



SANITATION
FOR MILLIONS



DEWATS Operation and Maintenance (O&M)

Implemented by:



Implemented by
giz
Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



General Rules and tool for Operation and Maintenance of DEWATS

1. General Site Safety

- Do always be careful and observant
 - Do ensure manholes are suitably covered or supervised when no operation and maintenance activity is being performed.
 - Don't leave open chambers unattended.
- Always close the manholes if not required.

2. Personal Safety Precautions

- Wash your hands or disinfect them after working on the DEWATS.
- Wear shoes, gloves, apron and mask while maintaining the DEWATS system.
- Do let the modules get proper aeration for at least 30 minutes before entering them if you have to.



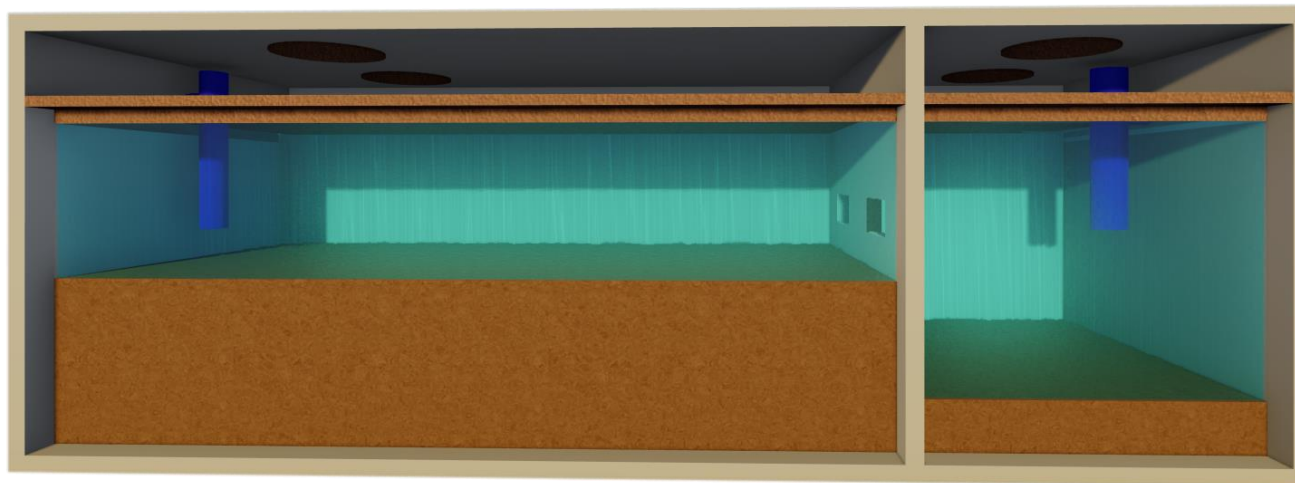
Operation and Maintenance Tools for DEWATS

Equipment	Picture	Equipment	Picture
Shovel		Hose pipe	
Perforated Shovel		Bucket	
Rake		Wheelbarrow	
Steel wire brush		Sludge level indicator	
Broom Stick		Agriculture sickle	
Crowbar		Transparent glass bottle	
Meter Tool		Wooden Stick	
Torch		First Aid Kit	
Ladder		L-Steel Sieve	

O&M activities for DEWATS plant

1. O&M Activities for Settler

As mentioned earlier the settler of the first compartment consists of two chambers. First chamber is designed to separate and to remove more large and floatable solids. The chamber fulfills his task and can be considered as an option to typical wastewater screens which require much more operation and maintenance.

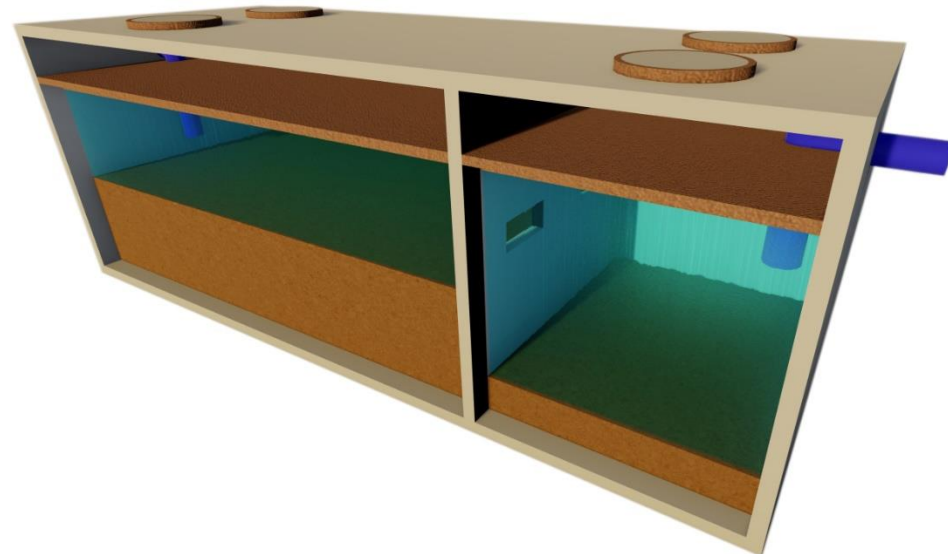


O&M activities for DEWATS plant

2. O&M Activities for Settler

Maintenance

1. Open once in a month the manhole of 1st chamber: remove foreign matters/ scum like plastic or debris and poke and stir the floating organic material into the water. Disposed the plastic waste and debris into a proper container



O&M activities for DEWATS plant

2. O&M Activities for Settler

Maintenance

2. Open once in two months the manholes of the second chamber: Check the scum and remove if required



O&M activities for DEWATS plant

2. O&M Activities for Settler

Maintenance

3. The process of removing scum from Settler is shown in this diagram



O&M activities for DEWATS plant

2. O&M Activities for Settler

Maintenance

4. Once in a year check the sludge level in Settler using a wooden stick



O&M activities for DEWATS plant

2. O&M Activities for Settler

Maintenance

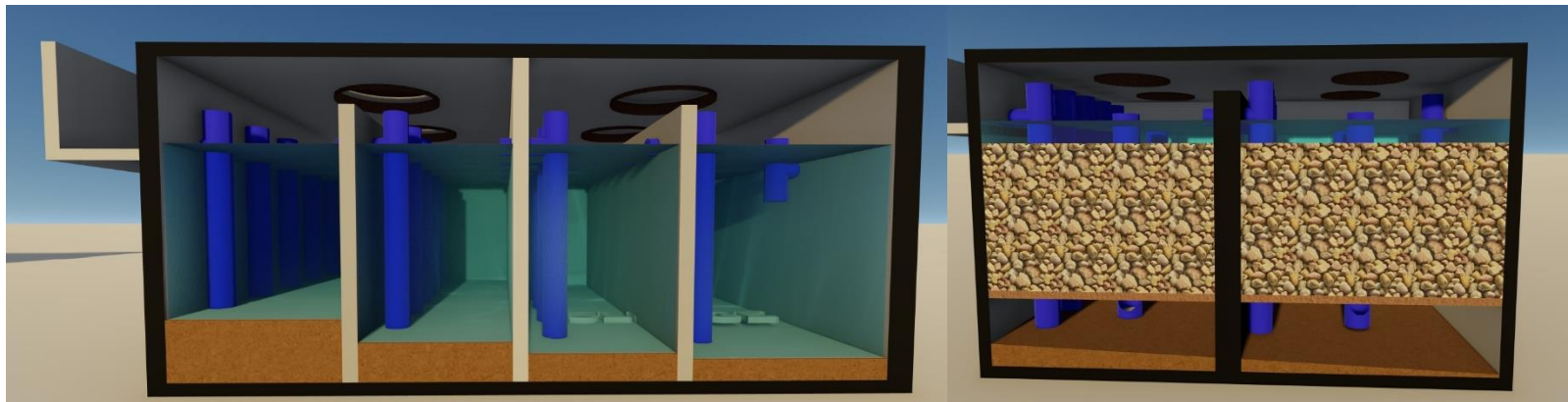
5. If the level of the sludge in the Settler has reach to its maximum, then it is required to fully dislodge the settler. The complete desludging of settler is required once in 2-3 year based on the project design



O&M activities for DEWATS plant

3. O&M Activities for Anaerobic baffled reactor(ABR) and anaerobic filter (AF)

Is biological treatment system where the solid-free wastewater is passing through active bio-sludge sedimented on the bottom or settled on filter material of the AF. ABR and AF requires very minimum maintenance work.



O&M activities for DEWATS plant

3. O&M Activities for Anaerobic baffled reactor(ABR) and anaerobic filter (AF) Maintenance

1. Once in 5-6 months, open the manholes of ABR, stir the scum in each baffle so the heavier particles can sink down, also remove the foreign materials like plastics and any other materials



O&M activities for DEWATS plant

3. O&M Activities for Anaerobic baffled reactor(ABR) and anaerobic filter (AF) Maintenance

2. Ensure that all lids are closed properly in order to avoid odor. Also, this prevents from mosquitos breeding in the system



O&M activities for DEWATS plant

3. O&M Activities for Anaerobic baffled reactor(ABR) and anaerobic filter (AF)

3. Check the sludge level of the last ABR chamber once in 3-4 years by sludge measuring device

Step 1: Open Manhole Cover

Step 2: Measure the sludge level by sludge measuring device

Step 3: Remove excess (more than 50 cm) sludge from the chambers using the desludging equipment. Leave around 15 cm of sludge in each chamber to ensure continuous treatment of wastewater. Chambers with less sludge inoculated with this sludge using sludge pump with hosepipe placed in the sludge collection tank.

Step 4: Place the manhole cover back over the manhole



O&M activities for DEWATS plant

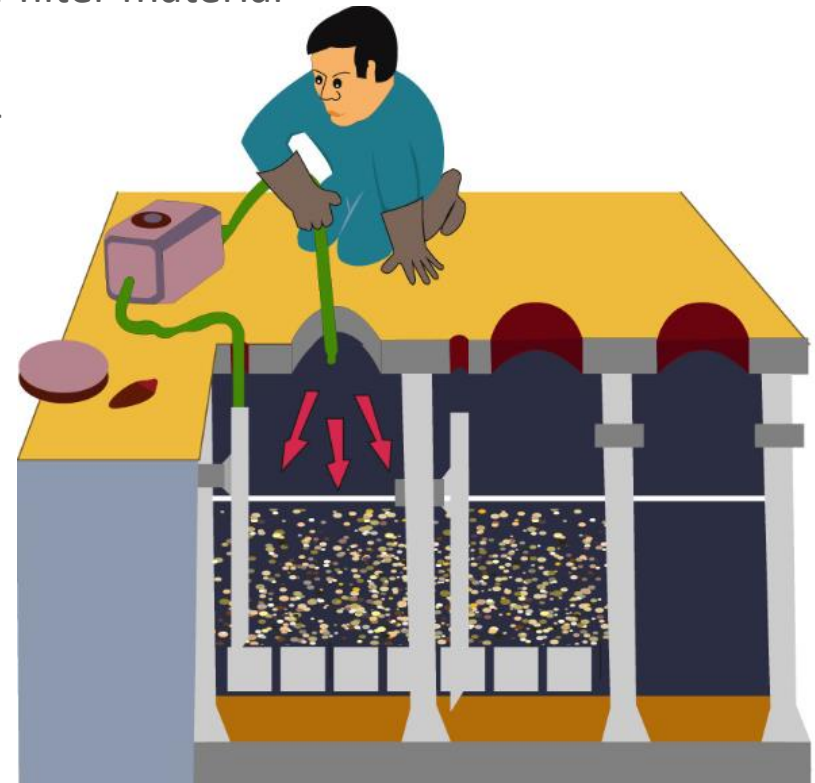
3. O&M Activities for Anaerobic baffled reactor(ABR) and anaerobic filter (AF)

Maintenance

1. Cleaning/washing of the filter material in Anaerobic Filter system will be required once in 5-6 years, There are two options for cleaning of filter material

Option 1:

- i. Pump out all the wastewater from the filter chamber and then fill the chamber with fresh water.
- ii. Then place the hose of the pump in the down-flow or desludging pipe. Hold the other end back in the chamber and start the pump for 10 minutes. This will let the water circulate through the filter material and will wash and clean the filter material.
- iii. Repeat the step 2.
- iv. Do the same with the other chambers of AF



O&M activities for DEWATS plant

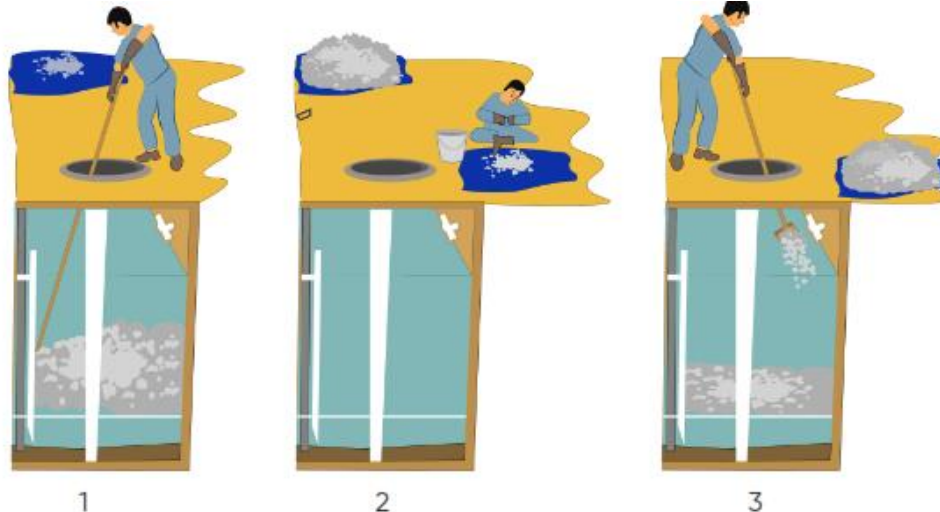
3. O&M Activities for Anaerobic baffled reactor(ABR) and anaerobic filter (AF)

Maintenance

1. Cleaning/washing of the filter material in Anaerobic Filter system will be required once in 5-6 years, There are two options for cleaning of filter material

Option 2:

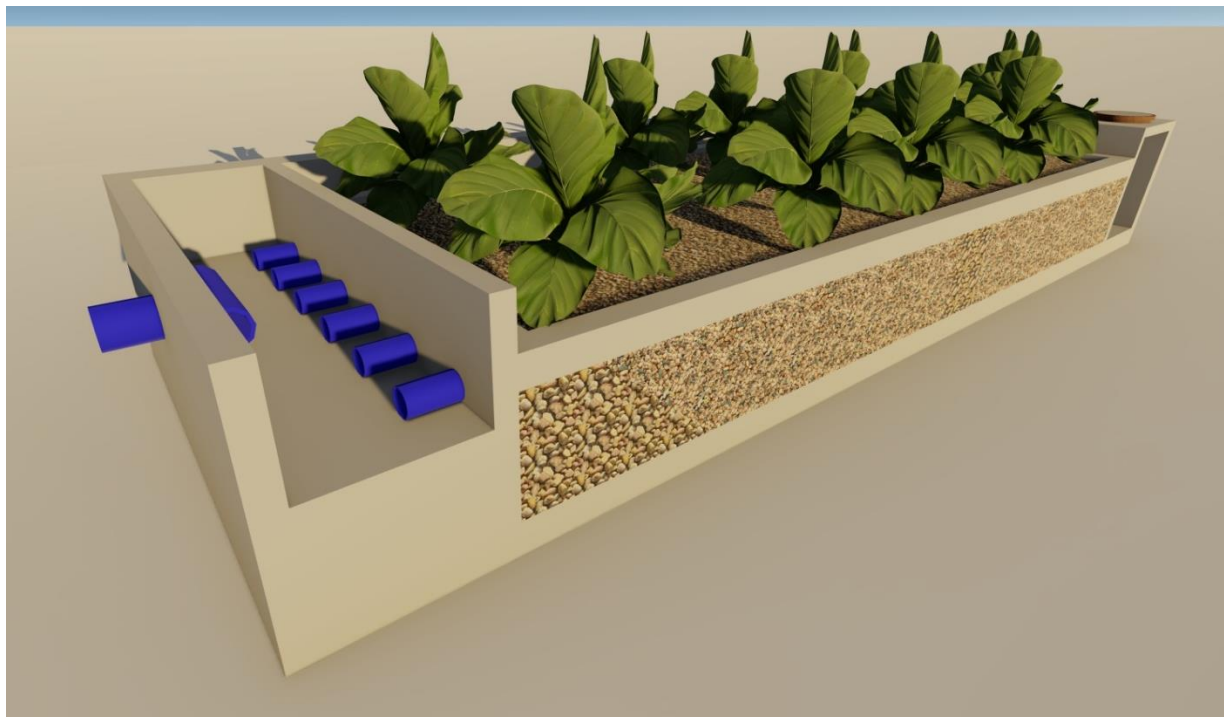
- i. Open the manhole covers of AF chambers
- ii. Dislodge all wastewater from the chambers
- iii. Remove all the filter material from the chambers
- iv. Wash the filter materials
- v. Put back the filter materials in the chamber
- vi. Place back the manhole covers properly



O&M activities for DEWATS plant

4. O&M Activities for Planted Gravel Filter (PGF)

Planted gravel filter (PGF) is made of planted filter bodies consisting of graded gravel. The bottom slope is 1% and the flow direction is mainly horizontal. The main plants used in this filter bed are *Canas indica*, Reed juncus, Papyrus, Phragmites and *Arunda donax*.



O&M activities for DEWATS plant

4. O&M Activities for Planted Gravel Filter (PGF)

Maintenance

1. Cutting of PGF plants and collecting of Dead Leaves on surface of PGF once in 30 days to avoid clogging of the system and maintain the cleanliness.

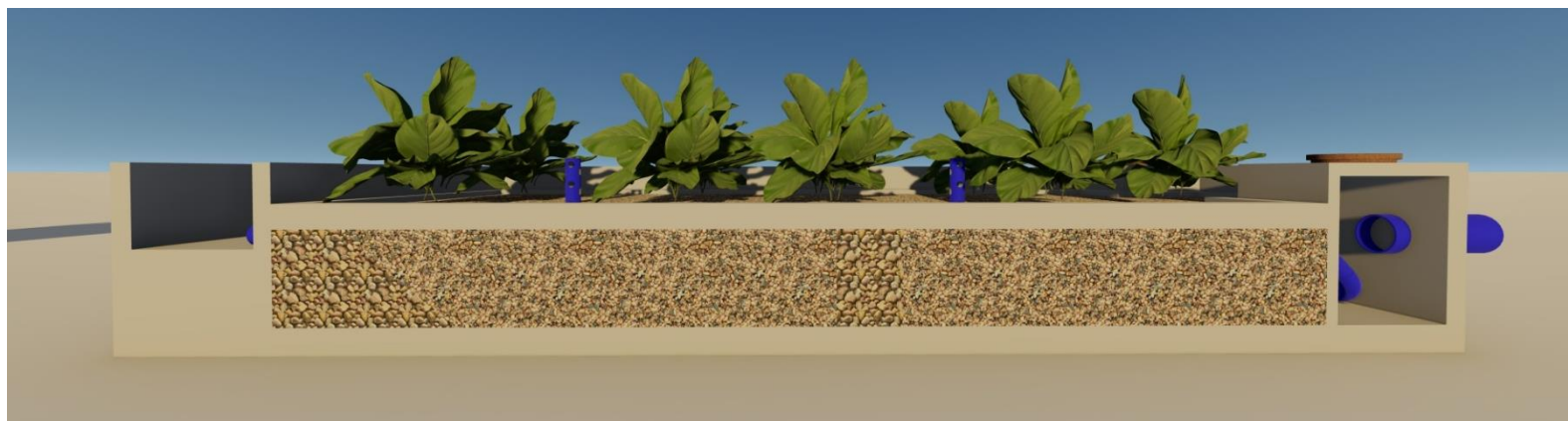


O&M activities for DEWATS plant

4. O&M Activities for Planted Gravel Filter (PGF)

2. Cleaning washing of PGF Filter Materials will be required once in 6-10 year or when the filter material clogged, to retaliate the design treatment efficiency in the effluent quality and to avoid clogging of wastewater through the treatment system. The process of cleaning and washing the filter materials of PGF is as follows;

- i. Disconnect the wastewater flow to PGF
- ii. Remove the plants properly from the PGF
- iii. Remove all the filter material from PGF
- iv. Wash the filter materials
- v. Place back the filter materials in the PGF basin
- vi. Place back to plants
- vii. Connect the wastewater flow.



O&M activities for DEWATS plant

5. O&M activities for Collection Tank and Pump check

Some of the systems are having Collection Tank at the end of DEWATS to collect treated wastewater for irrigation or discharging to Drainage.

All pumps get damaged if they run dry or not maintained properly!

Non automatic pumps must be attended manually: switch off the pumps if water level is reduced by 20 cm in the collection tank.

Maintenance

1. Check the submersible pump on weekly basis and see if they are properly working
2. Check power cord and make sure the cord is connected to power

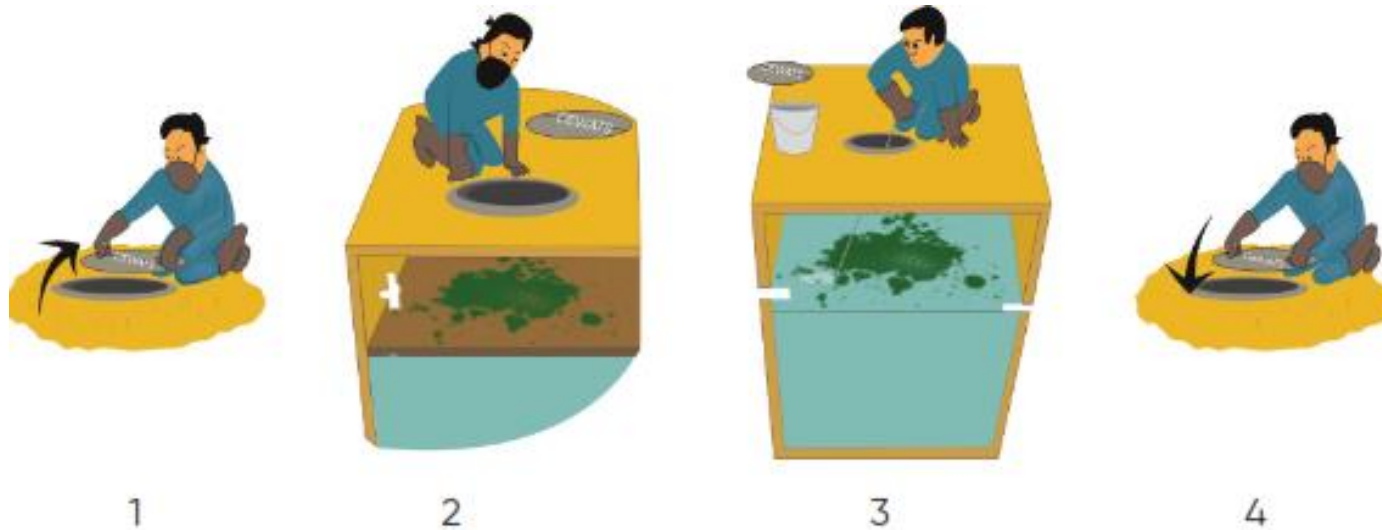


O&M activities for DEWATS plant

5. O&M activities for Collection Tank and Pump check

Maintenance

3. Removal of Algae and other floating material from Collection tank.



O&M activities for DEWATS plant

6. General Operation and Maintenance Performance In DEWATS

- i. Check that Manhole covers are suitably covered



- ii. Ensure free wastewater flow

The free wastewater flow needs to be checked at least every month! To avoid and identify possible obstructions in pipes and channels, a free flow of wastewater is required for the system to fully function. Damages or leakages can be identified.

O&M activities for DEWATS plant

6. General Operation and Maintenance Performance In DEWATS

Maintenance

a) Open manhole cover of inspection chamber and Inlet and Outlet of all DEWATS modules. Check for obstructions like solid material and deposition at all the points. Check if the wastewater has its usual flow. If required remove obstruction with an appropriate tool (e.g. shovel, stick). Once in 30 days



O&M activities for DEWATS plant

6. General Operation and Maintenance Performance In DEWATS

Maintenance

b) Also, you can check the flow of wastewater in sewer lines by using of color, open all inspection chamber, mix the color powder with water and flush the water in to the closet and then check the flow in each inspection chamber until DEWATS if you see the color than there is flow if you don't see than there is blockage



O&M activities for DEWATS plant

6. General Operation and Maintenance Performance In DEWATS

iii. Repair of leaking pipes

Step 1: Check for leakage of water from pipes. (Dripping dark depositions below pipes, wet spots on the nearby surroundings).

Step 2: If any leakages are found, contact a plumber to fix the leaked pipe.

These steps should be done once in a month to be ensure that pipe are not leaked or Block.



O&M activities for DEWATS plant

6. General Operation and Maintenance Performance In DEWATS

iv. Ensuring the functionality of vent pipe

Step 1: Look for damages on the outside of the vent pipe.

Step 2: Check for blockages in the vent pipe by either looking through it, tapping it with a stick and judging if it is free from the emanating sound or through other suitable Methods.

Step 3: Remove any blockages found using an L-brush. If you notice any damage, please contact your service provider for replacement.

These steps must do once in a month to avoid bad odour around the system

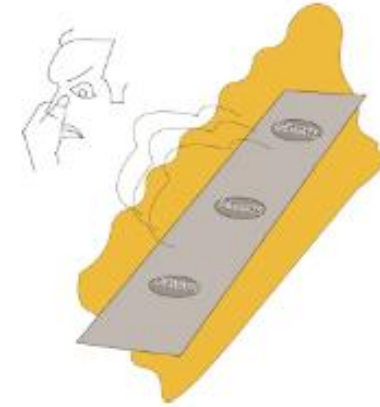


O&M activities for DEWATS plant

7. Common problems and their reason in DEWATS Systems

1. Foul Smell

- a. Manhole is left open
- b. Desludging needs to be done
- c. Broken Sewer pipes/vent pipes/blocked pipes
- d. Stagnant water (PGF/Percolation Pond)



2. Water stagnant in the PGF

- a. Clogging of Filter Materials/Outlet Pipe
- b. Position of Swivel Pip



O&M activities for DEWATS plant

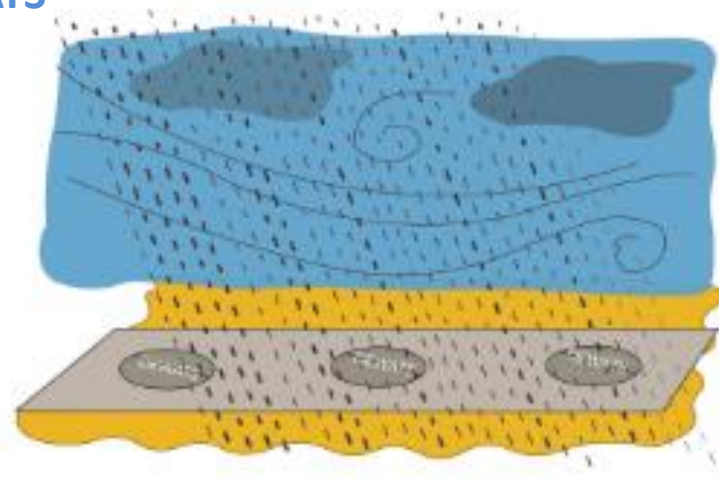
7. Common problems and their reason in DEWATS Systems

3. Poor Quality of Treated Wastewater

- a. Intrusion of Solid Waste
- b. Clogging of filter materials in PGF
- c. Desludging needs to be done.

4. No discharge of wastewater from DEWATS

- a. Clogging of Pipes/Filter Materials
- b. Leakage in pipes

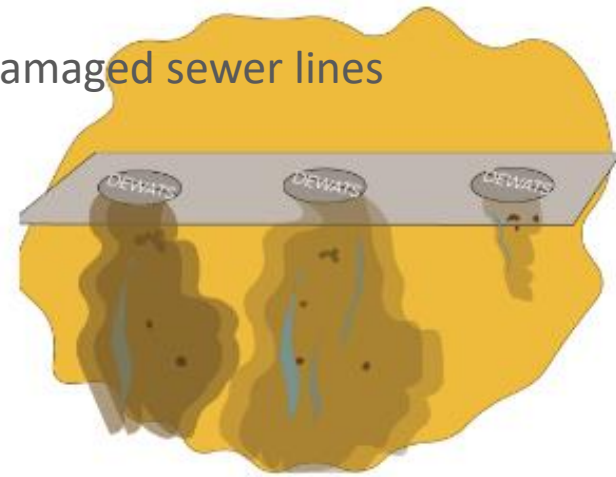


O&M activities for DEWATS plant

7. Common problems and their reason in DEWATS Systems

5. Sludge washout into latter ABR chambers

- a. Desludging needs to be done
- b. Rainwater intrusion into the DEWATS due to damaged sewer lines
- c. Chamber filled with sludge.



6. Back flow of wastewater

- a. Clogging

7. Mosquitoes

- b. Manholes are open

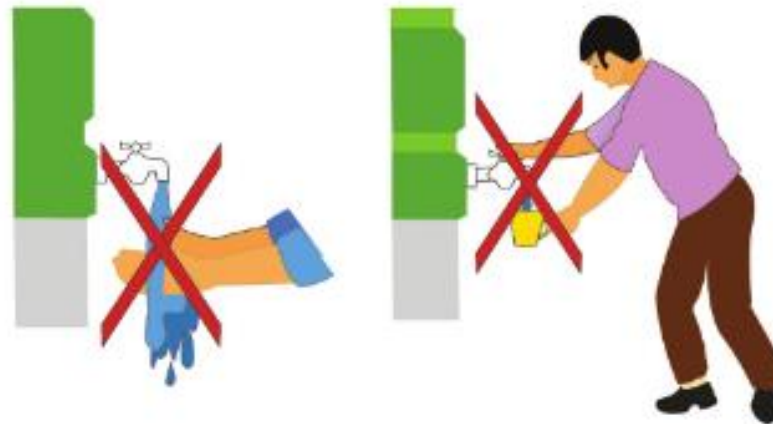


O&M activities for DEWATS plant

8. Rules for reuse of treated wastewater (recycling water) in food gardens

Use recycled water to save water and to fertilize your crops. Follow the rule below because recycled water is not as clean as tap water. If you use recycled water, as suggested, your profit will be great

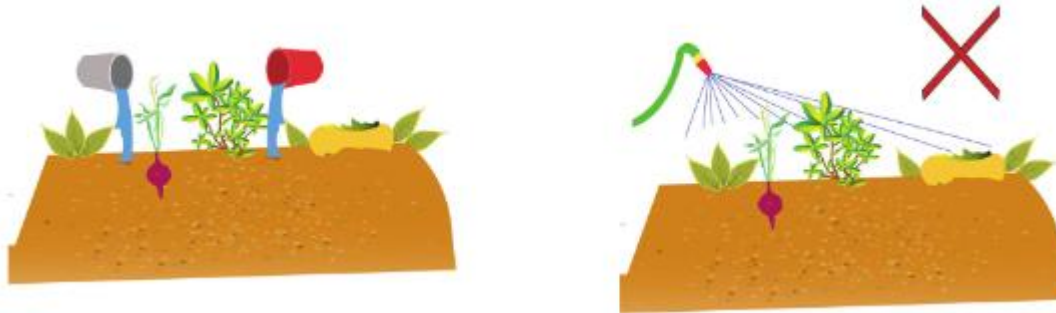
1. Do not drink and not wash your hands with recycling water



O&M activities for DEWATS plant

8. Rules for reuse of treated wastewater (recycling water) in food gardens

2. Do not pour recycling water over any vegetables, Water always the roots only



3. Wash your hands after irrigating with recycled water



O&M activities for DEWATS plant

8. Rules for reuse of treated wastewater (recycling water) in food gardens

4. Do not tip any oil or chemicals into the toilet or the basin! Everything you tip in the toilet or basin influence the recycled water and the growing of the vegetables.



O&M activities for DEWATS plant

8. Rules for reuse of treated wastewater (recycling water) in food gardens

5. Your system works purely biologically, so NO chemicals, NO plastics or metal, NO sanitary pads, tampon or nappies should be disposed into toilets or any basin. NO colouring toilet liquid put into the toilet cistern. Those stuff might clog or kill the biological process and might harm your crops through watering with the final effluent.



Recycled water is still wastewater and it might still contain germs. If you follow the rules your crops will gain, and you stay healthy.

THANK YOU!