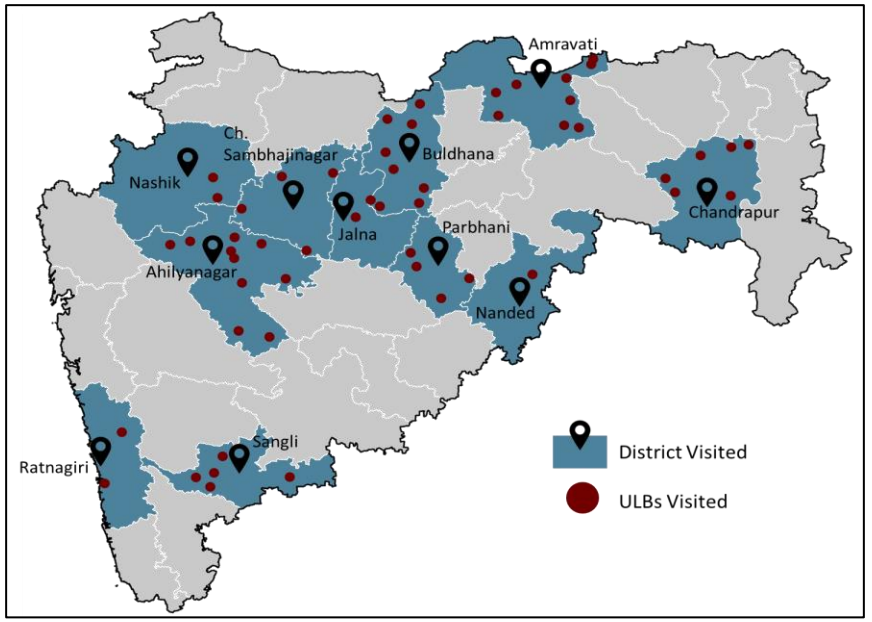
- **Replication of model** in other 6 clusters
- **Capacity building** of authorities for implementing URC with WSSD and UDD
- **Pilot in each division** to demonstrate different approaches/ models - assessments, field visits, contextual planning and implementation of URC
- **Refurbishment of FSTPs with technology upgradation – 2 places**
- **Digital interventions:** Developed an android application for 100 % HH survey and a web based Dashboard for monitoring

Dec. 2023 – Jan. 2025

Identifying opportunities to strengthen and sustain FSSM through URC by conducting field level assessment of FSSM in Maharashtra.

53 urban FSTPs (23%) assessed in **11 Districts** (covering each Division)

Focus area: Urban Local Bodies and surrounding villages



Institutional

- **URC is already practiced at local level in around 15 clusters** in a non systematic way. It needs to be strengthened and **institutionalized for systematic implementation** and scale up of URC in FSSM.
- **100% willingness at the local level** for URC in FSSM

Infrastructural

- **Scope for refurbishment of existing FSTPs** (treatment and non-treatment components) to ensure expected quality of treatment exists – Minimizing need for new infrastructure and investment

Operational

- **Unutilized capacities exist** (< 20 current utilization rate)
- **Technical capacities for O&M of the FSTP need to be strengthened**

Logistical

- **Sufficient Human Resources and other resources** (desludging vehicles) for FSSM service delivery exist.
- Detail planning can help develop a workable model for UR logistics
- **Potential of inclusion of private sector in desludging** services exists

Financial

- Mostly **ULBs are unable to recover O&M expenses** (are not even close to break even in revenue generation through desludging services and FSTP O&M)
- Business / revenue generating model needs to be strengthen
- **Potential increase in revenue generation through additional trips from rural areas to recover O&M costs in a sustainable way.**
- **Win-Win solution for both urban and rural, state and local governments and to the users.**

Capacity Building of Urban - Rural Stakeholders across Maharashtra

Regional Capacity Building Workshops Conducted at Mahasul Prabodhini, **Amravati** and at MEETRA, **Nashik**

Jointly organized by WSSD and UDD, GoM

120 + urban and rural participants – *Deputy CO's, City Engineers, etc.*

Key Takeaways:

- **Demand for URC is generated at local level**
- Scope for **refurbishment of FSTPs** exists – can be addressed through funding under SBM (G)
- URC can be adopted / can complement the plans for **scheduled/regular desludging**
- **Rural- urban convergence** is equally important to make it a mutually beneficial model (sharing of land in rural areas)
- **URC is agnostic to STP or FSTP**, it can be achieved through Co-treatment of FS in existing or new STPs
- Potential stakeholders involvement – Pvt. Sector, SHGs, NGOs
- **Optimising desludging charges and strengthening existing infrastructure** are the keys to make URC success

Training Modules Developed, along with a "Systematic Approach for Implementing U-R Convergence in FSSM"

Policy intervention: Government of Maharashtra (GoM) is working on scaling up of URC in FSSM in 123 clusters through UDD and WSSD with support from RCUES of AIILSG, Mumbai

Demonstration of Different Approaches of URC in Maharashtra

Sl. No.	Details	Deolali Pravara, (A'nagar)	Warud, (Amravati)	Shendurjana Ghat (Amravati)	Manvat, (Parbhani)	Bhadrawati, (Chandrapur)	Nandura, (Buldana)
1	**Existing Capacity of the urban FSTP**	10 KLD	10 KLD	5 KLD	10 KLD	15 KLD	10 KLD
2	**Utilised Capacity (Dec. 2023)**	24%	4%	15%	12%	8%	6%
3	**No. of villages in Cluster**	30	74	23	34	22	94
4	**No. of septic tanks from respective villages for URC**	9086	9725	2443	2278	2004	1301
5	**Approach for Implementation**	ULB led model	Multi-stakeholders model	Multi-stakeholders model	Private Operator	SHG led model	Private operators
7	**Refurbishment of the FSTP**	**Refurbishment of the FSTP keeping same technology of Unplanted Sludge Drying Bed Rs. 4 – 8 Lakh (Rs. 400 – 800 Thousand) per FSTP**				**Rs. 4,80,000 (Upgradation from UPDB to PDB)**	**Rs. 5,75,000 (Upgradation from UPDB to PDB)**

Supported by UNICEF Maharashtra

Glimpses after intervention at Bhadrawati, Maharashtra

Upgradation from Unplanted Drying Bed (UPDB) to Planted Drying Bed (PDB)

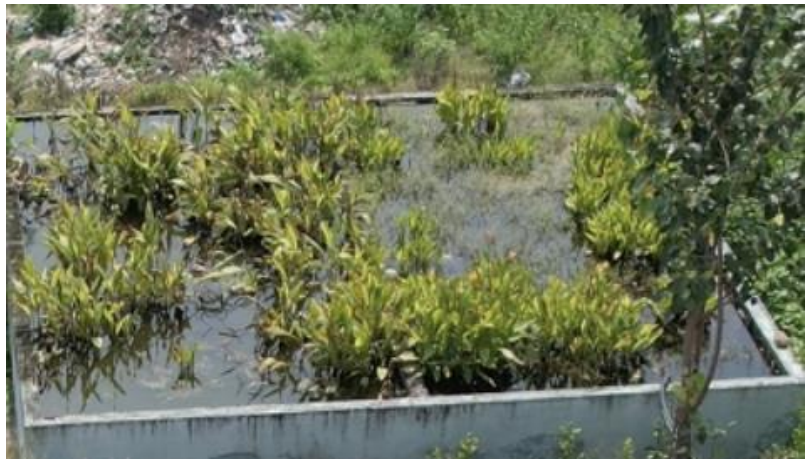
Technology Upgradation from Unplanted Drying Bed (UPDB) to Planted Drying Bed (PDB)

Main activities of refurbishment

- Raising Drying Bed's wall height to convert to PDB
- Cleaning of filter media at PDB and PGF
- Plantation in PDB and PGF
- Construction of Screening Chambers

Other activities of refurbishment

- Rectification of Planted Gravel Filter Tank
- Interconnection leakage repair work
- Ramp at receiving station
- Beatification and landscaping



Filter media replacement at Planted Gravel Filter

Before | **After**

Addition of Screen Chamber at receiving station

Glimpses after intervention at Nandura, Maharashtra

Filter media replacement at Planted Gravel Filter

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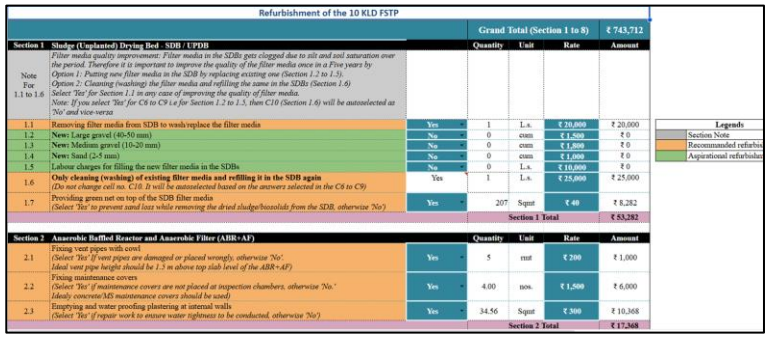
Before | **After**

Addition of Screen Chamber at receiving station

Tools to support decision making at the Local Level

Three Strategic Tools developed to Enhance Urban-Rural Convergence in FSSM

Quantity and cost estimation for Refurbishment

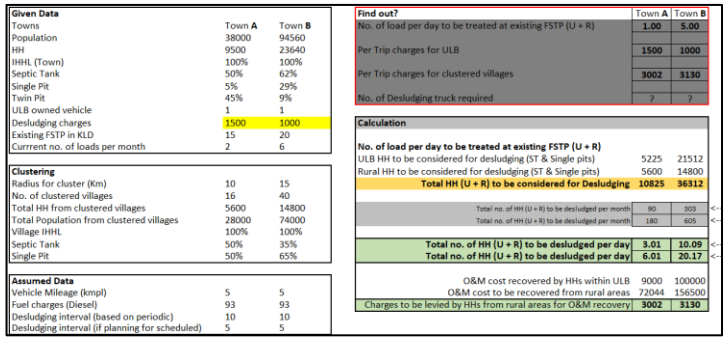


Offering simplified process to calculate refurbishment cost –

- **Quantity and cost estimation**
- **Technical Parameters considered** such as – gravel sizes, cleaning of filter media, labour charges etc.

Helps ULB to identify refurbishment needs and costing/ financial planning

Desludging charges calculator

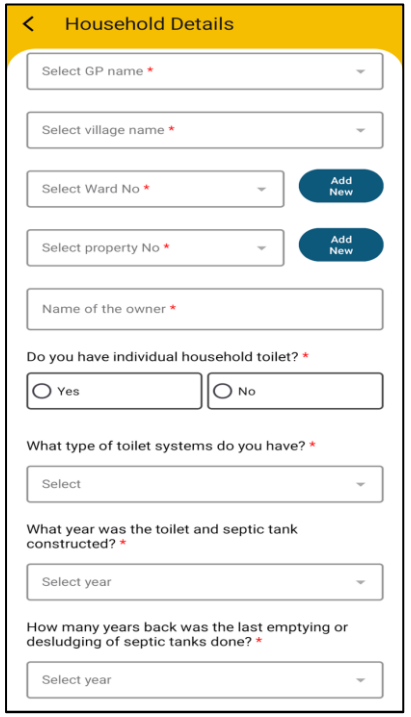


Helps to calculate desludging charges for urban & rural areas

- **Planning a financially feasible** URC model
- **Clustering** – involvement of no. of villages
- No. of **desludging vehicles** required
- **Efficient O&M** of the model

Helps calibrating of various indicators for feasible financial model

Web-based dashboard, as a planning and decision-making tool



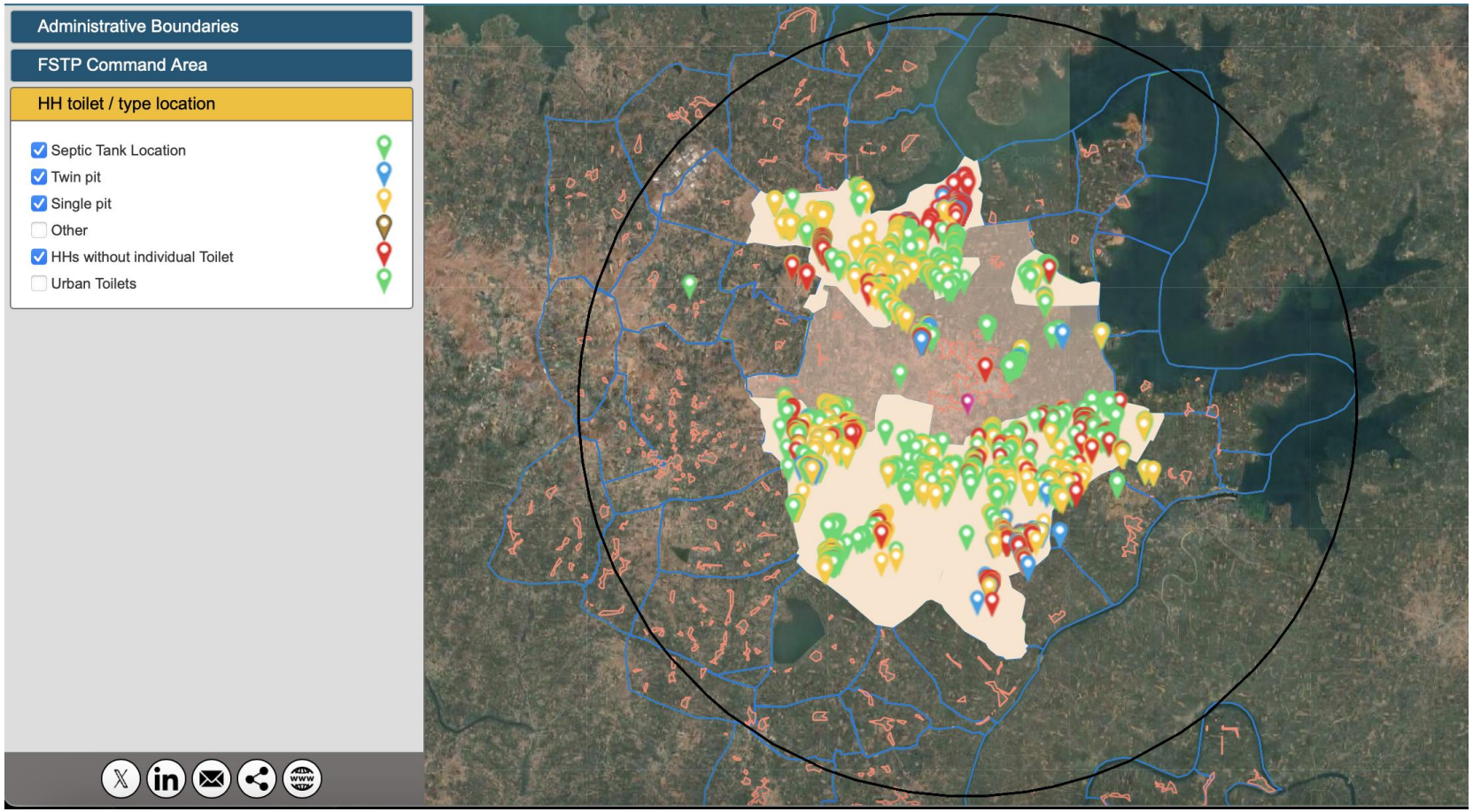
Data that will be reflected on DIGITAL DASH-BOARD of Planning tool

- **Spatial Data Analysis:** FSSM Data Overview
- **Monitoring Mechanisms Implementing systems** to oversee and evaluate progress
- **Data Generation**

Web-based dashboard - outputs

First time, Digital mapping of 100 % HH from rural areas for toilet related data such as,

Type of toilet's containment, age of toilet and containment, last emptying of containments and location and photographs of the toilet and containment



Dashboard helps in –

- **Optimizing charges** for better efficiency
- **Monitoring data** for informed decision-making
- **Tracking patterns** for insightful assessments
- Enhancing **logistical planning**
- **Scheduling desludging**

Nandura and Bhadravati – Pilot for Scheduled Desludging

IEC and Capacity Building at local bodies

- **O&M manual is developed for FSTP**
- **O&M training** conducted for FSTP and desludging vehicle's Operators
- Along with day to day SoPs, **Occupational Health, Safety and Dignity of SWs** was covered

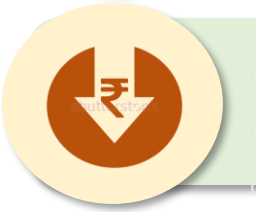
- IEC material is developed
- IEC workshops are being conducted for persons trained by KRC under SBM 2.0, **Swachhta Surakshak, Jal Surakshak under the guidance of Grampanchayat and Panchayat Samiti officials**
- **Target:** Spreading awareness of regular emptying of containments and health implications

URC Demonstrated - ‘Win – Win’ for Urban and Rural Local Bodies

Improved quality and coverage of FSSM service delivery at reduced cost to HH and increased revenues to local body

OPTIMIZATION OF EXISTING INFRASTRUCTURE – MINIMISING THE NEED FOR NEW INFRASTRUCTURE

This approach **minimized the need to construct a new treatment facility,** reducing the costs associated with new infrastructure development and maintenance.



REDUCED DESLUDGING CHARGES PER TRIP – ECONOMY OF SCALE

Service charge for desludging reduced by about 20 - 50 % per trip in the pilot clusters. It achieves increased coverage and frequency of desludging services, optimization of resources and equity due to increased affordability. **Improved quality of service at reduced rate.**

INCREASED REVENUE GENERATION TO RECOVER O&M COSTS

Additional revenue is being generated through increased frequency of desludging from rural areas is contributing to recovering **100% cost of O&M**

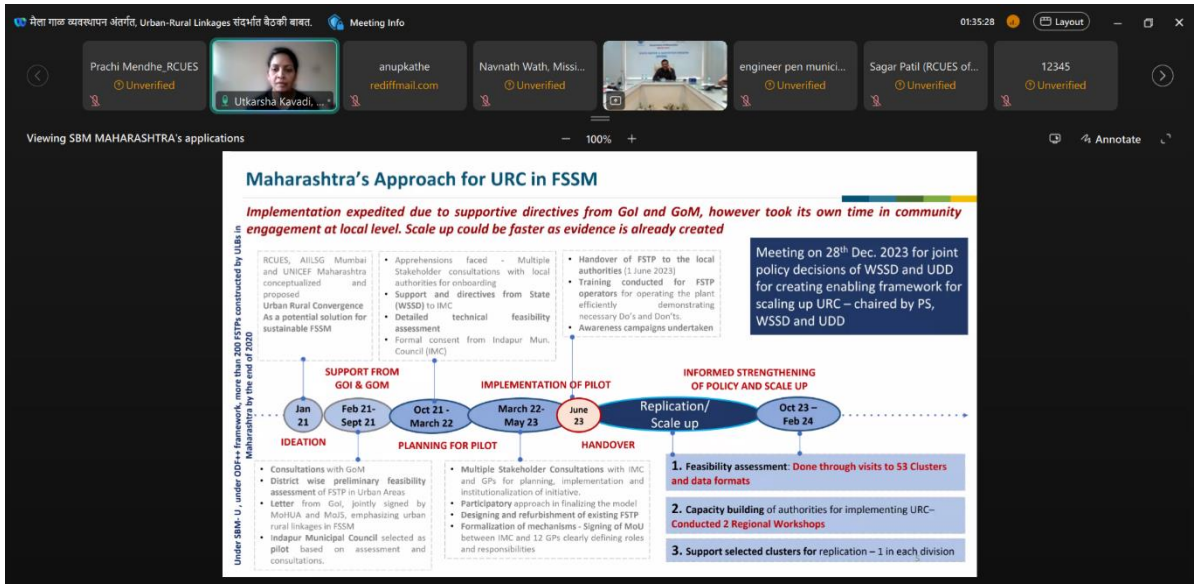
NATURE BASED, LOCALLY SUITABLE TECHNOLOGY, LEADING TO LIMITED O&M COSTS

Most of the treatment occurs with **Nature-based technology**. Operational costs are considerably lower, as the requirement of the model to use electricity, chemicals and skilled labor is less.

LONG TERM BENEFITS/ LIFECYCLE

- **Addressing SDG 6.0 for safe containment of faeces and affordability**
- **Compliance with norms and regulations** have long-term benefits in terms of avoiding penalties or legal issues
- Improved **awareness and public health** outcomes

State Government Departments (Urban and Rural) leading the way for URC



Series of consultations and meetings led by WSSD and UDD with Coalition team, Local government representatives to address challenges and provide solutions for URC in FSSM

Urban Development Department (UDD) and Water Supply and Sanitation Department (WSSD), GoM – are **working together** to drive the effective implementation of Urban-Rural Convergence (URC) at the state level

Scale Up across Maharashtra - led by the State Government Departments – technically supported by Coalition

Thank You

All India Institute of Local Self Government, Mumbai

(Secretariat, Maha Urban WASH & ES Coalition)

Global South Academic Conclave on WASH and Climate 2025