Managed Aquifer Recharge: Pretreatment Sedimentation Basin

Ryan Bernardino, Grace Boisen, Kent Ishida, Lillian Greener, & Colleen Anthony

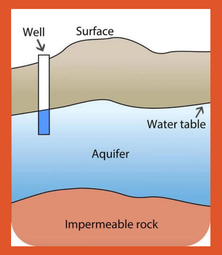
Background

Groundwater

- Used for drinking water, irrigation, industrial, livestock uses
- Over half of the U.S. population rely on groundwater for drinking water
- Stored in aquifers

Managed Aquifer Recharge (MAR)

- Device to inject water back into aquifers
- Many MAR methods require a level of water pretreatment



Images 1 & 2: Example Aquifer and MAR

Project Scope

- Reduce Total Suspended Solids (TSS)
- Minimize Space and Maintenance
- Withstand flow of 1cfs

Considerations

Economic - Instillation, Excavation, Compaction, Concrete, Cleaning

Social - Margin of Operation, improved water supply and quality for community

Environmental- Fertilizer/pesticide contamination, undesired fauna interaction

Oldcastle Infrastructure™ A CRH COMPANY

Oregon State University

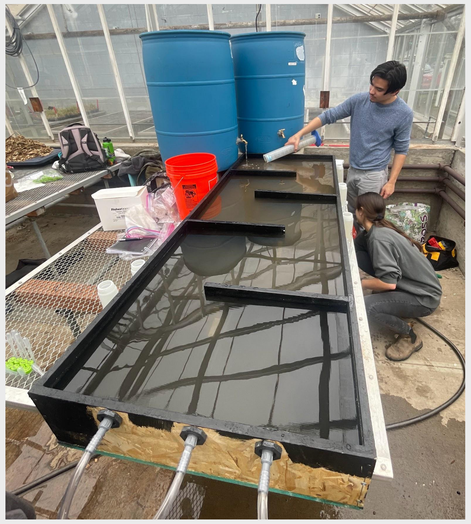


Image 3: Experimental trial with Baffles

Experimental Procedure

Objectives

- Determine if sediment basin can effectively reduce TSS
- Assess two basin configurations: presence & absence of baffles

Experimental Trials

- Create contaminated water source and allow to flow through basin
- Run time: 120 minutes (1 pulse)
- Collect samples at set locations every 10 minutes

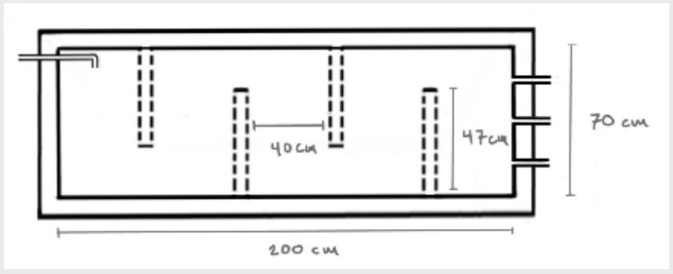


Image 4: Schematic of scaled basin with baffles

Lab Procedure

Gravimetric Analysis

- Tare weight of aluminum dish recorded
- Water sample poured into aluminum dush
- sample dried in oven overnight
- Sample reweighed to determine mass of sediment present in sample

Image 5 & 6: Gravimetric Analysis

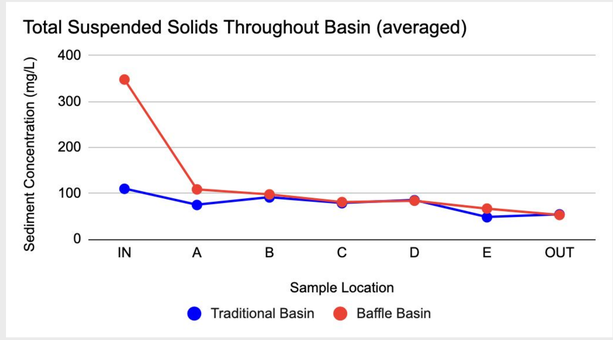


Figure 1: Average TSS Throughout Basin: Traditional vs Baffles

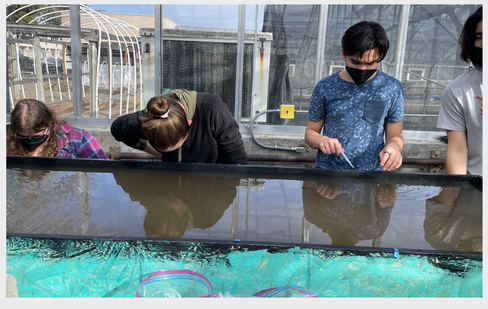


Image 7: Experimental Trial of Traditional Basin

Results

- Observed trend of reduction of TSS in both basin configurations
- Large variation in influent concentrations
- Small variation in effluent (both end at ~50 mg/L)

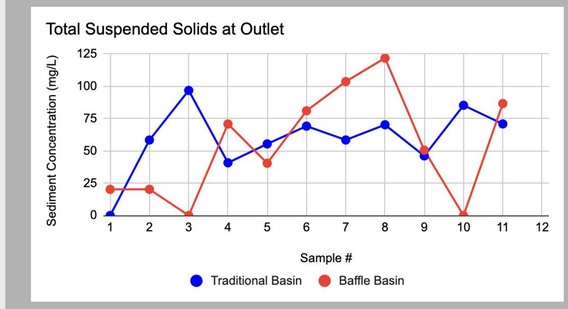


Figure 2: TSS at Outlet: Traditional vs Baffles

Conclusion

- Sediment Basins are a successful method for TSS removal
- No concrete recommendations regarding success of baffles
- Results indicate that baffles either do nothing or improve TSS removal

Special Thanks To!
Salini Sasidharan - Kathryn Thomason - Travis Pacheco - Gurpreet Singh - Frank Chaplen - Elsie Weisshaar - BEE Front Office Staff

Surge Solutions

Citations:
Dillon, P., Alley, W., Zheng, Y., & Vanderzalm, J. (Eds.). (2022). Managed Aquifer Recharge: Overview and Governance. IAH Special Publication
Environmental Protection Agency. (2021, December 29). Ground Water. EPA. Retrieved October 24, 2022, from https://www.epa.gov/report-environment/ground-water
Foundation, C.-12. (n.d.). *12 foundation*. CK. https://flexbooks.ck12.org/cbook/ck-12-middle-school-earth-science-flexbook-2.0/section/8.13/primary/lesson/groundwater-aquifers-ms-es/
Godwin, D., Cahill, M., & Tilt, J. (2018, May 1). *Drywells: Low-impact development fact sheet*. Drywells: Low-impact development fact sheet | OSU Extension Catalog | Oregon State University. https://catalog.extension.oregonstate.edu/em9200/html