

Case Study – Wildwood Commons and the Environmental Passive Integrated Chamber (EPIC) System.

A Paradigm shift in storm water management, William Mc Cully PE

Mr. Tim Jawor, President of White Horse Development Corporation developed the Wildwood Commons Townhouse development in the City of Willernie, MN. The project was constructed in 2006 and the development comprised of two town home buildings with a total of nine units. Project is located at the intersection of McGregor Avenue and Stillwater Road (Wildwood or CSAH 12) within RCWD boundaries. This in-fill development, on a vacant lot, attracted much opposition due to its proximity to a city boundary between two cities and being in a sensitive watershed with a popular recreational lake. This opposition manifested itself in attention given to how the developer might mitigate for the stormwater impacts and the avoidance of the adjacent wetland. A significant wetland north of the site wrapped itself tightly around the property's NE property corner. The developer had to meet the WCA and avoid or minimize the on-site wetland impacts. The site was a small vacant 30,000 SF lot which once housed a gas station and an engine repair shop. There were reasonable environmental concerns that if the site was contaminated that infiltration practices would exacerbate the problems of conveying pollutants into the adjacent wetland water bodies. Although this wetland, narrowly intersected the NE property corner, the developer was able to avoid impacting the wetland. Much refuse, rubber tires and an enormous concrete block were removed from the actual wetland north of the site but this was deemed an improvement and not an impact to the wetland, although it caused quite a stir with Rice Creek Watershed District (RCWD) and the Minnesota Pollution Control (MPCA) at the time. No significant trees were growing on the lot. However, deciduous trees and a large cottonwood tree were removed from the north and east lot line during construction. New water utilities were moved to avoid any further tree impacts. The buffer to this wetland was seeded with a seed mix that was native to the region as recommended by Jyneen Thatcher of the Washington Conservation District, MN.

There were a number of goals for this project. To be mindful of the current RCWD regulations even though this project fell below their one acre size threshold for a RCWD stormwater permit. RCWD has the following goals:

- Implementing Best Management Practices (BMPs) resulting in smaller downstream conveyance systems being required due to lower runoff rates.
- Reducing demand on city water systems due to less irrigation (water conservation).
- Reducing chances of adverse downstream effects, such as erosion.
- Improving water quality draining to White Bear Lake, MN.
- Providing benefits to existing and future generations.

Mr. Tim Jawor (the Developer) understood that he had to be sensitive to the concerns that many people voiced about the stormwater management. His development team was also aware that this region draining to White Bear Lake was extremely sensitive to water quality concerns raised by residents and two neighboring city councils of Willernie and Mahtomedi. Mr. Tim Jawor, wanted to ensure all concerned parties that he was addressing their concerns in the most thorough way he knew how. Mr. Jawor chose to sand filter and treat all stormwater from the roofs, impervious road surfaces and the rear driveways. He also chose to capture, retain and reuse stormwater for irrigation for his infill development. He wanted to show the development world the next generation stormwater management system. He chose the EPIC system.

The developer's goals in using the EPIC™ system are:

- To implement a stormwater management system that is so incredibly sound that it would bring nothing but positive attention to his project.
- To filter, store, reduce runoff and attenuate domestic runoff rates.
- Mimic natural hydrologic functions of a site before development
- Reduce or eliminate garden irrigation and water usage for residents, in **perpetuity**.
- Cool stormwater prior to it entering the city storm sewer system and downstream water bodies.
- Allow effective stormwater management without producing a mosquito breeding habitat.
- To meet these goals with an affordable solution that has simple maintenance.

This project was constructed using one stormwater management system for all of their stormwater runoff. The EPIC™ stormwater management system was installed in all green areas on the site. These EP areas provide immediate biological and sand filtration, treat, harvest, collect stormwater runoff for irrigation. The EPIC™ mimics the natural hydrologic function by storing water in the soil and the EPIC chambers. This free stormwater is then available to the plants on an “as needed” basis. An EPIC™ system at its normal water level can provide vegetation above with up to three weeks of irrigation water, which get to the plant roots by capillary action. No pumps are part of this irrigation design. In fact this irrigation is a gravity system which does not require winterizing, summerizing and there are no moving parts that can break or freeze. This free source of irrigation water could be supplemented with grey water or a third choice, domestic water if it is ever needed. Excess filtered stormwater eventually is allowed to discharge into a 4-inch PVC storm line which flows to an existing street catch basin located at the corner of McGregor Avenue and Stillwater Road (Wildwood). There are two lines that enter the catch basin from north and south of the townhouse buildings. Although there are immediate benefits to the stormwater rate, volume and water quality provided by the EPIC™ system, the real benefits will be reaped in the future. This one builder, has started the paradigm shift in the industry by installing this versatile system in his project. This may eventually be the norm for all irrigation systems across MN and the USA. Not only does the system provide fantastic environmental benefits but it also saves the end user 50-85% over current irrigation water usage. With these proven results) the real environmental impacts to America’s water usage could be seen in the future when this technology moves from being “new and innovative” to the new standard for stormwater management and irrigation. We at RESI had initial concerns over the “new and innovative” terminology because there is a perception it also means “experimental and unproven”. The inventor’s, Jonas Sipaila's, innovative idea was to: to utilize a proven, reliable medium--sand--therefore taking advantage of first century physics in order to solve twenty-first century problems associated with irrigation and drainage. By combining the concepts of subsurface irrigation, subsurface drainage, and the capillary movement of water through sand from nearby water sources, Jonas invented and received a patent in 1999 for the first pipe designed specifically for contact with sand. Other

subsurface systems have always had problems with clogging, thus hampering their effectiveness, but Jonas' invention has eradicated those problems.

Imagine, as developers adopt this technology, how much water will be saved. This water savings will reduce demand in areas where water is scarce and where pumping of water occurs. The energy saving benefits could be astronomical. Then if grey water (from green building strategies), which can be used with the EPIC™ system, is used as a reliable supply, many irrigation systems around the country could become self sustainable. Nobody knows what the true environmental impacts will be of Mr. Jawor's EPIC decision.

These project partnerships started with a developer that wanted to solve a current stormwater challenge recognized an innovative yet simple solution when it was introduced to him by RESI. RESI then engineered the project and managed the approval process with the City of Willernie, Willernie City Engineer, RCWD, Washington County and the MPCA. Discussions were had with the City of Mahtomedi, although they did not have any jurisdiction over the project even though their city hall is located directly across the street from the Wildwood Commons townhouse project. Without everyone's review and approval of the simple, gravity stormwater management system this project would not have been accepted at the city level. Having the City Engineer, Mr. Les Mateffy comprehensively understand and approve the EPIC™ system, essentially endorsed the EPIC™ system for the City of Willernie. With their approval, all other issues with the MPCA, Washington Soil and Water Conservation District and RCWD were overcome. At one point some contamination was found and officially remediated with the help of TetraTech, Inc. working with the MPCA. The EPIC™ system, in this application, proved to be an effective solution preventing any further leaching or contamination plume movement to the wetlands or ground water because the EPIC™ system essentially caps the remediated soil from further infiltration. By design on this project, the EPIC™ system's EPDM liner prevents infiltration. If infiltration was a stormwater management objective, it is also possible with the EPIC system.

This is the first project in the 7 county metro area of MN to solely rely upon one BMP for the entire sites stormwater management system. It is called the EPIC™ system and is based on

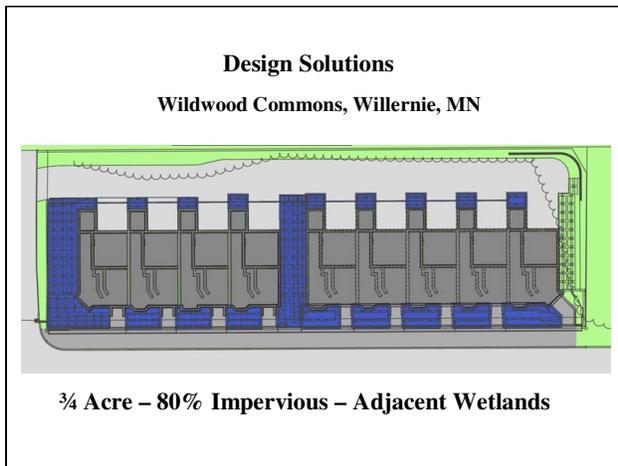
the oldest of technology, a sand filtration system and a patented and proprietary device that controls subsurface water flow. EPIC is an underground irrigation, drainage, stormwater harvesting and storage management system. The EPIC captures and stores stormwater as soon as it flows over the EPIC™ system. EPIC can turn all of your green space, shoulders, side slopes, ditch slopes linear BMP into a stormwater management system. EPIC™ captures and quadruple filters sheet flow and stormwater runoff and slowly releases the excess downstream in a controlled manner. It also moves stormwater pollutants up into the soil where they are actually available for plant uptake. It is for this reason the system is so effective at polishing stormwater runoff. The landscaping, sand filtration and the raised 2” PVC outlets provide additional stormwater treatment. If cities and watershed districts are looking for reasons to offer incentives for developers to use LID techniques, I would challenge them to look at the EPIC™ benefits, compare them to other irrigation systems and BMPs and voice and come out with a statement regarding it implementation and used base on it phenomenal uses. All of which have not been covered in this article.

To summarize the system, the most basic explanation would describe EPIC™ as a passive subsurface irrigation and drainage system which uses capillary physics and gravity to deliver water and nutrients to the plants and move water through an interconnected series of chambers and pans. The low pressure and greatly reduced water volume means less energy is needed to move the water.

At its simplest, the EPIC™ system works like this: rather than allowing stormwater to run off impervious surfaces to traditional infrastructure - the gravity based EPIC™ system (essentially a network of underground reservoirs) captures and filters stormwater runoff at its source and stores the water for irrigation.

By using a layer of porous sand beneath the surface of the turf, EPIC™ draws and filters water to an underground storage area created through the combination of chambers, pans, and PVC pipes. From this, water can then be wicked up (capillary action) through the same sand to the plant roots, thus taking care of all irrigation needs.

Therefore, while relying on zero moving parts and on an efficiency of 100%, this single product provides superior drainage, irrigation and phenomenal stormwater management benefits to a water resources industry hungry for real solutions.



Wildwood EPIC System Performance

Date	Precipitation (in)	Wildwood Commons Potential Runoff	EPIC System Actual Outflow
6/16 thru 9/24/07	13.55	32,181 c.f.	14,172 c.f.

Total Reduction 56%

Site Runoff Reduction

Date	Wildwood Commons Potential TP Load	EPIC System TP Load Outflow
8/11 thru 9/20	0.2 lbs	0.019 lbs

Phosphorus Reduction

Total Reduction 85%