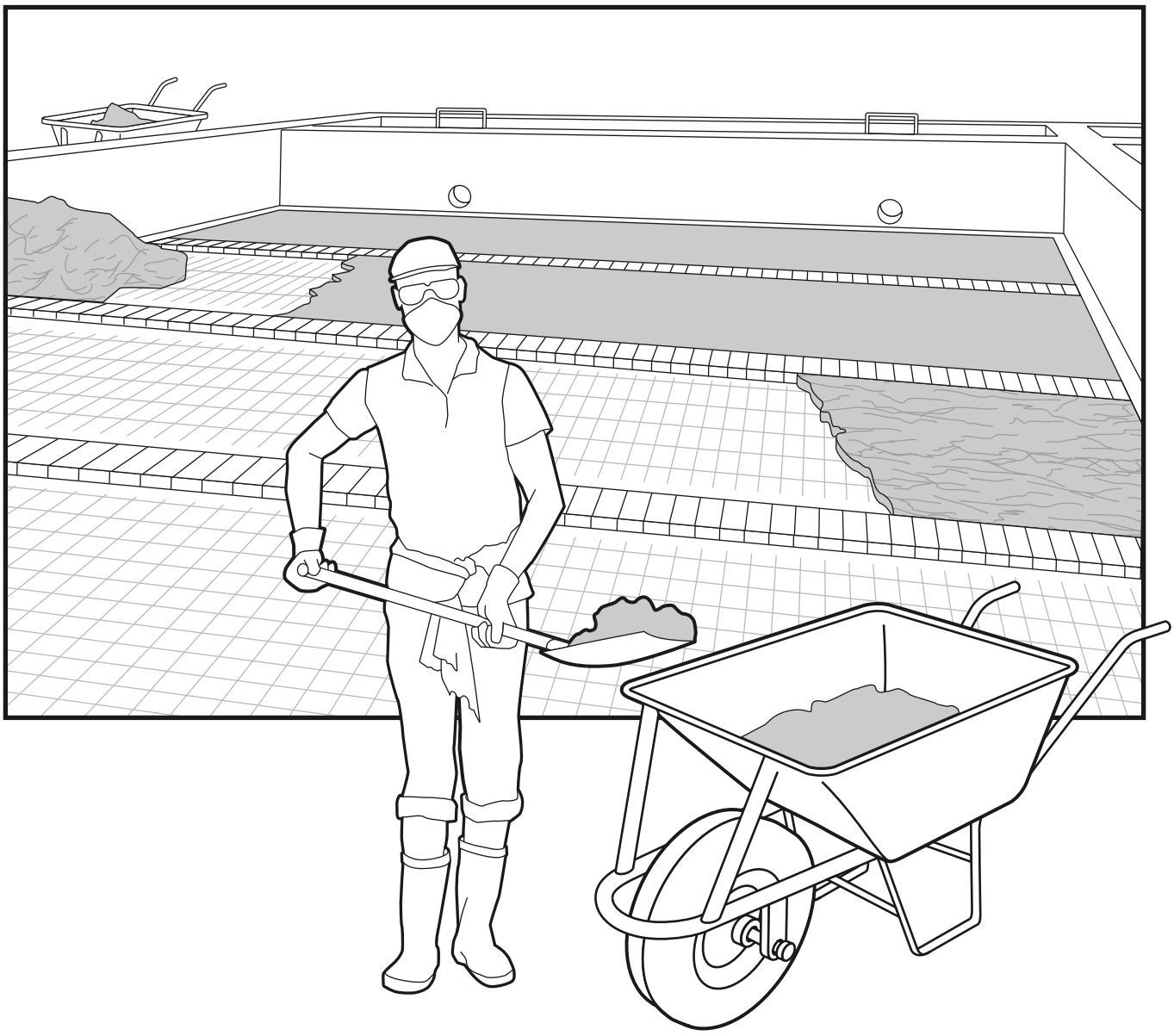
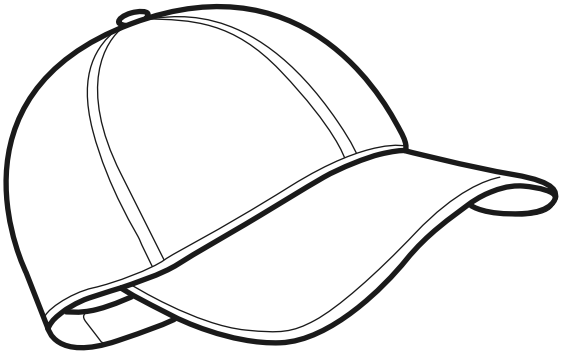
USER MANUAL FOR SLUDGE DRYING BEDS



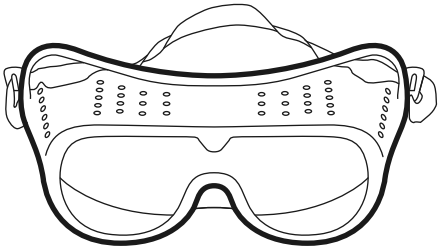
KUSHTIA, BANGLADESH

CLIENT	: SNV NETHERLANDS DEVELOPMENT ORGANISATION
BENEFICIARY	: KUSHTIA MUNICIPALITY, BANGLADESH
IMPLEMENTED BY	: UNIVERSITY OF SCIENCE AND TECHNOLOGY BEIJING, CHINA
FOUNDED BY	: BILL AND MELINDA GATES FOUNDATION

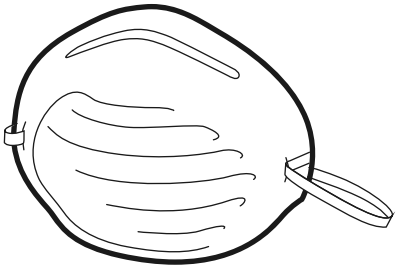
PERSONAL PROTECTIVE EQUIPMENT (PPE)



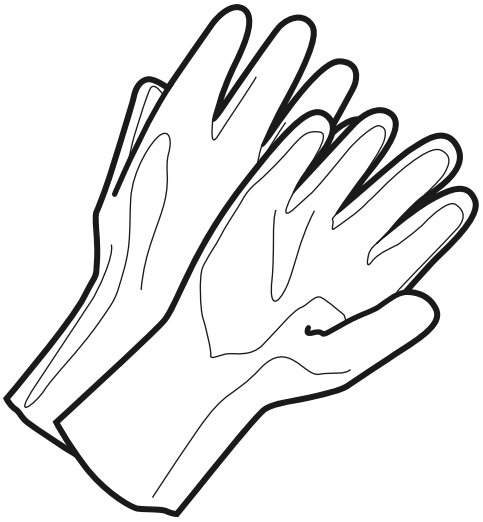
CAP



EYE PROTECTION



MASK

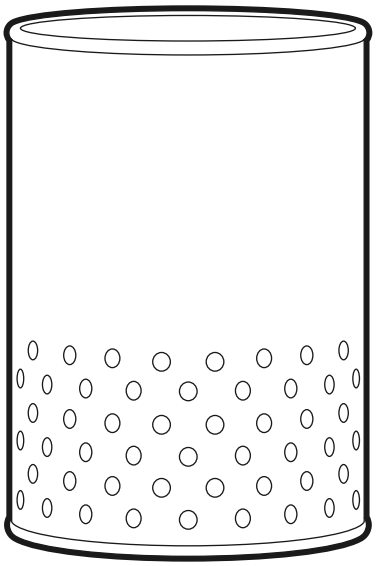


PROTECTIVE GLOVES

RUBBER BOOTS

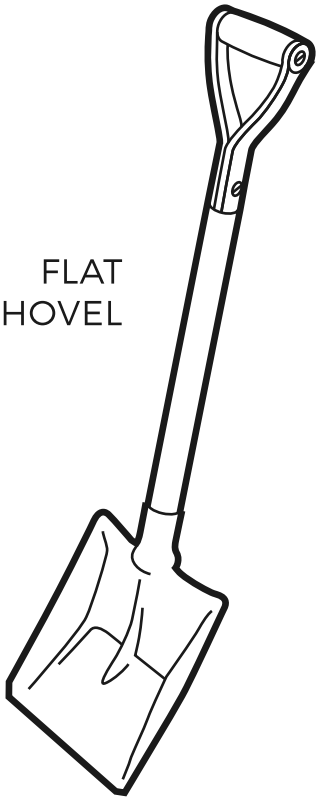
TOOLS

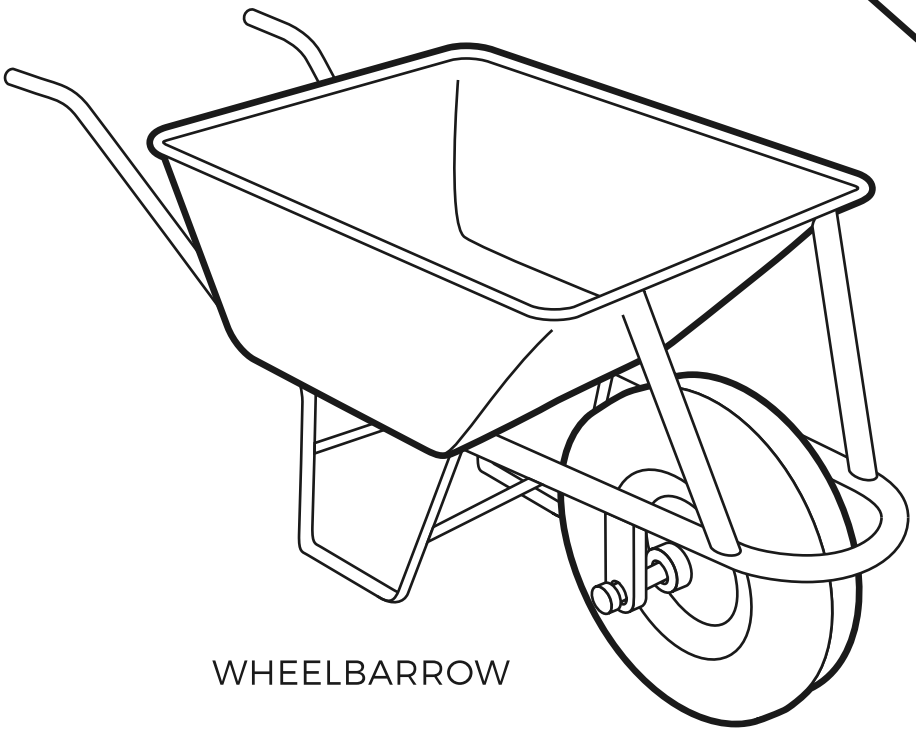
RAKE
attached to a 3,5m
bamboo stick



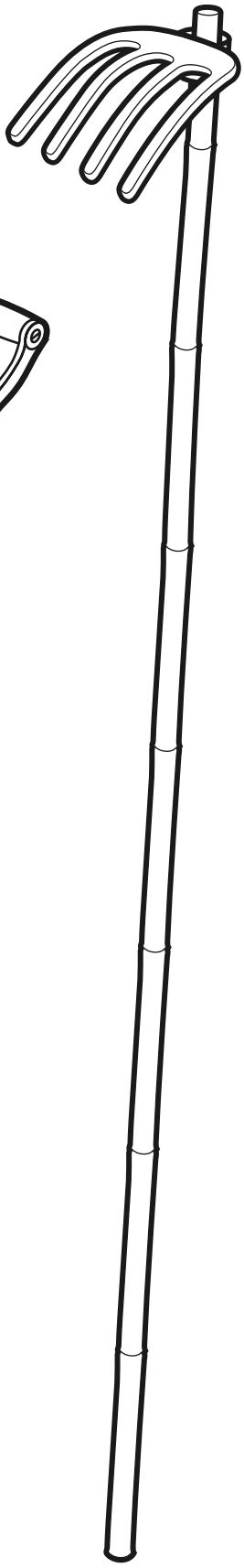
PERFORATED DRUM
(holes of 20mm)

FLAT
SHOVEL





WHEELBARROW



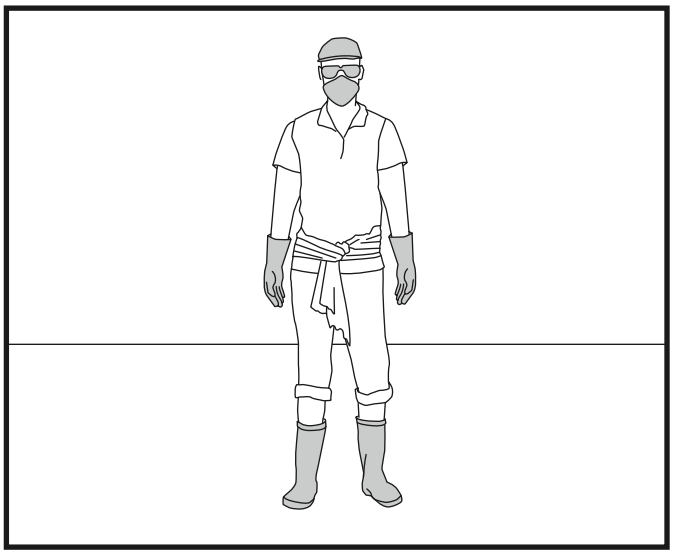
The sludge drying beds
on the Kushtia co-composting
test site are meant to dry
incoming faecal sludge
to be used for composting
with other organic matter.

They are not designed
to sterilize the fecal matter
as that is the purpose
of the co-composting.
Drying alone cannot
eliminate all pathogenes.

The newly established layer
of bricks between sand and
slurry make the removal
of the slurry very easy
and convenient.

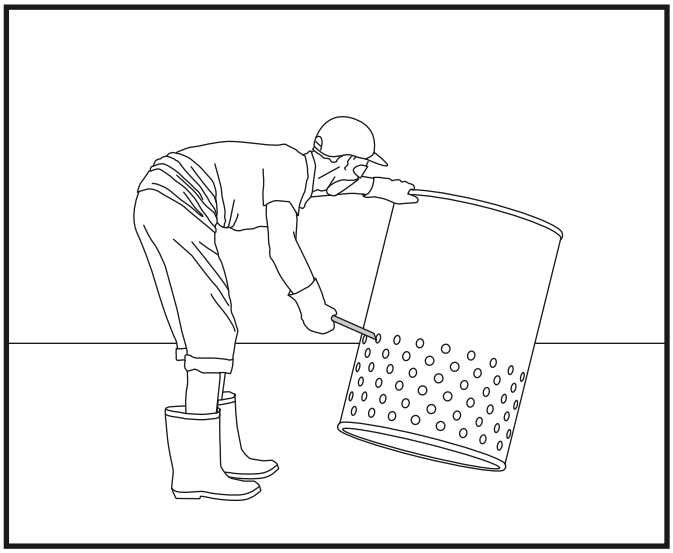
To achieve the best results, the
procedure explained here is done.

1. PERFORATED DRUM



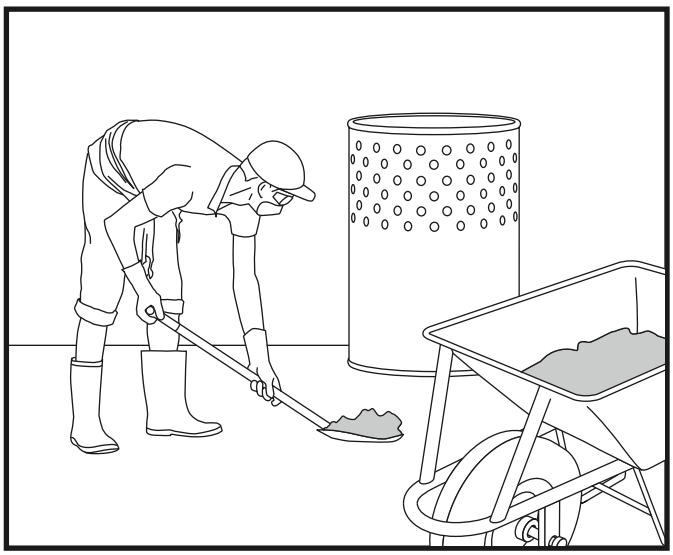
The emptying of the Vacutug is the moment when people come in closest contact with the fecal sludge.

They have to wear Personal Protective Equipment (PPE).



The incoming Vacutug is discharging its content via the perforated drum into the receiving tank. Most impurities are retained in the drum.

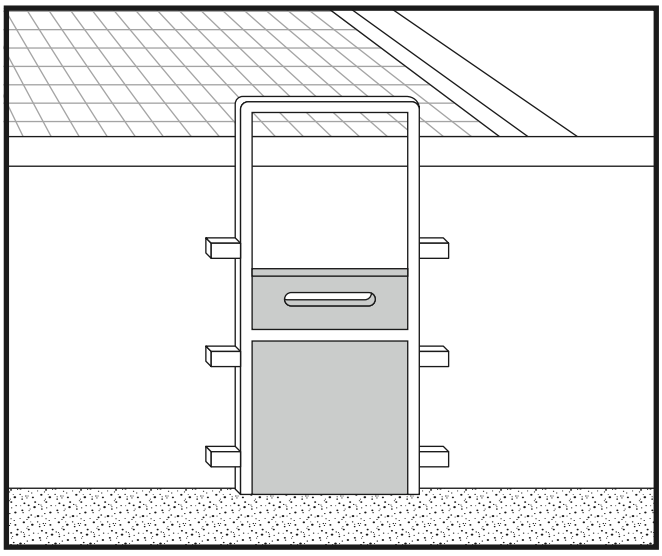
When the holes clog, it is best to push the clogging material back in the drum with a stick, where it will sink to the ground, now the hole is free again.



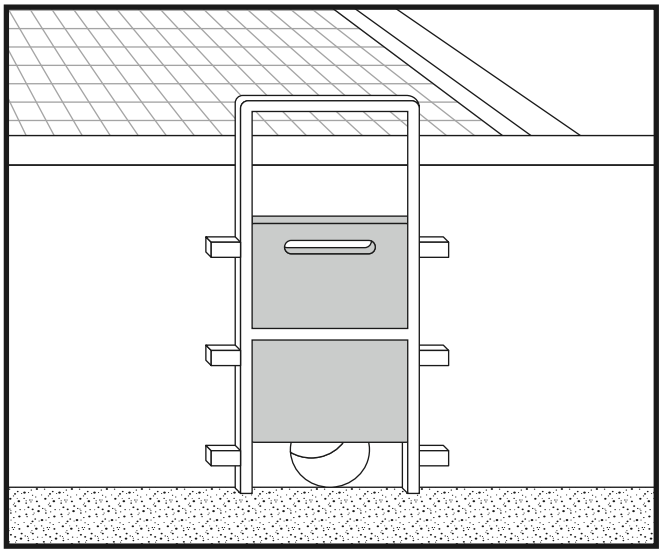
Depending on the amount of contaminants captured, the drum is tilted out and the material is piled and finally taken to the landfill site.

The faecal sludge proceeds through the holes to the holding tank.

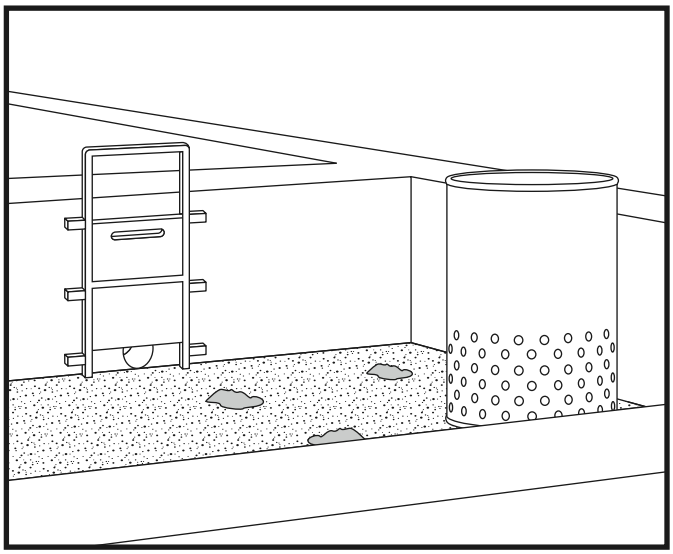
2. HOLDING TANK



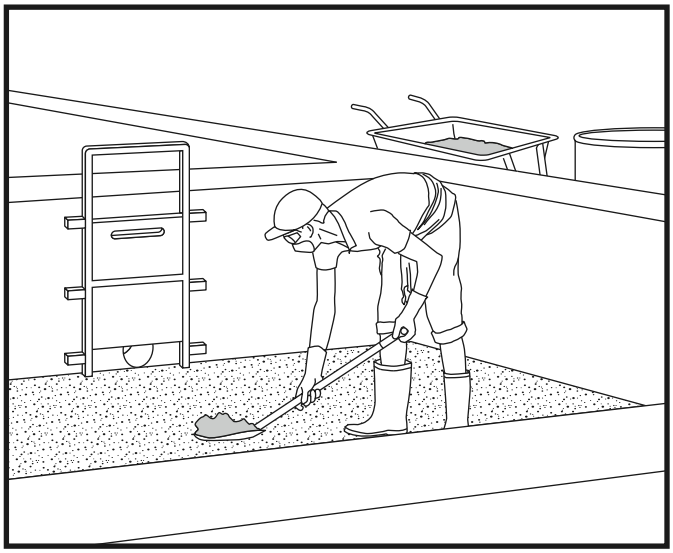
During discharge the sluice gates of the holding tank are closed. The material can settle sand and sludge.



The sluice gates are gradually opened half, to allow the sludge to slowly flow in the drying bed.

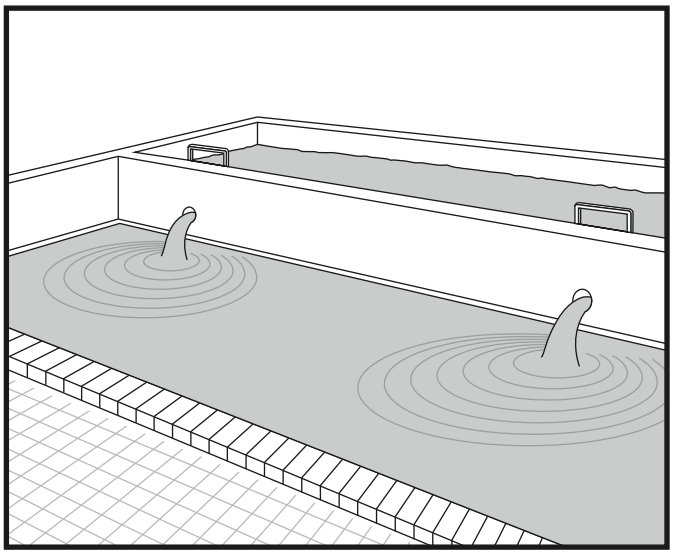


The solids in the holding tank remain there. They will dry up easily, as they are dewatered.



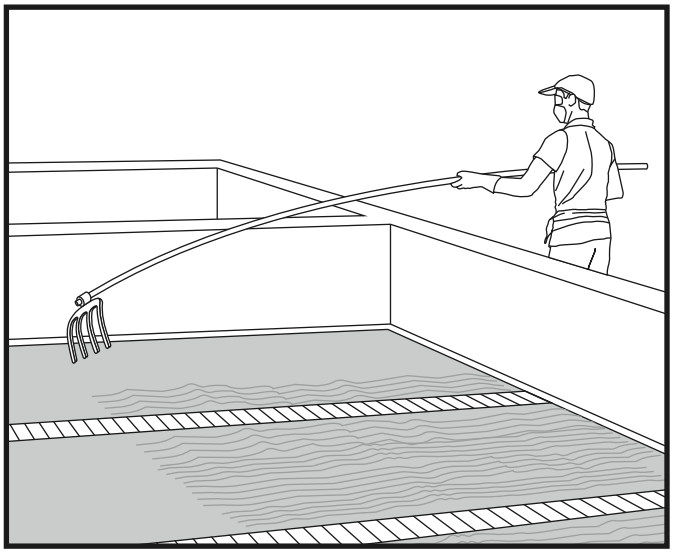
Latest, after a weekend these solids can be removed to the co-compost side. The sandy sections are unwanted material at the co-compost side and are piled and transported to the landfill.

3. DRYING BEDS

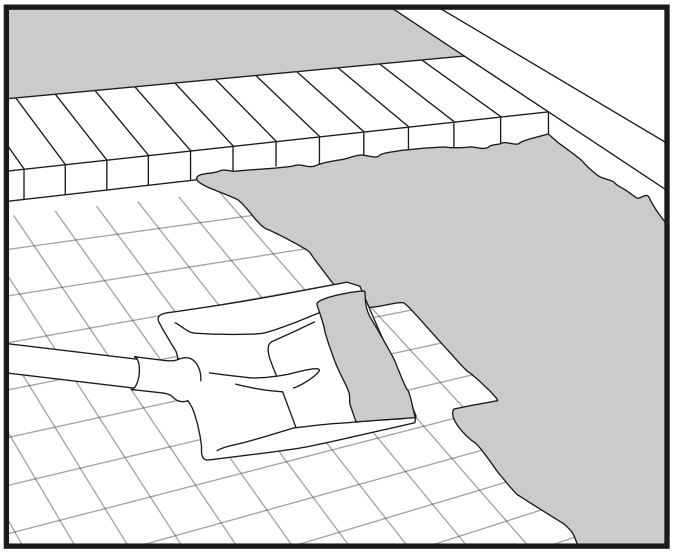


In the meantime, the next truck is coming and fills up the receiving tank once more.

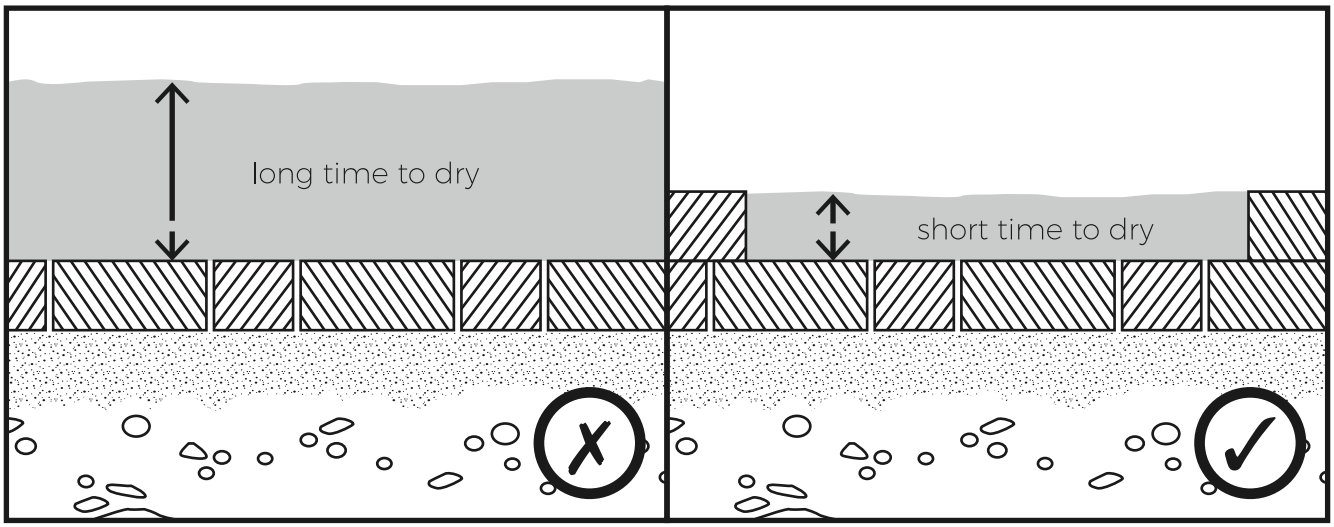
Again, the sluices are closed first and then gradually opened.



From the outside, scratch the surface using the long rake for better and faster drying.

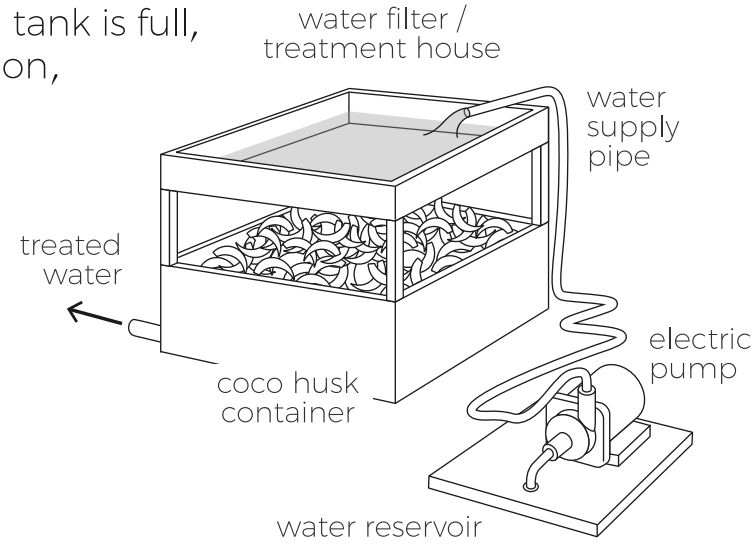


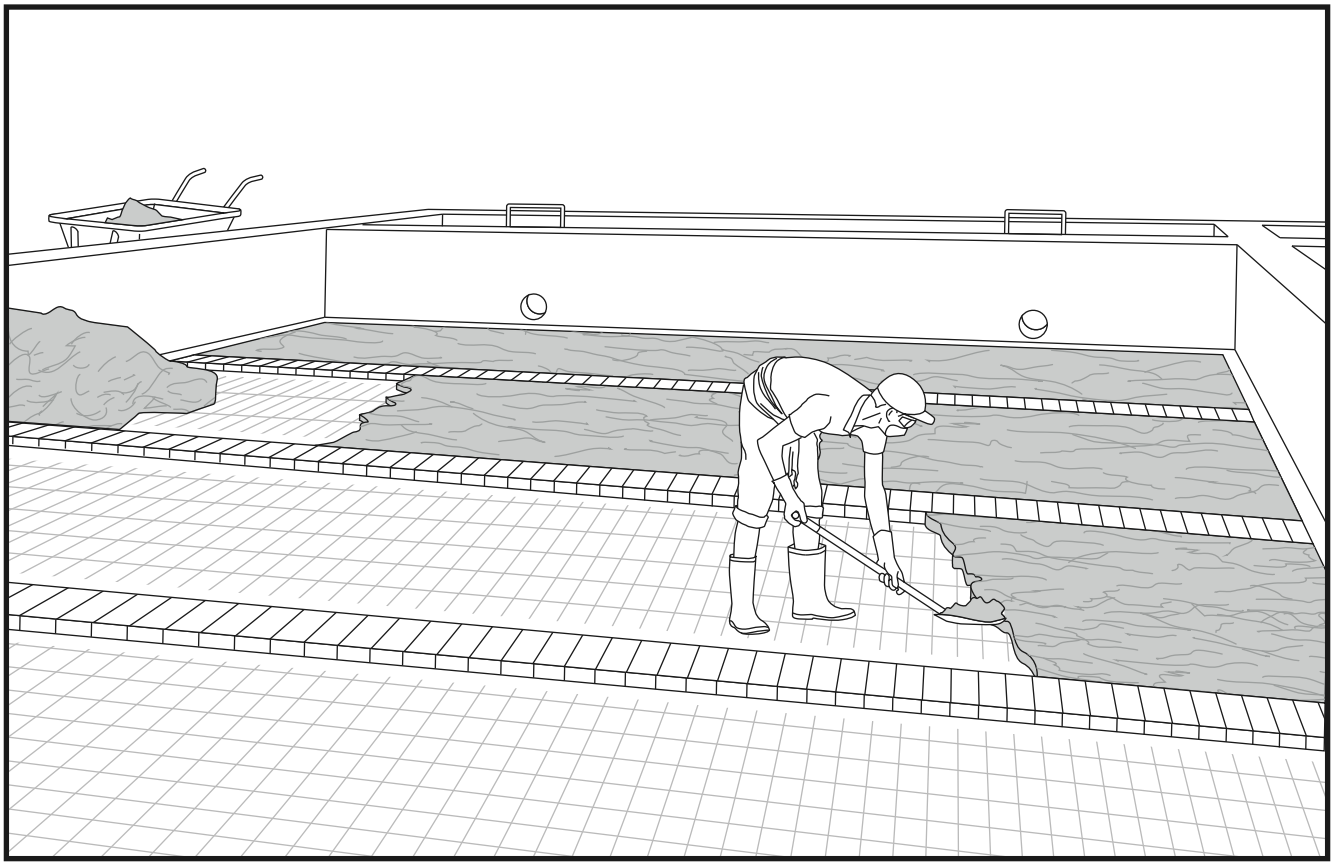
The thin crust in drying bed 4 should be removed so that the infiltration performance remains as good as possible.



- With a thick sludge layer, most dewatering takes place through evaporation and that is a very slow process.
- The infiltration process stops after three days due to clogging.
- With a thin sludge layer, a great share of the water infiltrates. Together with the evaporation the drying is much faster.
- Like this the drying bed can receive the next sludge load very fast.
- Over time this mode of operation can produce much more sludge than a drying bed which is highly loaded.

As soon as the water receiving tank is full, the pump must be switched on, to send the water through the coco husk filter.





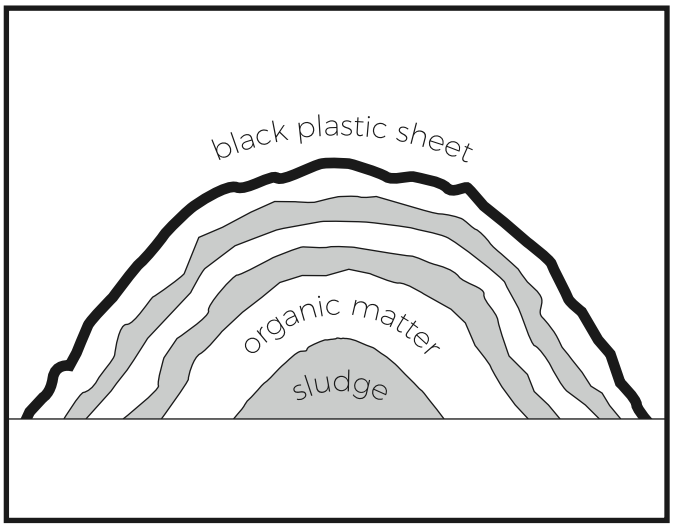
The drying bed is filled up to the level of the bricks (7 cm) only. The dried sludge should not rise higher than the bricks.

The drying beds are partitioned in 4 sections.
The last section will receive only very watery material and will therefore infiltrate most of the total water coming with the sludge.

Also rainwater will find its way in that section and trickle much easier away than through beds which have a thicker sludge layer. The dry matter reaching there will form a thin crust fast. This section is removed immediately.

Also from the other drying bed section the same applies: **whatever is dry or can be shovelled, should be removed and taken to the compost heaps**.

4. COMPOSTING PILE



Pile the co-compost with:
— 40% sludge
— 60% organic matter
— A small dosage of Trichoderma microorganisms after each layer, will help to sanitize the compost by killing pathogens.

The semi wet filter bed content is put on the compost heap in one work session. Any further storage and movement will lead to losses of nutrients.