



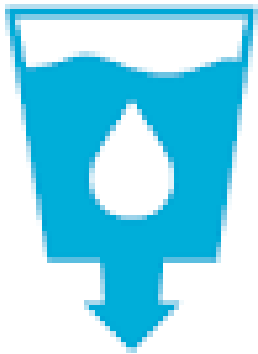
Solid and Liquid Waste Management, Sanitation and Hygiene in Clean and Green GPs

16 April 2022

Ministry of Jal Shakti
Department of Drinking Water and Sanitation

Sustainable Development Goals 6: Ensure access to water and sanitation for all

6 CLEAN WATER AND SANITATION



SDG 6.1: Safe and affordable drinking water

SDG 6.2: End open defecation and provide access to sanitation and hygiene.

Swachh Bharat Mission-Grameen

Under Swachh Bharat Mission-Grameen phase I (2014 to 2019) Rural India attained Open Defecation Free (ODF) status on 2nd Oct 2019.

Swachh Bharat Mission-Grameen phase II (2020-21 to 2024-25) aims to sustain the ODF status of villages and to improve the levels of cleanliness in rural areas through solid and liquid waste management activities, making villages ODF Plus.

**An ODF Plus village is
“a village which
sustains its Open Defecation Free (ODF)
status,
ensures solid and liquid waste management
and is visually clean”**

ODF Plus Components



For ODF Sustainability (ODF-S)

- Addressing any gaps in toilet coverage and ensuring that no one is left out
- Continued IEC for behavior change
- Capacity Strengthening: All Sarpanches, Swachhagrahis to be trained

For Solid and Liquid Waste Management (SLWM)

**Biodegradable
Waste
Management**

**Plastic Waste
Management**

**Grey Water
Management**

**Fecal Sludge
Management**

Solid Waste Management

Bio-degradable waste
management

Non-bio-degradable waste
management
Plastic Waste Management



Biodegradable Waste Management



Facts about biodegradable waste

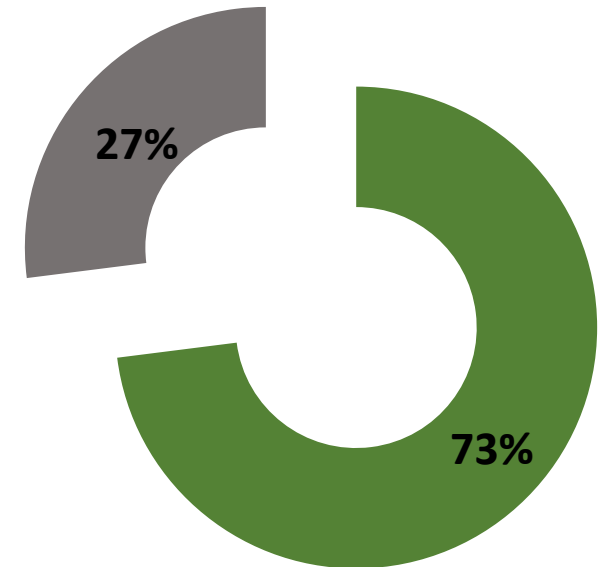
Biodegradable waste such as cattle dung, kitchen waste, crop residues, etc. can be completely decomposed by biological process with or without the presence of air.

Organic waste can be converted to organic manure and biogas, through aerobic and anaerobic digestion.

Improper management of solid waste may lead to environmental pollution and contamination of water bodies, particularly in the monsoon season.

Composition of Solid Waste in rural areas

■ Biodegradable ■ Non-Biodegradable



Steps to follow for Biodegradable Waste Management



**1. Segregation
at source**



**2. Collection &
Transportation**



3. Treatment



4. Disposal

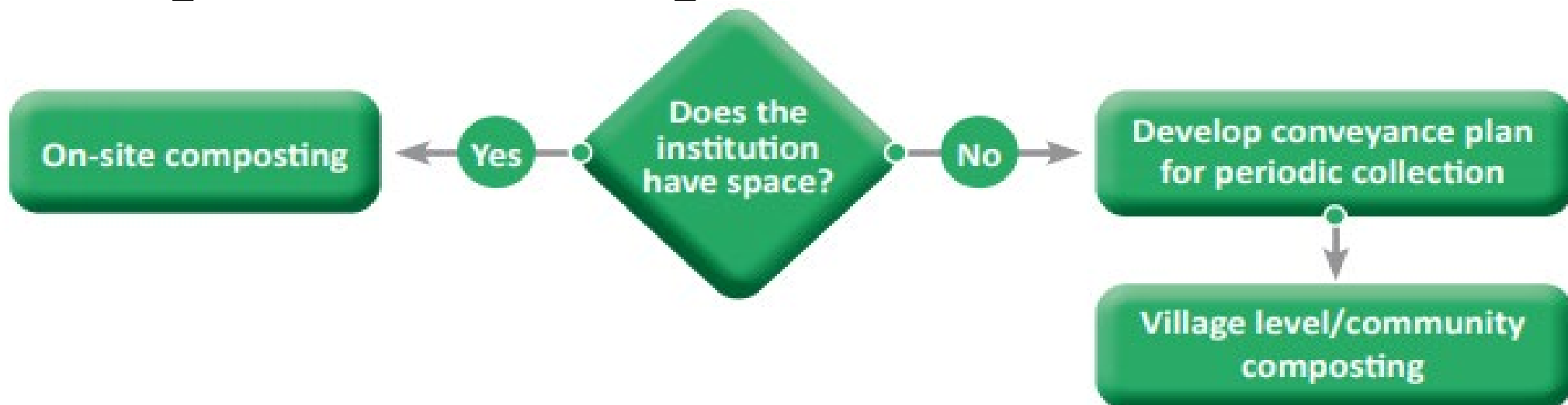
Decision Matrix for Bio-degradable Waste Management



- **Biodegradable waste management at Household level:**

S. No	Does Household have space?	Does Household have cattle?	Composting option
1.	Yes	No	HH Composting
2.	No	Yes	Feed to Cattle or Community Composting
3.	Yes	Yes	Feed to Cattle and HH Composting
4.	No	No	Community composting

- **Biodegradable waste management at Institution/ commercial areas**





Pit Composting

Suitability:

Areas with lower rainfall

Site for construction must be at a higher level to prevent flooding of rainwater

Pits of adequate size to bury the biodegradable waste of 6 months in each pit

Composting Technique – Community Level



NADEP composting

Suitability:

Villages having constraints of space at the household level

Site should not be a low-lying area to avoid waterlogging

Site should be easily accessible for transportation of waste & manure

The site should have the facility / access of water to maintain the moisture content

Site should be sheltered from rain & direct sunlight

Size (Recommended):

3 m (Length) X 1.8 m (Width) X 0.9 m (Height) with a 23 cm thick perforated brick wall



Vermi composting

It is the process of using earthworms & microorganisms to turn organic solid waste into vermi compost.

Size (Recommended):

2m x 1m x 0.75m. The size of the pits should be determined according to the volume of biomass and agricultural waste.

Material Required

Kitchen wastes, animal/ cow dung, and leafy biomass are more suitable for vermicomposting

GOBARDHAN



GOBARDHAN: Introduction



- **Feedstock/input material:** Cattle dung and other biodegradable waste including agricultural waste
- Biogas is a type of biofuel that is naturally produced from the anaerobic decomposition of organic waste. Gobardhan is an integral part of Swachh Bharat Mission (Grameen) Phase II under **Solid Waste Management component of SLWM.**
- **Under SBM(G) financial assistance upto Rs. 50 Lakh per District is available for setting up of community based Gobardhan projects for entire programme period i.e. up to 2024–25**

Benefits:

- ❖ Waste management
- ❖ Protects health
- ❖ Reduces GHG
- ❖ Increases employment
- ❖ Generates organic manure
- ❖ Improves savings

Community Level Model

- Can be constructed for 5-10 households .
- The plants can be operated and managed by GP/SHGs.
- The gas generated will be supplied to households/restaurants / institutions
slurry can be used by the community as organic manure in agriculture or sold to farmers.



Cluster Model

- A cluster of households is identified by the GPs having a minimum of 3 to 4 cattle.
- Individual household level biogas plants of 2 cum capacity is installed in identified households.
- The biogas generated is used by the households and slurry is collected and processed at slurry processing unit managed by the GPs/identified agencies for converting it to organic manure/Bio-fertilizer.



Community Biogas Plant Bancharaouda, Raipur, Chhattisgarh



- Biogas capacity: 10 to 25 m³.
- Biogas generated is used for cooking and electricity generation.
- Slurry is used by Households.
- Chhattisgarh government is purchasing cattle dung at Rs.2/kg under state government scheme “Godhan Nyay Yojana” .

Cooperative led Cluster model Zakariyapura, Anand, Gujarat



- Zakariyapura Women Milk Producer's Cooperative Society Ltd. Households (368) with more than 3 cattle.
- Society buy back Slurry for Rs 1-2/- litre based on quality
- Slurry converted to Solid and liquid fertilizer and sold to farmers – brand name “Su-Dhan”.

Plastic Waste Management

Refuse, Reduce, Reuse & Recycle (4Rs Principle)

First three R's – refuse, reduce and reuse – are responsibilities of the households.

Fourth R – recycle – the recyclable plastic will be handed over to scrap dealers/cement industry or used for road construction or any other recovery method.



Steps for Plastic Waste Management in Rural Areas

1 | Segregation at Source



Collection | 2



3 | Storage facility at Village level



Plastic Waste Management Unit at Block/District level | 4



Plastic Waste Management Units (PWMU)

A Plastic Waste Management Unit/materials recovery facility, materials reclamation facility, materials recycling facility or Multi re-use facility (MRF) is a specialized plant that receives and segregates recyclable materials which may be marketed to end-user manufacturers. PWMU receives plastic waste from villages and further gets balled or shredded. It should be further linked with Cement Factories for additional fuel and also used for road construction or any other recovery method.

Under SBM(G) financial assistance upto Rs. 16 Lakh per Block is available for setting up PWMU.

Machines/Equipment required at the Plastic Waste Management Unit

1. Dust Remover Machine
2. Plastic shredder
3. Plastic baler



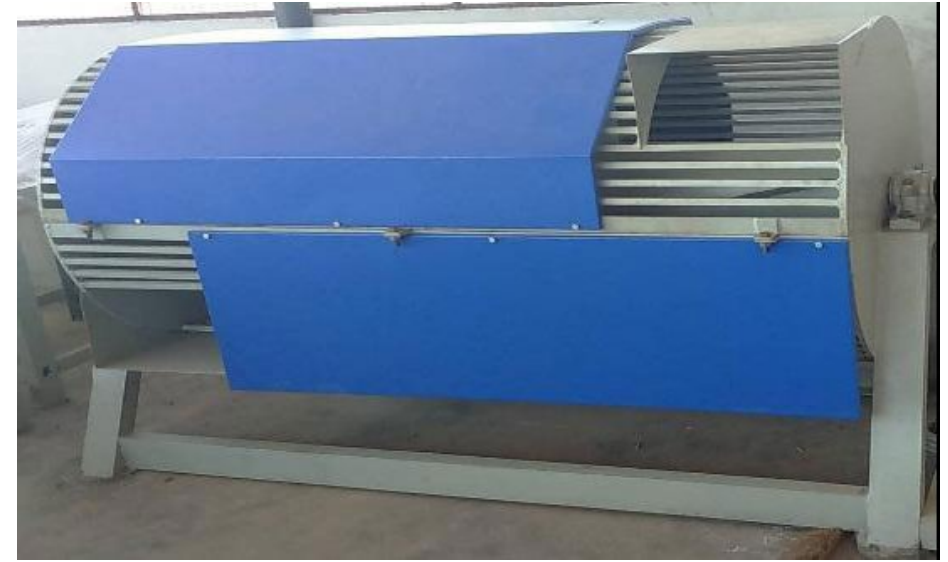
Machines/Equipment for Plastic Waste Management Unit



Plastic Shredding machine



Plastic baling machine



Dust remover machine

Establishing Forward Linkages

Plastic Waste being used for Road Construction



Non-biodegradable plastic waste



Segregation and cleaning of non-biodegradable plastic waste



Shredding



Road construction

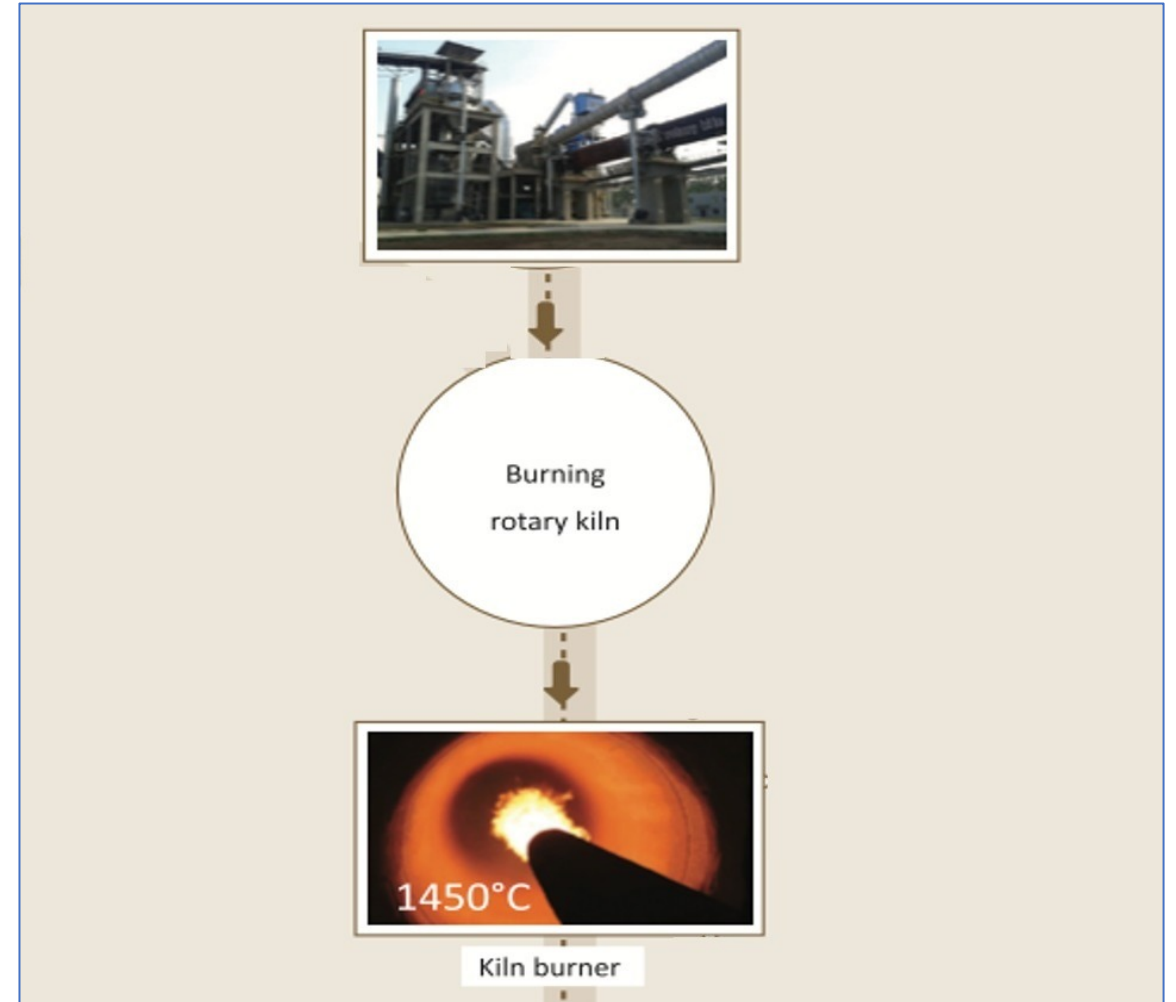


Bitumen added to the coated aggregate

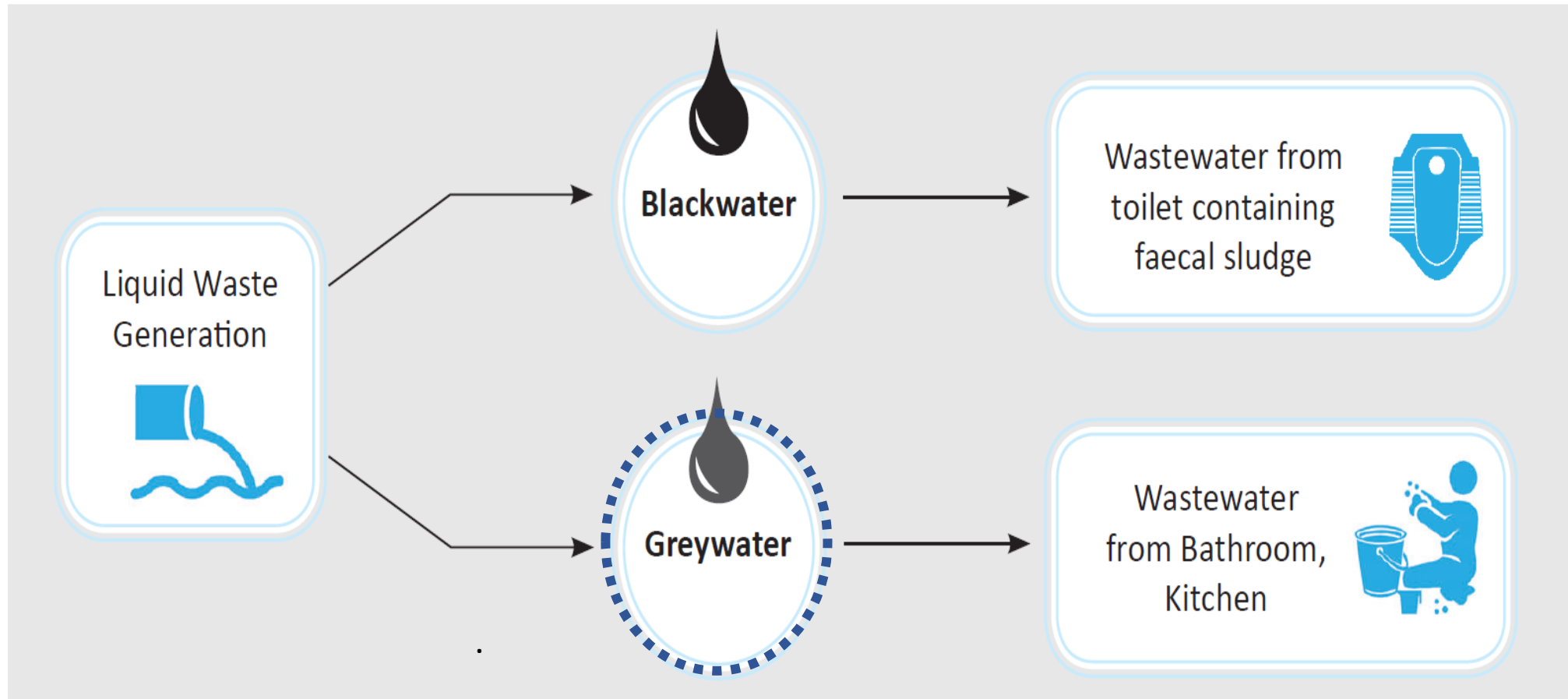


Shredded plastic mixed with hot aggregates

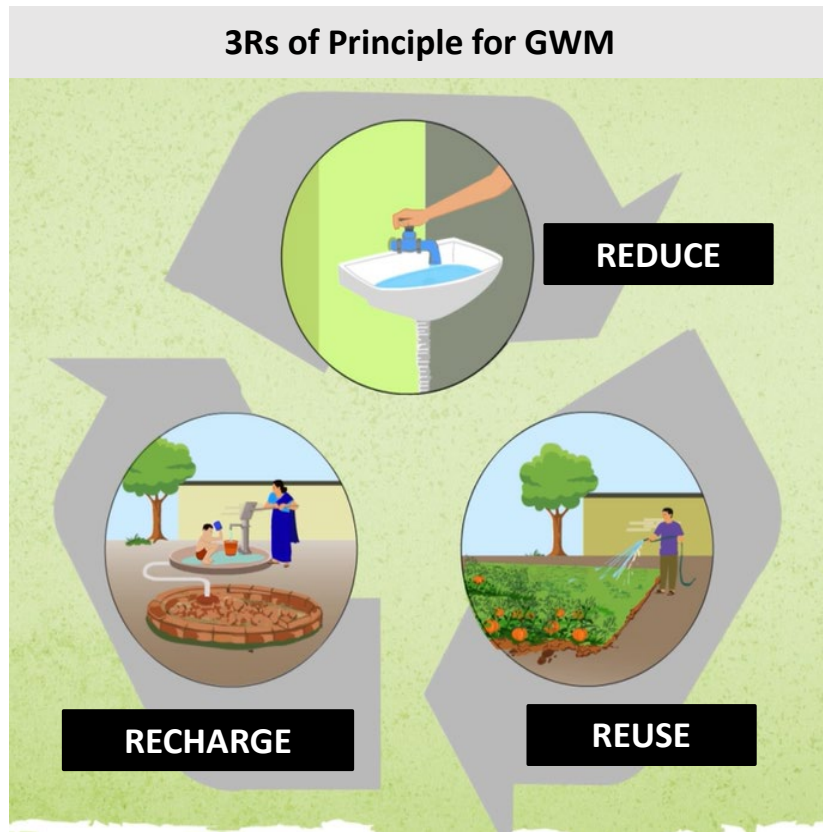
Co-processing of Plastic Waste in Cement Kilns



Liquid Waste Generation



Strategy for GWM



» **REDUCE:** Judicious use of fresh water which will result in the generation of a minimum quantity of Greywater

» **REUSE:** Reuse of Greywater for purposes such as kitchen garden, vehicle washing, toilet flushing etc to the maximum possible extent.

» **RECHARGE:** Recharge of ground water with Greywater by adopting technologies such as soakage pit, leach pit etc

Strategy for Grey Water



As per SBMG Phase-II guidelines, it is prioritized to treat the greywater near to its source/ point of generation

If Space is available at HH level

GW to be managed at household level through kitchen garden, soak pits, leach pits or magic pits

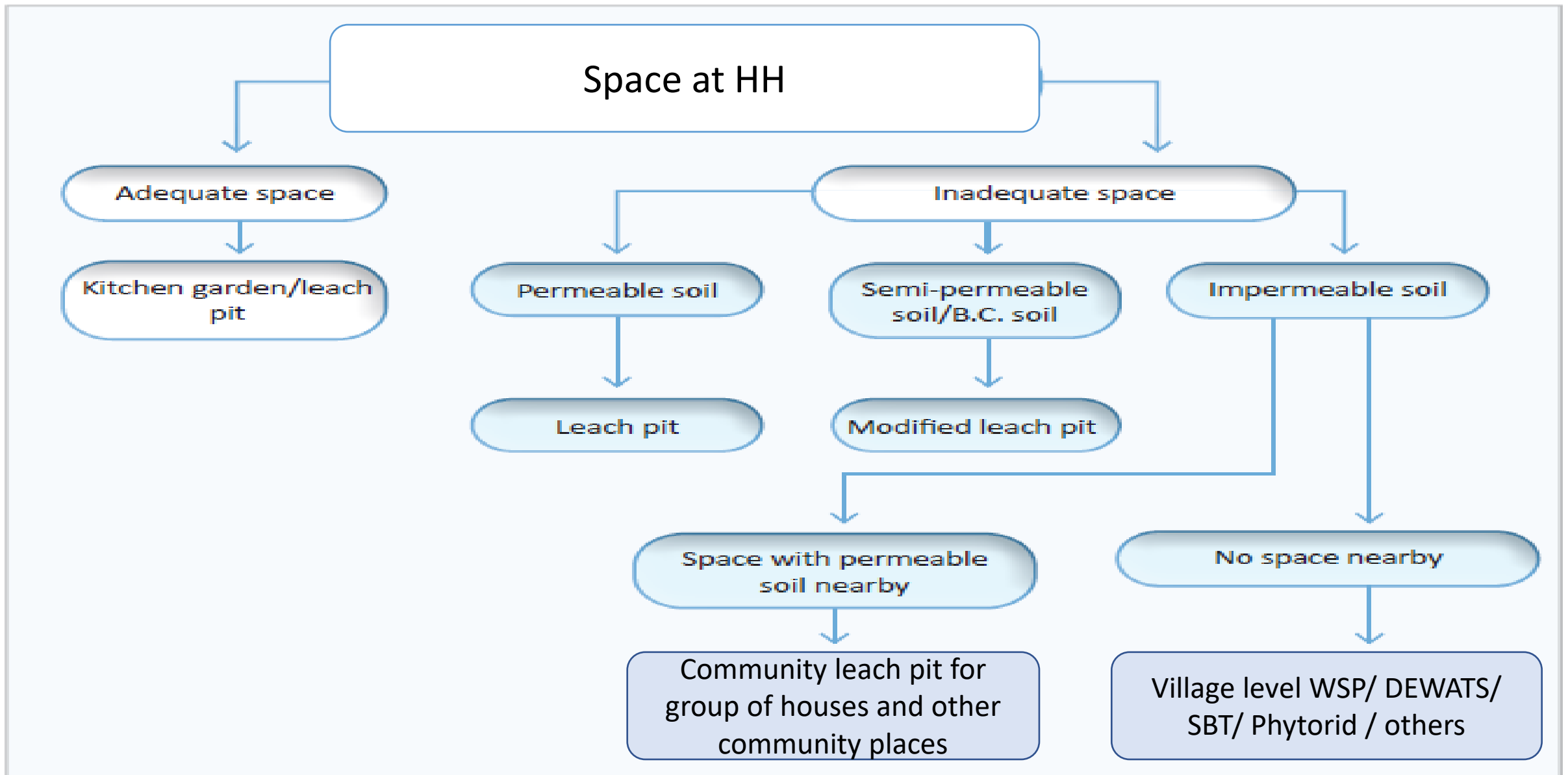
If space not available at HH level but available at community level

GW to be managed at community level constituting of 5-10 households/ Public stand posts/ hand pumps/ water tanks/ stagnant water points/ markets/ religious buildings/ institutions, etc.

If space is not available at HH or Community Level

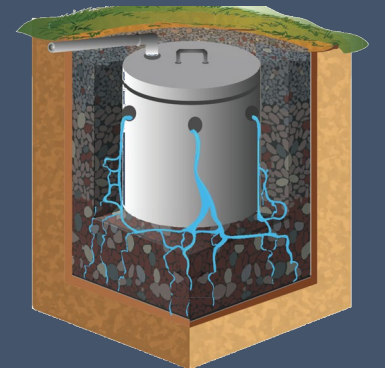
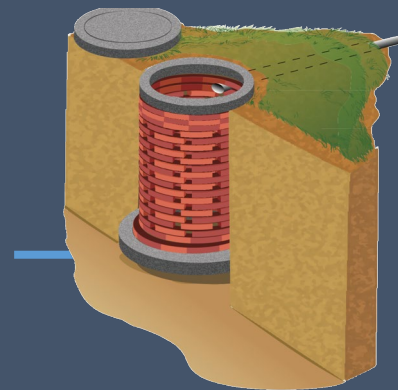
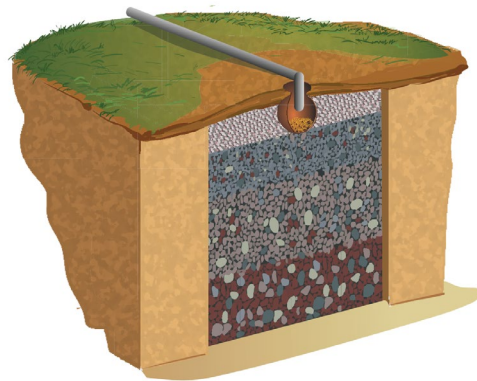
Constituting of village level GWM system if space is not available at household level/point of greywater generation, such as community leach pits, WSP, Constructed Wetland, Phytoid, DEWATS, among others.

Decision Matrix

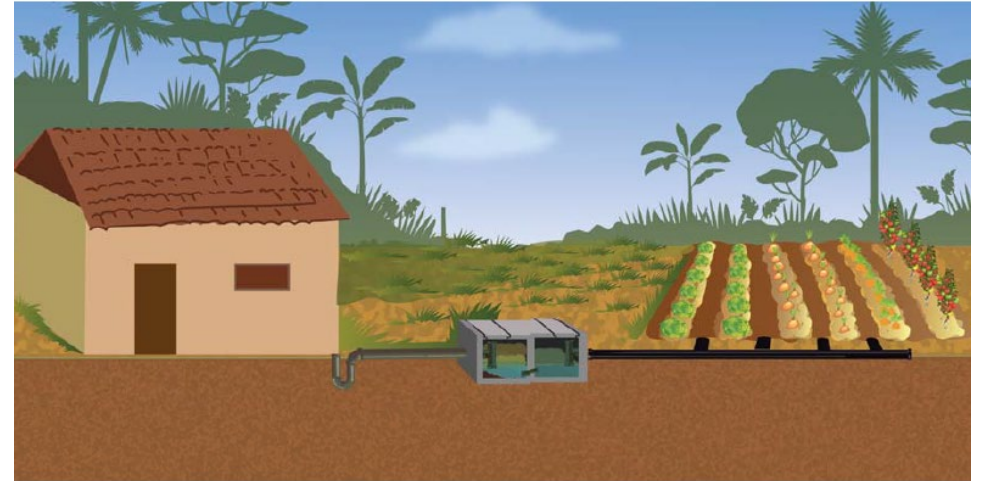


Greywater Management- Household Level

- Kitchen Garden
- Soak Pit
- Leach Pit (Modified)
- Magic Pit

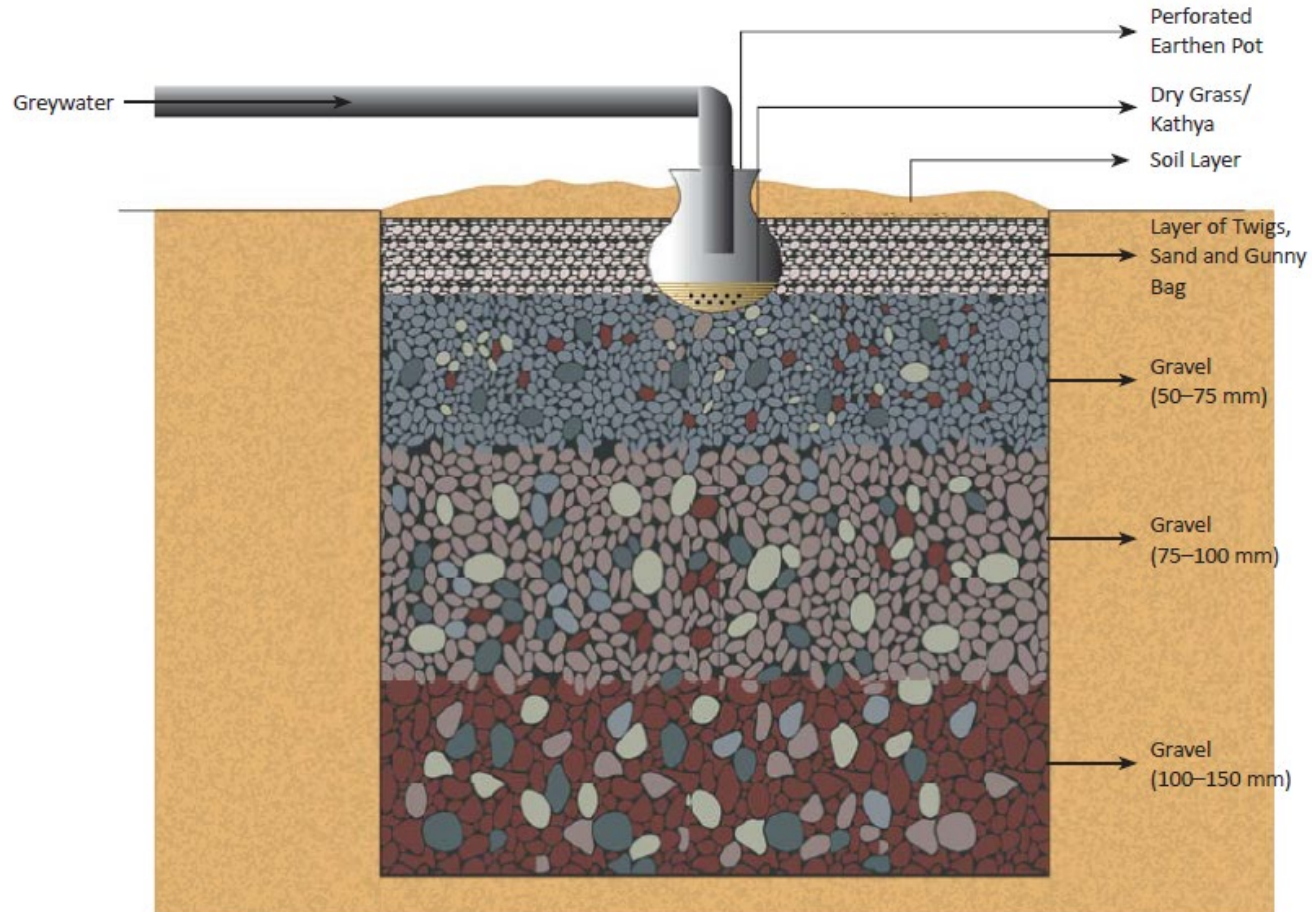


Kitchen Garden



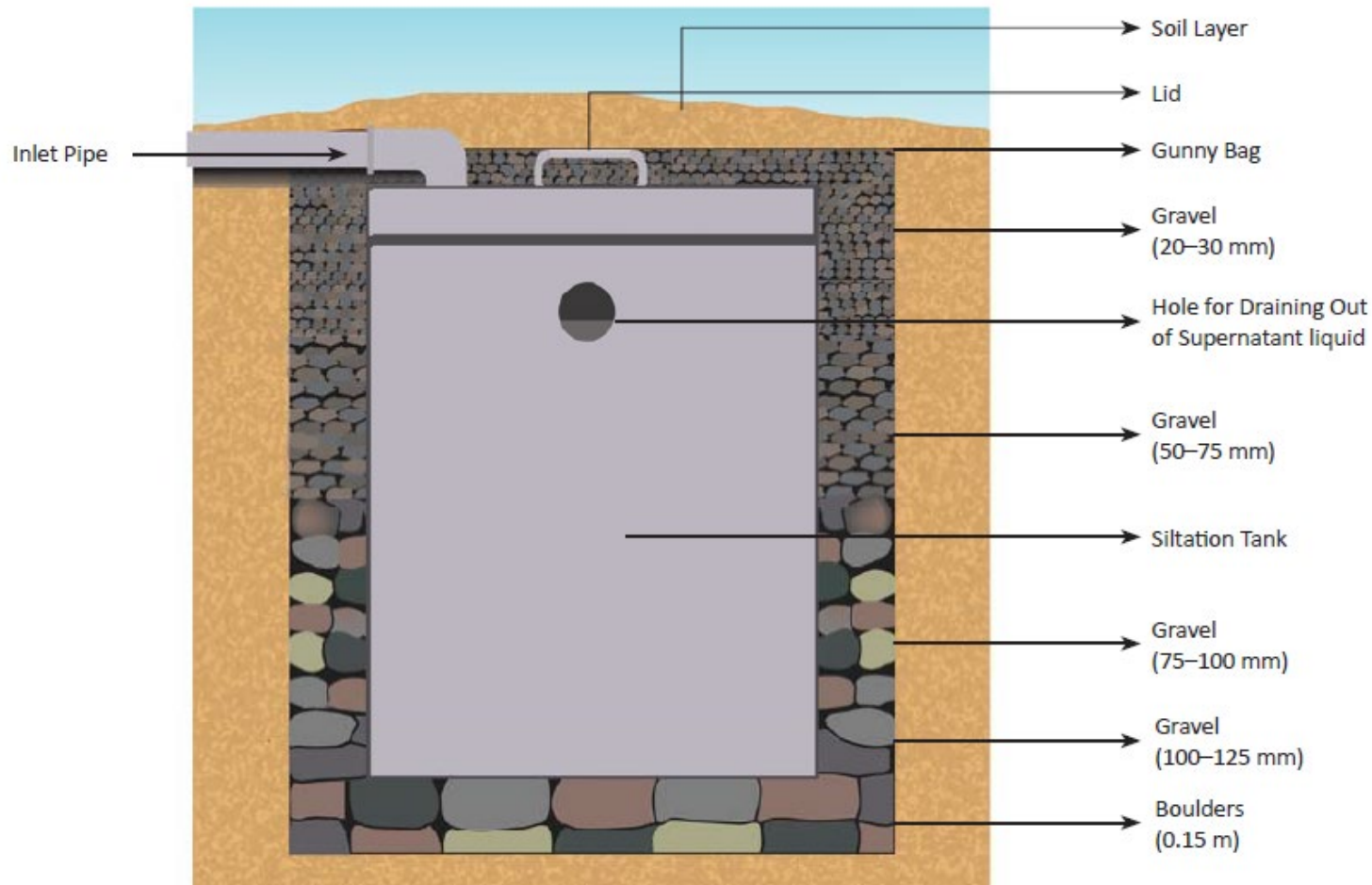
Use of greywater for irrigation.
Helps in reducing the fresh water demand for gardening.

Soak Pit



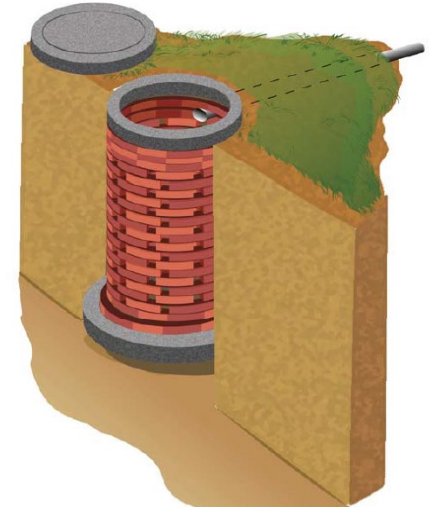
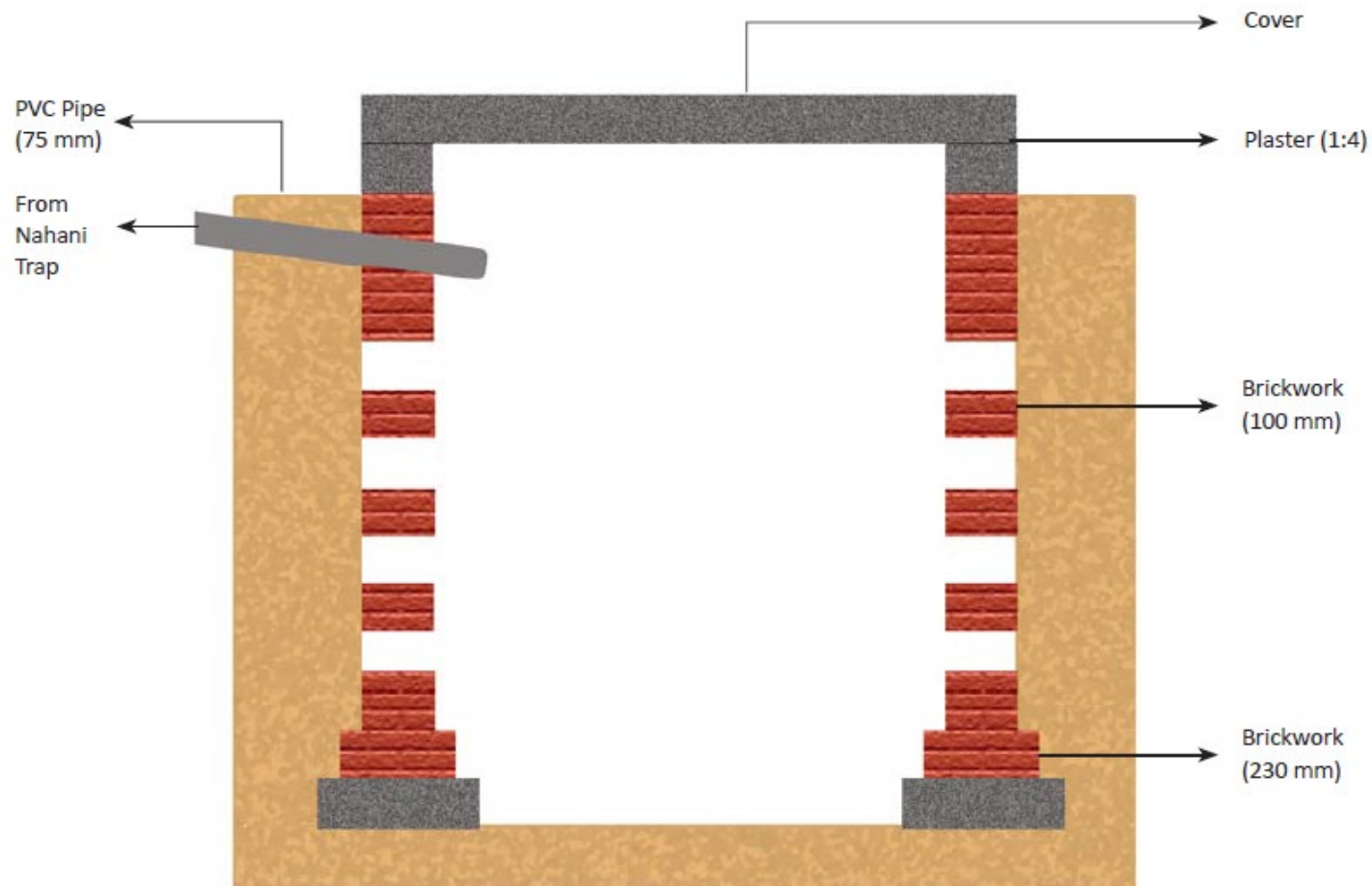
- A pit filled with layers of graded gravels aid in percolation of partially treated water into the ground.
- Its is suitable for permeable soil with low water table.

Magic Pit



- A pit filled with layers of graded gravels and siltation tank at the center.
- Liquid passes through layers of gravel and percolates in the surrounding soil.
- Its is suitable for permeable soil/ semi-permeable soil with low water table.

Leach Pit

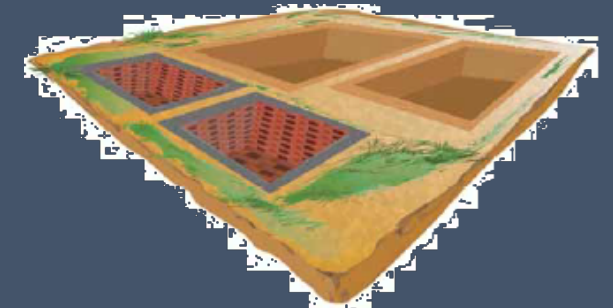
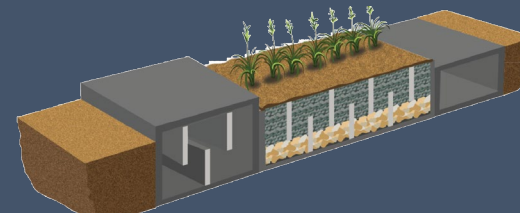
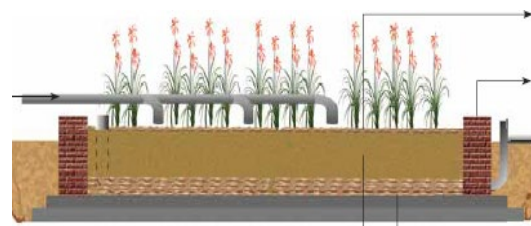
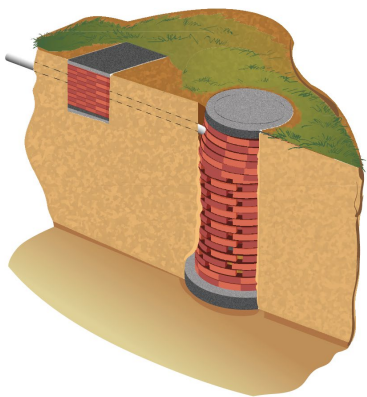


- A bricked lined pit in honeycombing fashion on alternate layer to facilitate seepage of water into the surrounding soil.
- Its is suitable for permeable soil/ semi-permeable soil with low water table.

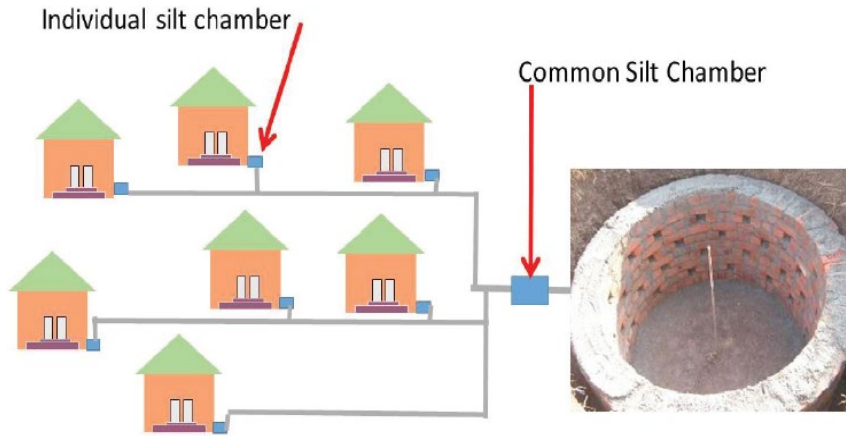
Community Level Treatments

- Cluster Level
- Village Level

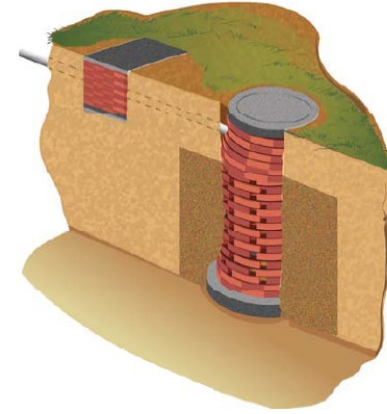
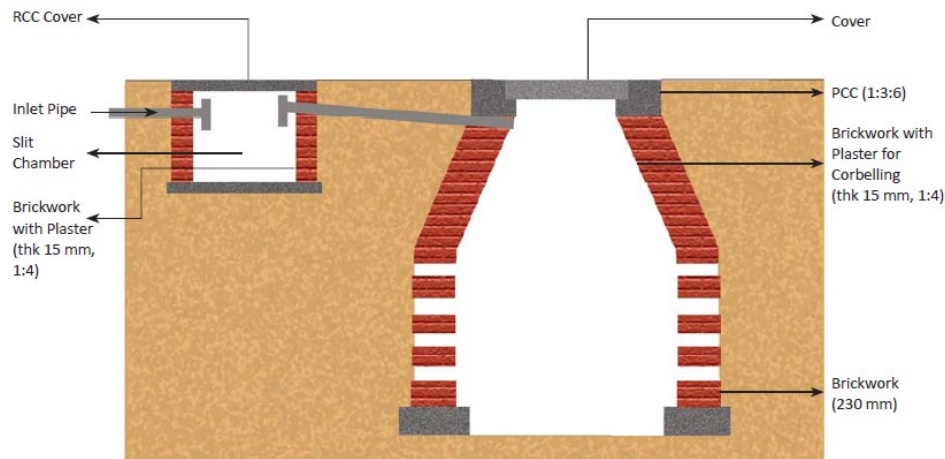
- Community Leach Pit
- WSP
- Constructed Wetland
- Phytotrid
- Decentralised Wastewater Treatment System



Community Leach Pit -Cluster Level

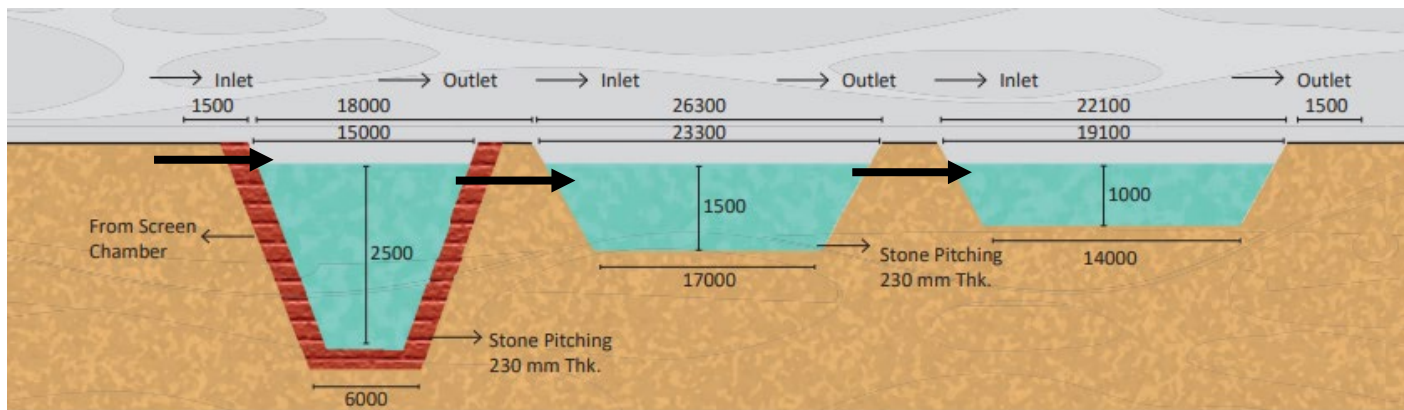


Each house to have a silt chamber
Common Silt chamber at the plantation site



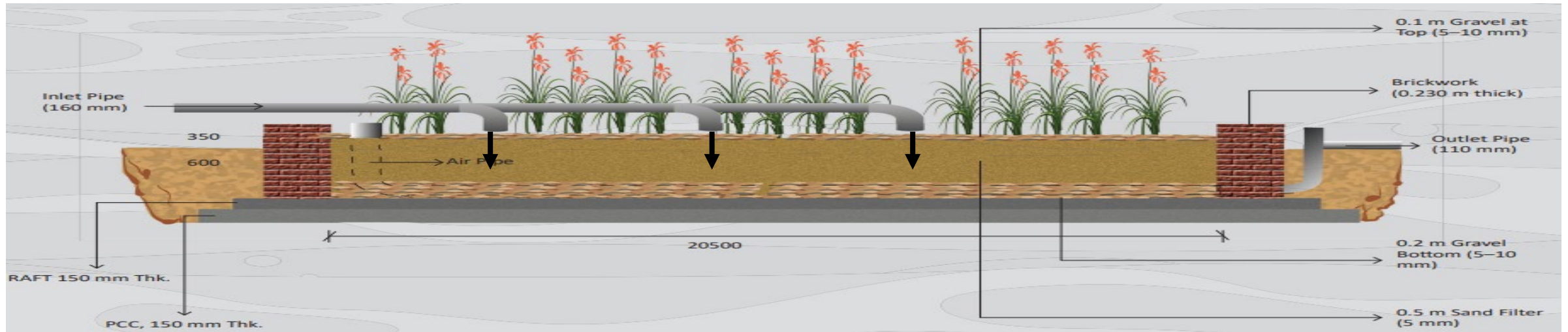
- This is a brick-lined pit constructed at a convenient place for a group of 5-15 houses.
- The number of houses to be connected should be calculated based on the greywater discharged from each house and the space available for the community leach pit.
- Its is suitable for permeable soil/ semi-permeable soil with low water table

Waste Stabilisation Pond -Village Level



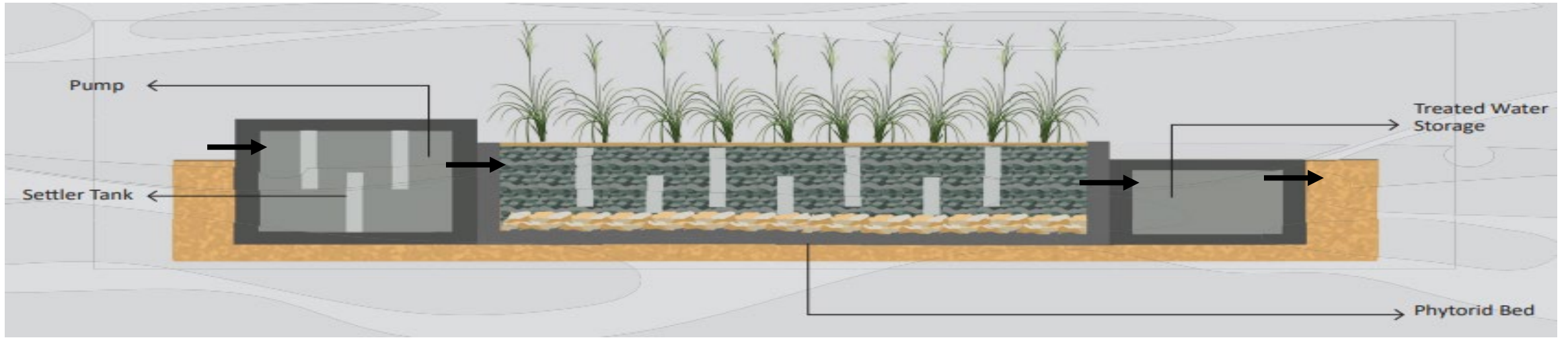
- A waste stabilization pond (WSP) is a series of shallow manmade basins that facilitate digestion of organics in the greywater through natural processes within the stipulated retention time.
- A WSP comprises of - anaerobic, facultative and maturation ponds.

Constructed Wetland -Village Level



- A horizontal flow constructed wetland (CW) is a planted filter bed for the treatment of wastewater (e.g. greywater or black water).
- A horizontal subsurface flow constructed wetland is a large gravel and sand-filled channel that is planted with aquatic vegetation.
- As wastewater flows horizontally through the channel, the filtration material filters out particles and microorganisms degrade organics.
- Treated water can be used for irrigation and recharge.

Phytorid Technology

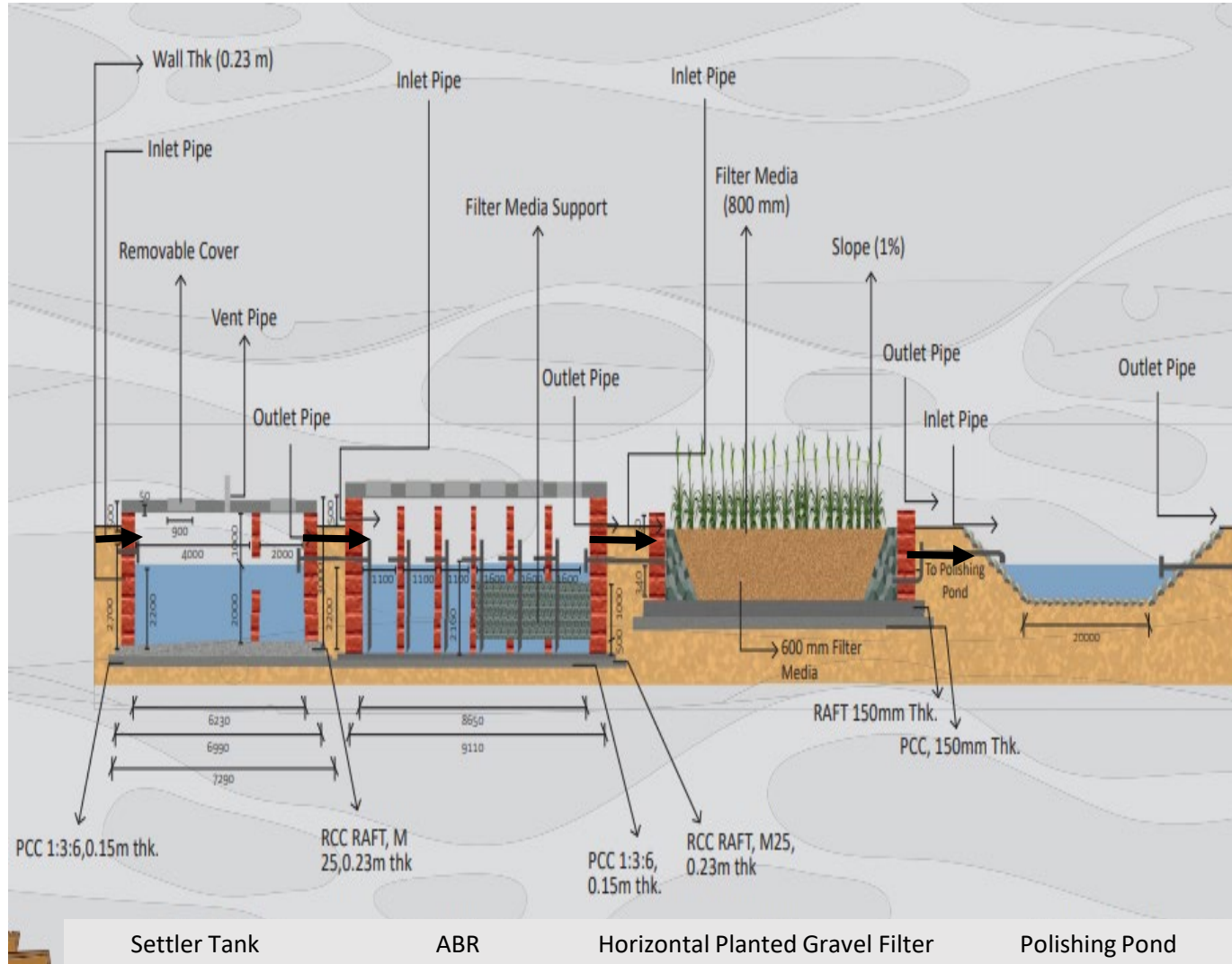


Phytoid is a scientifically developed systematic treatment methodology for wastewater. It combines physical, biological and chemical processes.

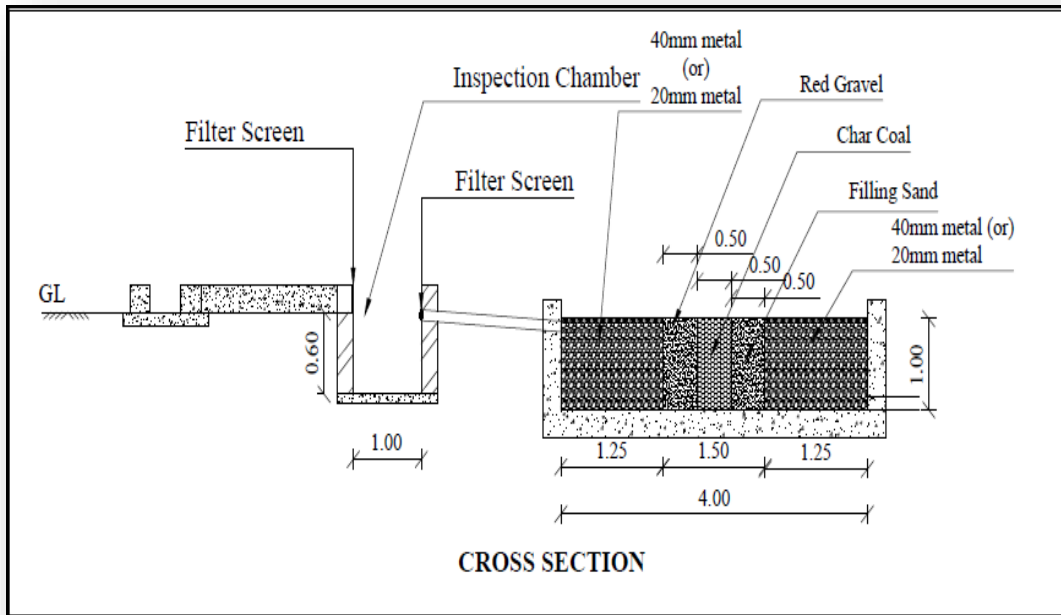
It is a scalable technology that works on gravity and has a low electric power requirement. It is also easy to maintain.

Treated water can be used for non-potable purpose and recharge.

Decentralized Wastewater Treatment System (DEWATS) -Village Level



- DEWATS is a proven nature-based treatment technology suitable for wastewater treatment including greywater which works under gravity negating the requirement of any electromechanical components and hence provides the advantage of minimal maintenance.
- DEWATS follows four stages of treatment namely –
 - I. pre-treatment,
 - II. solid-liquid separation,
 - III. treatment of liquid component,
 - IV. polishing of the effluent,



GWM in Tamil Nadu through Horizontal Filter

Process:

- Adopted a horizontal filter for treating greywater at drainage discharge point before waterbodies.

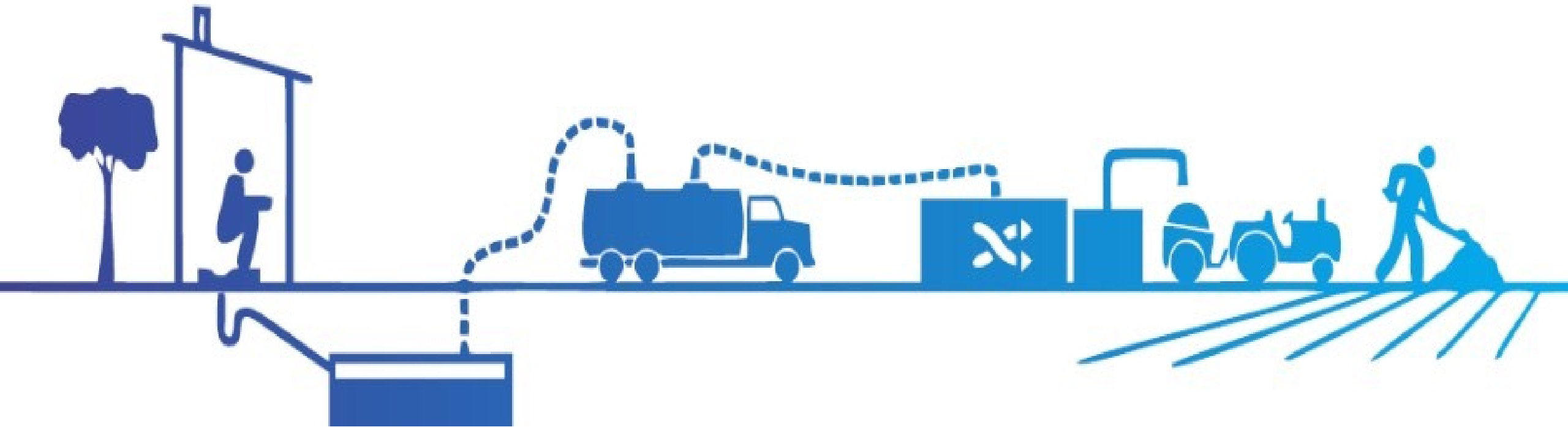
Impact:

- Solved issues related to greywater disposal.
- Waterbodies were cleaned of greywater.
- Visually clean village achieved.

- The system is filled with layers of graded gravels and planted bed, which aid in treatment of greywater.
- Its is suitable for drainage discharge points near waterbodies.



Faecal Sludge Management

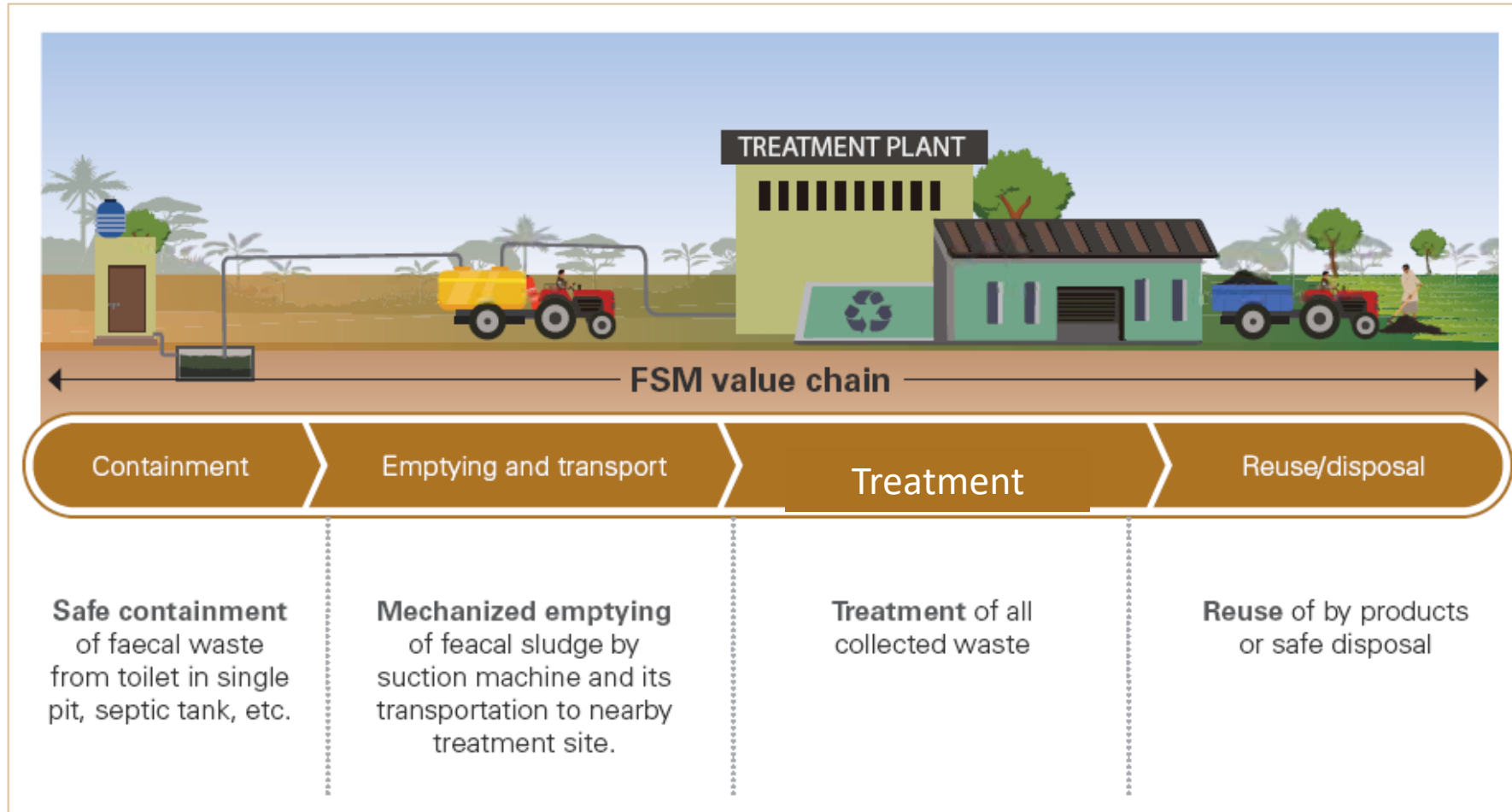


Faecal Sludge Management Rural Areas

- Faecal sludge management deals safe disposal of faecal matter generated from toilets.
- SBM Grameen has promoted Twin pit toilets for safe management of faecal matter through "*in-situ Treatment*" by converting it to manure (*also known sona khaad*).
- SBMG phase II promote the Retrofitting of single pit toilet into Twin pit toilets as a key measure of FSM.



Faecal Sludge Management Rural Areas



What is FSM

Faecal sludge management means safe disposal of faecal matter generated from toilets.

This is applicable to toilets which does not allow in-situ Treatment such as Septic tanks and Single pit toilets.

1. Retrofitting of toilets - Single pits to twin pit toilets & septic tanks repair

2. Urban –rural Convergence for mechanized desludging and treatment-

a. Joint advisory with urban ministry

b. Assessment and proximity analysis of the available STPs and FSMPs

3. Deep Row Entrenchment or new FSTP

Retrofitting of Toilets

1. Single Pit Toilets require mechanized emptying due to presence of harmful pathogens in faecal matter.
2. If converted into twin pits will not require mechanized emptying.
3. Twin Pit toilets will digest the sludge and produce manure which can be safely emptied by manual means.



Process of Single pit to Twin Pit toilets



- **Treatment at Urban Faecal sludge management(FSTP):** The faecal sludge from villages up to distance of 15-20 Km will be transported to urban FSTP having available capacities. The New FSTP proposed in Urban should be planned to cater these villages.
- **Co-Treatment at urban sewerage treatment plant (STP):** Faecal sludge from villages up to distance of 15-20 Km will be transported STPs in urban areas where it is co-treated with sewerage water. *The STPs may require detail assessment and may require retrofitting for the treatment of FS at STP.* The new units need to consider the rural population till 15-20 Km.

FSTP and Trenching -Clustering of villages

- For rural areas that can not be linked to urban areas, cluster of villages upto 15-20 KM will be formed
- For these cluster of villages – the provision of FSTPs are considered under SBMG phase II.



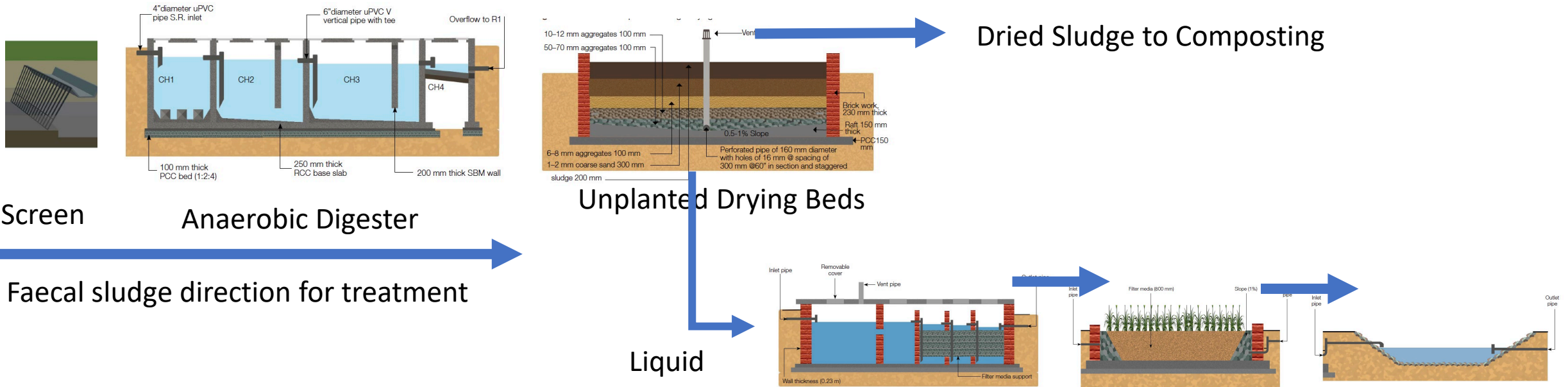
- Villages that are isolated and can not be clustered will be covered by *Deep Row Entrenchment*



Deep row
entrenchment
(Trenches)

Technology – Unplanted Drying Beds (PDBs) FSTP

An unplanted sludge drying bed allows water to percolate so that the solids remain at the top, where they dry by evaporation. The percolate water is collected at the bottom of the beds through perforated pipes (underdrain). This technology are adopted for large capacity FSTPs (>12 KLD)



Dried Sludge to Composting

Unplanted Drying Beds

Liquid

Anaerobic baffle filter

HPGF

PP

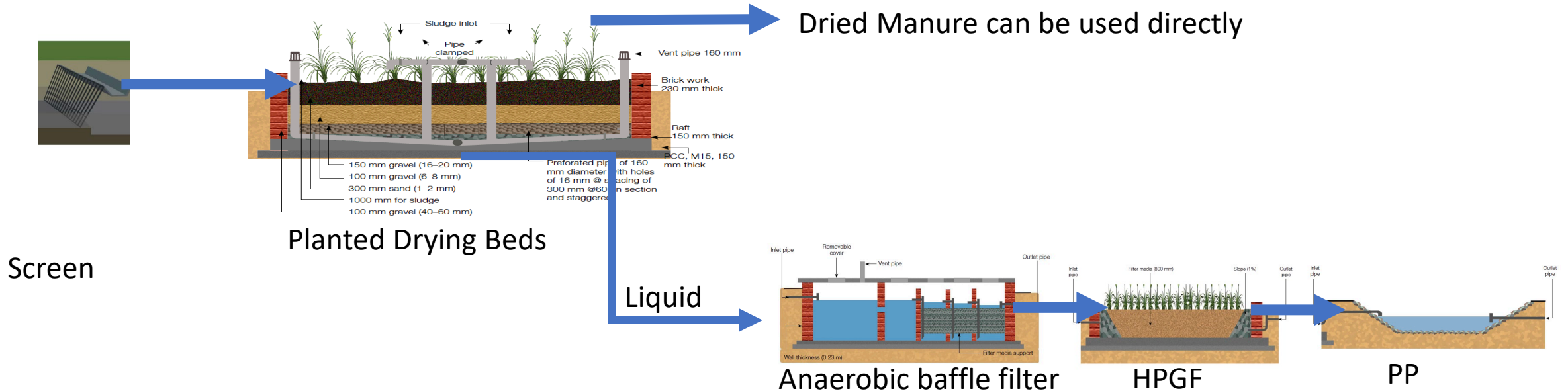
HPGF- Horizontal planted gravel Filter.

PP: Polishing Pond

KLD: Kiloliter per day

Technology – Planted Drying Beds (PDBs) FSTP

PDBs have porous media (e.g., sand and gravel) similar to unplanted drying beds with plants (emergent macrophytes). The percolate water is collected at the bottom of the beds through perforated pipes (underdrain). The plants will extract nutrient from sludge converting them into manure. This technology adopted for smaller capacity FSTP (<12 KLD)



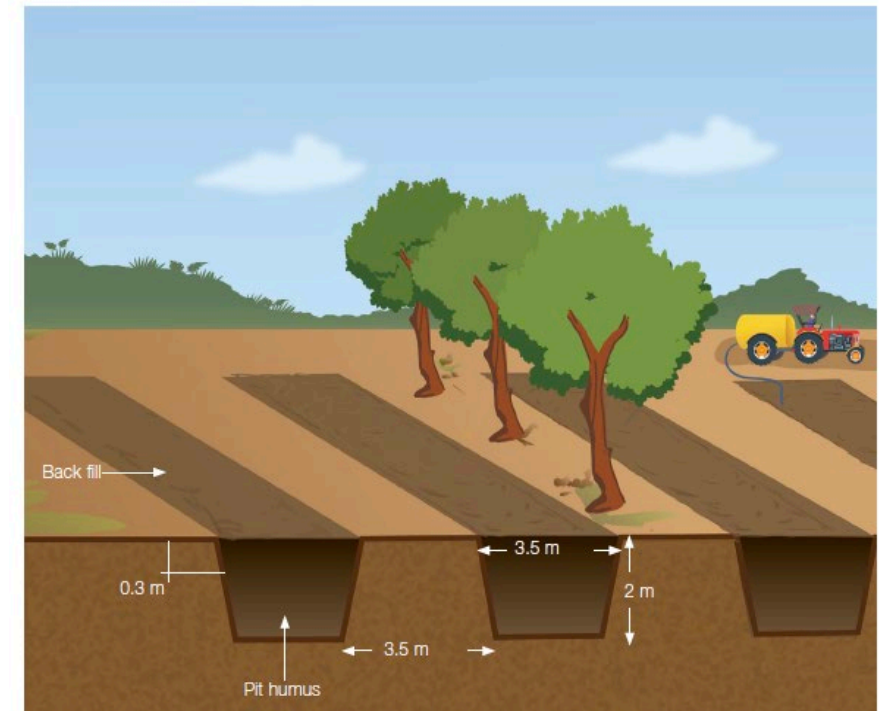
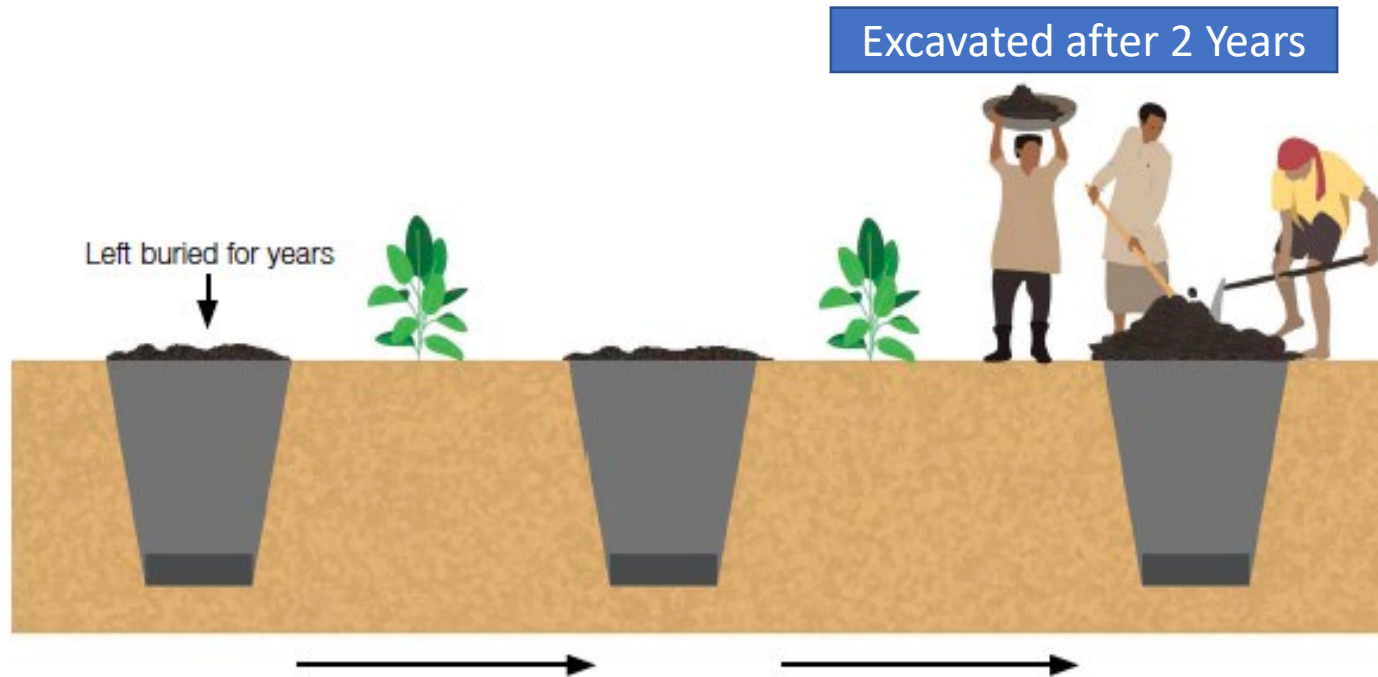
HPGF- Horizontal planted gravel Filter.

PP: Polishing Pond

KLD: Kiloliter per day

Technology – Deep Row Entrenchment (DRE)

Deep row entrenchment is a simple technique used for disposal of faecal sludge in an environmentally responsible manner. Deep row entrenchment involves pits that are usually not deeper than 2 m and are designed specifically for disposal of septage. The trench is filled with the sludge up to 0.3 m from the top of the surface and then backfilled with excavated soil.



FSM Implementation

Urban-rural convergence



Dhenkanal, Municipality in Odisha cover 20KM villages with transportation and treatment services

Odisha, Telangana, Haryana are leading state following convergence model

FSTP for cluster of villages



FSTP at Kalibillod, MP for cluster of GPs for rural areas.

Madhya Pradesh, Chhattisgarh, U.P, Karnataka have piloted the FSTP. Karnataka is taking lead in construction of FSTPs along with Urban-rural convergence.

Planning for implementation of SLWM



SLWM activities to be planned taking into the account the local factors/ in-situ conditions.
SLWM activities to be part of GPDP.

States shall proactively engage and involve Public Health Engineering Department, Panchayati Raj Department and Rural Development Department for coordinated implementation.

Departments to instruct and support their District units for proper coordination towards planning, implementation and financing.

District Water Sanitation Mission to prepare year-wise financial plan by pooling all the available resources like the Central fund, State fund, 15th FC grants to RLBs, MGNREGS, etc.

Key Policy Interventions



Guidelines amended to provide **flexibility** to States in funds utilisation

Technical manuals and **short films** on ODF Plus components released

15th FC manual released to facilitate effective utilisation of tied grants

Specific provision for sanitation activities made in **eGramSwaraj portal**

Joint advisory with MoHUA for integrated planning of **PWM** and **FSM**

All States onboarded on **PFMS**

Convergence under SBM-G

SBM-G Funds

- Novel model of convergence between different verticals of financing and various schemes of central and State governments to saturate the sanitation.

15th FC Tied Grants

- 60% tied grant for water and sanitation

Others

- MGNREGS
- User Charges
- Business model-based revenue

Funding Norms Under SBM-G – Village Level



Village size	Financial support
Up to 5000 population	Solid Waste Management : Up to Rs.60 per capita. Grey water Management : Up to Rs.280 per capita.
Above 5000 population	Solid Waste Management : Up to Rs.45 per capita Grey water Management : Up to Rs.660 per capita
30% share to be borne by the GP from 15th FC Tied Grants, Each village can utilize minimum of total rupees 1 lakh based on their requirements.	

Funding Norms Under SBM-G – District Level



Plastic Waste Management Unit (one in each Block)	Upto Rs.16 lakh per unit
Fecal Sludge Management Plant	Upto Rs.230 per capita
GOBAR-Dhan Projects [For model project(s) in each district]	Upto Rs.50 lakh per district

Integrated Management Information System (IMIS)



SBM-G, IMIS provides information on the status of the planning and implementation of the programme in real time.

Department of Drinking Water and Sanitation
Ministry of Jal Shakti

75 Azadi Ka Amrit Mahotsav

स्वच्छ भारत
एक कदम स्वच्छता की ओर

ODF-Plus Dashboard

- ODF-Plus Achievement
- Key Indicators
- ODF-Plus Assets



ODF Plus Villages

★	Aspiring (उदीयमान)	34,114
★★★	Rising (उज्ज्वल)	8,840
★★★★★	Model (उत्कृष्ट)	16,623

Capacity Building



Orientation of officials & policymakers – one day orientation modules, brochures as ready-reckoners

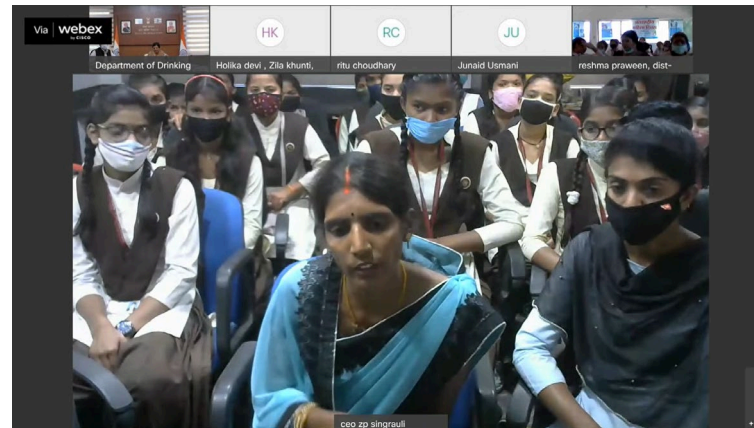
Monitoring capacity building initiatives at various levels – Capacity Building dashboard

Orientation of District and Block level functionaries on convergence of funds under SBM-G.

Sarpanch Samvaad: Bottom-up learning



Weekly interactions with Champion Sarpanches on COVID awareness and ODF Plus.
12 weekly Samvads with 150 Sarpanches done so far. States/ Districts have been encouraged to do at their level.



Thank You