Impervious Area (Simple) Disconnection

Impervious area (simple) disconnection can be used to direct runoff from roofs, driveways, roads, parking lots, and solar arrays to natural or landscaped vegetated areas that are of sufficient size and with adequately permeable soils (also called "Qualifying Pervious Areas" or QPAs) to disperse and retained runoff without causing erosion, basement seepage, or negative impacts to adjacent downgradient properties. QPA's may also be referred to as Qualifying Natural Dispersion areas in other stormwater management guidance / manuals locally or nationally. QPAs with flatter slopes, pervious soils, and a dense stand of vegetation are better suited for maintaining dispersed flow. Level spreaders may also be used to disperse the discharge, enhance infiltration, and avoid flow concentration and short-circuiting through the pervious area.

Credit Description

An impervious area disconnection credit is available when runoff from rooftops, driveways, roads, parking lots, and solar arrays are directed to a QPA such that the appropriate portion of the site's WQV is dispersed and retained/infiltrated on-site without causing erosion, basement seepage, or negative impacts to adjacent downgradient properties. This technique involves grading the site to direct runoff as sheet flow to specially designed vegetated areas that can treat and infiltrate the runoff.

If stormwater runoff from an impervious area is directed to a QPA that meets the minimum criteria described below, the area can be deducted from the total impervious area, reducing the

required Water Quality Volume and Required Retention Volume of the site and the size of the structural stormwater BMPs needed to meet the retention and treatment requirements of Standard 1.

Minimum Criteria for Credit

The impervious area disconnection credit is subject to the following general criteria and restrictions,[62] which apply to disconnection of runoff from all types of impervious surfaces.

General Criteria

- QPAs must be clearly shown and labeled as such on site plans.
- QPAs must be located outside of regulated wetland areas but may be used within the outer portion of wetland buffer areas (i.e., upland review areas) if allowed by the approving authority.
- Excessively fertilized lawn areas cannot be used as a QPA. For lawn areas to be considered as QPAs, they must consist of low-maintenance grasses adapted to the New England region (refer to Section 5.4.2 on the use of low-maintenance landscaping).
- QPAs can only receive runoff from land uses with higher potential pollutant loads (LUHPPLs), as defined in Chapter 10 - General Design Guidance for Stormwater Infiltration Systems, provided that no runoff from the areas or activities that may generate runoff with a higher potential pollutant load is directed to a QPA.
- The QPA must be designed to not cause basement seepage. To prevent basement seepage, at a minimum, the QPA must be at least 10 feet away from any building foundation and must be directed away from any building foundation. This credit shall not be utilized in locations where there is a history of groundwater seepage and/or basement flooding.
- Construction vehicles must not be allowed to drive over the QPA to prevent compaction of the soil. If it becomes compacted, the soil must be amended, tilled, and re-vegetated once construction is complete to restore infiltration capacity.
- The QPA must have a minimum of 4 inches of topsoil or organic material. The QPA must sustain healthy vegetative cover (dense herbaceous vegetative ground cover) over the long term. Existing vegetation, grasses, and/or plantings are acceptable. Vegetation must

[62] These criteria have been adapted from the Rhode Island Stormwater Design and Installation Standards Manual (2015), MA MS4 General Permit Appendix F (2021), CTDOT Guidance for Natural Dispersion/Vegetative Filter Areas (2021), Trinkaus Engineering, LLC Morris, CT Low Impact Sustainable Development and Stormwater Management Design Manual (2018), CT DEEP Construction Stormwater General Permit Appendix I (Stormwater Management at Solar Array Construction Projects), and New Jersey Stormwater BMP Manual (2004).

cover 90% or more of the QPA. Forested areas used as QPAs must have dense herbaceous vegetative ground cover to effectively disperse flows and prevent soil erosion.

- The slope of the QPA shall be less than or equal to 8% for lawn and less than or equal to 15% for undisturbed meadow or forested areas. Full or partial credit for QPA's outside of this slope criteria may be given based on-site specific conditions and the design retention requirement as approved by the review authority.
- Flow from the impervious surface must enter the QPA as sheet flow. All discharges onto the QPA must be stable and non-erosive.
- Upon entering the QPA, all runoff must remain as sheet flow. The shape, slope, and vegetated cover in the QPA must be sufficient to maintain sheet flow throughout its length.
- A vegetated channel, swale, or structural stormwater BMP may be necessary downgradient of the QPA to manage stormwater from larger storm events that is not fully retained within the QPA for stormwater quantity control purposes.
- The flow path through the QPA should comply with the setbacks established for structural infiltration BMPs (refer to Chapter 10 - General Design Guidance for Stormwater Infiltration Systems).
- QPAs should have a depth to the seasonal high groundwater table shall be 18 inches or greater. HSG classification will influence infiltration rates see Chapter 10 for guidance regarding the classifications and expected rates. HSG classification and depth to seasonal high groundwater table must be field verified by a Qualified Professional through field evaluation (i.e., test pits or soil borings) (refer to soil evaluation guidance in Chapter 10 - General Design Guidance for Stormwater Infiltration Systems).
- The QPA must be included in the Operation and Maintenance (O&M) Plan required by Standard 4. The O&M Plan shall include measures to inspect the QPA at least annually to remove any deposited sediment (e.g., sand from winter sanding operations) and trash, address any ponding and erosion, and re-plant any vegetation that has died to maintain vegetative cover of 90% or greater.
- The QPA must be owned or controlled (e.g., drainage easement) by the property owner and must remain as a landscaped or natural vegetated area over the long term.

The following additional criteria and restrictions apply to disconnection of runoff from the specific types of impervious surfaces listed below.

Roof Runoff

- The rooftop area contributing runoff to any one downspout cannot exceed 1,000 ft^2.

- If designing for retention of the full WQV the length of the QPA (in feet) is recommended to be equal to or greater than the contributing rooftop area (in square feet) divided by 13.3 (e.g., for 1,000 ft^2 roof/13.3 = 75 ft). Treatment can be achieved at varying lengths and widths.

- If designing for retention of the full WQV the width of the QPA is recommended to be equal to or greater than the roof length. For example, if a roof section is 20 feet wide by 50 feet long (1,000 ft^2 roof), the width of the QPA shall be at least 50 feet. Treatment can be achieved at varying lengths and widths.

- Although they may abut, there shall be no overlap between QPAs. For example, the runoff from two 1,000 ft^2 sections of roof must be directed to separate QPAs. They shall not be directed to the same area.

- Where provided, downspouts must be at least 10 feet away from the nearest impervious surface (e.g., driveways) to prevent reconnection to the stormwater drainage system.

- Where provided, downspouts must have a splash pad, level spreader, or dispersion trench to reduce flow velocity and induce sheet flow in the QPA.

- Where a gutter/downspout system is not used, the rooftop runoff must be designed to sheet flow at low velocity away from the structure housing the roof using an infiltration trench or similar level spreader.

- To take credit for rooftop disconnection associated with a LUHPPL (for non-metal rooftops), the rooftop runoff must not commingle with runoff from any paved surfaces or activities or areas on the site that may generate higher pollutant loads.

Driveway, Road, and Parking Lot Runoff

- The maximum contributing flow path from driveway, road, and parking lot impervious areas shall be 75 feet.

- QPA Sizing (0-8% slope): The length of the QPA (i.e., the dimension parallel to the direction of flow) must be equal to or greater than the length of the contributing impervious area. The width of the QPA (i.e., the dimension perpendicular to the direction of flow) shall be no less than the width of the contributing impervious surface. For roads, the minimum QPA width is 25 feet.

- QPA Sizing (8-15% slope): The length of the QPA must be equal to or greater than the length of the contributing impervious area. The width of the QPA shall be no less than the twice the width of the contributing impervious surface. For roads, the minimum QPA width is 50 feet. Full or partial credit for QPA's outside of this slope criteria may be given based on site specific conditions and the design retention requirement as approved by the review authority.

- Although they may abut, there shall be no overlap between QPAs. For example, the runoff from two consecutive segments of road must be directed to separate QPAs. They shall not be directed to the same area.
- Runoff from driveways, roadways, and parking lots may be directed over soft shoulders, through curb cuts, or level spreaders to QPAs. Measures must be employed at the discharge point to the QPA to prevent erosion and promote sheet flow.
- The drainage design must account for snow shelf blocking runoff during winter months.
- Salt tolerant vegetation shall be chosen for all roadside applications.

Solar Array Runoff

Roadways, gravel surfaces, and transformer pads within the solar array are considered Directly Connected Impervious Area (DCIA) for the purposes of calculating WQV. Solar panels are considered unconnected and therefore eligible for the impervious area disconnection credit if all of the following criteria are met:

- Post-construction slopes below the solar panels are less than 15%.
    - For slopes less than or equal to 5%, appropriate vegetation shall be established that will ensure sheet flow conditions and that will provide sufficient ground cover throughout the site.
    - For slopes greater than 5% but less than 10%, practices including, but not limited to, level spreaders, terraces, or berms shall be used to ensure long term sheet flow conditions.
    - For slopes greater than or equal to 8%, use erosion control measures in accordance with solar array requirements contained in the CT DEEP Construction Stormwater General Permit and the Connecticut Soil Erosion and Sediment Control Guidelines, as amended.
    - For slopes equal to or greater than 10% and less than 15%, use engineered stormwater control measures[63] designed to provide permanent stabilization and non-erosive conveyance of runoff to the property line of the site or downgradient from the site.
- The vegetated area receiving runoff between rows of solar panels is equal to or greater than the average width of the row of solar panels draining to the vegetated area.

[63] Engineered stormwater control measures does not refer to exclusively implemented by engineers, but rather the consideration that natural solutions may not solely provide the benefit needed.

- Overall site conditions and solar panel configuration within the array are designed and constructed such that stormwater runoff remains as sheet flow across the entire site and flows towards the intended stormwater management controls.
- The solar panels shall be designed and constructed in such a manner as to allow the growth of native vegetation beneath and between the panels. Pollinator-friendly vegetation is strongly encouraged. Chemical fertilization, herbicides, or pesticides cannot be used except as necessary to initially establish the vegetation.
- The lowest vertical clearance of the solar panels above the ground shall not be greater than 10 feet. The panels shall, however, be at an adequate height to support vegetative growth and maintenance beneath and between the panels. If the lowest vertical clearance of the solar panels above the ground is greater than 10 feet, non-vegetative control measures are required to prevent/control erosion and scour along the drip line or otherwise provide energy dissipation from water running off the panels.
- Appropriate vegetated buffers and setback distances between solar panels and downgradient wetlands or waters and property boundaries are maintained consistent with the requirements of the CT DEEP Construction Stormwater General Permit.

Additional Information Sources

- Sustainable Land Use Regulation Project and Model Regulations (Capitol Region Council of Governments)
- Livable Communities Toolkit: A Best Practices Manual for Metropolitan Regions (Capitol Region Council of Governments)
- Smart Growth Guidelines for Sustainable Design & Development (EPA and Capitol Region Council of Governments, November 2009)
- Transit Oriented Development Toolkit for CT (Connecticut Fund for the Environment, Partnership for Strong Communities, Regional Plan Association, Tri-State Transportation Campaign)
- Transit-Oriented Development and Responsible Growth Website (Connecticut Department of Economic and Community Development)
- Rhode Island Low Impact Development Site Planning and Design Guidance Manual (Rhode Island Department of Environmental Management and Rhode Island Coastal Resources Management Council, March 2011)
- The Rhode Island Conservation Development Manual: A Ten Step Process for the Planning and Design of Creative Development Projects (Rhode Island Department of Environmental Management, June 2003)
- City Green: Innovative Green Infrastructure Solutions for Downtowns and Infill Locations (EPA, May 2016)
- Smart Growth/Smart Energy Toolkit Modules – Open Space Design (OSD)/Natural Resource Protection Zoning (NRPZ) (Massachusetts Executive Office of Energy and Environmental Affairs)
- Water Quality Scorecard: Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (EPA 2009)
- Better Site Design Code and Ordinance Worksheet – 2017 Update (Center for Watershed Protection (December 2017)
- EPA Smart Growth Publications
- Smart Growth Network
- Sustainable Sites Initiative