VERMONT

Runoff Reduction Strawman Redux

Vermont Stormwater Management Manual Update, Meeting #4

Shelburne, Vermont Town Office

January 17, 2014

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Step 1: Project Layout and Site Design

- Avoid disturbance of vegetation and soil on steep slopes and near surface waters and other sensitive environmental areas
  - Accomplished by establishing simple, selective siting criteria for disturbance, similar to the horizontal isolation distances for septic systems in Chapter 1 of the Environmental Protection Rules (e.g., steep slopes are > 15% slope over a horizontal distance of 100 feet).

Step 1: Project Layout and Site Design

- Avoid mass clearing and grading; limit clearing and grading to the minimum needed to construct the development and associated infrastructure; minimize impacts to historically undisturbed vegetation and native trees
  - Accomplished by offering better (lower) CN for undisturbed soils and mature forest. Woods or meadow in "good condition" applies to the following portions of the site:

    Existing forest/meadow areas that are undisturbed

    Reforested areas where the soils have been restored/amended

Step 1: Project Layout and Site Design

- Build on the least porous soils; limit construction activities to previously disturbed soils; minimize soil compaction
  - Accomplished by offering better (lower) CN for areas with restored soils

Open space in "good condition" applies to areas that are disturbed during construction but the soils are actively restored/amended

Open space in "fair condition" applies to areas that are disturbed during construction and the soils are not amended, restored, or built on

CN Comparison

HSG	A	B	C	D
Land Use				
Woods	30/38	55	70	77
Open Space (good)	39	61	74	80
Open Space (fair)	49	69	79	84

What Do these Different CNs Look Like in Terms of Volume?

- For a site with two acres of open space, B soils and a 1-year, 24-hour design storm of 2.1 inches…

with CN = 55 → CPv = 0

with CN = 61 → CPv = 7,841 cf

with CN = 69 → CPv = 18,382 cf

Step 2:
Apply Non-Structural Stormwater Practices

- Maximize the use of non-structural practices to capture the WQv and CPv
  - Accomplished by:

    Requiring the WQv be managed using non-structural and structural GSI practices

    Encouraging the CPv to be managed wholly through the application of non-structural practices, and applying a reduced RCN reflecting the reduction achieved by non-structural GSI practice implementation to the calculations for CPv (and Q10 and Q100) in cases where CPv is partially reduced using non-structural GSI practices

Step 2:
Apply Non-Structural Stormwater Practices

- Enhance ability of background land cover to reduce runoff through practices such as soil amendment and planned reforestation
  - Accomplished by offering better (lower) CN for amended soils and reforested areas, as compared to “open space in fair condition”

Step 2:
Apply Non-Structural Stormwater Practices

- Manage stormwater close to the source and redirect it back into the ground using practices like rooftop and non-rooftop runoff disconnection, sheet flow to undisturbed natural/conservation areas and vegetated filter strips, and grassed channels

Step 2:
Apply Non-Structural Stormwater Practices

- Accomplished by:
  - Making residential, commercial, and industrial properties all eligible to use rooftop disconnection practice
  - Defining rooftop disconnection to include disconnecting to a bioswale or bioretention
  - Requiring that disconnection to HSG C/D be coupled with soil amendment to boost the runoff reduction rate and receive “full credit” for the disconnection
  - If the inflow is to a conservation area or vegetated filter strip is from a pipe or channel, an engineered level spreader must be incorporated into the design to ensure well-distributed flow, especially on sloping sites

Step 3: Apply Structural GSI Practices

- Maintain predevelopment runoff characteristics
  - Accomplished by using structural GSI practices to capture the WQv if non-structural practices are insufficient to reach targets
- Maximize the use of GSI practices for the treatment and control for WQv and CPv; if the reduced RCN for a drainage area with structural GSI practices reflects “woods in good condition” or “meadow in good condition”, then CPv is assumed to have been met.

Step 3: Apply Structural GSI Practices

- Maximization of GSI includes:
  - Maximization of disconnection or redirection of rooftop and non-rooftop runoff into infiltration areas or vegetated stormwater control measures.
  - Substitution of vegetated stormwater control measures for curb-and-drain systems.
  - Substitution of vegetated stormwater control measures for existing turfgrass or other landscaped areas that do not function as stormwater treatment areas.
  - Routing flows through bioretention swales whenever possible.If woods/meadow in “good condition” target is not met following maximization of GSI practices, a reduced RCN reflecting the (non-structural and) structural GSI practices that will be implemented is applied to the calculations for CPv, Q10 and Q100

Step 4: Apply Other Structural Practices

- Use “other” structural practices to meet peak flow control requirements only after use of GSI practices has been maximized.
- Reality is that on some sites, “other” structural practices will be needed to meet CPv, Q10 or Q100

“Typical” Operation Stormwater Permits

- Looking at all 9015 and INDS permits issued between January 2010 and December 2013…
  - More than 1/3 of permits result in less than an acre of impervious, suggesting that a high percentage of permits are issued for expansions
  - Mean Impervious = 2.51acres
  - Mean Impervious > 1 acre = 3.71acres
  - Mean Impervious < 1 acre = 0.46acres

“Typical” Operation Stormwater Permits

Impervious Range	# of 9015's and INDS Permits since January 1, 2010	% of Permits	Average % Impervious (Impervious / Site Area)
<1 acre	185	37%	33%
1-2 acres	148	29%	39%
2-3 acres	57	11%	44%
3-4 acres	32	6%	42%
4-5 acres	25	5%	37%
5-6 acres	8	2%	24%
6-7 acres	10	2%	40%
7-8 acres	5	1%	33%
8-9 acres	6	1%	53%
9-10 acres	6	1%	36%
>10 acres	21	4%	50%
Total	**503**	**100%**	**38%**

Questions?