

A Guide to Responsible Residential Rainwater and Meltwater Management for Warren Residents

“A paper on approaches to reducing or eliminating the need for municipal storm water management” by Fred Kaluza...Warren Resident

Until fairly recently, the conventional thinking regarding the management of water around residential homes was that it was best collected and ushered into municipal drains to be “handled” by the infrastructure. Due to increasing environmental awareness, energy costs, the continual expansion of impermeable surfaces in residential areas and a desire to enhance the aesthetics of urban/suburban living, that thinking has changed. Let me present my argument for alternative ways to address the issue.

Many municipalities have come to the understanding that the best way to treat this subject is to take a multi-layered approach. Key to achieving the objective is working towards the goal of ensuring that ALL the water that falls on a piece of property is retained ON that property leaving zero for the municipality to deal with. That’s the target anyway and the closer we get to it the better off we’ll all be.

The first approach is to eliminate or reduce the impermeable surfaces on the property. Consider using paver blocks or patio stones for walkways and driveways whenever possible. If your driveway is cracked and you are considering replacement, go with pavers or crushed rock if available. One benefit of pavers or aggregate is that they will never crack as your concrete probably already has. Some people think that pavers make shoveling snow impossible in northern climates but I assure you this isn’t the case. Next, I’ve noticed there are two kinds of sand being used to fill the joints between the paver blocks. One is traditional “beach” or “sharp” sand and the other is a chemical mixture called “polymeric” sand. The polymeric sand is said to form a mortar-like compound that’s less susceptible to dislodgement than regular sand but it’s the joints themselves that give the water a chance to penetrate into the underlying soil. Polymeric sand reduces the permeability of the joints you create and that’s not what we want, so refrain from using it. Basically here in Warren it’s unlikely you’ll encounter slopes where “washout” of conventional sand is going to be a problem. Also, the same frost heave that moves and cracks your driveway and sidewalk is going to be flexing your pavers as well so polymeric sand joints will soon crack anyway.



Obviously some parts of your property need to be impermeable to rainfall and snowmelt, namely the roof, walls and foundation of your home and any out-buildings. With gutters installed

on the edges of the roofs, we can capture most of the rainfall but there is still plenty of moisture that blows against the windows and walls which runs down against your foundation. Here in Warren our soil is old lake-bed and has a high clay content making it less permeable than lighter soils. This is especially true in the winter and early spring when the ground is saturated and frozen. Most homeowners can recall a bad flood or two occurring in early spring when snow and ice above ground is melting and a warm snap brings in copious amounts of rain.

Before rainfall or snow melt can soak in, it's going to flow on the surface under the effect of gravity. This is why we need to establish AND MAINTAIN a decent pitch or slope of soil leading away from the home. Any moisture we can't collect with gutters should be directed to flow away from the walls of the home. I say establish AND MAINTAIN a pitch because you may have noticed things change over time. When your home was originally constructed, the excavator disturbed the compacted soil that had been laying there for the last 12,000 years since it was deposited by the retreat of the glaciers. When the contractor back-filled the loose soil around your foundation, he had to gently replace it so as not to crush the clay drain tiles (or more recently black corrugated PVC tubing with a silt-sock) placed around the base of your foundation.

Removal of collected water around a home with a basement or crawlspace is critical because hydrostatic pressure will otherwise build to the point that it would crush your basement walls or cause the entire home to float up out of the ground. That relatively loose soil is going to subside over time as it attempts to get back to the original compaction level it once had. Take a look at many established homes in the area and note that soil within four or five feet of the house is now actually sloping TOWARD the walls rather than away. Your foundation's drainage system should be considered a last-defense whereas removing collected water from around the home at the surface and having a good slope should be your first priority. Now, let's talk about the water that falls on your roof.

If we're going to minimize the burden on your drain tiles then we want to think about collecting the water that falls on your roof. A roof without gutters only sends that water right onto the "danger zone" as it splashes down within the first few feet of your walls. A home without gutters and with a bad slope around the foundation is a disaster waiting to happen. Traditional open gutters work well but you may want to consider something like the "LeafGuard" product that prevents leaves and seeds from getting into the gutter. LeafGuard is a closed-top gutter that uses the surface tension of the water itself to capture it. At a minimum, consider using a screening material over open-trough style gutters. If you go this route, use metal screen inserts if you can find them. Although most outdoor plastic is U.V. stabilized against solar breakdown, it still eventually become brittle after years of summer sun and heat. In my experience there are only two kinds of plastic, the kind that's broken and the kind that's going to break.

Rain Barrels, Rain Gardens and Bio-Swales

Now that we've maximized the permeability of our property and have established a good slope away from our walls and are channeling the water off our roofs into gutters, what do we do next? Well, the choice is obvious in many regions of the world with less fresh water than we have here in Warren, Collecting that water has many benefits. By storing the water onsite we prevent the peak surges in outflow that are so problematic and costly for the municipality. Additionally, we now have the option of using this water at a later time for lawns and gardens. Any water that comes from rain barrels on those hot dry summer days ahead is water that does not need to be pumped, fluoridated, chlorinated and paid for from the municipal supply. Let's do a little math.



A typical home in Warren may have an area of 1200 square feet. Even if the roof has multiple angles and slopes it still presents about 1200 square feet of area to rain falling straight down. Calculating the total volume received during an average ½ inch shower yields about 375 gallons of runoff into the gutters. The more we can keep on hand the better. Even if you have no intended purpose for the collected water, you can release it into the soil at a later date when the ground is dry to avoid those “peak flows. High flows of water carry away topsoil, causing erosion and polluting the Bear Creek, Red Run, Beaver Creek, Clinton River and Lake St. Clair with herbicides, pesticides and fertilizers Rain barrels are an excellent way to hold water for later use or release. Most homes have perhaps four downspouts and garages may have a similar number. A homeowner should consider the prevailing direction of oncoming storms in their area and decide how many barrels they might like to incorporate. At my location the prevailing storms approach from the west and so I have more storage capacity for the rain from downspouts on that side of the house and garage than for those on the east.

For best use of the water collected in your rain barrels you’ll find having some “pressure” at the outlet of the connected hose is a real benefit. City water comes to us from pipes fed by pumps and as such it’s usually around 45 to 55 PSI. The only pressure you get on the water from a rain barrel comes from gravity. You’ll get better results and more satisfaction by placing your rain barrels as high above the ground as is practical for your situation. Still, don’t expect to be running any sprinklers from your rain barrels but having them up higher definitely aids in filling buckets, pails and watering cans. Some people build small scaffolds and others make pedestals of cinder block or decorative stones to place their rain barrels on. You may also want to consider placement behind a shrub or planting something in front of the rain barrels for aesthetic reasons.

Since most rain barrels come in capacities of 50 to 90 gallons, when full they can weigh

between 415 and 750 pounds. That's significant for a scaffold system but negligible if you place them on top of decorative stone columns that are maybe two-feet square. A full 90 gallon barrel would then provide about 1.3 pounds per square inch on the supporting soil beneath. Compare this to what a 200 pound person with a size 12 shoe applies when standing on one leg at about 5.5 pounds per square inch. So, it's not huge but it does compact the soil over time. I mention this because we want to ensure the rain barrel is installed on a level surface and remember, at an earlier point we purposely established a slight pitch AWAY from the walls. In doing so, don't remove soil to create the flat spot. Instead, use some sand or pea gravel to raise the height of the downhill edge of your placement pad until it's level. Use a hand-tamper to pre-compact the base material to offset the settling that is going to continue for several years. I've adjusted my barrel bases twice over the last ten years. Most people opt to have the top of the rain barrel about six feet above the ground. It's a good compromise to provide enough working pressure while still being able to look inside and clean the inlet screens. Rain barrels are cool! You're going to be curious to see how much water they contain at many points throughout the year.



Most rain barrels have a hose connection at the bottom to facilitate regular usage. An additional feature would be the ability to connect multiple barrels together to hold more water than just a single barrel. Manufacturers of modern rain barrels have thought of everything and typically include a screen over the top. The screen filters water coming from your downspouts and keeps mosquitos from laying eggs in the stored water. For old-style open barrels you can simply float a circular piece of wood inside. Incoming water finds its way around the wood to fill the barrel. Meanwhile, the wood presents a "dry surface" above to defeat the mosquitos.

Again, by "doing the math", we can see there will likely be times when we get more rain than we can store and the barrels eventually overflow. What do we do with that excess? The

good news is we still have environmentally friendly alternatives. Don't consider routing that overflow down the driveway and into the street until you've exhausted your other options. Let's talk about rain gardens and bio swales.



A “swale” is simply a low area of land that tends to have winding curves. These can either be naturally formed or created by design as a way to slow the movement of water that's flowing during wet periods. Swales serve to allow sediment suspended in fast-moving water to filter out before moving downstream. They are great ways to remove pollutants, fertilizers and fine particulates from runoff. A “bio-swale” then is simply a swale with active biological filtration. This can include grasses, rushes and sedges among other things whose biological processes absorb and utilize excess nutrients in the water. These compounds would otherwise get into our lakes and streams where they would then cause undesirable algae blooms. Bio-swales (like rain gardens) are not bodies of permanently standing open water. They simply stay wet for a couple days and by that time the water has had a chance to seep slowly back into the soil to replenish the ground water table.

In Warren (as mentioned earlier) the soil generally contains a lot of clay. Even if your property once had several inches (or more) of top soil, there is a chance that the construction of your home brought a lot of that clay to the surface. My own yard has about 14 inches of top soil; sadly we found it by digging through the two feet of clay that lies above it! As such, you may find that water tends to stand open in your yard for more than a couple days after a good rain. Here's where rain gardens come into play.

In a constructed rain garden, the heavy impermeable clay soil is excavated (and can then be used to create decorative landscape berms in your yard) or taken off site altogether. The

“hole” is then backfilled with a mix of sharp sand and compost. You can bring the level pretty-much back to flush with the surrounding soil since it will settle slightly over the years to come. What you’ve just created is a big sponge-like pit to be used in conjunction with the overflow from your rain barrels. Alternatively it can be fed directly with downspout runoff if you don’t use any rain barrels. The depth of the excavation depends on how much collection volume you want to create and going down three feet or so is usually enough to “break-through” that clay “cap” that may be making your soil less permeable than it would be otherwise. The combination of sharp sand, compost and moisture makes an excellent growth medium for the coolest kinds of native moisture-loving vegetation. The plants will attract butterflies in the spring, summer and fall and feed birds all year long! I use native plants exclusively since they evolved specifically for the local conditions thereby requiring very little maintenance. Native plants have long roots that reach deep to stabilize the soil and are the base of the food chain for all our native creatures that are under such pressure from habitat loss. Your rain garden and bio-swale is only limited by your ambition and the size of your property.



You might also think about creating an open pond (either lined or unlined) but I should mention present city code requires it to be no more than 24” in depth if you don’t want a fence around it. Your pond can then be stocked with a few “feeder fish” from the local pet shop. Ours have overwintered beneath the snow and ice without pumps or aeration for years and are now self-sustaining with subsequent generations being born annually.



So, there you have some ideas on what to do with your water. In most parts of the world, water is considered a gift, a blessing and not a nuisance. You can think of the water that comes to your property as one of the benefits of being a homeowner here in Warren and the water is yours to do with as you see fit. Why give it away to anyone or waste it unnecessarily. Integrate it as a beneficial part of your landscaping plan and give it a chance to work the magic that nature intended right there in your own yard!

Below are some links to associated content.

LeafGuard Gutters

<http://www.leafguard.com/>

Rain Barrels

[http://www.google.com/search?](http://www.google.com/search?hl=en&source=hp&q=Rain+barrels&gbv=2&oq=Rain+barrels&aq=f&aqi=g10&aql=&gs_sm=3&gs_upl=78121102251011046511217101010101450186014-21210)

[hl=en&source=hp&q=Rain+barrels&gbv=2&oq=Rain+barrels&aq=f&aqi=g10&aql=&gs_sm=3&gs_upl=78121102251011046511217101010101450186014-21210](http://www.google.com/search?hl=en&source=hp&q=Rain+barrels&gbv=2&oq=Rain+barrels&aq=f&aqi=g10&aql=&gs_sm=3&gs_upl=78121102251011046511217101010101450186014-21210)

SOCWA videos “scroll down to the section on short instructional videos”

http://www.socwa.org/lawns_gardens.shtml

Sources for rain garden plants

<http://www.prairiemoon.com/search.php?mode=search&page=1>

[http://www.prairienursery.com/store/index.php?](http://www.prairienursery.com/store/index.php?main_page=advanced_search_result&search_in_description=0&zenid=594bf51333a35f3b6624e1de40a8fee1&keyword=rain+garden)

[main_page=advanced_search_result&search_in_description=0&zenid=594bf51333a35f3b6624e1de40a8fee1&keyword=rain+garden](http://www.prairienursery.com/store/index.php?main_page=advanced_search_result&search_in_description=0&zenid=594bf51333a35f3b6624e1de40a8fee1&keyword=rain+garden)

Oakland Wildflower Farm

<http://oaklandwildflowerfarm.com/>

