



Specialists in onsite wastewater products

November 2013.

Re: Practical Ways to Improve Septic Tanks and Percolation Areas

There is a lot of concern and uncertainty among the public about the impact of their inspection of domestic wastewater treatment systems. Many people simply don't understand how their system should operate and are very concerned that they are facing a large bill to repair their systems, even if they are eligible for a grant. While some systems will need significant work, a large proportion may only require inexpensive improvements to the existing septic tanks and percolation areas. We can suggest a number of practical and inexpensive general solutions that can be made to improve existing septic tank systems and percolation areas, without taking advantage of people's concerns in difficult times.

Following an inspection under the National Inspection Plan or at the request of a concerned homeowner, we can provide site specific suggestions to assist with difficult problems such as homes with little space and or impermeable soils

We provided design assistance and supplied our Geoflow drip systems and Low Pressure Pipe (LPP) in 2012 for two homes with low permeability soils in Kilkenny and Monaghan under the EPA funded STRIVE project being conducted by Trinity College. We can report that the systems are performing very well after more than a year's monitoring. When completed in early 2014, it is intended to make drip systems and LPP systems more available for use in both very free draining soils with little soil treatment and the more impermeable soils with hydraulic difficulties.

Ash Environmental has a track record and of providing support to reputable and experienced wastewater companies and individuals. We have been providing a specialist service of design and supply of wastewater pressure systems for a number of years. We have provided site specific design options to assist engineers, architects, site assessors and contractors with both low pressure and drip infiltration systems for use on many rural houses, small communities and commercial projects.

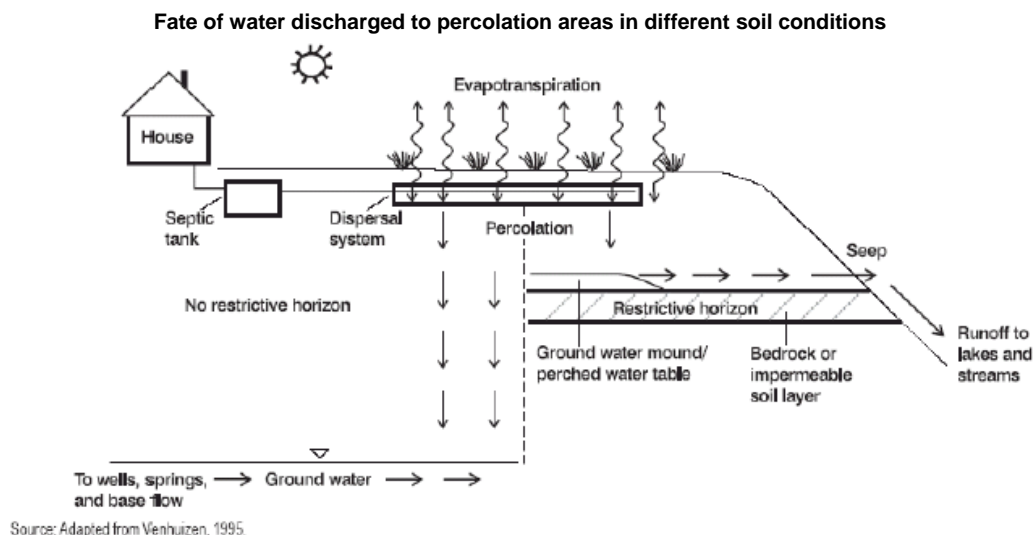
We look forward to being of service to you in the future.

Yours sincerely,

Joe Walsh

Practical Ways to Improve Septic Tanks and Percolation Areas

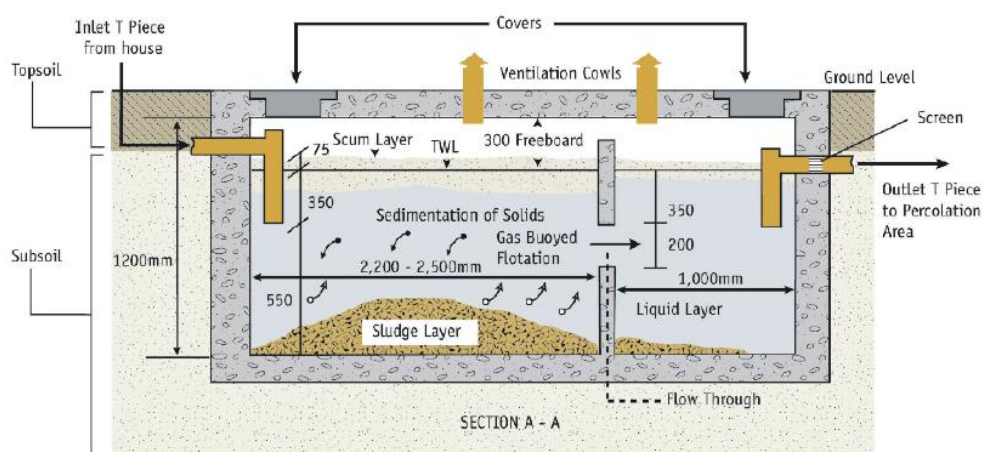
Before deciding on any alteration to an existing wastewater treatment system, the first step should be to establish the cause of the problem. This should involve an assessment of the particular site and circumstances before coming up with any solutions.



As many inspections will be as a result of a request by concerned homeowners, we have a suggested approach to help you to establish the cause of a percolation problem at the end of this document. If one of the following problems is identified then we may be able to offer a solution from our product range:

Septic tank or secondary treatment tank problems

- inlet or outlet leaking
- tank walls or base leaking
- manhole not sealed or damaged
- No outlet tee piece on tank outlet
- No access or manhole at or over the tank outlet
- High sludge levels.



Septic tank from EPA Code of Practice

Distribution box problems

- None in use
- Not providing even flow to each outlet as outlets are at uneven levels
- Access junction (AJ) not distributing flow to all outlet pipes
- Distribution box has settled and water is not flowing to all outlets
- No method of adjusting or fine tuning flow from tank to percolation trenches
- Sludge, paper or other debris fouling the distribution box.

Percolation Area or Polishing Filter problems

We have outlined an approach to help establish the cause of a percolation or infiltration area problem at the end of this document. By first establishing the cause of the existing percolation problem(s) the solution can be focussed to the address particular conditions or difficulties that the site poses.



Problems with wet and soggy percolation areas

These problems can be seen by one or more of the following:

- Water ponding on the ground or soggy areas of percolation area
- Effluent water diverted to a drain or ditch
- No knowledge/evidence of where the effluent is going
- Soakpit area overloaded and plugged
- Surface water or stormwater flowing down gradient to overload the percolation area
- Water infiltration to tank or distribution box.
- Drainage pipe with too small perforations instead of standard percolation pipe.
- Percolation trenches aligned downhill so water accelerates and breaks out at surface down gradient
- Percolation area located at low point of site where water cannot infiltrate easily
- Impermeable or poorly draining soil unsuitable for gravity percolation area.
- Polishing filters will often be located on poorly draining soils and may...
 - Have wet areas evident at the interface with indigenous soil
 - Be undersized to cater for the underlying soil



- Have too many perforations or too large perforations to distribute water throughout the filter.
- Have too many pipes so that the pumped dose volume cannot fill the pipe network long enough to distribute water throughout the filter.
- Have an undersized pump not suitable to pressurise the network
- Have an undersized pump tank or compartment volume.
- Have impermeable soil/sand media in the filter
- Have been plugged at the surface due to grease, paper or high strength effluent etc.

Improvement Suggestions

Once the problems have been identified the appropriate methods of improving the wastewater system can be decided. Many of these products can be seen in our brochure entitled Ash Environmental Products and Services.

Septic Tank Improvement Options

Depending on the nature of the septic tank problem identified some or more of the following options may be useful:

- Seal the tank inlet and outlet and tank riser and cover with appropriate sealants
- Replace the manhole and bring to ground level.
- Add an access manhole and riser above the tank outlet and fit a filter screen at the tank outlet.
- Place a pre-assembled filter screen and housing between septic tank and percolation area.
- Replace with a new watertight septic tank fitted with effluent filter screen to protect a new percolation area.
- Sludge tank levels can be assessed using our sludge samplers also known as “sludge judges” to decide if the tank needs to be desludged.
- Replace the tank with a new tank with inlet and outlet seals and filter screen to protect the percolation area.



“Sludge Judge” sampler



New tank access packages -Tank adapter, riser cover and filter and standalone filter in basin.

Distribution Box improvement options

The distribution box may be concrete or heavy duty plastic material and should distribute the effluent evenly to each outlet pipe feeding the percolation area. Many older distribution boxes may not effectively distribute flows between the trenches and replacement may be the best option.

- If no distribution box exists -then add one to feed the 110m perforated pipes
- If an access junction is in use replace it with a flow adjustable distribution box
- Replace a defective distribution box with new flow adjustable distribution box
- If an existing flow adjustable box is in use then adjust the weirs to provide even flows.

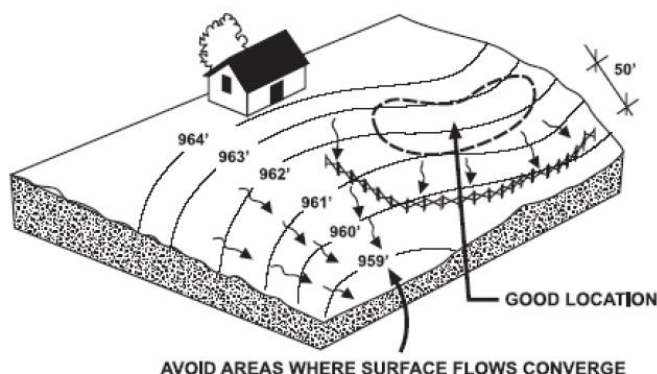


Ash Environmental 7 hole distribution box with flow adjustable weirs feeding multiple percolation trenches

Percolation area and Polishing Filter improvement options

Older percolation areas can often be soakpits while most recent ones are likely to be conventional perforated pipe and gravel filled trenches. Often there is no one solution to “fix” a difficult site or no obvious solution may be evident. A combination of alterations may be necessary to try to improve a difficult situation.

We suggest for both septic tanks and secondary treatment systems that the first step should be to assess the siting location and original design. Then if the siting location and original design are fundamentally satisfactory, that the first focus should be on improving the distribution to the percolation area using either gravity or pressure – i.e. add a distribution box and percolation trenches, extend the percolation area, or pump to a new percolation area. If space is a problem than a pumped polishing filter or a drip distribution system may be the best option. Drip systems can save significantly on the need to import soil, sand and gravel to the site and may be an attractive option.



Finding the right location on the site can be very important



Drip systems can be very cost effective especially when no sand or fill material is required

Depending on the problems identified some or a combination of the following options may be useful to remediate percolation areas and polishing filters:

- Divert surface water, seal inlet and outlet; replace AJ or ineffective distribution box etc.
- Replace the old soakpit or drainfield with a proper percolation area
- Add a filter screen at the tank outlet (internal or external) to protect the new percolation area i.e. by keeping solids in the tank.
- Divert and rest the percolation area using a flow divider or diverter.
- If the indigenous soil will accept the effluent cover the sides of a raised filter with impermeable liner or clay soil to prevent effluent seepage.
- Pumped polishing filters can have a variety of problems and the solution may be complex. However, if valves are fitted where perforated lateral pipes are blocked then flush the laterals by opening and closing flush valves in sequence.
- Add a pump tank and pump to new gravity percolation area
- Pump to a new pressurised polishing filter which will require a smaller area than gravity
- Pump to a new drip system distribution system which will require a smaller area. (Drip systems have been installed in 2 low permeable sites under EPA STRIVE/TCD studies and have successfully been used in other sites. They are also ideal for fast draining soils to maximise the soil treatment).
- Add a secondary treatment system and new percolation area (gravity or pumped).
- Consider UV sterilisation before dispersal if reduced soil treatment is likely.



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Pumped polishing filters must be site specifically “designed” i.e. the quantity and diameter of holes matched to the water volume, the volume of the pipe network and the pump capacity and dose volume.

Picture shows water squiring from all orifices (perforations) with orifice shields ready to be placed over the orifices prior to backfilling to prevent blockage. Too many holes or inadequate pump will result in a continuous “trickle flow” from some orifices closest to the pump probably resulting in overloading and ponding.



Appendix 1 - Establish the Cause of a Percolation Problem

In order to come up with an appropriate design the most likely cause(s) for the infiltration problem should first be established. Infiltration areas (which mostly involves gravity percolation areas and either gravity or pumped polishing filters) are designed and sized based on a calculated organic (BOD and TSS) and hydraulic load. Higher strength effluent with high BOD or grease content or effluent with paper or other solids debris will likely coat or block any infiltration system. Removal at source is usually the best option.

We suggest for both septic tanks and secondary treatment systems that the first step should be to assess the siting location and the original design. If the siting location and original design are fundamentally satisfactory the first focus should be on improving the distribution to the percolation area using either gravity or pressure – e.g. add a distribution box and percolation trenches, extend the percolation area, or pump to a new percolation area. If space is a problem than a pumped polishing filter or a drip distribution system may be the best option. Drip systems can save significantly on the need to import soil, sand and gravel to the site and may be an attractive option.

Old soakaways were used before this level of understanding existed and are likely to be problematic by being either overloaded with surface ponding or to be causing pollution downstream in free draining soils.

The following checklist may assist in establishing the cause of a percolation problem.

1. Assess each system to establish the cause of the malfunction
 - Incorrect siting
 - Poor design
 - Poor construction or materials
 - Lack of maintenance
 - Hydraulic overloading
 - Combination of items.
2. Decide if the existing location of the percolation area is suitable.
3. Check the available space and soil type, home population and usage.
4. Check for:
 - stormwater or drainage water entering percolation area directly or indirectly and divert if necessary to a soakaway or using an up gradient curtain drain.
 - check the soil suitability for a gravity or pressure infiltration system. A pressure system provides better distribution and therefore provides a better option for sub-surface infiltration.
 - availability of additional space to extend or replace the percolation area.
5. Assess the design of gravity polishing filter for leakage, distribution device, pipe suitability etc.



6. Assess the design of pumped polishing filter for:
 - Filter material, blockage of holes, size of pipes and spacing
 - Amount of pipework and dose volume required to pressurise
 - Number of holes (orifices), hole size and hole spacing (too many holes or holes too large may not allow even distribution)
 - Pump capacity and head
 - Pump and float switch operating
 - Flush solids from pipes if possible
 - Replace or upgrade as required.
7. Decide the best option for remediation in consultation with the homeowner and Local Authority.

Please contact us if we can assist you with problem solving or solutions to existing or new wastewater treatment systems. We will be glad to assist you.

Joe Walsh
Ash Environmental
November 2013.

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