

Beneficial Use of Reclaimed Water In Delaware “Greywater” and/or “Wastewater”

Presented by

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What is Greywater?

- “The untreated wastewater that has not come into contact with toilet waste. Greywater includes wastewater from bathtubs, showers, bathroom wash basins, washing machines, laundry tubs and other wastewater that does not present threat of contamination by unhealthy processing, manufacturing or operating waste. It does not include wastewater from kitchen sinks or dishwashers.” Section 2 of the Regulations Governing the Design, Installation and Operation of On-Site Wastewater Treatment and Disposal Systems (Regulations)
 - This definition is consistent with most states

Does Delaware Allow Greywater Systems?

- Yes, systems may be permitted under the Regulations, Section 5.1000 Alternative Wastewater Treatment and Disposal
 - Provided that if it is used for residential irrigation then it must be subsurface discharged so that there is no human contact
 - The reason for this requirement: Untreated greywater can pose public health threat
 - System design meets criteria in the Regulations
 - Soil profile determines depth to limiting zone (seasonal high water table)
 - Soil textures determines percolation rates
 - Isolation distances to wells

Plumbing Codes for Greywater Systems

- International Plumbing Code (IPC): The IPC, Appendix C, provides guidance on Greywater Recycling Systems in residential and commercial buildings. It includes provisions to use greywater for flushing toilets (water closets) and urinals as well as for subsurface landscape irrigation. The Uniform Plumbing Code (UPC) only allows greywater to be used in residential subsurface landscape irrigation.
 - Local County codes may not allow this use

How much water are we talking about?

- Average greywater residential flow
 - Laundry – 30 gallons per day
 - Bath – 60 gallons per day
 - Misc. – 10 gallons per day
 - Total average flow plus or minus 100 gallons per day

Pros & Cons of Greywater Use

➤ Pros:

- It replaces or conserves potable water use and can reduce the cost of potable water supply.
- It benefits plant growth when applied appropriately
- It offers potential cost reductions for regional sewage treatment facilities. Removing greywater from residential wastewater drainage to sewer decreases the flow and enables the existing infrastructure to service more connections.
- It can be used for toilet flushing; and if treated to an advanced tertiary level, it can also be used for other domestic water uses such as bathing, showering and laundry.

Pros & Cons of Greywater Use

➤ Cons:

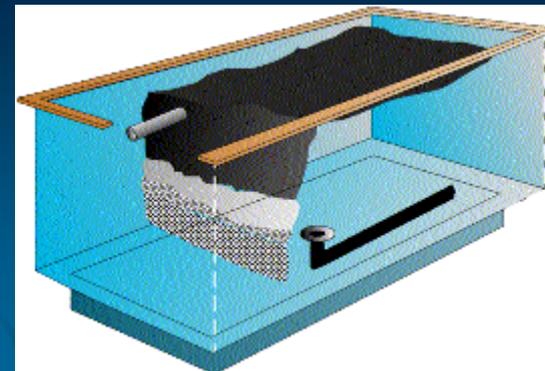
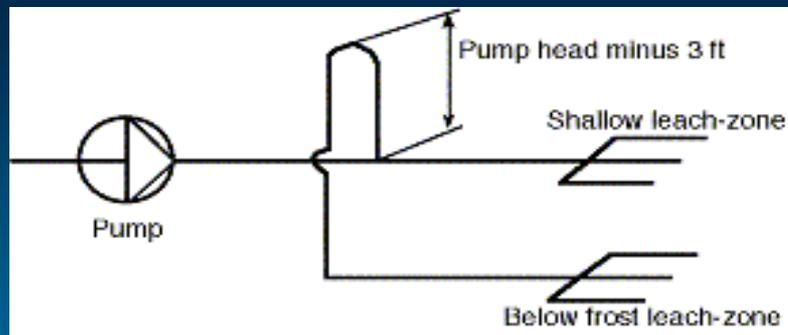
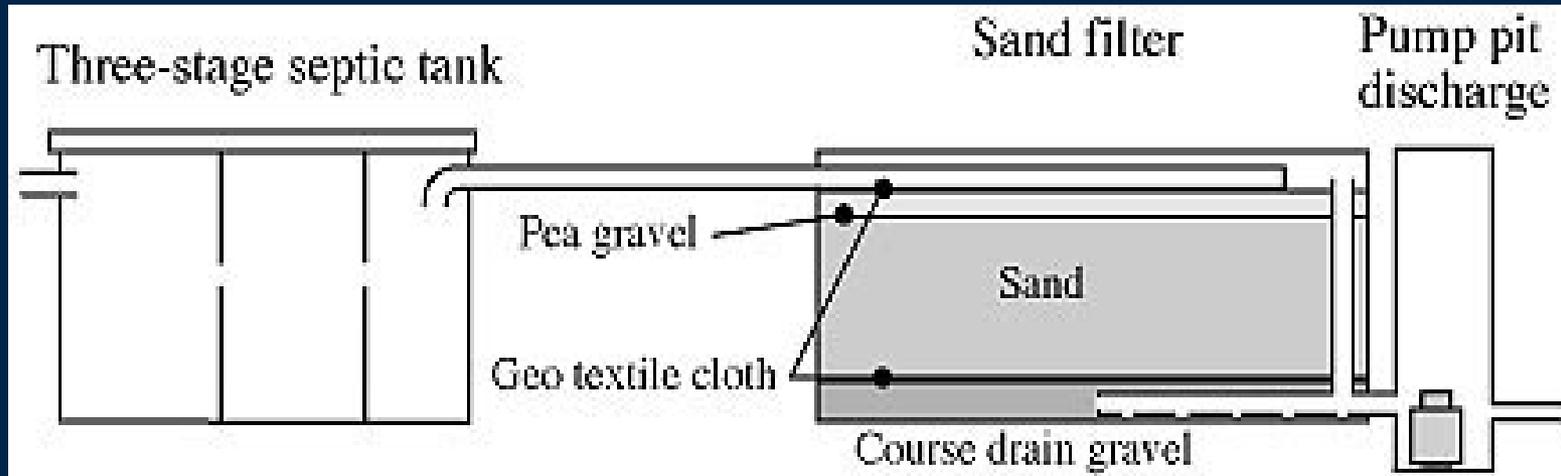
- Greywater may contain sodium and chloride or other chemicals that may be harmful to some sensitive plant species. Additionally, greywater is alkaline (high PH) and should not be used to irrigate acid-loving plants such as rhododendrons or azaleas.
- Diminished sewer flows from domestic greywater could potentially result in insufficient sewer flows to carry waste to the sewer plant, and will result in a high strength sewage that may lead to treatment, odor and corrosion problems in the centralized sewer systems.

Pros & Cons of Greywater Use

➤ Cons continued:

- There are concerns regarding the public health implication of greywater reuse and the need for research to determine the risks of greywater reuse.
- Cost of treatment and diversion/transfer pipe and pumps.

Examples of Greywater Irrigation Systems



Examples of Greywater Irrigation Systems

- These Greywater Systems utilize sand filters and disperse the greywater into planter boxes



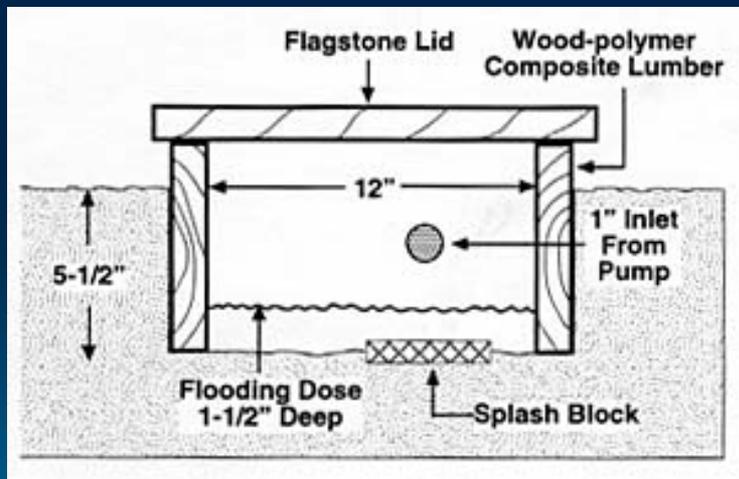
Library in Rhode Island



Mass Audubon, Wellfleet
Cape Cod

Examples of Greywater Irrigation Systems

- This greywater trench is set up for dosing/flooding with around 1-2" of greywater per cycle. Can be utilized both as gravity and pump operated (pressure dosed) systems.



Examples of Greywater Irrigation Systems

➤ Private Residence, Cambridge, MA

- This planter bed was built to demonstrate greywater use in a masonry soil bed on the floor of a basement living room.



Beneficial Reuse via On-site Wastewater Treatment Systems in Delaware

- Residential aeration treatment unit

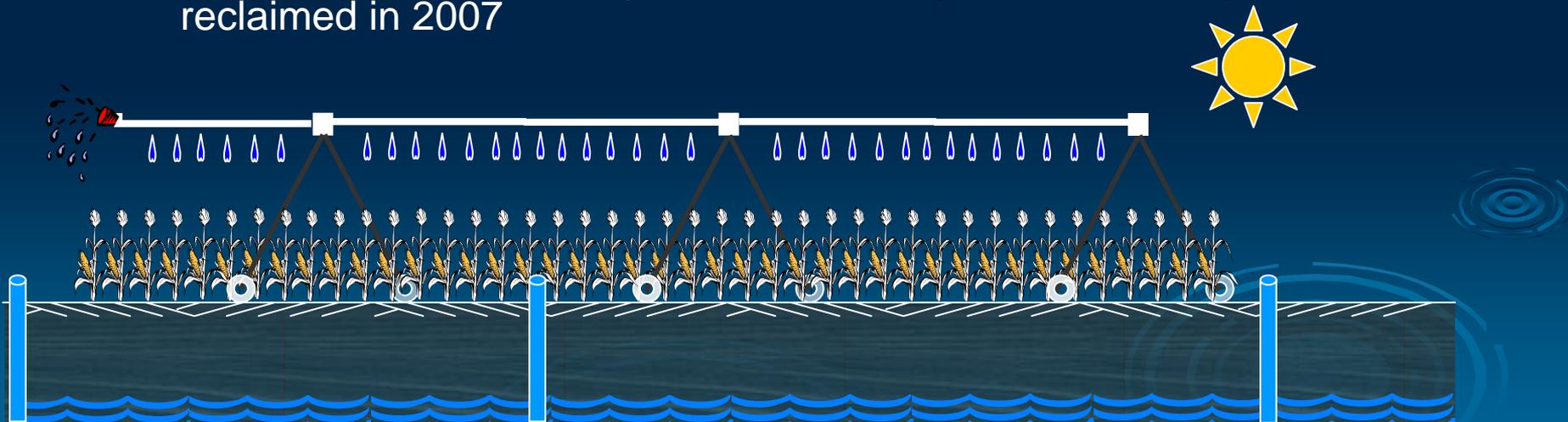


Followed by Drip Irrigation



Beneficial Reuse via Spray Irrigation in Delaware

- Originated in the 1970's in Delaware
- Applied to agricultural sites, golf courses, wooded tracks and open spaces
- Currently there are...
 - 24 active spray irrigation facilities in Delaware
 - 3100 acres of land permitted for spray irrigation
 - 2.5 Billion gallons of water reclaimed annually
 - 650,000 pounds of Nitrogen and 212,000 pounds of Phosphorus reclaimed in 2007



Typical Wastewater Characteristics

Parameter	Prior to Treatment		Treated WW/ Prior to Spray Irrigation		3 feet Below the Soil Surface	
Nitrogen	45	mg/L	20	mg/L	<5	mg/L
Phosphorus	12	mg/L	8	mg/L	0	mg/L
Fecal Coliforms	>1,000,000	col/100mL	10 - 200 *	col/100mL	0	col/100mL
BOD	250	mg/L	10 - 50 *	mg/L	0	mg/L
TSS	220	mg/L	10 - 50*	mg/L	0	mg/L
Chlorides	30	mg/L	30	mg/L	30	mg/L

* The lower concentrations must be met if the public may come into contact with the reclaimed water, such as in Golf Course Irrigation

In Southern New Castle County Reclaimed Water is Used to Irrigate a Forage Crop



Corn Crop with Spray Irrigation



Spray Irrigation on Golf Course



Benefits of using reclaimed water include:

- Aquifer recharge
- Reduces current demand on aquifer
- Keeps water in watershed
- Maintains open space
- Preserves agricultural lands
- Reduces agricultural operating costs
- Helps protect surface water quality

Future uses of Reclaimed Water (Wastewater) in Delaware

- Eliminate current surface water discharges
- Wetland restoration / Wetland creation
- Greenhouse production of ornamental flora
- Residential and commercial lawn watering
- Greywater reuse

Questions/Comments

