Changes & Additions to the VT Stormwater Management Manual

Submitted by Kim Kendall, Staff Scientist, Vermont Natural Resources Council

Better Site Design Checklist

Completion of this checklist is required for new development in stormwater-impaired waters. The aim of the checklist is to aid designers in thoroughly considering "Better Site Design" (BSD) concepts for development projects and to improve the use of the "BSD" credits outlined in Section 3 of the Vermont Stormwater Management Manual. Implementation of BSD will help protect streams from pollutants in urban runoff and associated hydrological changes in streams. The checklist should be completed as early as possible in the design phase.

1. Natural Area Conservation Credit

A stormwater credit is given when natural areas are conserved at development sites, thereby retaining their pre-development hydrologic and water quality characteristics. A simple WQV credit (reduction in the required water quality volume) is granted for all conservation areas protected under the terms of the permit or other locally acceptable means.

1.1. Does the site contain soils with high infiltration capacity or areas in forest cover?

1.2. Can all or a portion of these areas be maintained in a natural vegetative state as a natural area and restricted from development and disturbance for the life of the stormwater permit? If not, explain why.

2. Disconnection of Rooftop Runoff Credit

A credit is given when rooftop runoff is "disconnected" and then directed over to a pervious area where it can either infiltrate into the soil or flow over it with sufficient time and velocity to allow for filtering. The credit is typically obtained by grading the site to promote overland flow through vegetated channels or by providing bioretention areas either on-lot or in common areas.

2.1. Can disconnection of rooftops be designed to adequately address the issue of basement seepage?

2.2. Are soils relatively permeable (HSG A and B)?

2.3. In less permeable soils (HSG C and D), can a spreading device or a temporary storage device such as a french drain or gravel trench be used to provide sheetflow over grass surfaces and to compensate for a poor infiltration capability?

2.4 Can rooftops be disconnected in accordance with the requirements outlined in the Vermont Stormwater Management Manual? If not, explain why.

3. Disconnection of Non-Rooftop Runoff Credit

Credit is given for practices that disconnect surface impervious cover runoff by directing it to pervious areas where it is either infiltrated into the soil or filtered (by overland flow). This credit can be obtained by grading the site to promote overland vegetative filtering.

3.1. Are soils relatively permeable (HSGs A and B)?

3.2. In less permeable soils (HSG C and D), can a spreading device or a temporary storage device such as a french drain or gravel trench be used to provide sheetflow over grass surfaces and to compensate for a poor infiltration capability?

3.3 Can areas of surface impervious cover runoff be disconnected in accordance with the requirements outlined in the Vermont Stormwater Management Manual? If not, explain why.

4. Stream Buffer Credit

This credit is given when a stream buffer effectively treats stormwater runoff. Effective treatment constitutes capturing runoff from pervious and impervious areas adjacent to a stream buffer and treating runoff through the overland flow in a natural buffer. The use of a filter strip is also recommended to treat overland flow in the green space of a development site.

4.1. Are any streams or wetlands present on the site?

4.2. Can a minimum 50-foot buffer be maintained in a natural condition (ungraded, uncompacted and in its natural vegetation) to capture and treat runoff from pervious and impervious areas that are adjacent to the buffer in accordance with the requirements outlined in the Vermont Stormwater Management Manual? If not, explain why.

5. Grass Channel Credit

Credit may be given when open grass channels are used to reduce the volume of runoff and pollutants during smaller storms (i.e. 0.9 inches and less).

5.1. Will the site be developed as moderate to low density residential (maximum density of 4 dwelling units per acre)? (If no, the credit is not applicable.)

5.2. Can grass channels be incorporated into the site design in accordance with the Grass Channel Credit requirements outlined in the Vermont Stormwater Management Manual? If not, explain why.

6. Environmentally Sensitive Rural Devlopment Credit

This credit is given when a group of environmental site design techniques are applied to lower density or rural residential development.

6.1. Will the site be developed as a low density (maximum density of 0.5 dwelling units per acre) residential development? (If no, the credit is not applicable.)

6.2. Can a combination of natural conservation areas, rooftop disconnection, grass channels and stream buffers (if applicable) be applied to the site design in accordance with the requirements in the Vermont Stormwater Management Manual? If not explain why.

Cold Climate Practices Required for Stormwater-Impaired Waters

Implementation of the following practices is required in stormwater-impaired watersheds. The numbers reference Section 2 of the Vermont Stormwater Management Manual (April 2002).

1. 2.7.1.G Ponds, pages 2-22 th. 2-24

Higher Runoff Volumes and Increased Pollutant Loads During the Spring Melt
None

Pipe Freezing and Clogging

- Inlet pipes should not be submerged, since this can result in freezing and upstream damage or flooding.
- Burying all pipes below the frost line can prevent frost heave and pipe freezing.
- Increase the slope of inlet pipes to a minimum of 1% to prevent standing water in the pipe, reducing the potential for ice formation. This design may be difficult to achieve at sites with flat local slopes.
- If perforated riser pipes are used, the minimum opening diameter should be 1/2". In addition, the pipe should have a minimum 6" diameter.
- When a standard weir is used, the minimum slot width should be 3", especially when the slot is tall.
- Baffle weirs (essentially fences in the pond) can prevent ice reformation during the spring melt near the outlet by preventing surface ice from blocking the outlet structure.
- In cold climates, riser hoods should be oversized and reverse slope pipes should draw from at least 6" below the typical ice layer.
- Trash racks should be installed at a shallow angle to prevent ice formation (See Appendix D5 of the Vermont Stormwater Guidance Manual).

Ice Formation
None

Road Sand Build-Up

- In areas where road sand is used, an inspection of the forebay and pond should be scheduled after the spring melt to determine if dredging is necessary. For forebays, dredging is needed if one half of the capacity of the forebay is full.

2. 2.7.2.G Wetlands p.2-34

Many of the cold climate concerns for stormwater wetlands are very similar to the ones for ponds. All the required items above for ponds are also required for wetlands. The additional practices below are for wetlands in particular.

Short Growing Season

- The planting schedule should reflect the short growing season. Site designers should consider incorporating relatively mature plants, or planting dormant rhizomes during the winter.

Chlorides

- Consider use of salt tolerant plants if the stormwater wetland treats runoff from roads or parking lots that are treated with salt.

3. 2.7.3.G Infiltration p. 2-40 th. 2-41

Reduced Infiltration
None

Chlorides
None

4. 2.7.4G Stormwater Filtering Systems p. 2-52

Freezing of Filter Bed
None

Pipe Freezing

- Use a minimum 8" diameter underdrain in a 1' gravel bed. Increasing the diameter of the underdrain makes freezing less likely, and provides a greater capacity to drain standing water from the filter. The porous gravel bed prevents standing water in the system by promoting drainage. Gravel is also less susceptible to frost heaving than finer grained media.

Clogging of Filter

- If a filter is used to treat runoff from a parking lot or roadway that is frequently sanded during snow events, there is a high potential for clogging from sand in runoff. In these cases, the size of the pretreatment chamber should be increased to 40% of the treatment volume. For bioretention systems, a grass strip, such as a swale, of at least twenty-five

feet in length (or alternative pretreatment method) should convey flow to the system.
- Filters should always be inspected for sand build-up in the filter chamber following the spring melt event.

5. 2.7.5.G Open Channels p. 2-58

Snowmelt Infiltration

None

Culvert Freezing

- Use culvert pipes with a minimum diameter of 18".
- Design culverts with a minimum 1% slope where possible.

Impacts of Deicers

- Inspect open channel systems after the spring melt. At this time, residual sand should be removed and any damaged vegetation should be replaced.
- If roadside or parking lot runoff is directed to the practice, mulching and/or soil aeration/manipulation may be required in the spring to restore soil structure and moisture capacity to reduce the impacts of deicing agents.
- Use salt-tolerant plant species in vegetated swales (See Appendix A of the Vermont Stormwater Guidance Manual).

Required As-built Certification

The first annual report submitted by a permittee should be performed by a stormwater designer rather than by the land owner to ensure that the system was installed and is functioning properly.