CONSERVATION DESIGN FOR STORMWATER MANAGEMENT

DEFINITION

Conservation Design (or "Non-Structural Approaches") for Stormwater Management follow a low-impact development strategy for site design and for stormwater management Best Management Practice (BMP) selection. Conservation Design for Stormwater Management places less emphasis on structural stormwater practices—such as large ponds and sand filters—and emphasizes site design that reduces impervious areas. Conservation Design approaches also highlight the value of a water-budget approach to site design where recharge of rainfall is a primary design consideration.

WATER QUALITY IMPACTS & TYPICAL LOADINGS

In general, the amount of phosphorus and nitrogen washed off typical urban and suburban lands is directly related to the amount of impervious cover present in that drainage area (Schueler 1998). Once a development exceeds 20 to 25 percent impervious cover range, nutrient loadings to waterways often exceed background levels—despite even the most effective BMPs.

A conventional, medium-density residential development—even with traditional stormwater BMPs in place—can load as much as eight times more nutrients than the mixed forest and meadow it replaces. Site development not employing Conservation Design for Stormwater Management practices likely only minimize the effects of the increased runoff ***rates***, not increased runoff ***volumes.*** Such a scenario likely leads to both increased stream channel erosion and sediment deposition.

MANAGEMENT TECHNIQUES & TYPICAL REDUCTIONS

Non-Structural approaches to Stormwater Management include measures that:

- reduce impervious cover,
- spread runoff over areas that promote infiltration,
- utilize open channel drainage/swales, and
- use natural areas including buffers for stormwater purposes.

Management techniques for reducing impervious cover can range from reducing road widths and clustering residential dwellings, to encouraging shared parking facilities and driveways. Medium residential developments employing Conservation Design for Stormwater Management have been estimated to reduce nutrient loading as much as *40 to 60 percent less than conventional site development*.

The Conservation Design also features a strategy that combines reduction in impervious cover with the need to replicate, as closely as possible, pre-development hydrology.

A residential subdivision that utilizes a cluster option for the homes increases the amount of open space that could typically be used to meet stormwater management needs. With less impervious cover, less runoff is generated. There is a better chance that the use of swales as a conveyance system, a buffer area along the stream corridor, and natural area recharge will all reduce the need for expensive, land consumptive stormwater BMPs.

TYPICAL COSTS

The use of Conservation Design for Stormwater Management may reduce project costs associated with land development. Home clustering reduces the amount of roadway and utilities necessary to serve residential communities. Compared to traditional approaches, Conservation Design approaches can also provide substantial stormwater management savings:

- Use of Conservation Design techniques in a Davis, California residential development saved $800 per home (Lipan and Brown 1996).
- A Delaware DNREC subdivision redesign example for Tharpe Knoll reflected a 56-percent infrastructure cost savings.

Particular site features and characteristics will influence which, where, even whether, Conservation Design elements can be incorporated—making costs and cost-savings difficult to generalize.

IMPLEMENTATION ISSUES

Not every land development project can use the Conservation Design principles described. Physical site features—soils, topography, wetlands, and proximity to ground and surface water bodies—influence design suitability. More importantly, proper site conditions, planning, and zoning restrictions may even *discourage* use of Conservation Design in site development. Land use agencies need to recognize the present codes, comprehensive plans, and laws *may not* support the progressive design elements that can be incorporated into the land development process. Public education is crucial—to demonstrate to the land development community and to regulators—that innovative approaches to stormwater management can work better, be less costly, and positively affect both the environment and regional economic development.

APPOQUINIMINK WATERSHED

This fact sheet was prepared by the Delaware Department of Natural Resources and Environmental Control's Whole Basin Team for citizens and stakeholders interested in one of Delaware's most environmentally and economically attractive areas—the Appoquinimink River and its surrounding lands, surface and ground waters.

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