

Research Proposal

Improving Hydraulic Infiltration of Existing Systems

Problem Title. How can existing stormwater treatment system designs be modified to improve their hydraulic infiltration capacities?

Problem Statement. Substantial land acquisitions are sometimes needed to construct flow-control facilities when native soils do not infiltrate efficiently, particularly when flow duration criteria are incorporated into the designs using HSPF-based pond sizing models. These land acquisitions can be very expensive, many times accounting for a large percentage of project costs. Most of western Washington has soils with intermediate infiltration capacities, generally less than 5 inches per hour when saturated. If stormwater BMP designs could be modified to enhance their natural infiltration capacity, land acquisitions could be minimized, reducing project costs. Some tools that may be useful for enhancing infiltration capacities can include soil amendments, transitional underground storage areas, check dams, french drains, and groundwater contactors.

Literature Search. It is widely recognized that poor soil quality and widespread compaction in urban areas have, with paved surfaces, significantly reduced the subsurface water storage capacities of urban watersheds. Incorporating soil amendments into vegetated BMPs such as filter strips and biofiltration swales has become routine to promote dense, uniform plant growth and improve its field capacity. An ongoing monitoring study of Interstate 5 compacted highway embankments that were top-dressed with 4 inches of composted yard waste and revegetated has shown dramatic (>70 percent) reductions in runoff volumes as well as significant water quality improvements. There is also a good potential that conveyance channels and biofiltration swale designs can be modified to efficiently infiltrate a high percentage of annual runoff.

Research Methods. During the Highway Runoff Manual revision process, incorporate infiltration enhancing features into the revised BMP designs. Continue to lobby for flow control credits for implementing “low impact development” integrated management practices, including compost-amended filter strips, engineered roadsides, natural or engineered dispersion, pervious pavement, infiltration trenches, and bioretention areas. Review technical literature on a regular basis for applicable results and new products.

Partnering Opportunities. Significant within western Washington, but limited elsewhere. Flow control standards in western Washington are easily the most stringent in the nation and regulatory flexibility on projects are rare. Design modifications to improve infiltration capacity in conjunction with design credits to account for water losses through highway conveyances, appurtenances, and BMPs would allow developers to accurately size end-of-pipe treatment systems and hopefully reduce the land acquisition needs for projects.

Estimate of Costs and Research Duration. Cost estimates have not been developed. Cost for BMP design revision would be relatively low, but cost of monitoring modified BMPs could be between \$50,000 and \$100,000.

Urgency, Payoff Potential, and Implementation. With flow controls being so land-intensive, methods to reduce runoff rates and enhance infiltration have value in containing project costs.

Research Proposer

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