**GROUNDWATER QUALITY CONSIDERATIONS RELATED TO USE OF EGRP**

**By Michael Bateman, P.E.; January 2019**

**BACKGROUND:** EGRP can be used to remediate stormwater treatment ponds that are not functioning properly, i.e. ponds that do not recover properly and have standing water for days and weeks after a storm event. Similarly, EGRP can be used to facilitate percolation of surface waters in landscape areas that have consistent problems related to standing water after rainfall.

**QUESTION 1** – EGRP is placed a minimum of 2 feet below the soil or pond bottom. Does 2 feet of soil between the bottom of a stormwater treatment pond and the top of the EGRP unit provide sufficient buffer to preclude transport of most stormwater pollutants into adjacent groundwater or surface water?

**ANSWER: *The presence of 2 feet of soil between the pond bottom and the top of the EGRP should be considered as protective of groundwater resources for those ponds receiving typical urban; residential; or highway runoff.***

**DISCUSSION:**

A design incorporating a minimum of 2 feet of soil beneath the pond bottom for percolation is widely accepted as protective of downgradient groundwater. This is recognized by several of Florida’s Water Management District’s rules and can be found in the design criteria for Underdrains; Exfiltration Systems; and Filter Systems (See NWFWMD Applicant’s Handbook References below).

For example, Underdrains Systems require a minimum of 2 feet of separation between collection pipes and the pond bottom. According to NWFWMD Applicant’s Handbook Volume II, Section 6.1, *“Underdrain systems provide excellent removal of stormwater pollutants. Substantial amounts of suspended solids, oxygen demanding materials, heavy metals, bacteria, some varieties of pesticides and nutrients such as phosphorus are removed as runoff percolates through the vegetation and soil.”* Also, *“To provide proper treatment of the runoff, at least two feet of indigenous soil is required between the bottom of the basin storing the treatment volume and the outside of the gravel envelope.”* In the case of Underdrain systems, the 2 feet of soil provides the necessary travel distance for pollutant removal as stormwater is percolated through the sediments. Research regarding pollutant removal is discussed briefly below.

Very early after the adoption of stormwater infiltration practices into state rule (Retention BMPs), several independent studies were conducted to evaluate the effect of stormwater treatment systems on groundwater quality. Quoting: *“Analysis…of water quality data in groundwater below the pond at the retention pond…were never significantly higher than in groundwater from the control wells”* (Shiffer, 1989). Also, *“Results of the study indicate that natural processes occurring in soils attenuate inorganic constituents in runoff prior to reaching the receiving groundwater”* (Shiffer, 1989).

A significant study was commissioned by DEP resulting in similar results, *“Sediment concentrations of heavy metals were attenuated rapidly with increasing sediment depth…the increase in sediment metal concentrations resulting from inputs of stormwater runoff has been limited to within the top 10-15 centimeters below pond and swale areas”* (Harper, 1988).

Research indicates that the first 4 to 6 inches (10-15 centimeters) of soil depth within the stormwater pond bottom are effective at retaining most of the pollutants of concern. These results are for typical urban; residential; or highway runoff, and may not be transferrable to sites with *unusually high* concentrations of pollutants such as industrial facilities, particularly if native soils are considered “excessively drained” sandy soils with very high permeability.

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**QUESTION 2** – Does remediation of a stormwater pond (to increase infiltration) with EGPR increase the transport of pollutants resulting in increased adverse effects to adjacent groundwater or surface or waters due to increased movement of groundwater?

**ANSWER:** ***The use of EGRP to enhance groundwater infiltration meets the intent of the associated ERP permit and does not increase pollutant transfer. Rather, it allows the pond to percolate the treatment volume within the required 72 hours as designed.***

**DISCUSSION:**

Installation of EGRP merely facilitates the infiltration of the stormwater captured in the treatment pond, in accordance with the intended performance criteria for such systems.

For example, Section 5.3 of Applicant’s Handbook Volume II (Retention Systems), requires that the treatment volume be infiltrated within 72 hours. In other words, the treatment volume generated after each storm event is intended to be infiltrated into the groundwater. This infiltration is authorized by the ERP permit with the full intention to percolate all of the treatment volume into the surficial aquifer.

When EGRP is used to facilitate percolation, it does not increase the volume of water intended for the surficial aquifer, rather it simply allows the pond to function as designed and required by rule. This percolation is recognized and authorized by the Water Management District and DEP under the ERP permit.

Lastly, EGRP has been accepted by the DEP as a viable technology for use with stormwater runoff in Florida as recognized by listing EGRP on DEP’s web-based Technical Library. Please see listing under Parjana, Inc. at <https://fldeploc.dep.state.fl.us/tech_portal/accept_list.asp?prog_choice=Water>

**REFERENCES**

1. NWFWMD Applicant’s Handbook Volume II, Sections 6, 7; and Appendix B, adopted by Rule 62-330, F.A.C.
2. Harper, Harvey H., 1988. Effects of Stormwater Management Systems on Groundwater Quality. Final Report to Florida Department of Environmental Regulation, Project WM 190, September 1988, pp 445-450.
3. Shiffer, Donna M., 1989. Effects of Three Highway-Runoff detention Methods on Water Quality of the Surficial Aquifer System in Central Florida. U.S. Geological Survey, Water-Resources Investigations Report 88-4170. Prepared in Cooperation with the Florida Department of Transportation, pp 1-2.