

11.0 Post Construction BMPs Standards and Specifications

11.9 Sheet Flow to Vegetated Filter Strip or Vegetated Open Space

11.9.1 Vegetated areas can treat sheet flow delivered from adjacent impervious and managed turf areas by slowing runoff velocities and allowing sediment and attached pollutants to settle and/or be filtered by the vegetation. Vegetation can consist of grasses, planted trees, or existing forest. Design variants include:

11.9.1.1 Sheet Flow to Grassed Filter Strip

11.9.1.2 Sheet Flow to Afforested Filter Strip

11.9.1.3 Sheet Flow to Forested Filter Strip

11.9.1.4 Sheet Flow to Grassed Open Space

11.9.1.5 Sheet Flow to Afforested Open Space

11.9.1.6 Sheet Flow to Forested Open Space

11.9.2 Sheet Flow practices receive the following annual runoff reduction and pollutant reduction credits.

11.9.2.1 The R_{Pv} runoff reduction performance credit for a Vegetated Filter Strip on A/B soil or compost amended C soil is as follows:

11.9.2.1.1 Grassed filter strips receive 25% annual runoff reduction performance credit.

11.9.2.1.2 Afforested filter strips receive 30% annual runoff reduction performance credit.

11.9.2.1.3 Forested filter strips receive 40% annual runoff reduction performance credit.

11.9.2.2 The R_{Pv} runoff reduction performance credit for a Vegetated Filter Strip on C/D soil is as follows:

11.9.2.2.1 Grassed filter strips receive 10% annual runoff reduction performance credit.

11.9.2.2.2 Afforested filter strips receive 15% annual runoff reduction performance credit.

11.9.2.2.3 Forested filter strips receive 20% annual runoff reduction performance credit.

11.9.2.3 The R_{Pv} runoff reduction performance credit for Sheet Flow to Vegetated Open Space on A/B soil or compost amended C soil is as follows:

11.9.2.3.1 Grassed open space receives 50% annual runoff reduction performance credit.

11.9.2.3.2 Afforested open space receives 60% annual runoff reduction performance credit.

11.9.2.3.3 Forested open space receives 65% annual runoff reduction performance credit.

11.9.2.4 The R_{Pv} runoff reduction performance credit for Sheet Flow to Vegetated Open Space on C/D soil is as follows:

11.9.2.4.1 Grassed open space receives 20% annual runoff reduction performance credit.

11.9.2.4.2 Afforested open space receives 30% annual runoff reduction performance credit.

11.9.2.4.3 Forested open space receives 40% annual runoff reduction performance credit.

11.9.2.5 The C_v runoff reduction performance credit for all Sheet Flow practices is 10% of the R_{Pv} allowance.

11.9.2.6 The F_v runoff reduction performance credit for all Sheet Flow practices is 1% of the R_{Pv} allowance.

11.9.2.7 The total nitrogen pollutant reduction performance credit for all Sheet Flow practices is 100% of the load reduction.

11.9.2.8 The total phosphorous pollutant reduction performance credit for all Sheet Flow practices is 100% of the load reduction.

11.9.2.9 The total suspended solids pollutant reduction performance credit for all Sheet Flow Practices is 100% of the load reduction.

11.9.3 Sheet Flow Feasibility Criteria

11.9.3.1 To maintain sheet flow through the practice, maximum slope for Filter Strips shall be 8% unless additional calculations are submitted showing the maximum depth and minimum residence time can be met.

11.9.3.2 Filter Strips shall not be used in structural fill areas where material must be compacted to meet specific structural criteria.

11.9.3.3 To maintain sheet flow through the practice, maximum slope for Open Space shall be 3%.

11.9.4 Sheet Flow Design Criteria

11.9.4.1 Stormwater shall enter the filter strip or open space as sheet flow.

11.9.4.1.1 Sheet flow length from impervious surfaces shall be limited to 150 feet.

11.9.4.1.2 A gravel diaphragm or other level spreading device shall be provided for impervious sheet flow lengths greater than 75 feet.

11.9.4.1.3 When the inflow is from a pipe or channel, an engineered level spreader or other device shall be used to convert the concentrated flow to sheet flow.

11.9.4.2 Vegetated Filter Strip

11.9.4.2.1 The maximum length of a Vegetated Filter Strip shall be 100 feet.

11.9.4.2.2 Vegetated Filter Strips shall have the following minimum lengths, measured in the direction of flow, unless calculations are provided in accordance with the Computational Method of Compliance.

11.9.4.2.2.1 Vegetated Filter Strips having slopes less than 3% shall have a minimum length of 20 feet.

11.9.4.2.2.2 Vegetated Filter Strips having slopes between 3% and 8% shall have a minimum length of 30 feet.

11.9.4.3 Vegetated Open Space

11.9.4.3.1 Vegetated Open Space shall have a maximum slope of 3%.

11.9.4.3.2 The minimum area of the Vegetated Open Space shall be equivalent to the impervious area of the contributing drainage area to the Vegetated Open Space.

11.9.4.4 Computational Method of Compliance.

11.9.4.4.1 Vegetated Filter Strips using the Computational Method of Compliance shall meet the following criteria in order to receive RPv runoff reduction credits listed above:

11.9.4.4.1.1 The maximum depth of flow shall be 0.5" (0.04').

11.9.4.4.1.2 The minimum residence time shall be 2.5 minutes.

11.9.4.4.2 Adjusted RPv runoff reduction credit based on the ratio of the computed residence to the minimum residence time shall be applied to Vegetated Filter Strips that meet the maximum depth of flow criteria.

11.9.4.4.2.1 The maximum adjusted RPv runoff reduction credit is 75% for HSG A/B soils and 30% for HSG C/D soils.

11.9.4.4.2.2 RPv runoff reduction credit shall not be adjusted for lengths greater than 100 feet.

11.9.4.5 Soil amendments, when used, shall extend over the length and width of the Vegetated Filter Strip or Vegetated Open Space, and compost shall be incorporated to the depth as shown on the approved plan.

11.9.4.6 All Vegetated Filter Strips and Vegetated Open Spaces must be designed so as to be accessible for maintenance.

11.9.5 Sheet Flow Landscaping Criteria

11.9.5.1 Grassed Filter Strips and Grassed Open Space shall be established at such a density to achieve a 90% vegetated cover for project completion.

11.9.5.2 Afforested Filter Strips and Afforested Open Space shall be planted in accordance with Afforestation requirements.

11.9.5.3 Forested Filter Strips and Forested Open Space shall have no grading or clearing of native vegetation and shall have at least 80% tree canopy coverage.

11.9.5.4 All Vegetated Filter Strips and Vegetated Open Spaces must be stabilized to prevent erosion or transport of sediment to receiving practices or drainage systems.

11.9.5.5 A planting plan shall be provided that indicates the methods used to establish and maintain vegetative stabilization of the Vegetated Filter Strip or Vegetated Open Space.

11.9.6 Sheet Flow Construction

11.9.6.1 No clearing or grading shall take place in Vegetated Open Space except temporary disturbances associated with incidental utility construction, restoration operations, or management of nuisance vegetation. The Vegetated Open Space area shall not be stripped of topsoil.

11.9.6.2 Construction reviews are required during the following stages of construction, and shall be noted on the plan in the sequence of construction:

11.9.6.2.1 Pre-construction meeting

11.9.6.2.2 Initial site preparation including installation of erosion and sediment controls and sensitive area protection surrounding vegetated filter strip locations

11.9.6.2.3 Excavation and grading including interim and final elevations

11.9.6.2.4 Implementation of required stabilization and planting plan

11.9.6.2.5 Final construction review including development of a punch list for facility acceptance

11.9.6.3 Post Construction Verification Documentation.

11.9.6.3.1 Upon facility completion, the owner shall submit Post Construction Verification Documents at the discretion of the Department or Delegated Agency as follows to demonstrate that the Vegetated Filter Strip or Vegetated Open Space has been constructed within allowable tolerances in accordance with the approved Sediment and Stormwater Management Plan and accepted by the approving agency. The following items, as applicable, shall be included in the Post Construction Verification Documentation for Sheet Flow Practices:

11.9.6.3.1.1 Dimensions of Vegetated Filter Strips (length and width).

11.9.6.3.1.2 Area of Vegetated Open Space.

11.9.6.3.1.3 Cross-slope.

11.9.6.3.1.4 Elevations of any structural components, such as gravel diaphragms or engineered level spreaders.

11.9.6.3.1.5 Photo documentation of the grassed filter strip or grassed open space providing verification of achievement of the required 90% vegetated cover.

11.9.6.3.2 Constructed allowable tolerances for vegetated filter strips and vegetated open spaces, if disturbed, shall be within the tolerances of design geometrics for the following parameters:

11.9.6.3.2.1 Slope shall be no greater than 2% steeper than design slope

11.9.6.3.2.2 Length shall be no less than 90% of design length

11.9.6.3.2.3 Width shall be no less than 90% of design width

11.9.6.3.2.4 Elevations of any structural components shall be within 0.15 feet of design elevation

11.9.6.3.3 In the event that the constructed allowable tolerances are exceeded for the vegetated filter strip, supplemental calculations shall be submitted to determine if the vegetated filter strip, as constructed, meets the minimum residence time. The computed residence time rounded to the nearest minute shall be no less than the minimum design residence time.

11.9.6.3.4 Performance of a vegetated filter strip shall be evaluated by the Department or Delegated Agency if requested in writing to determine if reconstruction of a vegetated filter strip that exceeds allowable tolerances is necessary.