Summary Fact Sheet

Category: 4.0 Site Design Strategies
Practice: 4.1 Disconnect Impervious Areas/Downspout Disconnection

General Description: Runoff from connected impervious surfaces commonly flows directly to a stormwater collection system with no possibility for infiltration into the soil. For example, roofs and sidewalks commonly drain onto roads, and the runoff is conveyed by the roadway curb and gutter to the nearest storm inlet. Runoff from numerous impervious drainage areas may converge, combining their volumes, peak runoff rates, and pollutant loads. Disconnection decouples roof leaders, roadways and other impervious areas from stormwater conveyance systems, allowing runoff to be collected and managed on site or dispersed into the landscape. Runoff is redirected onto pervious surfaces such as vegetated areas, reducing the amount of directly connected impervious area and potentially reducing the runoff volume and filtering out pollutants.

Water Quantity Controls
Routing runoff to vegetated areas will reduce the peak discharge and stormwater volume by providing an opportunity for infiltration and evapotranspiration. The potential exists for runoff to be completely taken "out of the system" by spreading it out and infiltrating it over pervious surfaces and BMPs. The impact of disconnection on stormwater volume and peak discharge is dependent upon the area to which the stormwater is directed.

Disconnection can also reduce the calculated peak discharge rate by increasing the time of concentration (t_c; see fact sheet 4.4). The time of concentration can be calculated using TR-55 as specified in section 6-0802 of the PFM.

The peak discharge rate for the site can be calculated using SCS methods (TR-20 and TR-55) or the Rational Formula, as discussed in sections 6-0802 and 6-0803 of the PFM, respectively. Lower runoff velocities will result in greater contact time with the soil, potentially increasing the runoff volume lost to infiltration.

Factors influencing runoff velocity include slope and surface roughness. Decreasing the slope and increasing surface roughness (i.e. Manning's *n* or the Surface Code in TR-55) will reduce the runoff velocity. The time of concentration can also be increased by increasing the length of the flow paths; for instance, by increasing circuitousness.

Water Quality Controls
Water quality benefits are gained from disconnection practices because a percentage of the overall stormwater volume infiltrates into pervious areas or is lost through evapotranspiration. Pollutant load from impervious areas is a product of pollutant concentration and the stormwater volume. Disconnection practices decrease the total volume of stormwater discharged to receiving water bodies. Therefore, the reduction in pollutant and nutrient loading attributed to disconnection is dependent upon the reduction in stormwater volume.

Location: Disconnection practices may be applied in almost any location, but impervious surfaces must discharge into a suitable receiving area for the practices to be effective. Runoff must not flow toward building foundations or onto adjacent private property. Typical receiving

areas for disconnected impervious runoff include vegetated BMPs (e.g. filter strips or bioretention) and other existing landscaping such as shrubs.

Design Construction and Materials: Disconnecting impervious areas requires little construction and few materials. Rooftop disconnection will require minimal modification to the downspouts to redirect runoff away from the collection system or other impervious areas. Various other methods are available to disconnect impervious areas, but typical procedures may include curb cuts to encourage stormwater flows away from inlets and open area modifications to enhance the infiltration characteristics of receiving areas. Other modifications include flow spreading and leveling devices, which may be used to encourage shallow sheet flow through vegetated areas. Soil amendments to increase soil permeability are also a possible design option.

Cost: Disconnecting impervious areas is a management technique and does not require maintenance costs as with other BMPs. Disconnecting roof leaders, for example, requires simple modifications typically costing $100 or less. There is generally assumed to be little cost associated with implementing a disconnection program.

Maintenance: Related maintenance activities are primarily focused on the areas designated to receive stormwater runoff. Engineering infiltration areas should be routinely checked to ensure that they are free of debris and trash. Both vegetated and constructed infiltration areas should be inspected for sediment accumulation. Additionally, receiving areas should be inspected for signs of channelized flow and signs of compaction.

Performance and Inspection: Disconnection practices may require annual inspection to ensure that the stormwater is still directed to the desired location. Requirements to measure performance are minimal.

Downspout disconnection into vegetated area
Source: PGDER

Downspout disconnection into vegetated area
Source: LID Center

Potential LEED Credits:

Primary: Sustainable Sites – Credit 7.1 “Landscape & Exterior Design to Reduce Heat Islands” (1 Point)
Sustainable Sites – Credit 6 “Stormwater Management” (1-2 Points)
Other: Innovation & Design Process (1-4 Points)

Links to Additional Information:

Fairfax County PFM:

http://www.co.fairfax.va.us/dpwes/publications/pfm/6.htm

Virginia Stormwater Management Handbook:
http://www.dcr.virginia.gov/sw/stormwat.htm#pubs

Northern Virginia BMP Handbook:
http://www.novaregion.org/pdf/NVBMP-Handbook.pdf