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Flush With Confidence: Master Your Backyard's Hidden Hero

Dr. Sara Heger

NOWRA
National Onsite Wastewater Recycling Association

septicSMART
National Onsite Wastewater Recycling Association
SepticSMART Week - September 14-18, 2026

Who is NOWRA?

- The largest U.S. organization devoted exclusively to supporting members of the onsite and decentralized wastewater industry.
- Established in 1991
- 501(c)(6) Not for Profit Trade Organization
- Nearly 6000 members
- 25 Affiliated Organizations representing 30 states
 - www.nowra.org/about/state-organizations/
- Represent all segments of the onsite industry
 - Contractors
 - Service Providers
 - Designers & Engineers
 - Regulators
 - Academics
 - Manufacturers

Training agenda

Top questions about Onsite Wastewater Treatment Systems

- What is a good onsite wastewater treatment system (OWTS)?
- How do OWTS protect ground and surface waters?
- What are the maintenance milestones I need to follow?
- Do I need to use a OWTS additive?
- How to hire a OWTS professional and/or make repairs?
- What are cost saving strategies to protect my system?
- How do I protect my property and OWTS?
- Why can I smell my OWTS?
- Where can I get more information?

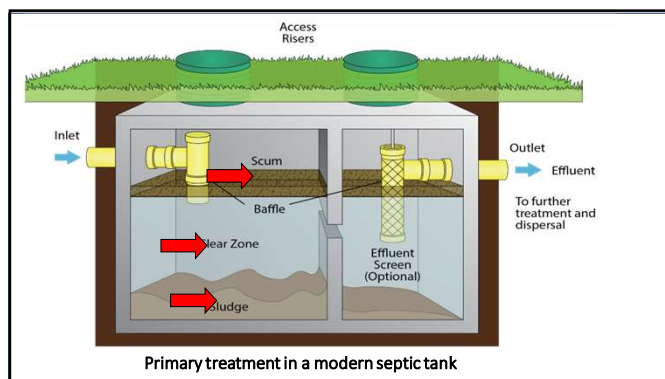
What is a good OWTS?

Good OWTS

- Do not backup into the home
- Do not surface in the yard or into a water body
- Have watertight septic tanks
- Protect groundwater by having adequate vertical separation to saturated zone, bedrock or confining layer

Septic Tank: primary treatment

- Job of tank: catch the solids
 - Decompose organic solids
 - Store inorganic solids
- Layers in tank
 - Scum layer: floating soap, grease, toilet paper, etc.
 - Liquid layer: water, liquid, and suspended solids
 - Sludge: heavy organic and inorganic materials in the bottom of the tank
- Good anaerobic bacteria breakdown organic solids



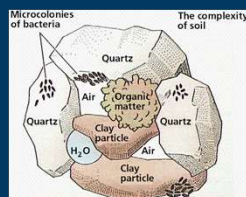
Soil based treatment

- After treatment in a septic tank effluent sent to a soil treatment area (STA)
- Soil has many natural treatment methods
 - biological
 - chemical
 - physical
- The soil must allow for water movement



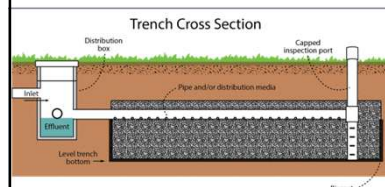
Soil Based Treatment

- A suitable soil allows
 - Biodegradation
 - Pathogen die-off
 - Nutrient conversion
 - Binding with minerals
 - Plant uptake
 - Deep percolation of water (dispersal)



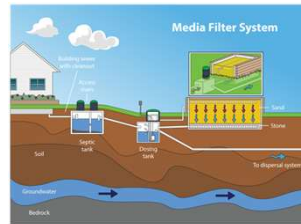
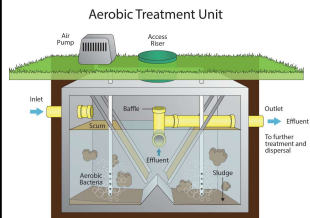
Treatment in a STA

As septic tank effluent is applied to the soil, naturally occurring aerobic microorganisms accumulate to eat the organic material

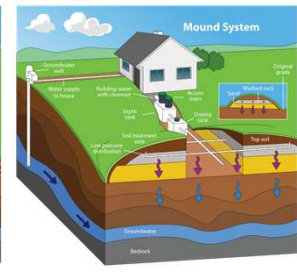
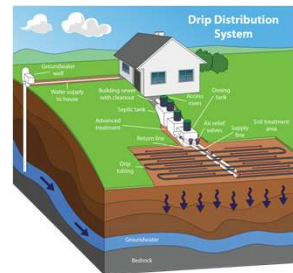


They form a biomat that assists in the treatment process

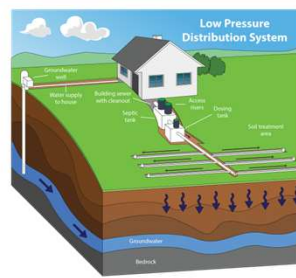
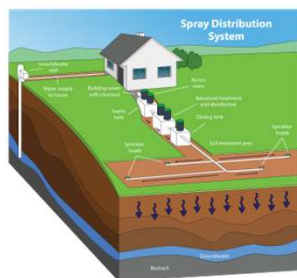
Advanced treatment options



Soil treatment options



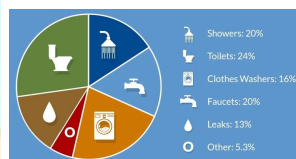
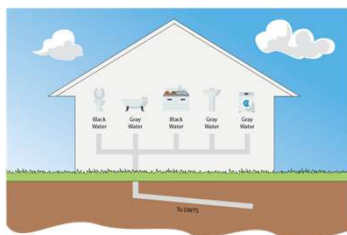
Soil treatment options



How do OWTS project ground and surface waters?



Wastewater sources and usage

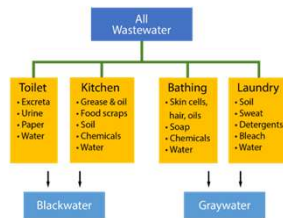


Wastewater estimates and generation

- Residential systems typically use bedrooms to predict maximum occupancy/use
- Assuming two people per bedroom, rules specifies a hydraulic loading of 90 – 200 gallons per day per bedroom
- Try to conserve water
- Based on annual estimates of actual use
 - Per person per year = 27,000 gal/year
 - Typical home ~ 3 persons = 58,000 gal/yr
 - 250 homes in an area = 14.5 million gallons/year

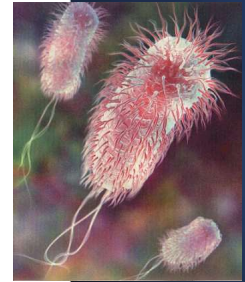
What is added to the water?

- **Pathogens**
 - Virus, Bacteria
- **Solids**
 - Organic
 - Inorganics
- **Nutrients**
 - Phosphorus
 - Nitrogen
- **Chemicals**
 - Cleaning products
 - Water treatment
 - Medications



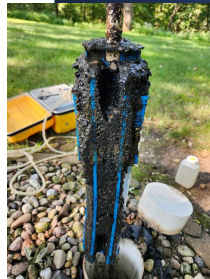
Pathogens

- What?
 - Virus, bacteria, helminths (worms), protozoa
- Impacts?
 - Human health
- How treated?
 - Difficulty living in oxygen-rich environments
 - Removal and die-off in soil treatment system or advanced treatment unit



Organic solids

- What?
 - Digested and undigested animal and vegetable material
 - Synthetic (artificial) organic compounds
- Impacts?
 - Requires oxygen to be broken down
 - Biochemical Oxygen Demand (BOD)
 - Reduces dissolved oxygen (DO) in lakes, rivers, and streams
- How treated?
 - Stored in septic tank and removed when septic tank is pumped
 - Effluent screen/filter limits passage to soil treatment area
 - Serves as food source for good soil bacteria in soil treatment system



Inorganic solids

- What?
 - Fibers from synthetic clothing (lint from washing machine), minerals, metals and salts from soil material, plumbing, make-up
- Impacts?
 - Inert and not subject to decay
 - Causes clouding of water (turbidity)
 - Plugging of soil pores
- How treated?
 - Stored in septic tank and removed when septic tank is pumped
 - Effluent screen/filter limits passage to soil treatment area
 - Overtime may cause soil pores to plug



Phosphorus

- What?
 - Nutrient
 - From:
 - Urine
 - Food
 - Household detergents
- Impacts?
 - Weed & algal growth in lakes, ponds, and streams
- How treated?
 - Removed in the soil treatment system
 - 3 foot of unsaturated soil key
 - Removal life is based on soil type, mineralogy, separation (lateral and horizontal) but many soils will be the length of life of the OWTS



Nitrogen

- What?
 - Nutrient
 - From:
 - Urine and food breakdown
 - Household cleaners and chemicals
- Impacts?
 - Drinking water quality, weed and algal growth
- How treated?
 - Variable removal in septic tank and soil treatment system
 - Diluted in groundwater (well setbacks)
 - Advanced systems need in sensitive areas



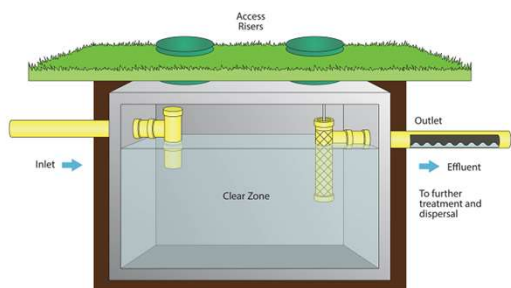
Chemicals

- What?
 - Cleaners
 - Medications
 - Contaminants of emerging concern (CEC)
- Impacts?
 - Can harm your OWTS
 - Aquatic food chain, species reproduction, drinking water quality
- How treated?
 - Stored in the tank until pumped
 - Variable removal in the septic tank and soil treatment system



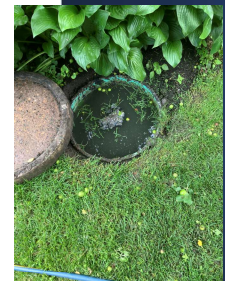
What management is needed?

Septic Tank Reaching a Maintenance Condition



Understand what in your backyard

- Tank or tanks?
- Effluent filter, pump and alarm
- Review your design/as-built
- Contact your county or permitting authority for records
- Ask your installer or pumper/maintainer



Risk with OWTS

- Gases produced are flammable and hazardous to humans in high levels
- Wastewater contains pathogens which make people sick
- Tanks in systems can contain 4 or more feet of water which child, pets and even adults could potentially drown in
- Tanks and other components could collapse if driven over with heavy equipment



Safety – Rules to protect your family and pets

1. Never enter the septic tank
2. Do not smoke or have a fire near septic tank openings
3. If wastewater is on the surface the issue must be corrected
4. Do not use electrical tools near the water or wet ground as it could cause a shock or explosion
5. Keep vehicles and other heavy equipment off the OWTS
6. Assure all lids are secured in place to prevent entry at all times

Inspection versus maintenance

The word inspection typically means they will evaluate your system for regulatory compliance

Maintenance is servicing your OWTS with no regulatory triggers

Maintenance milestones

Every 2 - 5 years the septic tank should be evaluated for the need for tank cleaning/pumping by a licensed Maintainer/Pumper/Service Provider

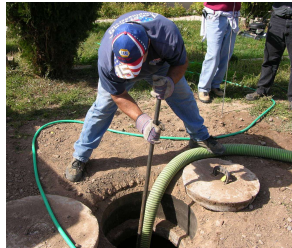
- Interval is dependent on size of the septic tank, water use and habits within the home

Solids must be removed to prevent them from potentially

- Overloading soils treatment area
- Backing wastewater up into the structure or causing surfacing or both

Septic tank maintenance cont'd

- Tank cleaning needed when more than 25% of the tank is storing sludge and scum
- When tank is cleaned, backflushing and/or stirring is needed to mix the tank contents and get the sludge off the bottom



Tank cleaning with correct access

- Tank must be cleaned through a large manhole ~20 inches
 - May require digging up the access
 - Recommended to be at grade
 - 4 - 6 inch inspection ports should not be used



Effluent Screen Cleaning

Screen is washed off directly into the septic tank

Interval may be more frequent than tank cleaning (such as every 6 months)

This is being done at the inlet end of the tank to protect against debris going directly out the outlet



Septic tank cleaning report

The service provider/pumper should provide a report of including:

- Amount of sludge and scum
- Any tank leakage
- Any safety concerns with tank access
- Troubleshooting or repairs needed or conducted

Request a report if you are not given one

Property protection with good record keeping

Some jurisdictions require that a report must be submitted to them when service is performed on the system

It is wise to keep records of your system's design, installation, and service reports

The permitting authority may keep a copy of these records but having a copy for yourself can be helpful if problems arise or when you sell your property

Do I need to add an additive to my OWTS?



Additives: not needed

- OWTS additives, to date, have no third-party research to support their effectiveness
- They are marketed in the follow ways:
 - Starters → Bacteria are abundant in existing wastewater
 - Feeders → Wastewater contains a lot of food for bacteria
 - Cleaners → Some regulations ban the use of these products in OWTS as they may move solids out of septic tank that should be settled out

HOW DO I HIRE A OWTS PROFESSIONAL AND/OR MAKE REPAIRS ?



Hiring OWTS Professionals

- Word of mouth - referrals
- List of licensed professionals from your permitting authority or state
- Check NOWRA's septic locator:
 - www.nowra.org/septic-locator/



Repairs and replacement –

check your local permitting authority

- Minor repairs do not typically need a permit – *example* – pump replacement
- Large repairs do typically require a permit – *example* – replacing a tank
- Most permits are issued by counties, but some townships and cities do as well, occasionally the state
- When a full replacement is needed a new soil treatment area is identified whenever possible vs building over the old one

What are some cost-saving strategies to protect your OWTS?



General recommendations

- Listen for drips and leaks and fix all internal pumping leaks
- Choose appliances that offer water and energy efficient cycles
- Do not use your toilet or OWTS as a garbage can – place this waste in the garbage
- Limit the use of harsh cleaners and sanitizers as they kill beneficial bacteria in the OWTS
- Use products that are natural/biodegradable
 - Look up products that get an “A” www.ewg.org/guides/cleaners/

Bathroom recommendations

- Toilet is #1 water user in a homes
- Replace old 5+ gallon flush toilets with low or dual flush toilets to use 1.6 gallons per flush or less
- Fix leaking problems
 - Typically, a simple gasket that if not replaced can add 100s of gallons of water per day



The golden rules of drains

- Many toilet cleaners are very hard on OWTS
- Do not use automatic sanitizers
- Small amount with “elbow grease”
- Only put human waste and toilet paper in the toilet
 - No kleenex, q-tips, cigarettes, hair, cotton balls, wipes, condoms, feminine products, unused medication

Bathroom cont'd bathing

Take shorter showers versus baths

Use low flow fixtures (< 2 gpm)

Avoid daily cleaners

- Sanitizing nature hard on good microbes

Avoid anti-bacterial soaps

- They are no more effective than regular soap

The less soap and cleaners the better

Clearing clogged drains

Use adequate strainers in all drains from sinks, showers, tubs, laundry, etc.

- Inexpensive metal or plastic drain screens

When drains do plug, it's usually in trap below sink

- Take it apart, use a plunger or snake

Majority of products sold to clear drains will damage the microbes in your OWTS

Laundry recommendations

- Install front loading machines
 - 65% less water
 - 12 – 20 gallons
 - Less electricity to dry clothes
- Spread out FULL loads
 - think even
 - throughout week
 - throughout day



Laundry cont'd

- Add a washing machine lint filters:
 - Washing clothing release a lot of lint much of which is inorganic
- Options:
 - Simple screen on discharge line
 - Purchase and install an after market lint filter



Laundry cont'd

- Limit bleach and other sanitizing products (less than 1 load/week)
- Do not use laundry sanitizers
- Limit detergent to the minimal amount needed to get clothing clean
- Inexpensive powders contain clay as a filler



Laundry cont'd

- Do not use liquid fabric softeners
 - May prevent natural 3-layer stratification from occurring
- Recommendations:
 - Add a ½ cup of baking soda or vinegar or both
 - Drier balls
 - Anti-static - aluminum foil ball

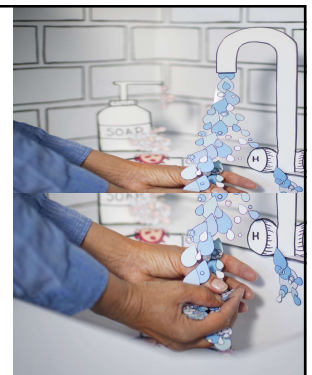


Kitchen recommendations

- Run FULL dishwasher or fill the sink to wash dishes
 - do not let water run
- Detergents - Choose phosphate free
- Sink:
 - Scrape plates into compost/garbage
 - Fix leaks
 - Fats and oils are solid waste!
- Thaw food in refrigerator versus under running water
- Eliminate or reduce the use of a garbage disposal/ grinder
 - Adds more solids
 - Undigested food is harder to break down
 - Chopped into small pieces which do not settle out as well
 - Require 50% more capacity in the septic tank in MN

Utility room recommendations

- Do not allow clean water from sump pumps or tile lines to drain into system
- Do not run water to prevent a system from freezing
- Consider routing other uncontaminated sources out of your system such as furnace condensate, dehumidifiers, water treatment devices (water softeners, iron filters, reverse osmosis)



Hazardous waste

- Can not go into your system so find a hazardous waste drop off
- Examples: paints, adhesives, aerosols, cleaners, drain cleaners, antifreeze, automotive fluids, used oil, gasoline, herbicides, pesticides, pool chemicals
- Unused medicine drop off
 - [fda.gov/drugs/disposal-unused-medicines-what-you-should-know/drug-disposal-drug-take-back-locations](https://www.fda.gov/drugs/disposal-unused-medicines-what-you-should-know/drug-disposal-drug-take-back-locations)



How do I protect my property and OWTS?

Outside the home recommendations

- Assure no treated water from hot tubs or pools enter the OWTS
- Route roof drains away from the OWTS
- Do not park vehicles over the OWTS



Landscaping considerations

1

Do not irrigate or fertilize over the OWTS

2

Do not drive anything larger than a riding lawn mower over your OWTS

3

Do not grade or add soil over the system without consulting the Installer/Permitting authority

Vegetation do's and don'ts

Do's

- Do establish vegetation to protect the system from erosion and freezing
- Do use native drought-tolerant plants on and near the soil treatment area
- Do frame the system with dwarf trees and shrubs at a distance

Don'ts

- Don't plant edible plants such as vegetables and herbs over the system
- Don't place trees and shrubs on the soil dispersal system or near other components
- Don't place plastic landscaping sheets over the soil treatment area

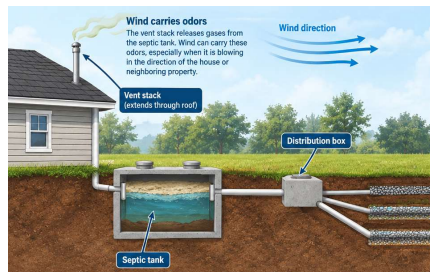
Setbacks from the OWTS

Rules have required setback from building, structures, and other architectural features to allow for protection of resources along with maintenance access and repairs

- Wells, lakes, rivers, ponds and streams
- Property features such as retaining walls, stone walkways, pools, hot tubs, decks and patios, or fire pits
- Swimming pools, sports courts, storage sheds, swing sets, sand boxes, driveways, vehicles

Fencing and gate placement can affect septic pumper truck access

WHY CAN I SMELL MY OWTs?



Odors with onsite systems



Every system produces odorous gases



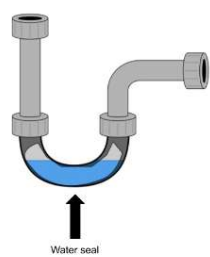
Old systems vented through cesspools and seepage pits, old building sewers



With new systems venting occurs through plumbing stack

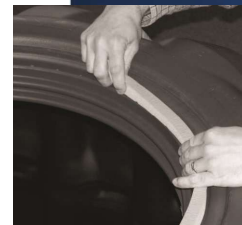
Smell orders in the home?

- Odor in Home = Plumbing problem
 - Dry traps allow odor back into home
 - Add water periodically as needed
 - Not tight or sealed clean out access plug or sump basket
 - Tighten or seal
 - Is plumbing stack frozen or clogged?
 - Gurgling drains
 - Poor warm water down stack if frozen
 - Clean out debris (leaves, etc.)



Odors near your septic tank

- Manholes and riser secure?
 - Cover with soil or mulch
 - Seal
- Maintenance needed
- Sick septic tank
 - Excessive chemical/medicine use in tank or lack of maintenance can affect odor
 - Pump tanks, reduce chemical usage



Odors near a pump tank or STA

- Odors near pump tank
 - Tank lid secure
 - Electrical conduit sealed?
- Odors near soil treatment units
 - Surfacing effluent
 - Vent pipe open



Odors in yard

- Can get caught under roof over hangs
- Wind patterns can limit odor traveling away from home
 - Valleys, forested areas, low areas, etc.
- Vent can be extended
- Carbon filters can be added on end
 - Be careful of winter use
 - Last 1-5 years



Online Free Self Paced Module
<https://www.pathlms.com/nowra/>

Onsite Wastewater Treatment System Homeowner Education

RESUME COURSE



Key take aways

- Good OWTS are critical to protecting public health & the environment
- Stagger water usage to spread it out over the day and week
- Be mindful of the products you use and limit cleaners
- Do not use OWTS as a garbage can
- Evaluate your vegetation, obstructions, and traffic over the OWTS

Questions

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