

# **Green Innoventions in Home Septic Tank**

**by**

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# Definitions

**Wastewater** is any water that has been adversely affected in quality by anthropogenic influence and comprises liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations

**Sewage** is a type of wastewater that comprises domestic wastewater and is therefore contaminated with feces or urine from people's toilets, but the term sewage is also used to mean any type of wastewater.

**Sewerage** is the physical infrastructure, including pipes, pumps, screens, channels etc. used to convey sewage from its origin to the point of eventual treatment or disposal.



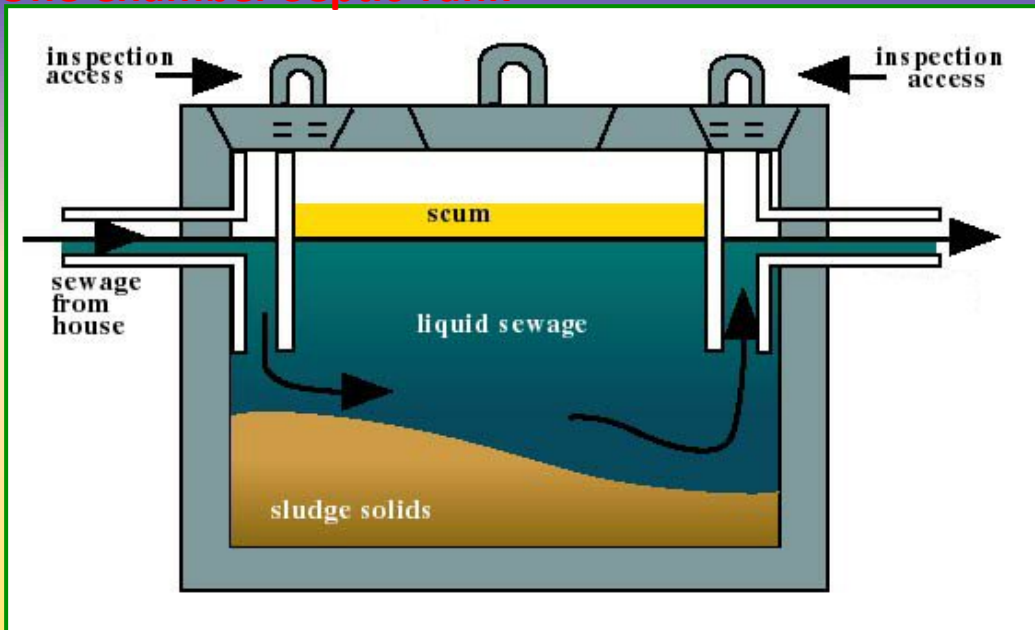
# Problems with Waste water, Water Quality and Sanitation

- Contains pathogenic bacteria
- Untreated wastewater contaminates the environment and affects water quality
- Septic tanks are sources of domestic waste water
- Most LGUs have no wastewater treatment system
- Many informal settlements don't have sanitation facilities
- Wastewater goes directly to outfalls that goes untreated into the surface waters



## Current Practice: One Chamber or Double Chamber Septic Tank

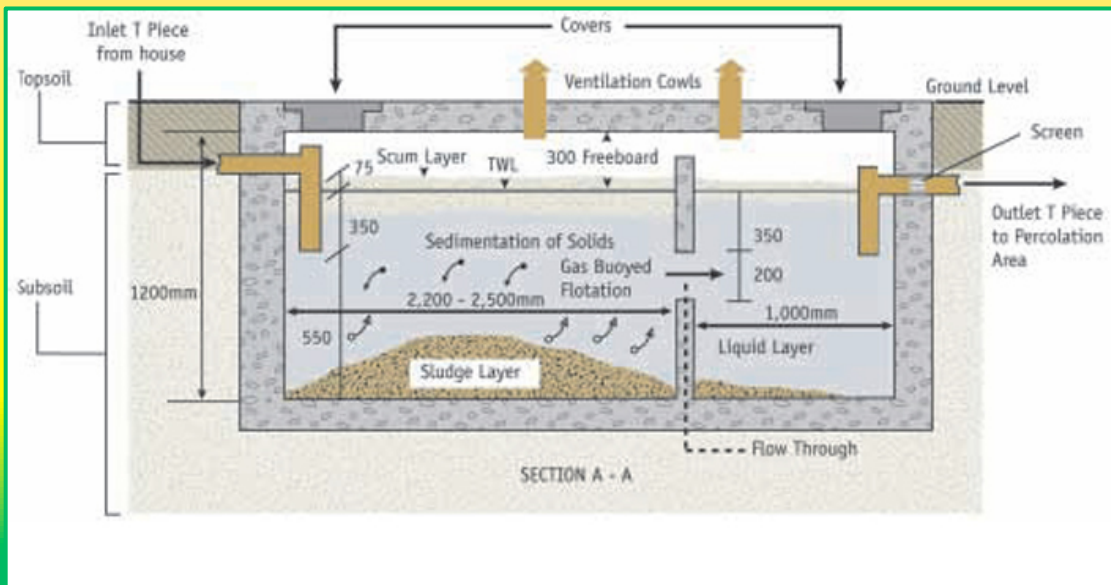
### One Chamber Septic Tank



#### Description:

- One-Chamber capacity
- Interruption of usage during desludging
- Limited aerobic/anaerobic treatment for liquid
- Incurs cost for desludging

### Double Chamber Septic Tank

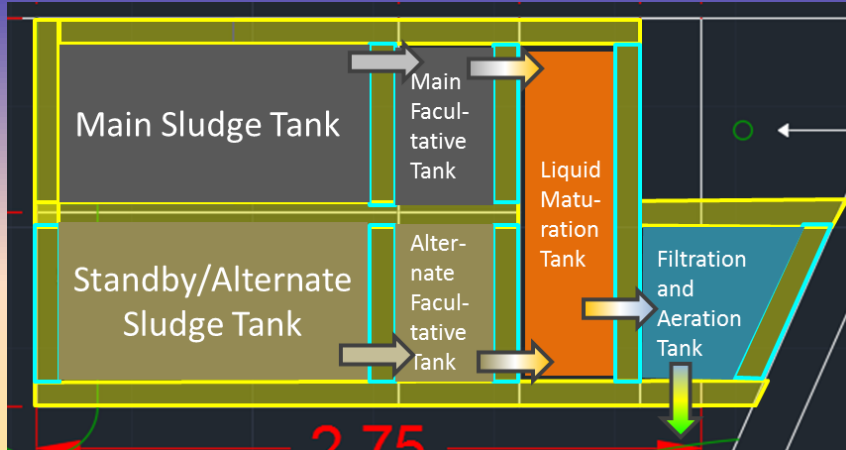


#### Description in comparison to single chamber:

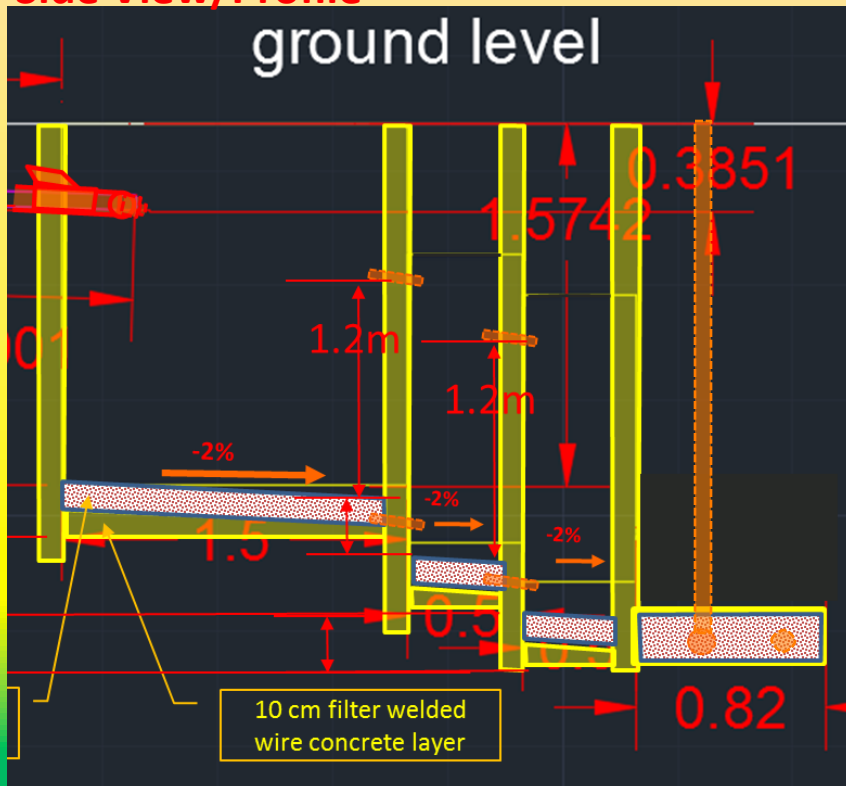
- Bigger → more capacity
- Improved liquid treatment

# Innoventions: Alternating, Quad-Chamber Septic Tank (AQ CST)

## Plan View



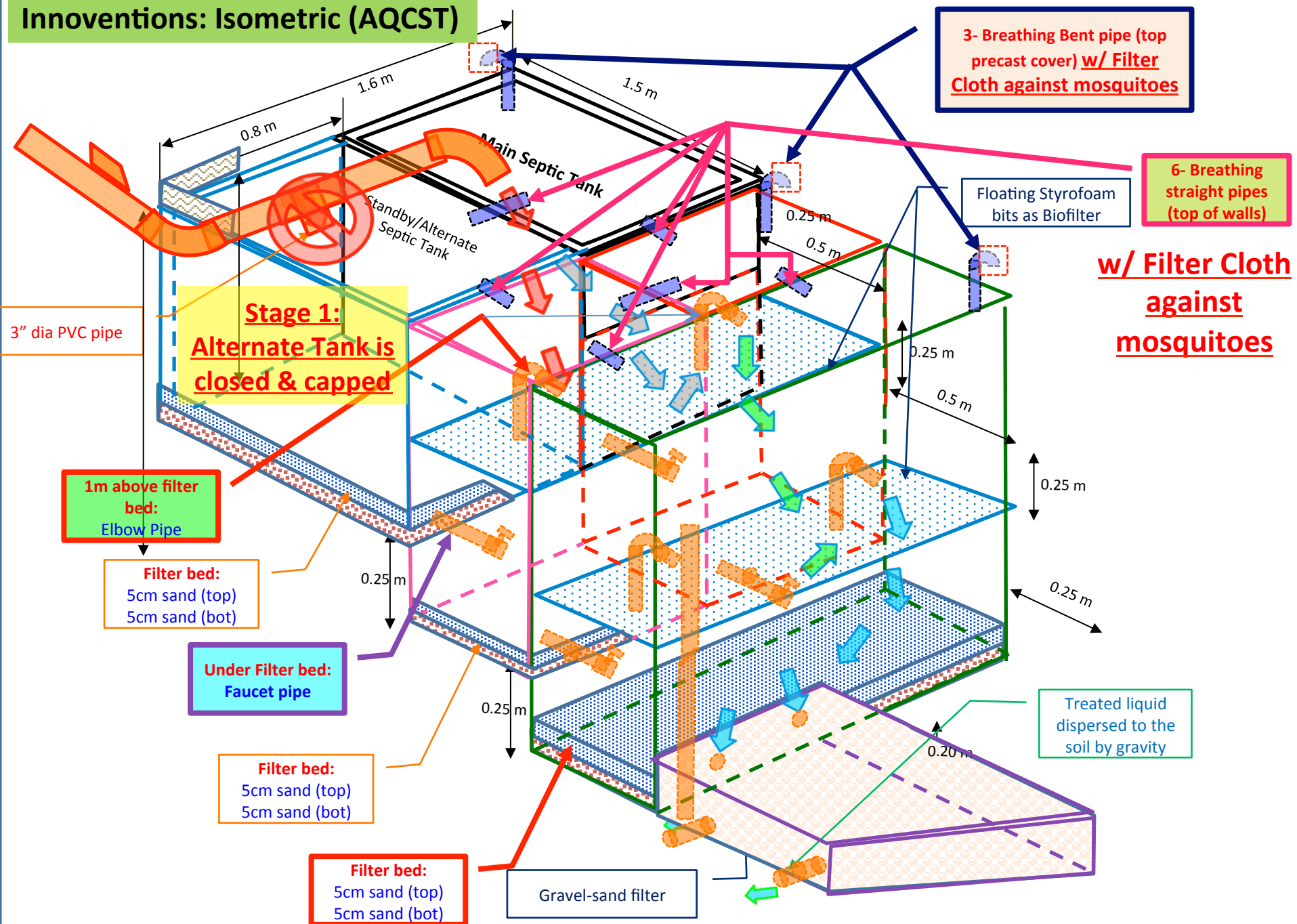
## Side View/Profile



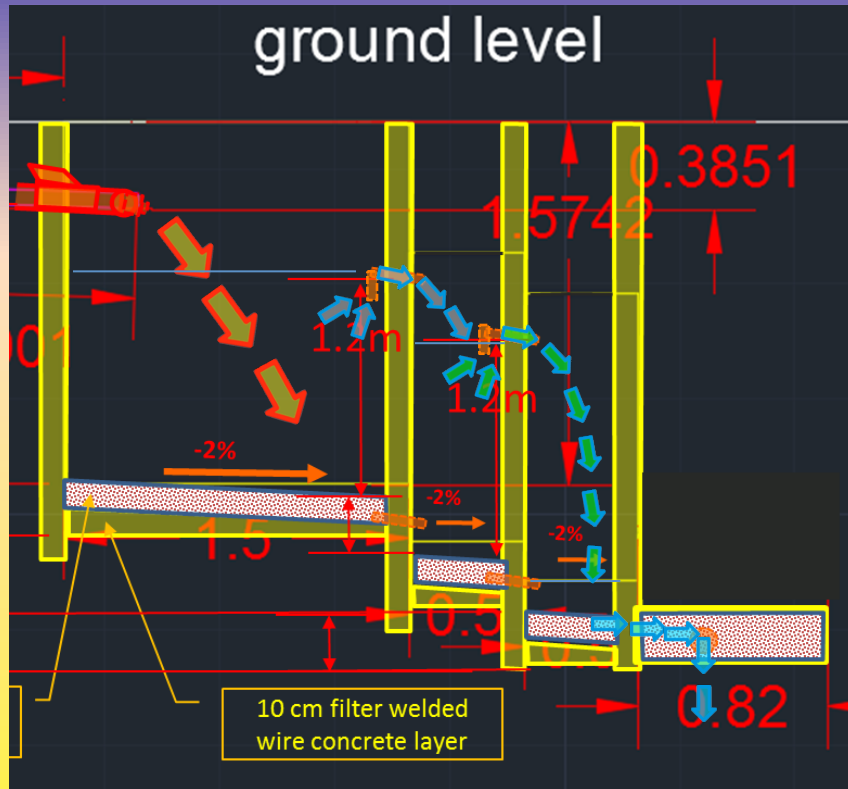
## Parts (mainly reinforced hollow blocks construction):

- 6 tanks / 4 tanks per operational set:
  - Sludge tank; Facultative tank; Maturation tank; Filtration – Aeration tank
- Elbow flow pipes between tanks
- Tank Bottom: Mesh-glued tiles, sand layer, gravel; valve pipes to discharge liquid through tank partitions
- Top slab: Gas vents, breathing pipes between tanks, old drinking glass as sunlight hole [reusable items]
- Styrofoam bits as biofilters [recycled materials]
- Vertical sampling pipe for final effluent

# Innoventions: Isometric (AQ CST)



## Basic Operations



3. Treated liquid flows into Maturation tank (mainly aerobic treatment as liquid goes through filter media.
4. Liquid seeps through filter into filtration and aeration tank for polishing.
5. Treated water discharges into the soil and is taken up by plants

### Sewage treatment process [when full and stops accepting discharge] :

1. Gate pipe at the bottom is open in both septic tank and Facultative tank
2. Settled solids is retained to dry in the septic tank while liquid seeps through filter media and through the gate pipes. This dewateres the sludge and sunlight facilitates drying
3. When sludge is dry, this can be shoveled out to further mature into compost.

### Flow process [Either Main or alternate tank is used at a time – no interruption of service] :

1. Sewage flush flows into the septic tank (aerobic/anaerobic digestions occur)
2. Solids settle, clarified liquid flows into and stays in Facultative tank (aerobic treatment occurs at upper liquid levels, anaerobic at lower levels.

# Construction Stages Photos



Main sludge Tank



Main  
Facultative  
Tank



Liquid  
Maturation  
Tank



Alternate/ Standby sludge Tank



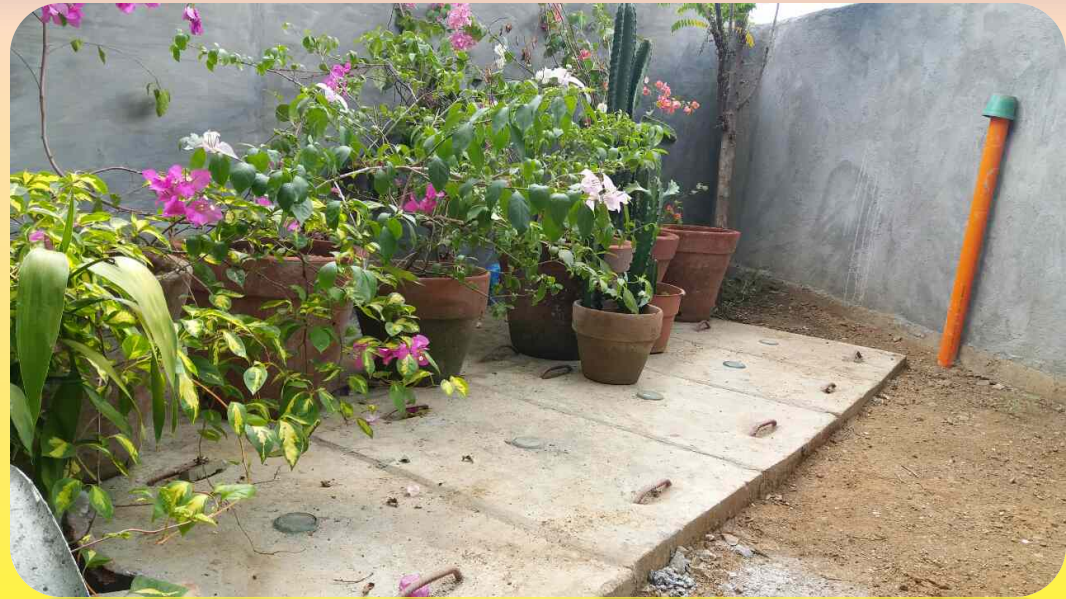
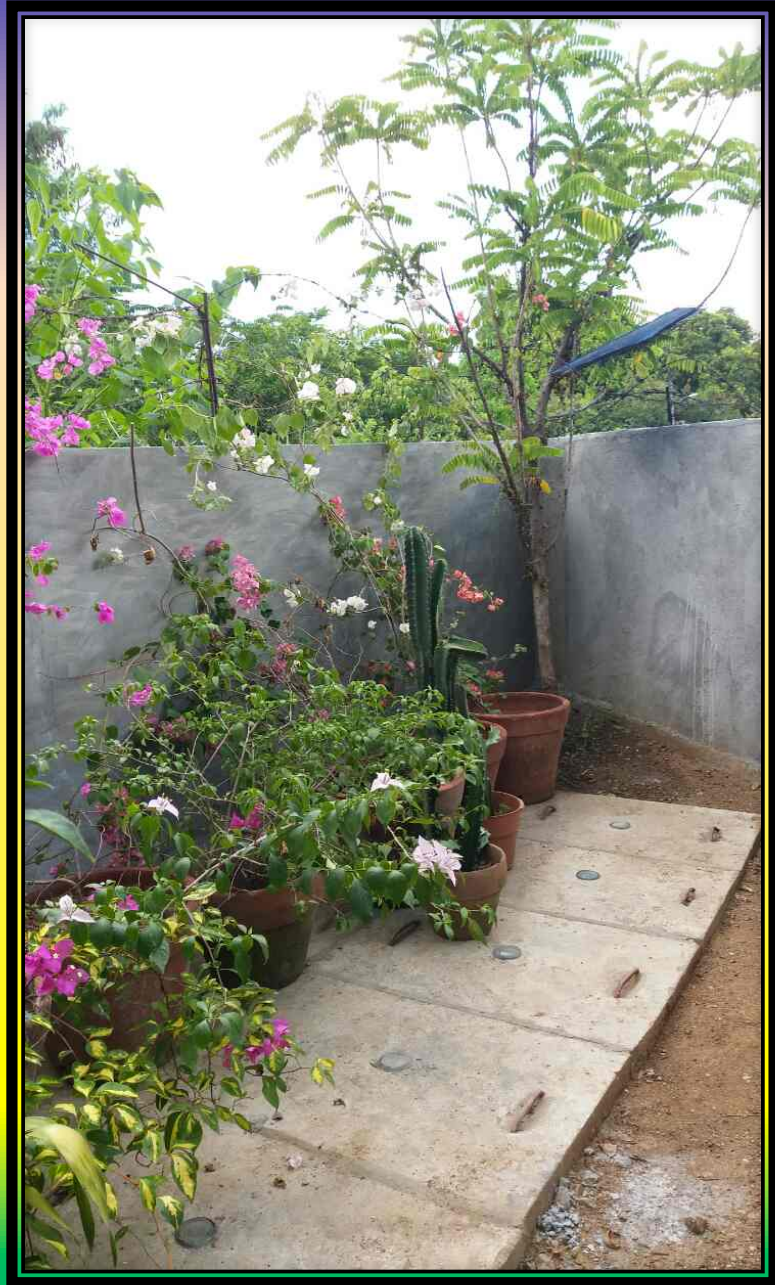
Alternate  
Facultative  
Tank



Filtration &  
Aeration  
Tank



## Innoventions AQ CST Finished Product



## AQCST Introduced Innovations

1. Alternate chambers – no interruptions to multi-dwellings or apartment buildings
2. More aerobic and aerobic treatment to liquid in (i) septic, (ii) facultative, (iii) maturation and (iv) aeration tanks prior to discharge to the soil
3. No need for de-sludging company – saves cost and low maintenance
4. Sludge converted into compost after drying – good for organic horticulture
5. Liquid treated properly – adds nutrients to soil to be taken up by plants
6. Floating filter media was introduced made from old Styrofoam to host aerobic microorganisms
7. Old drinking glasses were embedded on slab cover to allow sunlight to penetrate and enhance biodegradation and microbial actions
8. Welded wire mesh were used on top slab covers instead of reinforced rebars
9. Innovative Parts:
  - a) Filter (sand and gravel layer) at the bottom of tanks – facilitates sludge drying
  - b) Mesh glued tiles – keeps sand intact
  - c) Gate pipes – to allow liquid to discharge from filter layers to dewater and dry the sludge for easy composting
  - d) Arm Opener for gate pipe was fabricated since they were too deep to be reached by man's arm.

## **AQCST Potential Applications**

- 1. Since desludgers are not needed - attractive to LGUs with no sanitation service providers**
- 2. In residential subdivisions, clustered apartments/ condominiums and low occupancy commercial/ industrial establishments, the AQCST can be a good substitute to expensive and operation/maintenance intensive Waste Water Treatment Plant, especially for toilets waste water. AQCST has lower cost of engineering/construction and practically nil operations & maintenance.**
- 3. Clustered settlements in urban and rural (“barrios”) areas can have shared AQCST or modular types to contain and treatment toilet discharges.**
- 4. Production of Compost will be good for organic farming and horticulture**

# Green Innoventions in Home Septic Tank

Lessons Learned:

*Within our professions, we can  
Innovent*

Thank you for your Attention