पेयजल एवं स्वच्छता विभाग
जल शक्ति मंत्रालय
भारत सरकार
DEPARTMENT OF DRINKING WATER AND SANITATION
MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA

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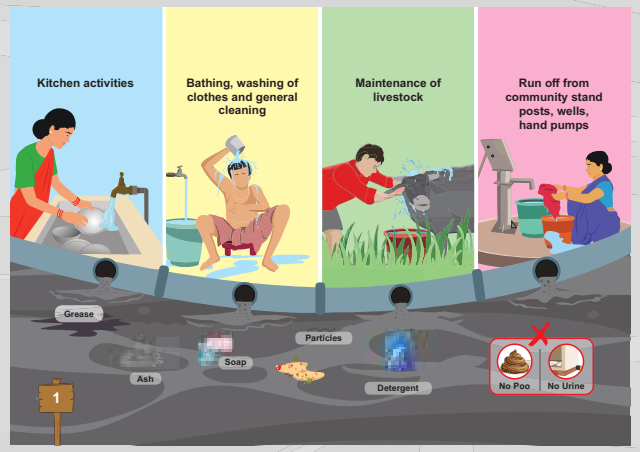
GREYWATER MANAGEMENT

AT VILLAGE-LEVEL

WHAT IS GREYWATER?

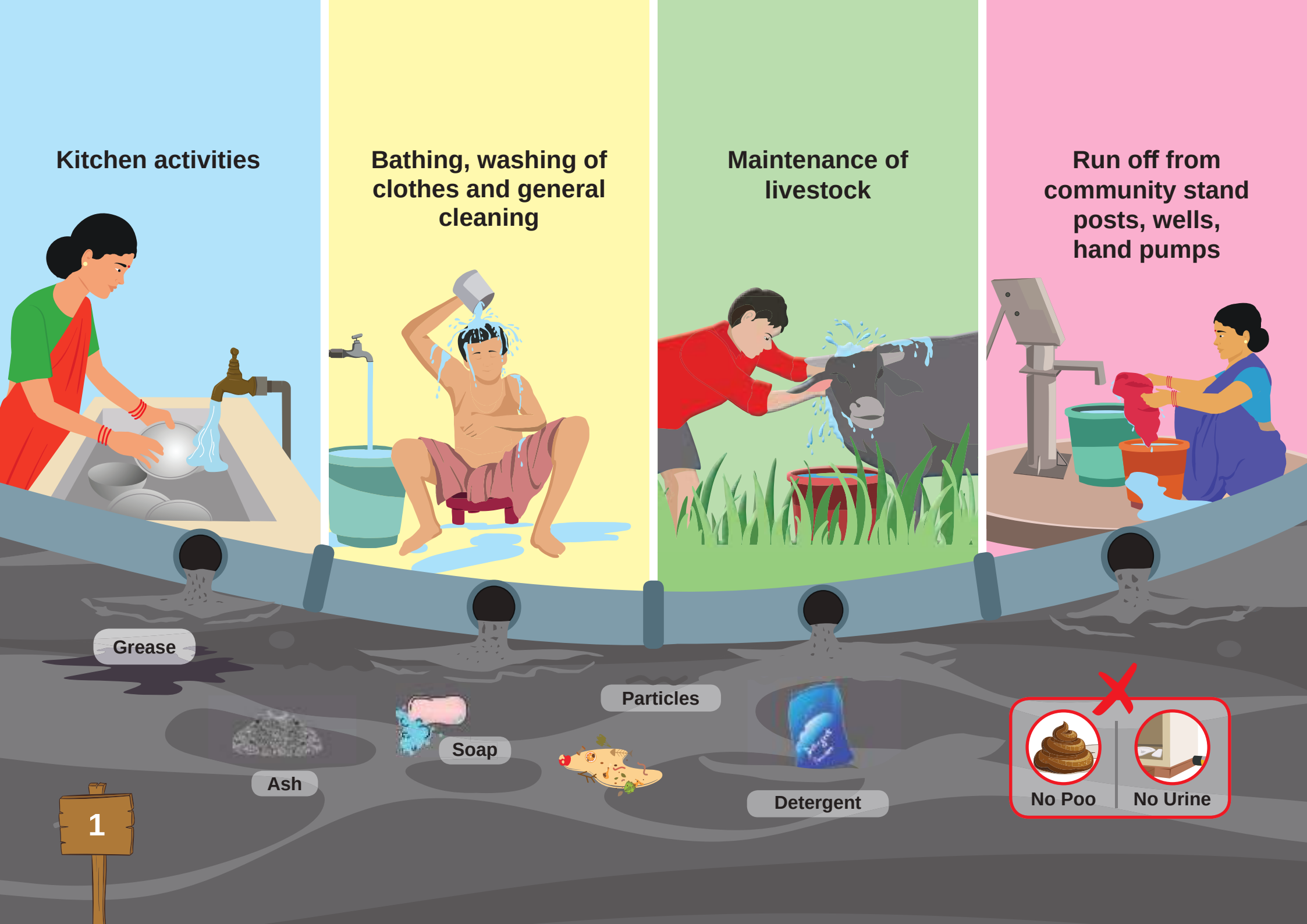
Greywater is wastewater. If properly collected, it can be easily treated and used for certain purposes. It is generated in homes, schools, shops, offices, etc. as a result of human activities such as:



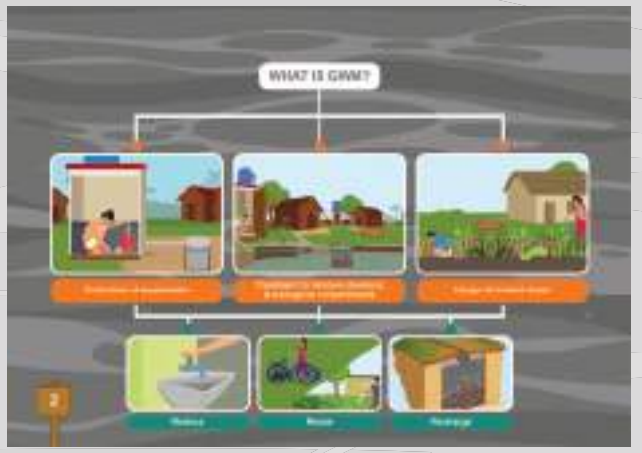
- **Kitchen activities**
- **Bathing, washing of clothes and general cleaning**
- **Maintenance of livestock**
- **Run off from community stand posts, wells, hand pumps**

Important point to remember

Greywater is free of any faecal or urine contamination. However, it still contains some chemical and biological particles such as grease, soap, ash, food particles, etc. which must be removed to make it usable.


Kitchen activities
Bathing, washing of clothes and general cleaning
Maintenance of livestock
Run off from community stand posts, wells, hand pumps
Grease
Ash
Soap
Particles
Detergent
No Poo
No Urine
1

WHAT IS GREYWATER MANAGEMENT (GWM)?



GWM is the use of simple technologies to properly collect and treat greywater. It has three fundamental steps:

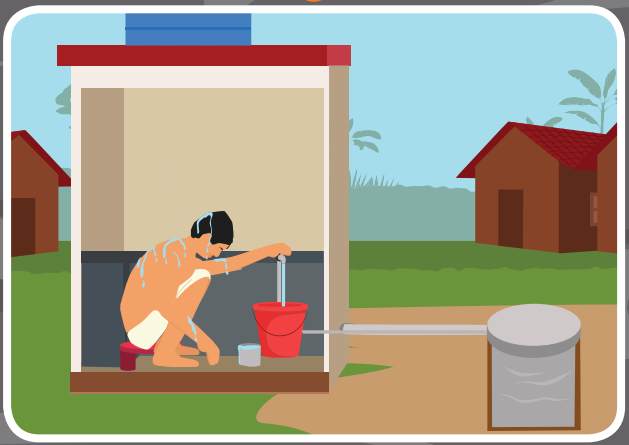
- **Collection of greywater/used water**
- **Treatment to remove chemical & biological contaminants**
- **Usage of treated water**

GWM revolves around the three Rs: reduce, reuse and recharge.

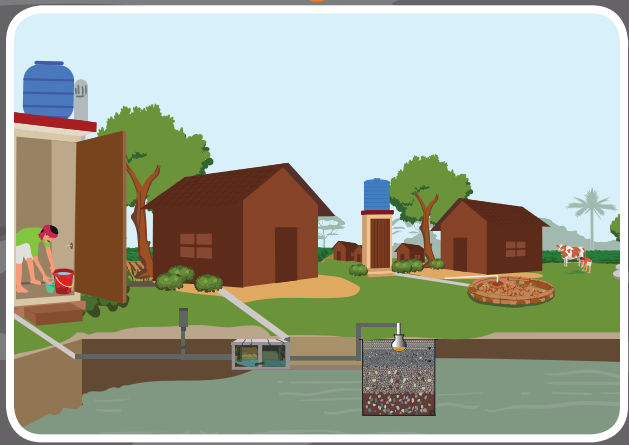
- **Reduce:** Reduce consumption of freshwater to decrease the quantity of greywater generated
- **Reuse:** Use treated greywater for non-potable activities such as irrigation, cleaning of vehicles or industrial usage
- **Recharge:** Allow treated greywater to percolate into the ground and replenish groundwater

All activities undertaken under GWM must lead to any one or more of these three Rs.

WHAT IS GWM?

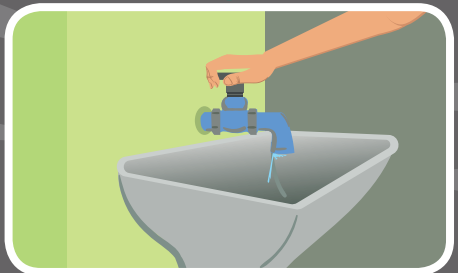


Collection of wastewater



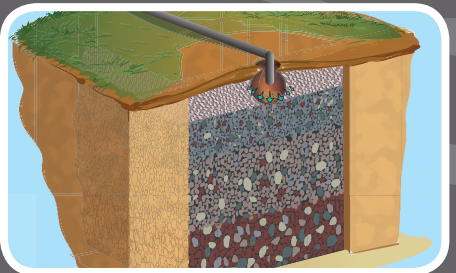
Treatment to remove chemical & biological contaminants

Usage of treated water



Reduce

Reuse



Recharge

PROBLEMS & BENEFITS RELATED TO GREYWATER

Almost 60% of freshwater becomes greywater.

Benefits of adopting GWM

- **Reduces vector-borne (malaria, dengue, etc.), water-borne and water-washed diseases**
- **Improves the water table through groundwater recharge**
- **Helps keep the village clean**
- **Reduces the strain on freshwater**
- **Improves greenery through village-level gardens/plantations**
- **Improves family nutrition through individual kitchen gardens**

Problems if it is not properly managed

- Leads to accumulation of greywater on roads and open areas
- Pollutes land and water bodies, and contaminates groundwater
- Leads to health hazards

This is why GWM is necessary.

PROBLEMS & BENEFITS RELATED TO GREYWATER

Before GWM

After GWM

USES OF GREYWATER

Treated greywater can be used for:

- **Flushing of toilets**
- **Cleaning of floors, public spaces**
- **Farming and irrigation**
- **Pisciculture**
- **Groundwater recharge**

Segregation of greywater, blackwater and freshwater

It is important to segregate greywater from blackwater. As greywater has fewer contaminants, it can be treated at the household/community/village levels. If it is mixed with blackwater, then it needs to be treated at a treatment plant.

Important to remember

Treated greywater must not be consumed. Do not use it for cooking, drinking, washing utensils or bathing.

USES OF TREATED GREYWATER

Flushing of toilets

Cleaning of floors, public spaces, vehicles

Farming and irrigation

Pisciculture

Groundwater recharge

GWM TECHNOLOGIES AT HOUSEHOLD (HH) LEVEL

HH LEVEL

HH technologies are suitable for villages having space available in each individual house, and can be developed with:

- **Locally available materials**
- **Minimum labour**
- **Low costs**

Their Operations and Maintenance (O&M) can also be done at HH level

You must choose the right GWM technology according to:

- **Usage & volume of discharge**
- **Space available**
- **Type of terrain**
- **Level of water table**

OPTIONS ARE:

KITCHEN GARDEN: An arrangement near the source of greywater to water plants with it

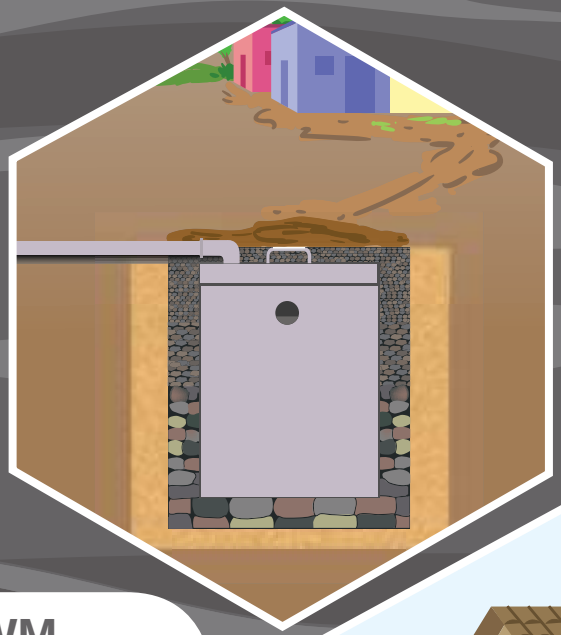
SOAK PIT: A dug-out pit filled with graded stones and gravel

LEACH PIT: A honeycomb-patterned pit with brick lining and an RCC cover

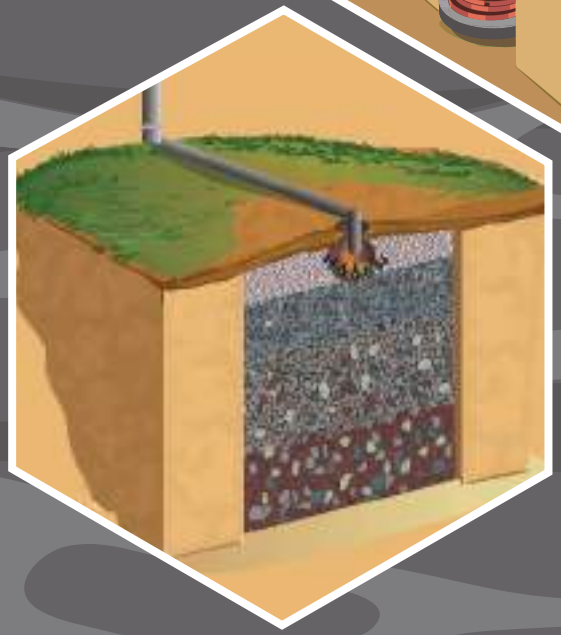
MAGIC PIT: A pit with a cement/plastic tank at the centre surrounded by different grades of boulders and stones

GWM TECHNOLOGIES AT HH LEVEL

LEACH PIT



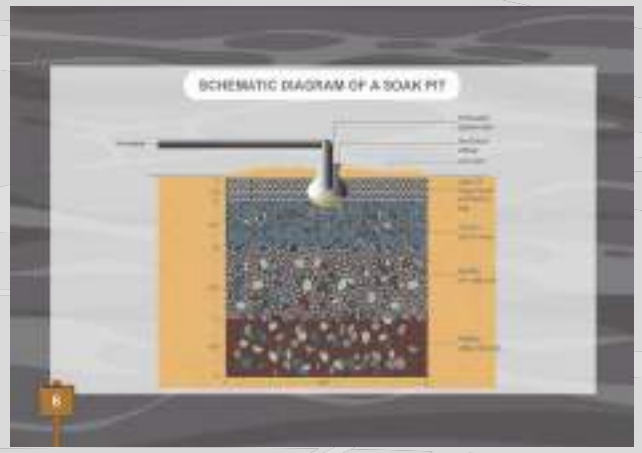
MAGIC PIT



SOAK PIT

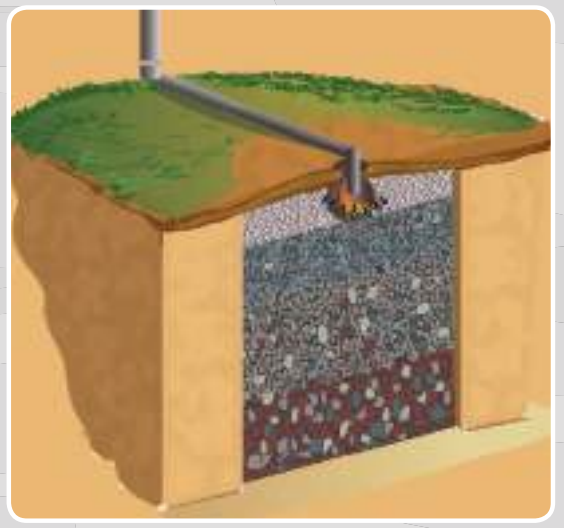
KITCHEN GARDEN

SOAK PIT TECHNOLOGY



What is a soak pit?

A soak pit is a covered, porous structure that allows water to slowly soak into the ground. As greywater percolates through the layers of graded aggregates and soil, small particles are filtered out and organics digested.



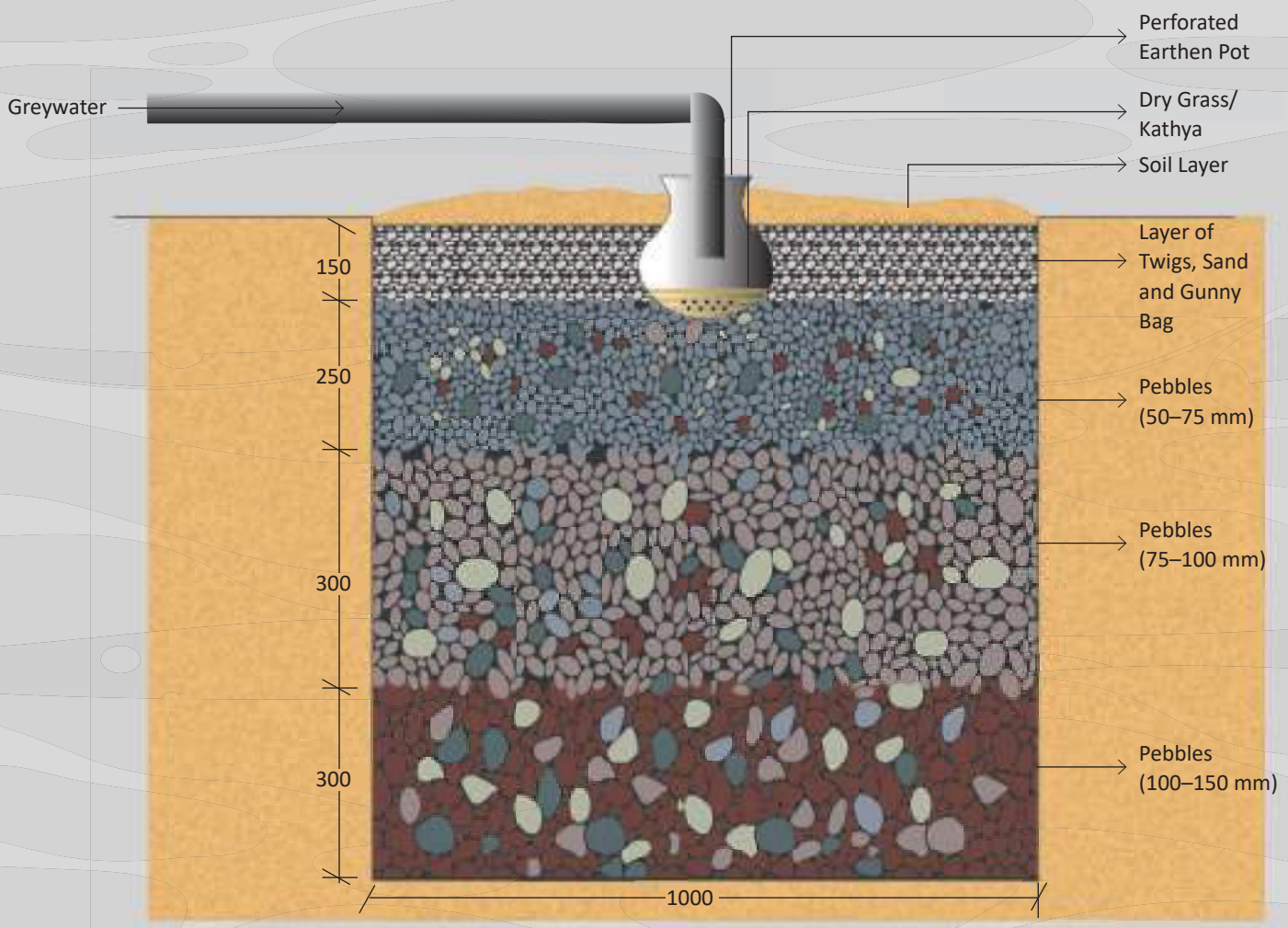
Suitable for:

- Permeable soil
- Low water table

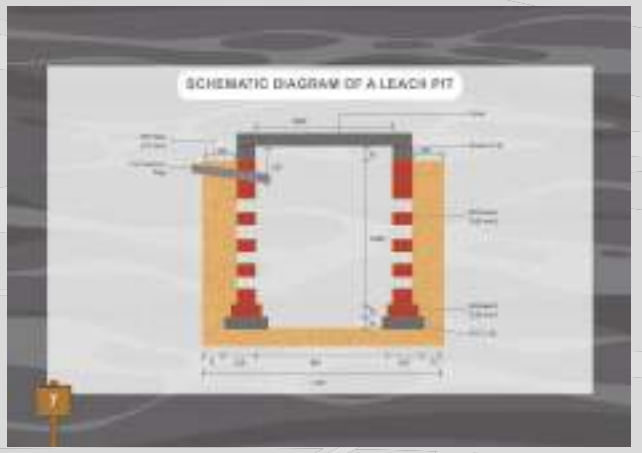
How much does it cost?

Approximately ₹ 1279

SCHEMATIC DIAGRAM OF A SOAK PIT



LEACH PIT TECHNOLOGY



What is a leach pit?

A leach pit is a brick-lined or RCC pit constructed in the courtyard of a house at a convenient place. The greywater from the house (kitchen wastewater, bathing water, and washing water) should be directed to this pit.

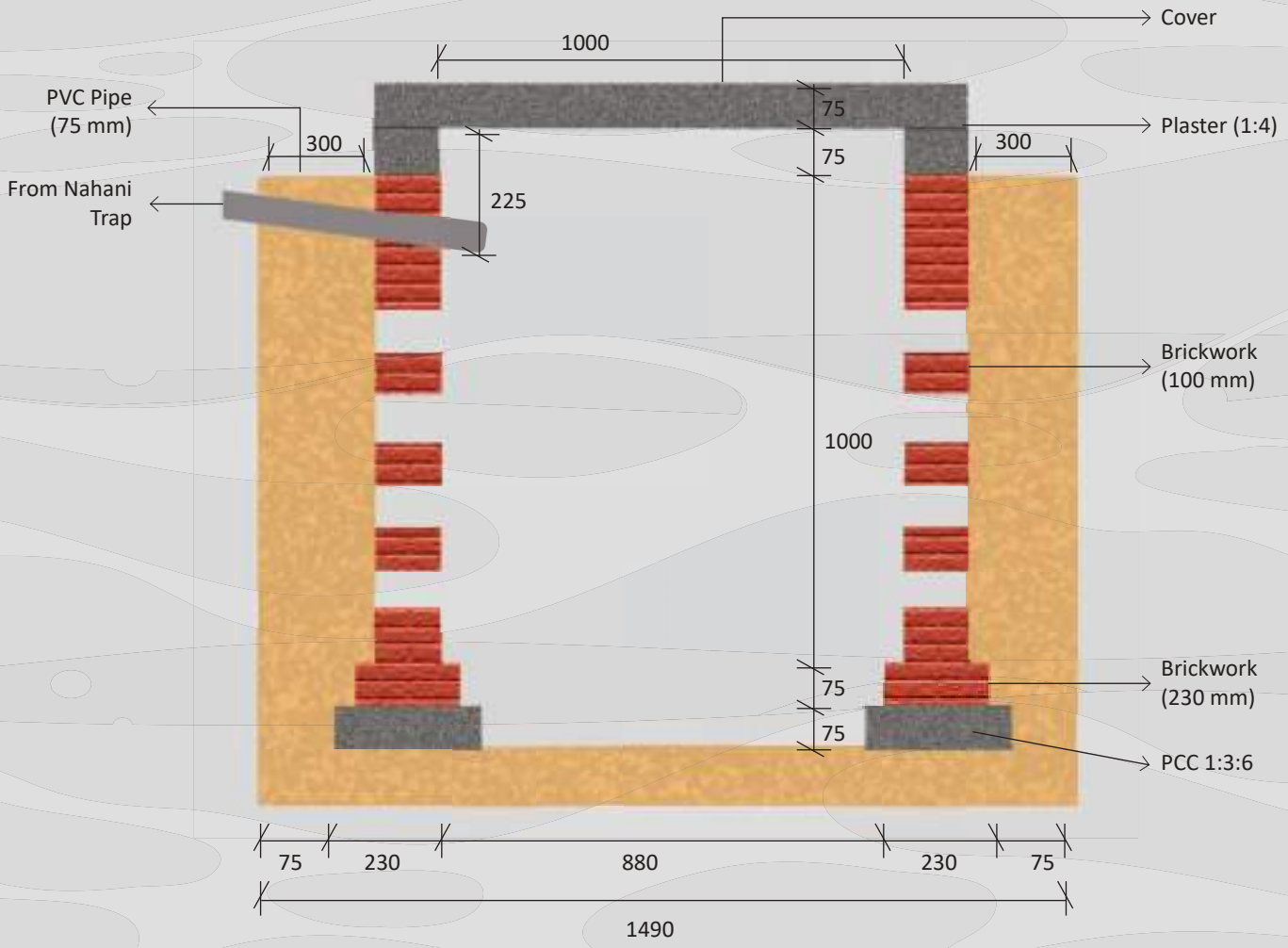
Suitable for:

- Permeable and semi-permeable soil
- Low water table

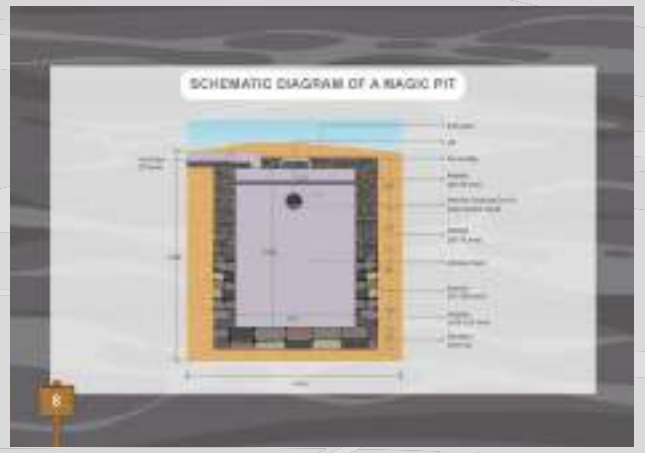
How much does it cost?

Approximately ₹ 4126

SCHEMATIC DIAGRAM OF A LEACH PIT



MAGIC PIT TECHNOLOGY

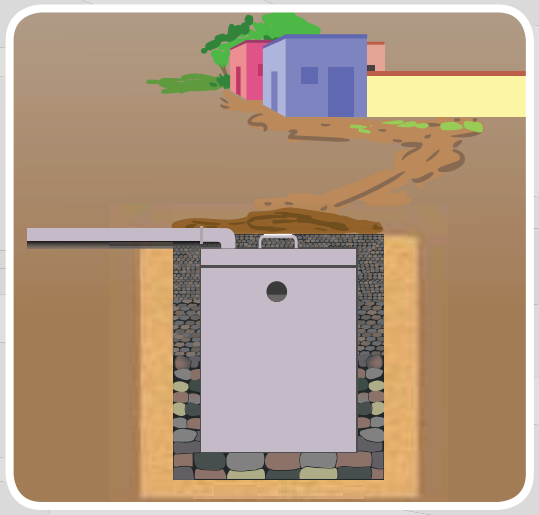


What is a magic pit?

A magic soak pit is a structure that consists of a cement/plastic tank at the centre surrounded by different grades of boulders and stones.

Suitable for:

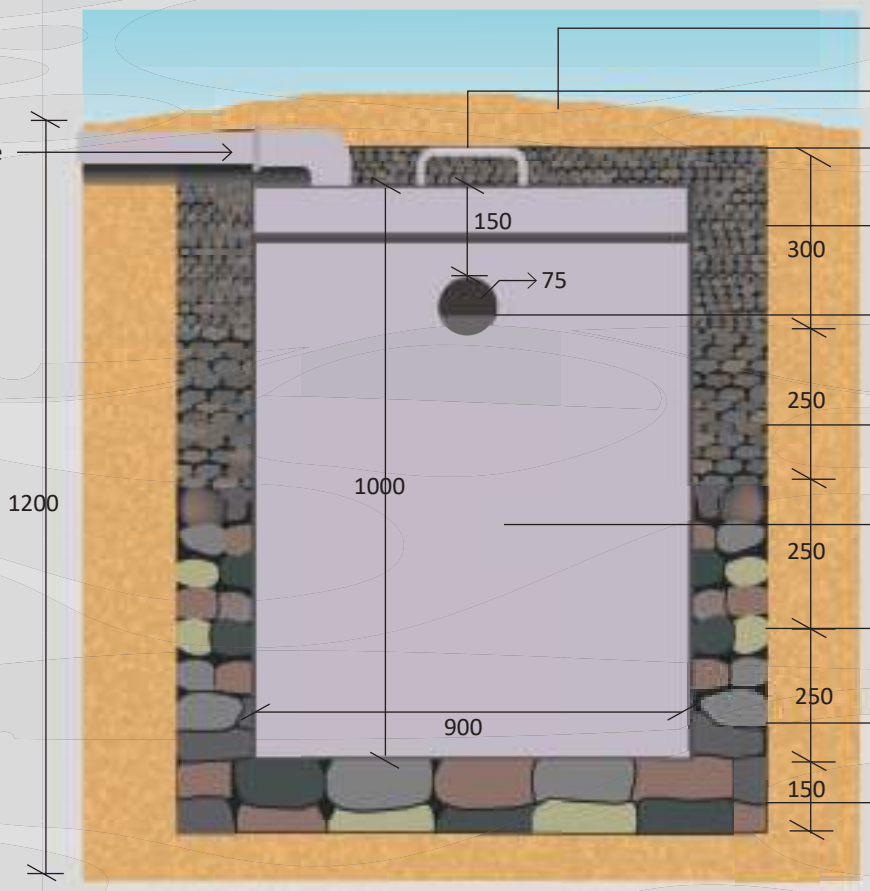
- Permeable and semi-permeable soil
- Low water table



How much does it cost?

Approximately ₹ 2539

SCHEMATIC DIAGRAM OF A MAGIC PIT



KITCHEN GARDEN TECHNOLOGY

What is a kitchen garden?

A kitchen garden not only solves the issue of greywater management, but also reduces the demand for freshwater for growing vegetables. It can be used to grow fresh fruits and vegetables and thus to help in providing nutrition to the entire family.

Suitable for:

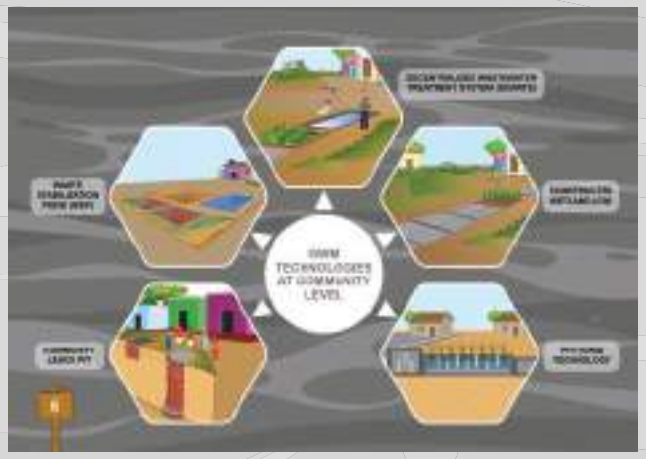
- All soil types
- High water table areas
- All terrains, requires alternate arrangement during rainy season

How much does it cost?

Approximately ₹ 600

SCHEMATIC DIAGRAM OF A KITCHEN GARDEN

GWM TECHNOLOGIES AT COMMUNITY LEVEL



COMMUNITY LEVEL

Community-level GWM technologies are suitable for a larger greywater load, and where individual technologies are not applicable. Conveyance systems like underground/small bore system/closed covered drains must be constructed to connect the source of greywater to the treatment unit. Community-level greywater technologies are:

COMMUNITY LEACH PIT: A brick-lined pit that can be connected to a group of houses

WASTE STABILIZATION POND (WSP): A series of shallow man-made basins that facilitate the natural decomposition of organic matter in greywater

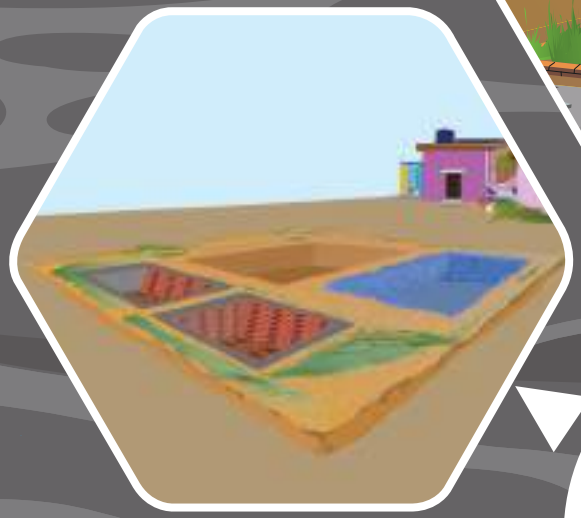
DECENTRALIZED WASTEWATER TREATMENT SYSTEM (DEWATS): A gravity-based treatment technology that avoids electromechanical requirement

CONSTRUCTED WETLAND (CW): A horizontal flow filter bed planted with aquatic vegetation

PHYTORID TECHNOLOGY: A scalable technology that combines physical, biological and chemical processes

GWM TECHNOLOGIES AT COMMUNITY LEVEL

DECENTRALIZED WASTEWATER TREATMENT SYSTEM (DEWATS)



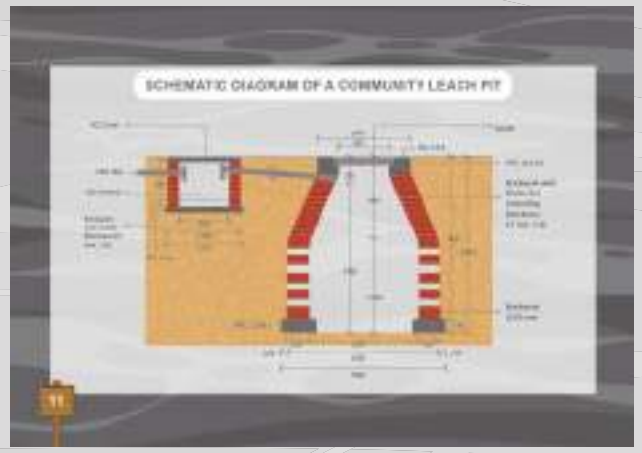
WASTE STABILIZATION POND (WSP)

CONSTRUCTED WETLAND (CW)

COMMUNITY LEACH PIT

PHYTORID TECHNOLOGY

COMMUNITY LEACH PIT TECHNOLOGY



What is a community leach pit?

A community leach pit is an extended version of a household leach pit where multiple houses can be connected to a single pit.

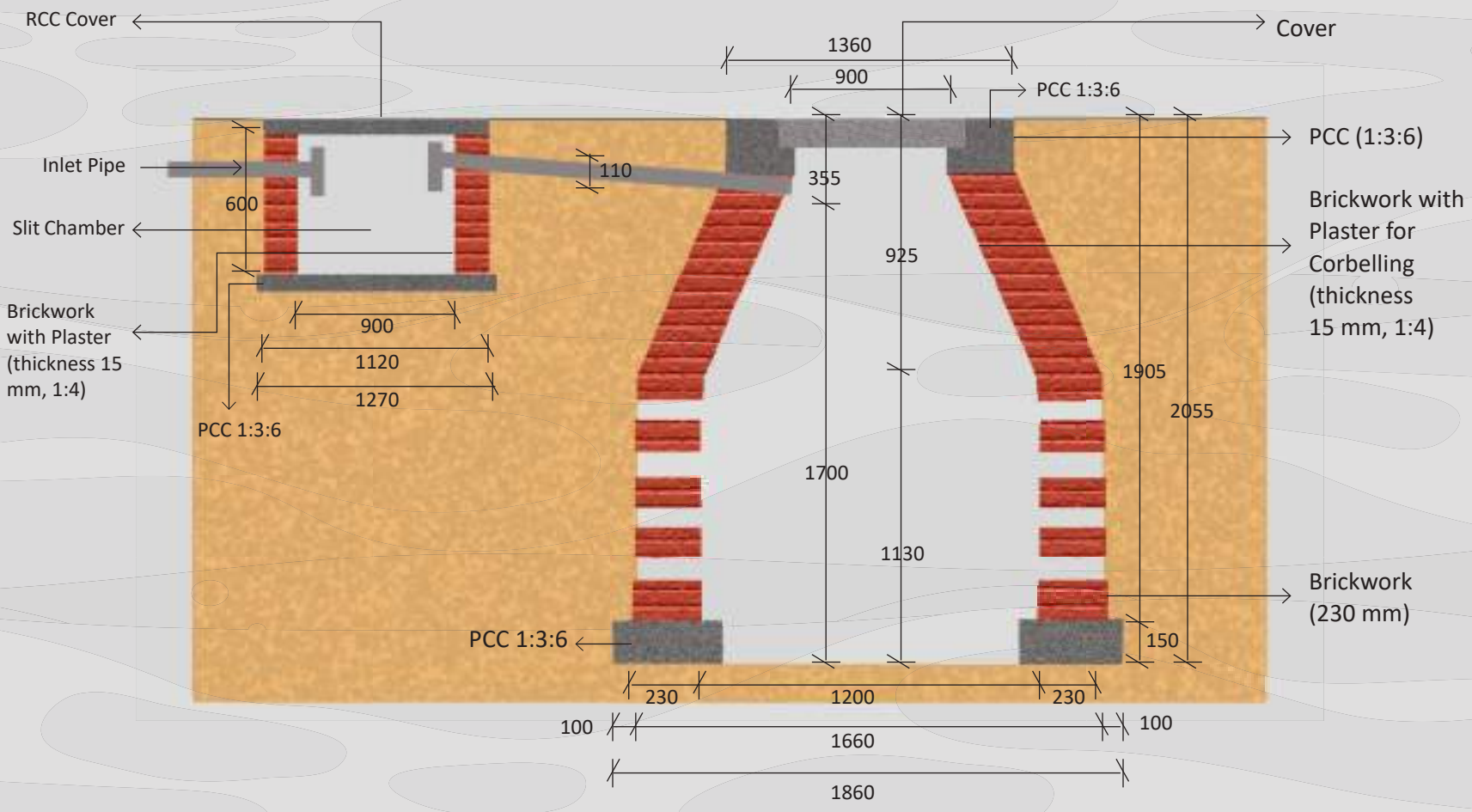
Suitable for:

- Permeable and semi-permeable soil
- Low water table

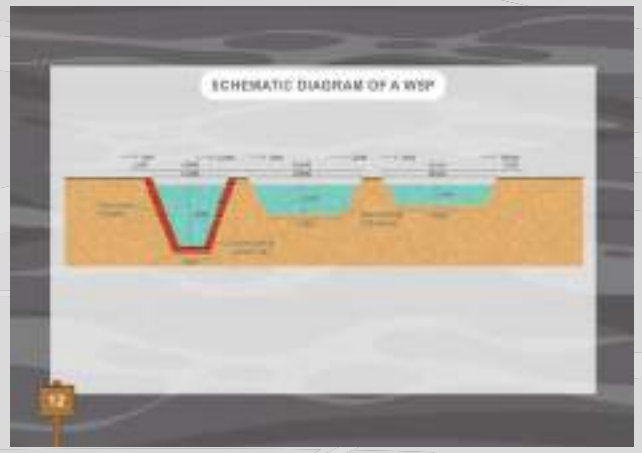
How much does it cost?

Approximately ₹ 22,776 for 5 HHs

SCHEMATIC DIAGRAM OF A COMMUNITY LEACH PIT



WASTE STABILIZATION POND (WSP) TECHNOLOGY



What is a waste stabilization pond?

Waste stabilization is a conventional technology in which a series of ponds is developed for the treatment of wastewater through natural microbial processes. Treated water can be reused for agriculture or irrigation.

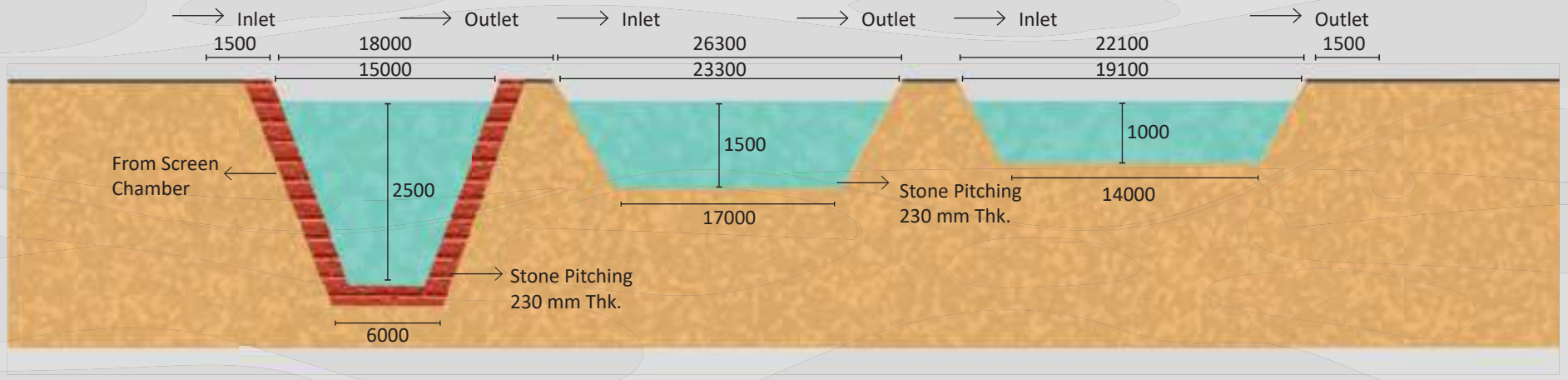
Suitable for:

At village-level drainage discharge points, where large quantity of greywater is generated

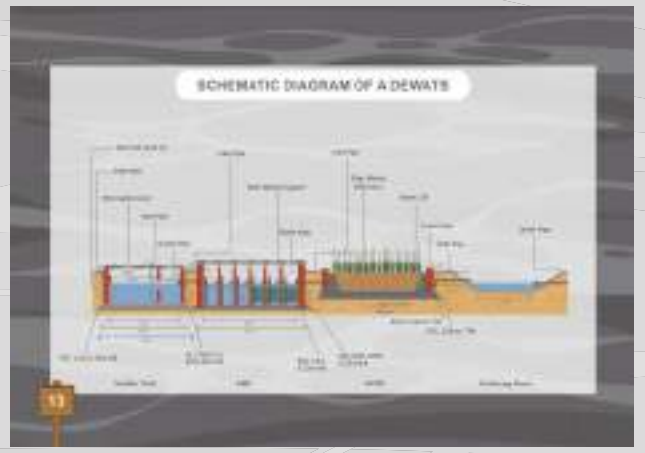
How much does it cost?

Approximately ₹ 16,58,076 for 211 kld

SCHEMATIC DIAGRAM OF A WSP



DECENTRALIZED WASTEWATER TREATMENT SYSTEM (DEWATS) TECHNOLOGY



What is a decentralized wastewater treatment system?

A decentralized wastewater treatment system is a robust nature-based technology that uses a combination of different treatment modules to achieve the desired level of treatment.

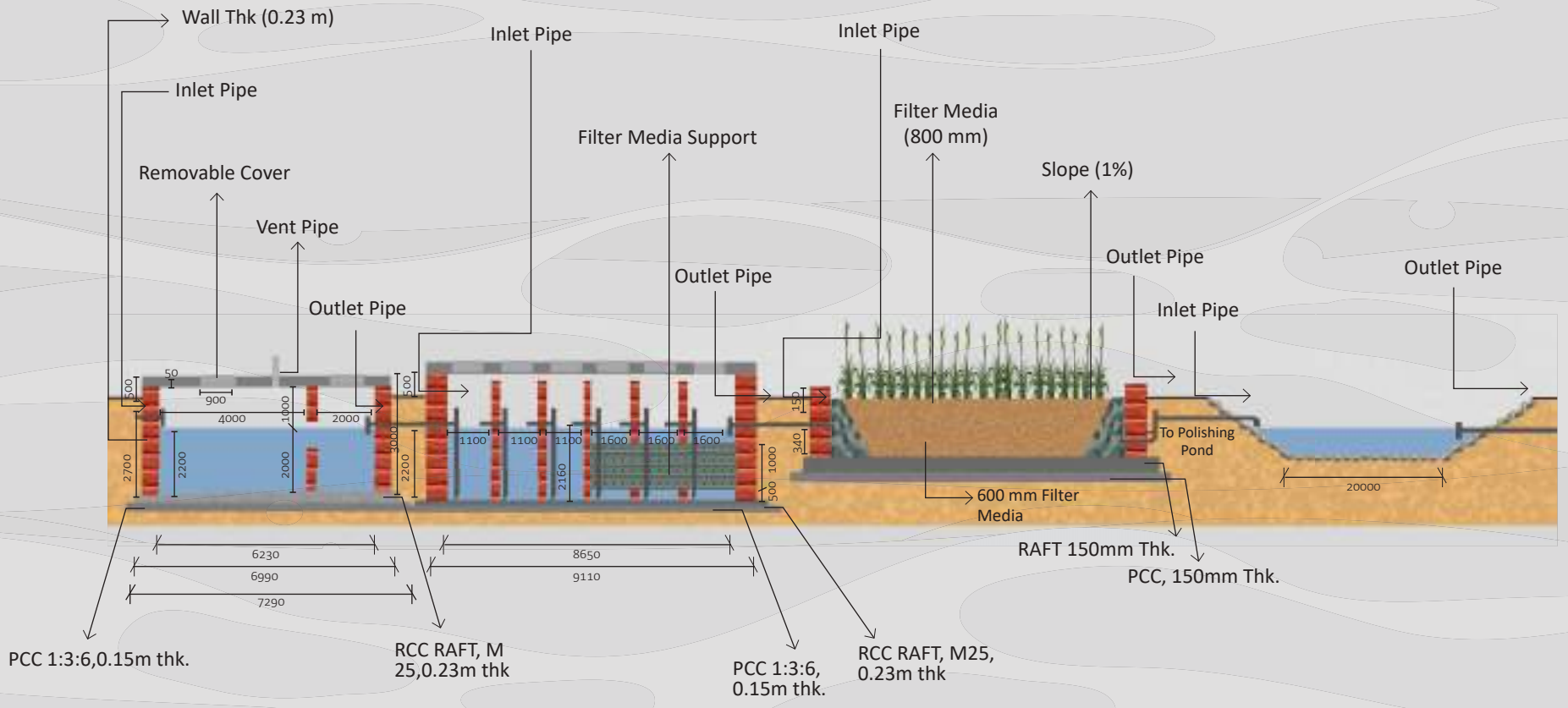
Suitable for:

Customizable

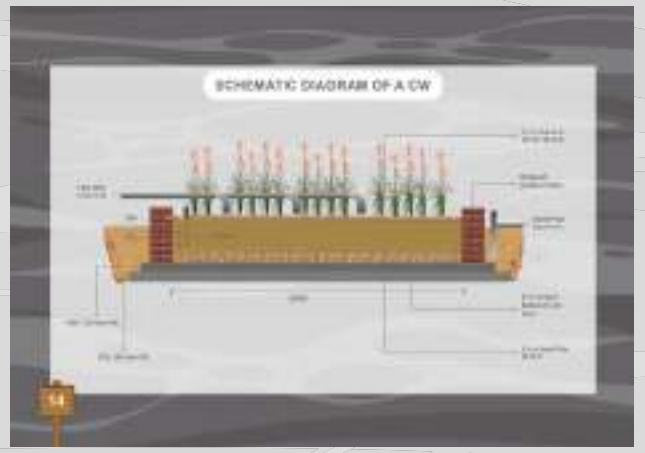
How much does it cost?

Approximately ₹ 50,27,999 for 211 kld

SCHEMATIC DIAGRAM OF A DEWATS



CONSTRUCTED WETLANDS (CWs) TECHNOLOGY



What is a constructed wetland?

Constructed wetlands are man-made systems in which wastewater treatment is achieved through natural processes involving soil, vegetation, and microbial communities. They resemble the natural wetlands in treatment.

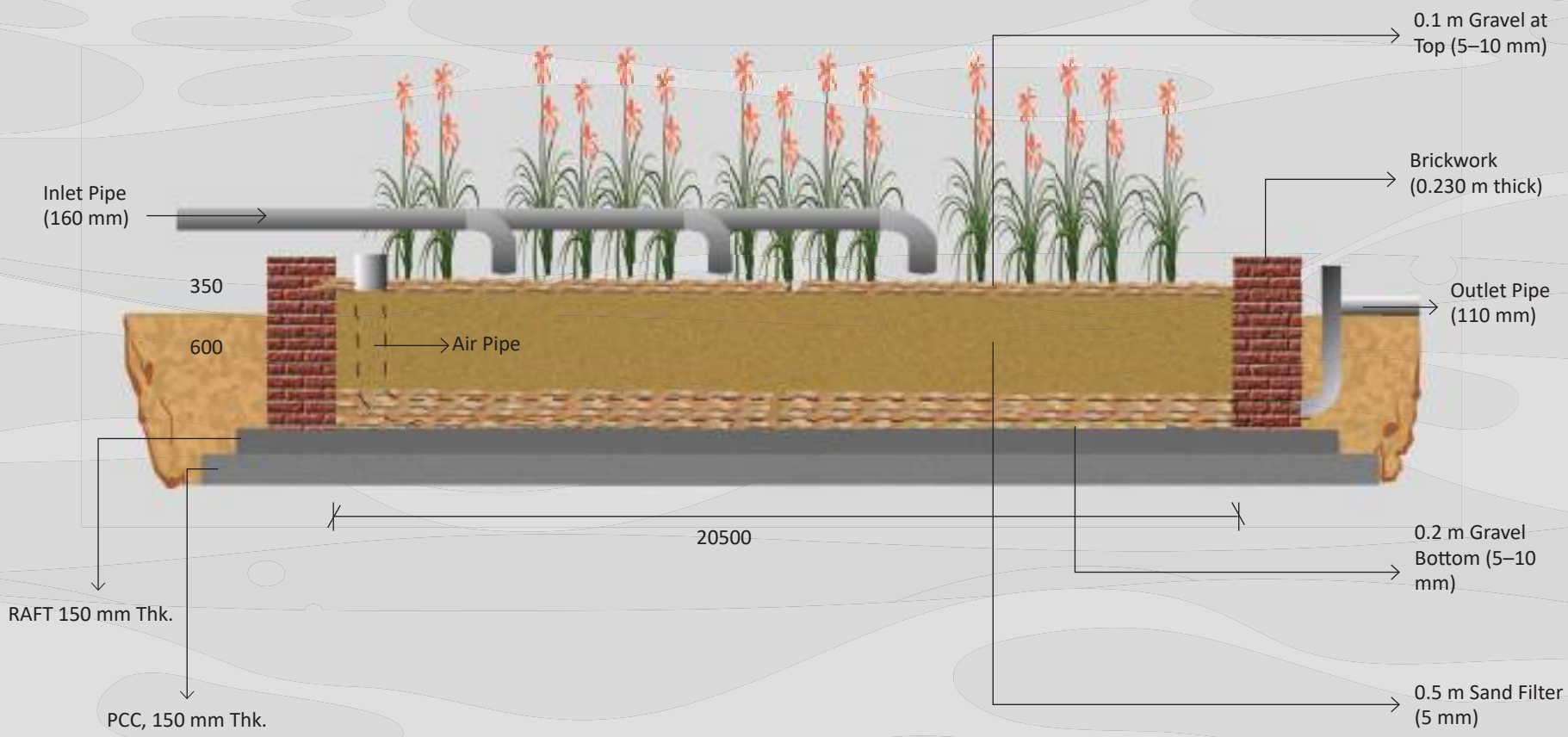
Suitable for:

- All terrains
- All climatic conditions

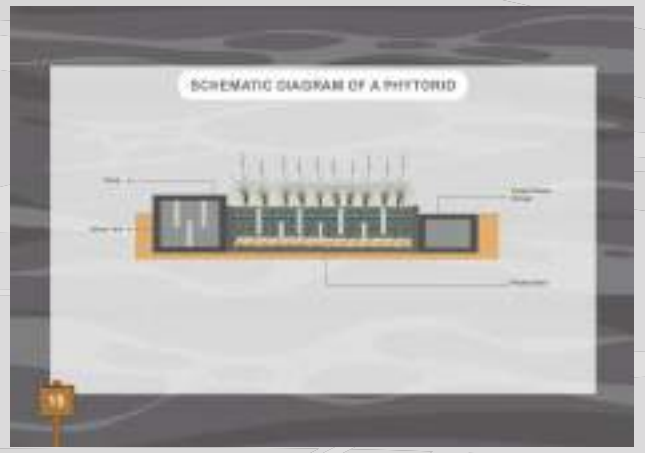
How much does it cost?

Approximately ₹ 36,38,113 for 211 kld

SCHEMATIC DIAGRAM OF A CW



PHYTORID TECHNOLOGY



What is a phytorid?

The phytorid system is based on natural treatment methods which have distinct advantages over conventional treatment plants.

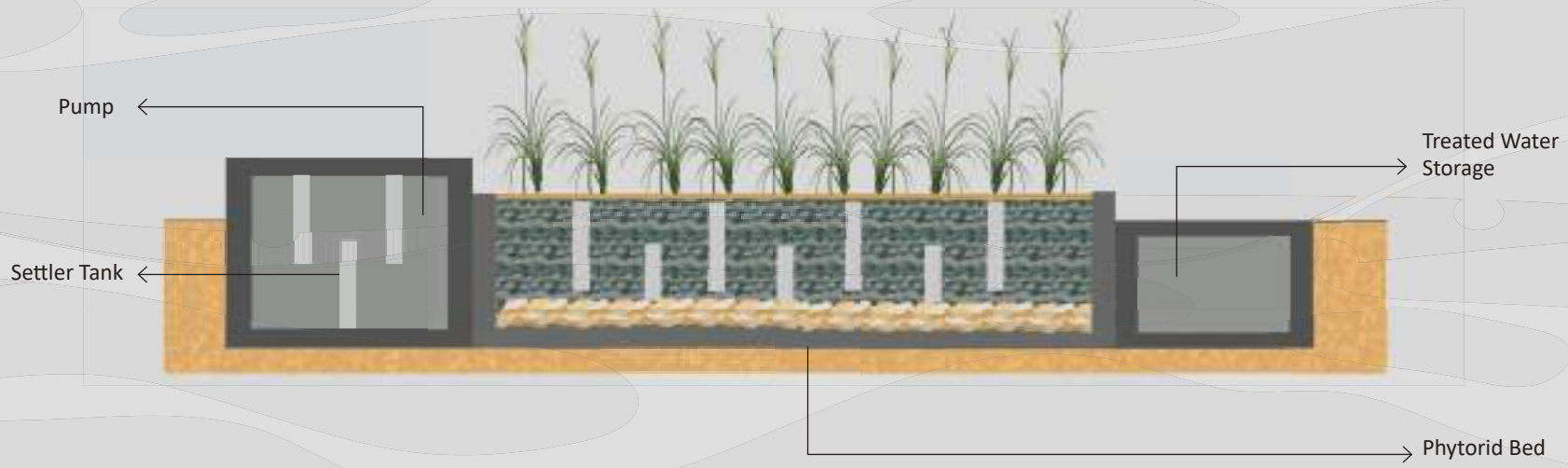
Suitable for:

Any terrain. The space requirement is 120 m^2 for 100 kld

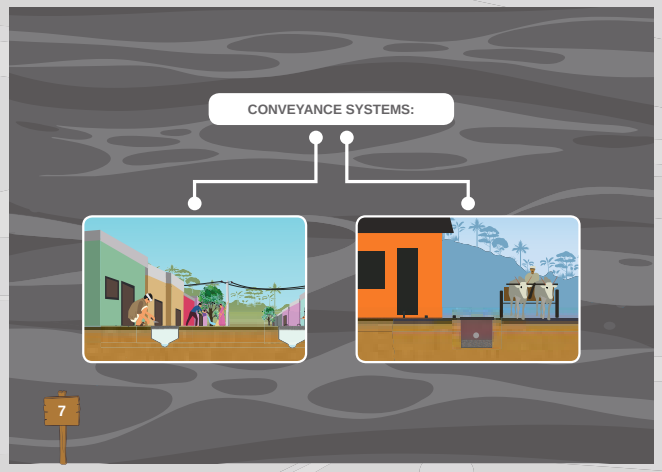
How much does it cost?

Approximately ₹ 51,961 for 211 kld

SCHEMATIC DIAGRAM OF A PHYTORID



GREYWATER CONVEYANCE SYSTEMS



CONVEYANCE SYSTEMS: CONSTRUCTION & MAINTENANCE

Conveyance system is the method of transporting greywater to the treatment technology.

Covered drains

Small bore system
are both useful for community-level GWM technologies.

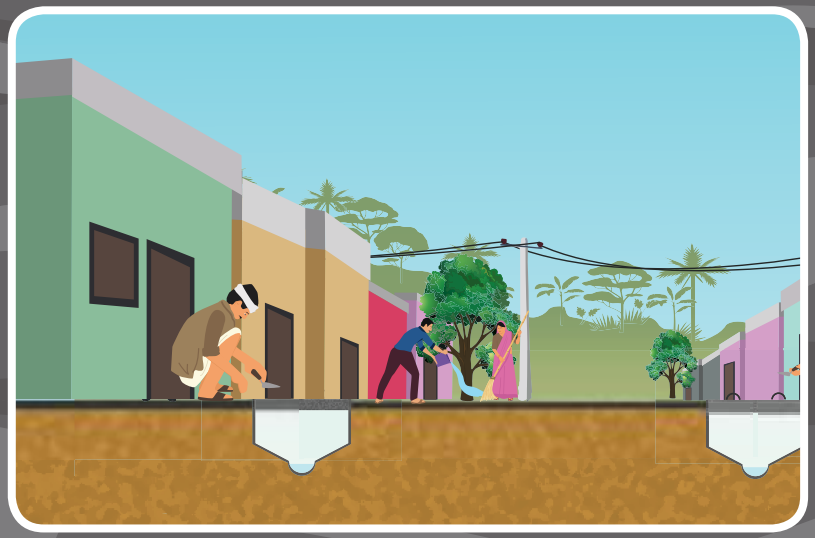
For community-level GWM technologies to function well, it is important for conveyance systems to be:

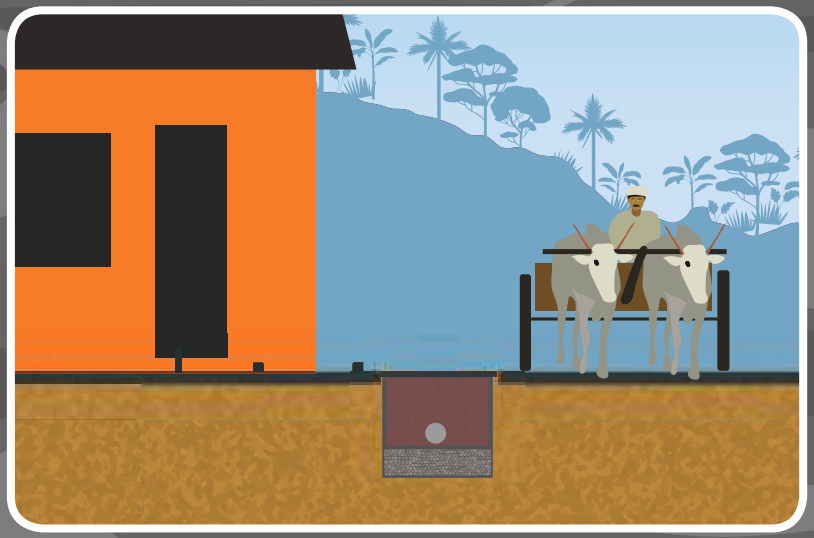
Covered properly to prevent random input of waste

Regularly cleaned to avoid clogging

Keeping the drains closed and regularly cleaning them is necessary, otherwise it causes clogging, which results in greywater overflow.

CONVEYANCE SYSTEMS:





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एक कदम स्वच्छता की ओर

सत्यमेव जयते

पेयजल एवं स्वच्छता विभाग
जल शक्ति मंत्रालय
भारत सरकार

DEPARTMENT OF DRINKING WATER AND SANITATION
MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA

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