

Integrating Advanced Greywater System into Residential Landscape Project

by Alan Hackler



Project Background

- San Jose suburban home
- Family of 4
- Wanted way to have a lush edible/colorful garden without wasting water
- Contacted Bay Maples to find solution for saving water





Combined
greywater/rainwater
system, and potable water
irrigation system working
in conjunction

System components are located on side
of house, utilizing a previously unused
space on property





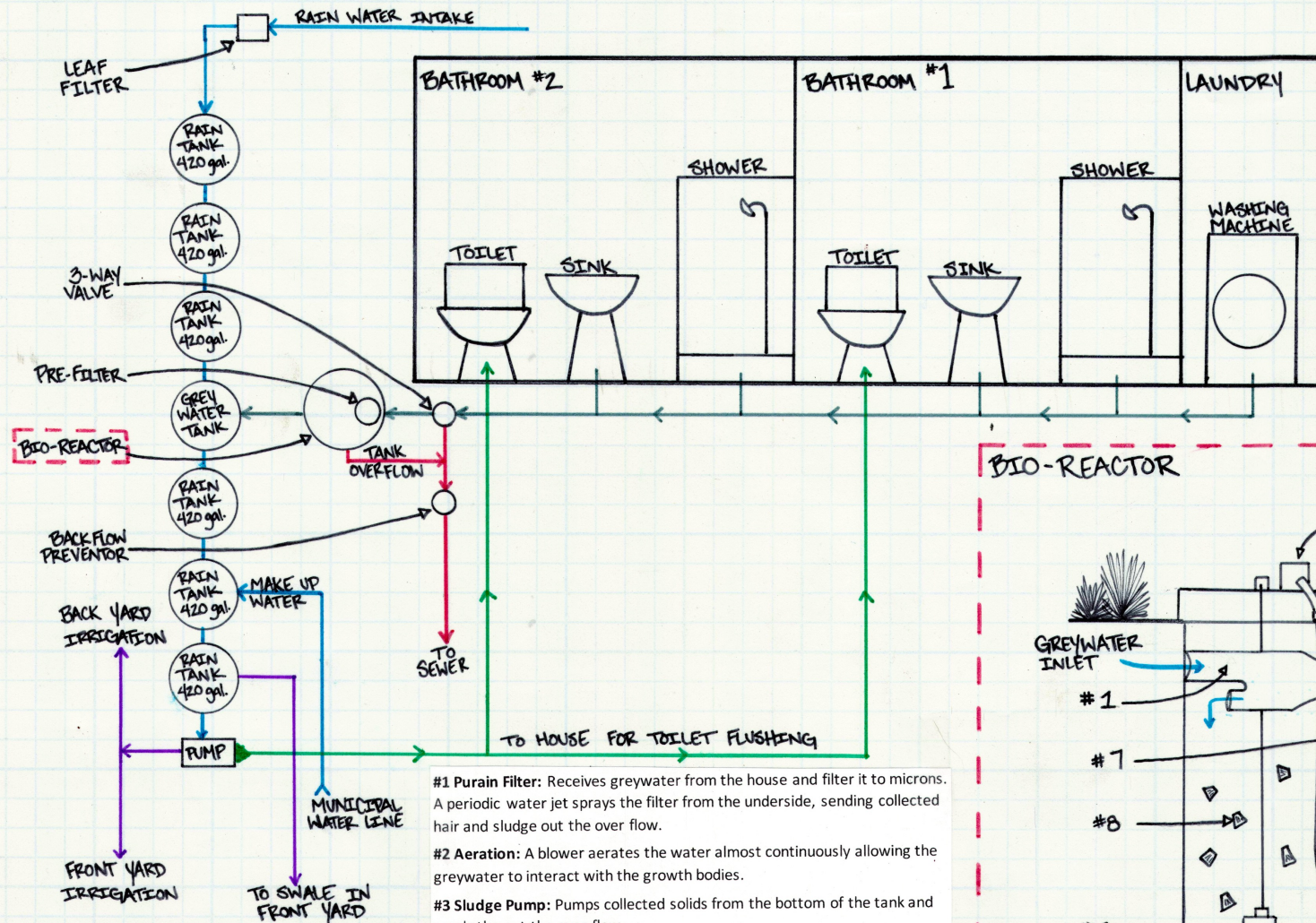
Aqualoop NSF 350 C Certified Greywater system

- Only Greywater system that can be used for overhead spray irrigation & non-potable, indoor use, decorative water fountains, cool tower make, car washing



System Details:

- AquaLoop Greywater system w/ Integrated Rain Catchment System
- System requires plumbing permit
- (6) 420 gallon Bushman Rain tanks (2,520 gallon total)
- (1) 420 gallon tank used to store* filtered greywater
 - *Only allowed w/ NSF certified greywater systems
- Used for irrigation & indoor, non-potable use (toilets & laundry)
- Greywater collected from 2 bathrooms & laundry water
- Irrigation system uses standard Hunter Valves, Hunter HC-Pro controller & Netafim 'in-line' drip tubing



#1 Purain Filter: Receives greywater from the house and filter it to microns. A periodic water jet sprays the filter from the underside, sending collected hair and sludge out the over flow.

#2 Aeration: A blower aerates the water almost continuously allowing the greywater to interact with the growth bodies.

#3 Sludge Pump: Pumps collected solids from the bottom of the tank and sends the out the over flow.

#4 Membrane Filter: Provides for ultrafiltration. With a pore size of 0.02 microns, it can attain a 99.99 removal rate of bacteria and a 99.7 rate for viruses. The aeration blower is connected to the membrane which provides a backflushing of air to assist in the cleaning of the membrane.

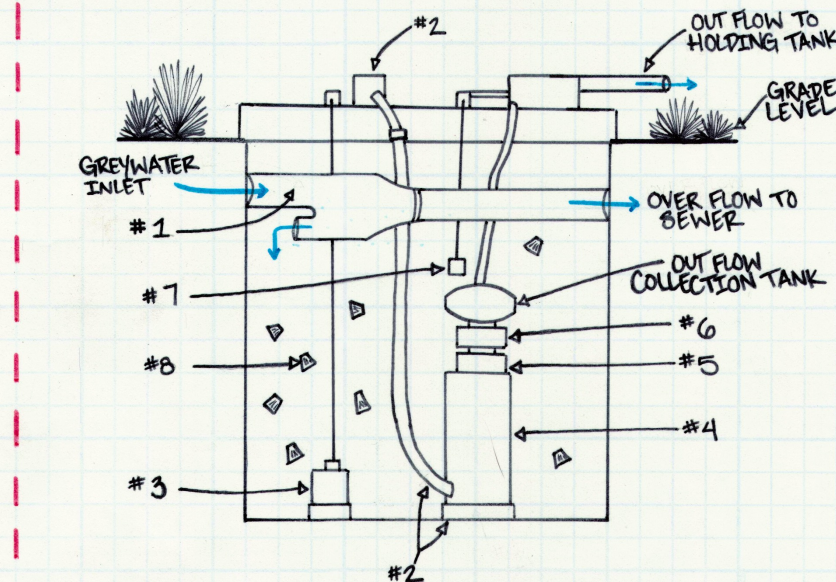
#5 The Suction Pump: Pulls the treated water out of the tank and sends it to the holding tank where it can be used for irrigation, laundry, and toilet flushing.

#6 The Backflush Pump: Send water through the membrane to keep sludge and solids from collecting.

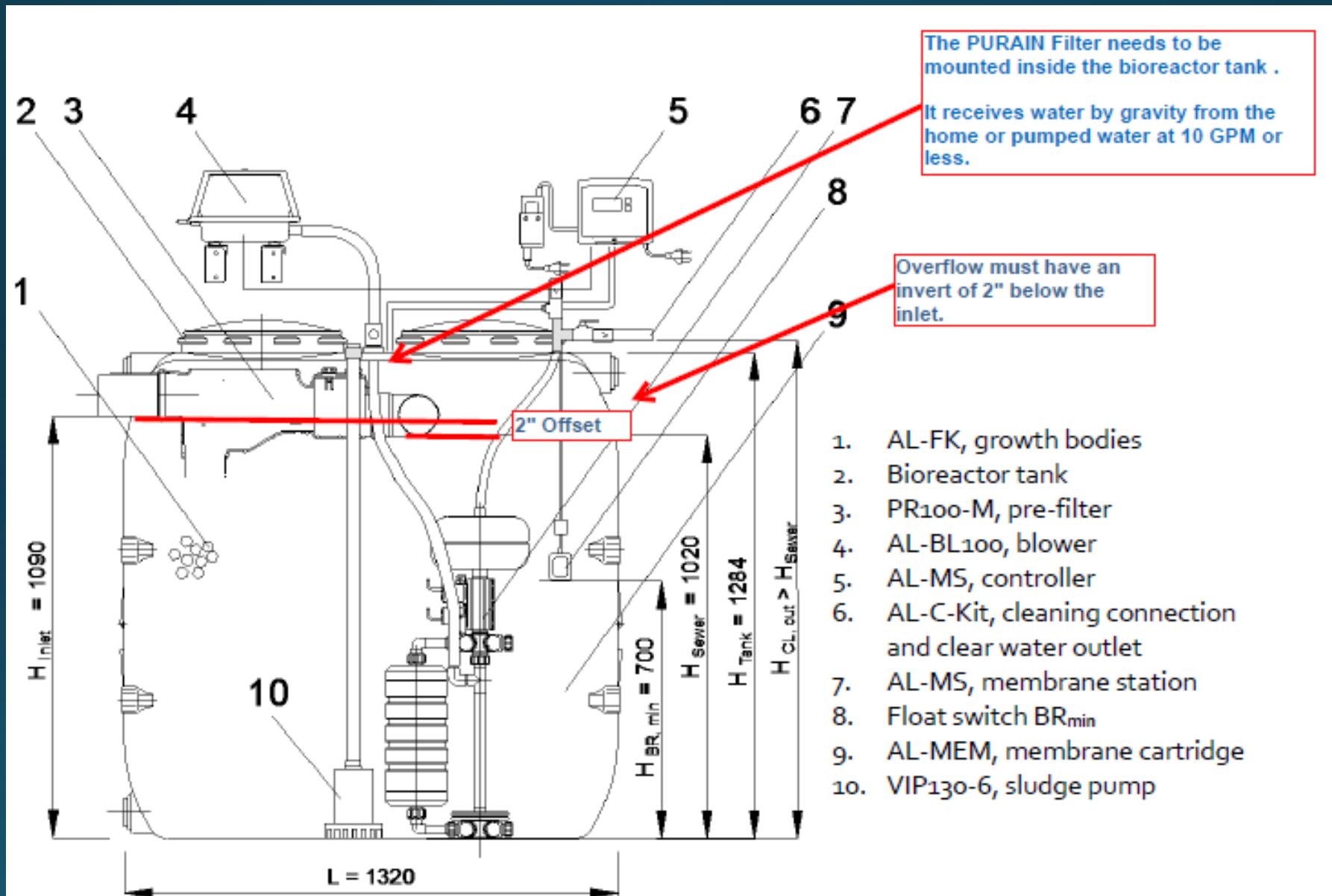
#7 The Float Switch: Tells the controller how much water is in the bio-reactor and if there is too little the suction pump will not send water to the holding tank.

#8 Growth Bodies: Encourages growth of micro-organisms to assist in the breakdown of organics.

BIO-REACTOR



Greywater Filter Tank Schematic



Greywater inlet, Pre-Filter, Bio Reactor Tank, Intewa Filter Membrane & Transfer Pump

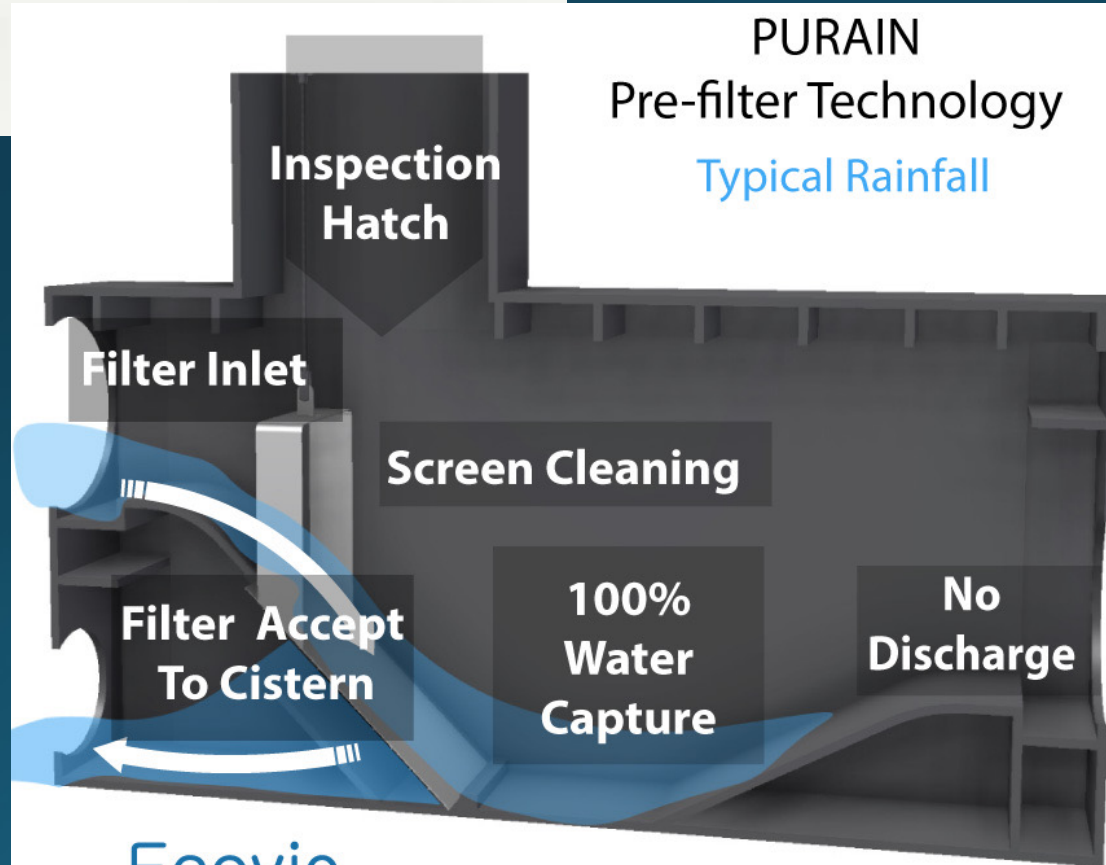


3 stages of filtration

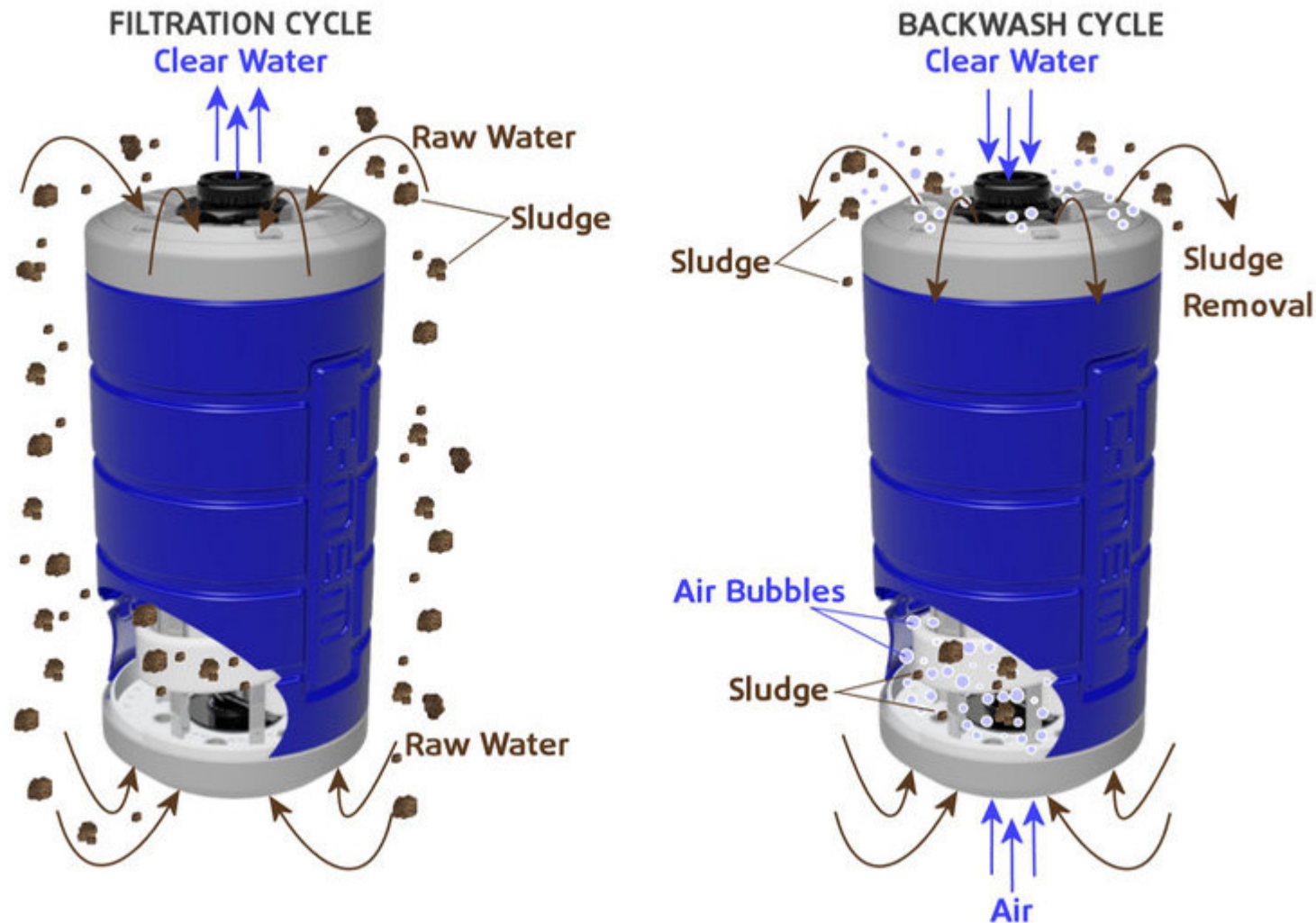
- Purain Pre-Filter: Remove largest debris in greywater
- Membrane Filter: Ultrafiltration of smallest greywater particulate
- Bio-Reactor Tank: Utilizes living biological microbes to clean water



Purain Pre-Filter



Membrane Filter



Primary greywater filter for system, positioned after purain filter and before greywater enters 'bio-reactor tank.

With pore size of 0.02 microns it can attain 99.99 removal rate of bacteria & 99.7 rate for viruses.

Blower is connected to membrane & provides a backflushing of air to assist in the cleaning of membrane

Bio-Reactor Tank



Utilizes plastic media to create surface area for beneficial microbes to colonize water

Air blower oxygenates water to help microbes live & propagate.

Air helps to keep water from going anaerobic

After greywater is cleaned by microbes, water is able to be sent to holding tank, then used for irrigation and

Filtered Greywater holding tank, irrigation pump, controller & air pump





Irrigation pump & indoor non-potable connection point

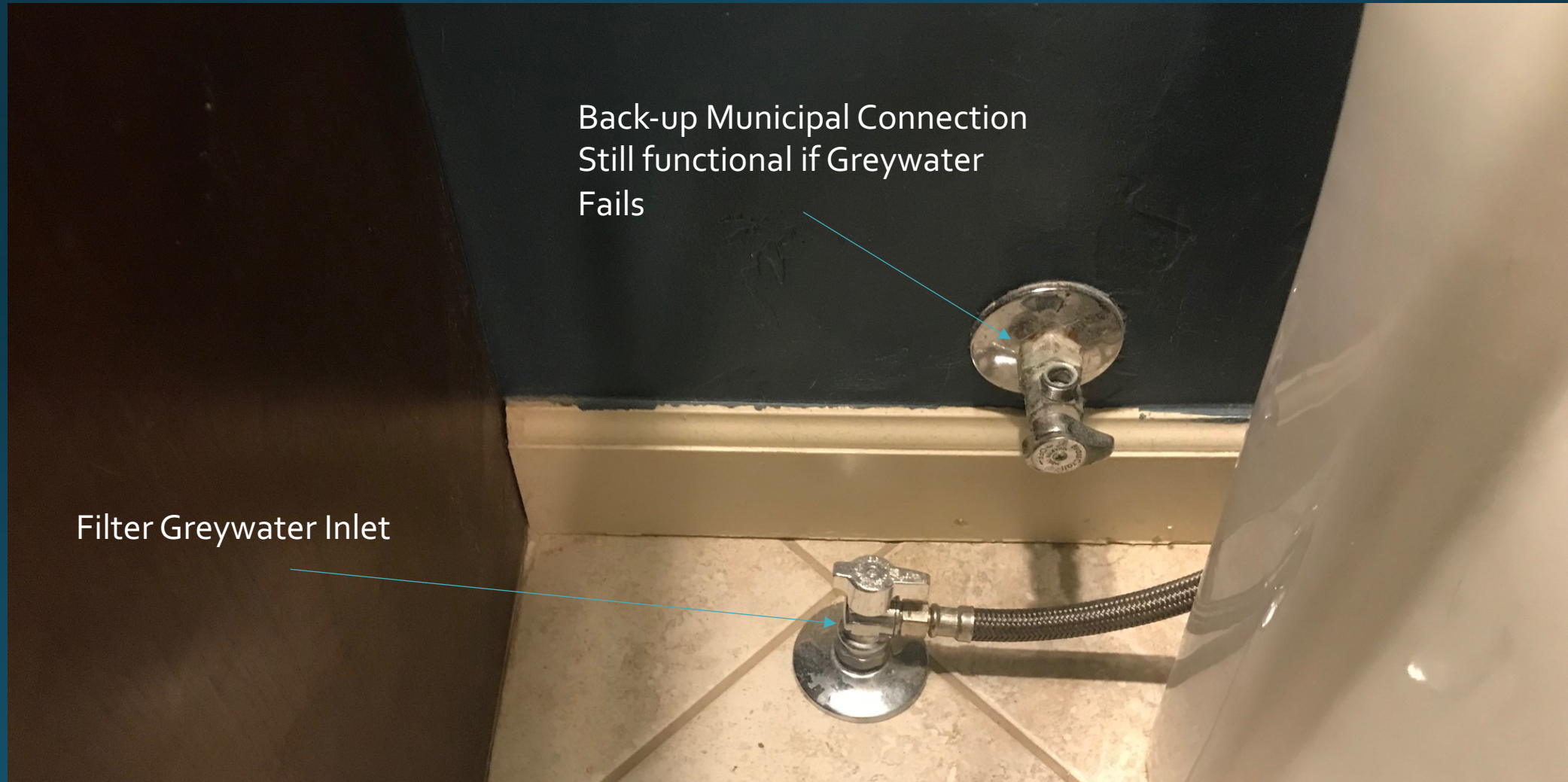


Outlet to Irrigation

1/2 HP Constant Pressure Pump

Outlet for Indoor Non-Potable Connection

Indoor, non-potable connection -Toilet Flushing & Laundry use



Potable Water 'Make-up'



Solenoid Valve to allow
Municipal Water into
System

Rain Tank Inlet & Leaf Filter



Hunter Pro-HC Controller w/ WiFi control & waterwise



Netafim Techline RW



- Emitter flow rates: 0.9 GPH
- Emitter spacings: 12",
- Pressure compensation range: 7 to 58 psi
- Maximum recommended system pressure: 58 psi
- Minimum recommended system pressure: 6 psi
- Tubing diameter: 0.66" OD; 0.56" ID; 0.050" wall
- Recommended minimum filtration: 120 mesh
- ISO 9261 Standard Compliance

- Continuous Self-Flushing Emitter Design**

Flushes debris as it is detected, throughout operation, not just at the beginning or end of a cycle, ensuring uninterrupted emitter operation

- Emitter With Anti-Siphon Feature**

Prevents ingestion of debris into tubing caused by vacuum.

- Self-Contained, One-Piece Dripline Construction**

Assures reliable, easy installation.

- Flexible UV Resistant Tubing**

Adapts to any planting area shape – tubing curves at a 7" radius. On-surface installations withstand heat and direct sun.

System Maintenance

- Similar to labor required for maintaining pool filter, water softener or traditional irrigation system
- Periodic cleaning of filter. Frequency dependent on number of house people in house & type of greywater system
- Periodic checking & flushing of drip irrigation



Benefits of this style of system

- Don't have to change out existing irrigation components.
- Can still irrigate a lawn, without having to change out lawn w/ sub-surface irrigation
- Larger range of uses for greywater
- Can utilize greywater during winter months when irrigation not needed in landscape
- Can work with rainwater system and utilize potable water make-up
- Greywater can be stored
- Easier to have traditional irrigation scheduling

Incorporating Greywater into your projects?

- *Is there enough greywater available to make a system worthwhile?
- *Is the house good candidate for greywater
 - Is there access to sub floor plumbing? No slab foundations
 - Can plumbing make proper grade to tank location?
- *Best time to install greywater systems
 - During home/bathroom remodel
 - When installing major garden/irrigation remodel
- *Only work w/ plumbers w/ greywater experience, most plumbers install greywater systems incorrectly
- *Reduce irrigation demand as much as possible, to achieve more benefit from greywater potential