

Stormwater Credits

To Encourage Non-Structural BMPs and Better Site Design

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Why WQ_v Credits?

- ▶ Long Term Maintenance.
- ▶ Incentive for Better Site Design or Layout.
- ▶ Lowering Development and Ongoing Cost (Economic Incentives).

Long Term Maintenance

- ▶ Less Infrastructure = Less Maintenance = Less Money
- ▶ Utilizing Green Infrastructure = Less Money
- ▶ “Keep it Simple” (filter strip, open space, riparian buffers)
- ▶ Extended Detention Needs to be Mowed, Debris Cleared and Trash Picked Up (steep slopes = unfavorable environment).

Better Site Design?

- ▶ Decentralizing the Stormwater Treatment Practice (STP)
- ▶ Reducing Size & Cost of STP
- ▶ Avoiding Sensitive Areas & Utilizing Green Infrastructure
- ▶ Less Soil Disturbance = Less Grading: leaving soil structure, no compaction, maintaining storage capacity in soil and trees.
- ▶ Less Impervious Cover
- ▶ TMDL Requirements

Lower Cost?

- ▶ More Open Space = Less Infrastructure & ESC = More Money in the Developer's and Municipal's Pockets.
- ▶ Less Maintenance & Dependency on STP.
- ▶ Wetlands & Floodplains will Retain Floodwaters & Remove More Pollutants than any Design Practice (Dollar to Dollar).
- ▶ Less Impervious Cover

How Do WQ_v Credits Work?

- ▶ Reduce Water Quality Volume by Reducing Site Impervious Cover.
- ▶ Reduce Storage Volume for Channel Protection and Larger Storms by:
 - Adjusting Curve Number
 - Decreasing Time of Concentration

2 Types of Credits

- ▶ **Watershed Credits** – focus on the location of the development, rather than on the design of the site. They reward developers who locate in areas that result in less impact to water resources by encouraging development in already urbanized or highly degraded areas.
- ▶ **Site Design Credits** – act as an incentive to developers, designers, and builders to implement better site design and low impact development techniques that can reduce the volume of stormwater runoff, preserve natural areas, and minimize the pollutant loads from the site.

Watershed Credits

- ▶ Watershed Zoning
- ▶ Infill
- ▶ Redevelopment



Types of Site Design Credits

- ▶ Open Channel
- ▶ Permeable Pavements (Gravel Base or DA)
- ▶ Disconnection of Rooftops/Downspouts
- ▶ Filter Strips
- ▶ Wetland, Floodplain & Riparian Setbacks
- ▶ Reforestation/Afforestation
- ▶ Non-rooftop Disconnect (parking lot)
- ▶ Green Roofs/Rain Harvesting/Cisterns
- ▶ Redevelopment
- ▶ Floodplain, Wetland & Stream Restorations

Trends in Credits

- ▶ Water Quality Volume * What we will look at today
- ▶ Groundwater Recharge
- ▶ Channel Protection
- ▶ Flood Control



Conservation of Natural Areas Credit

- ▶ This Credit Rewards Protection of Natural Vegetation or Critical Resource Areas.
- ▶ Natural Resource Protection Goals Depend on your Community (forest, wetlands, streams, floodplains, steep slopes, meadows & water supplies).

Conservation of Natural Areas Credit

- ▶ The Designer can Deduct Conservation Areas from the Total Site Area When Computing the WQv.
- ▶ The Post Development Curve Number (CN) to Compute Water Quantity Parameters shall be Forest in Good Condition.

Conservation of Natural Areas Credit

- ▶ 30 Acre Shopping Center
- ▶ $WQv = (C \times P \times A) / 12$ *no additional 20% for sediment storage
- ▶ $WQv = ((.8)(.75)(30)) / 12$
- ▶ $WQv = 1.5$ ac-ft
- ▶ $CWQv = (NA / TA)(WQv)$
- ▶ $CWQv = (10ac / 30ac)(1.5ac-ft)$
- ▶ $CWQv = .5ac-ft$
- ▶ **New $WQv = 1.0ac-ft$**
- ▶ Reduction in WQv of 33%

Up Front Cost Saving

- ▶ Original Cost Estimate for Building 1.5 ac-ft ED Wet Pond: \$60,781.
- ▶ **Cost Estimate for Building 1.0 ac-ft ED Wet Pond: \$45,700 (initial savings of \$15,081 by leaving 33% open space).**
- ▶ Cost Estimate for Building Original 1.5 ac-ft ED Dry Pond: \$55,328.
- ▶ **Cost Estimate for Building 1.0 ac-ft ED Dry Pond: \$41,600 (saving of \$13,328 by leaving 33% open space).**

Stream Buffer or Filter Strip Credit

- ▶ Credit Encourages Buffers or Filter Strips to Treat Stormwater at the Site Level.
- ▶ Credits:
 - Area Draining to the Buffer is Deducted from the Calculations for WQv & Recharge
 - Curve Numbers of Areas Draining to Buffer Preserved in Natural Vegetation shall Receive a Curve Number to Reflect Woods in Good Condition.

Stream Buffer or Filter Strip Credit

- ▶ To Receive Credit, the Buffer must meet the Following Criteria:
 - The Minimum Undisturbed Buffer Width is 50'.
 - The Buffer shall Meet the Maintenance & Design Requirements Described in Ordinance.
 - The Maximum Contributing Length of buffer (decided locally)
 - If Buffer is greater than 50', a level spreader shall be used.
 - The average contributing slope shall be less than or equal to 3%.
 - The Buffer shall be preserved in perpetuity or some form of protective measures.

Filter Strip Adjacent to Parking Lot

- ▶ 30 Acre Shopping Center
- ▶ $WQv = (C \times P \times A) / 12$ *no additional 20% for sediment storage
- ▶ $WQv = 1.5$ ac-ft
- ▶ $CWQv = (BDA / TA)(WQv)$
- ▶ $CWQv = (5ac / 30ac)(1.5ac-ft)$
- ▶ $CWQv = .25ac-ft$
- ▶ **New $WQv = 1.25ac-ft$**
- ▶ Reduction in WQv of 17%

Reforestation & Afforestation



Reforestation & Afforestation Credits

- ▶ Similar to Conservation Credit, except it rewards reforestation rather than preserving existing forest.
- ▶ Afforestation is weighted more because of a net increase of forest cover. *typically on developed agriculture lands.
- ▶ Reforestation only compensates for the trees that have been cleared on-site.

Reforestation & Afforestation Credits

- ▶ Tree Species used shall be native to area.
- ▶ Reforestation must be guaranteed with a performance bond or similar measure. The bond can be returned after 2 successful growing seasons.
- ▶ Plantings shall be from nursery stock, at a minimum of 1.5" diameter at breast height (CWP recommendation, Stark may go with ODNR Program or CREP Specifications).

Reforestation & Afforestation Credits

- ▶ 30 Acre Shopping Center
- ▶ $WQv = (C \times P \times A) / 12$ *no additional 20% for sediment storage
- ▶ $WQv = 1.5 \text{ ac-ft}$
- ▶ $CWQv = ((1.5AA + 0.5RA) / TA) (WQv)$
- ▶ $CWQv = ((1.5)5ac + (0.5)1.5ac / 30ac)(1.5ac-ft)$
- ▶ $CWQv = (8.25ac / 30ac)(1.5ac-ft)$
- ▶ $CWQv = .41ac-ft$
- ▶ New $WQv = 1.09ac-ft$

Rooftop Disconnection

- ▶ Encourage Downspout Disconnections to Promote Overland Treatment or Infiltration.
- ▶ Must Meet Outlined Criteria.
- ▶ Credit for Water Quality & Recharge by Deducting Total Disconnect Area from the Sites Total Impervious Cover.
- ▶ Rooftop Percentage for Total Development: 1 ac. lots (8%), 1/2ac. (10%) & 1/4 ac. (15%)
- ▶ Adjust CN for Rooftop to Reflect Woods in Good Condition.

Open Channel Credits

- ▶ Encourages use of open channels to treat stormwater, provide recharge and increase time of concentration.
- ▶ Must meet outlined criteria
- ▶ Credit is expressed as a function of the area draining to the open channels
- ▶ Climate Change? Will there be more intense storms and today's infrastructure designed for new rain patterns?

Pennsylvania DEP Credits



Pennsylvania DEP NPDES

- ▶ **Post Construction Stormwater Management Plan (PCSM Plan)** - Designed to maximize volume reductions technologies, **eliminate (where possible) or minimize point source discharges to surface waters**, preserve the integrity of stream channels, and protect the qualities of the receiving surface waters.



Pennsylvania DEP NPDES

- ▶ Summary of Post Construction Stormwater BMP: Rate Control, Volume Control & Water Quality.
- ▶ Thermal Impacts Avoided or Mitigated.
- ▶ **Non-Discharge Alternatives: alternative siting, limited disturbed areas, LID, riparian buffers, infiltration & water reuse.**
- ▶ Antidegradation Best Available Combination of Technologies (ABACT): can't fully manage stormwater with non-discharge BMPs, then utilize ABACT BMPs to manage the difference.

Pennsylvania DEP NPDES Credits

- ▶ Protected Area
 - Area of Protected Sensitive Features in Acres
 - Area of Riparian Forested Buffer in Acres
 - Area of Minimum Disturbance in Acres
- Site Area - Protected Area = Stormwater Man. Area

Pennsylvania DEP NPDES Credits

- ▶ Non-Structural Volume Credits:
 - Minimum Soil Compaction
 - Protection of Existing Trees
 - Disconnect Roof Leaders to Vegetated Areas
 - Disconnect Non-Roof Impervious to Vegetated Areas
- *Add all categories for total non-structural volume credits

Pennsylvania DEP NPDES Credits

- ▶ Structural BMP Volume Credits
- Required Control Volume Ft³ - Non-structural Credit ft³ = Structural Volume Requirement Ft³



Reviewing Stormwater Credits



Reviewing Stormwater Credits

- ▶ Requires Review in Early Stages and Feasibility.
- ▶ Effective Working Relationships b/w Designers & Reviewers.
- ▶ Inspecting Proposed Areas During Construction.
- ▶ Confirming Area in Final Design.
- ▶ Field Verification with Final Plat.
- ▶ Continue Maintenance Inspections.

U.S. EPA & Credits



US EPA & Stormwater Permits

- ▶ We wanted Green Infrastructure to be the foundation for a state's stormwater management program.
- ▶ We also wanted to recognize that some development patterns have better environmental performance, e.g., redevelopment.
- ▶ We wanted to use an iterative approach to permitting, e.g., each permit cycle builds off gains made in the previous permit cycle.

US EPA & Stormwater Permits

- ▶ All development must infiltrate, reuse, or evapotranspire a minimum amount of stormwater.
- ▶ Stormwater shall be managed on site, there are provisions to allow management off-site.
- ▶ Some land uses can receive a reduction in how much runoff to be managed, aka a "stormwater credit".

US EPA & Stormwater Credits

- ▶ Mix Use Development
- ▶ Redevelopment
- ▶ Transit-Oriented Development (TOD)
- ▶ Brownfield Redevelopment
- ▶ Higher Density Development (seven or more units/acre)
- ▶ Vertical Density (18 units or more/acre or 2.0 FAR (floor to area ratio-- a measurement for retail and office development))

Future Stormwater Trends

- ▶ Soil Structure (end of mass grading)
- ▶ Rain Harvesting Practices (cisterns, rain barrels)
- ▶ Impervious Cover Minimization and Disconnection.
- ▶ Roof to Stream (No More Pipes) Concept: open swales, linear wetlands & roof top disconnect.
- ▶ Forest Conservation & Urban Forestry ^{*Riparian Forest}
- ▶ Protection of Ephemeral Waterways
- ▶ Sprawl & Abandonment Issues (urban doughnuts)
- ▶ Watershed Based Permitting
- ▶ Retrofit Requirements ^{*possible offsite "Credit" (Highway projects)}

OHIO EPA & Credits

- ▶ As far as implementation of credits in Ohio goes, the MS4 permit gives communities the ability to start these types of programs. Communities are free to go deeper than the surface when implementing their MS4 programs.
- ▶ Try and establish a statewide baseline, Ohio EPA has not done that yet, but has recognized the need to allow for it. The credits suggested by USEPA would likely be used as their basis.

The Future of Stormwater Credits in Stark County

- ▶ We'll Review Them More In-depth.
- ▶ Work with OEPA, ODNR, BIA & Get Their Insight & Comments.
- ▶ Amend Our Stormwater Regulations Next Year "2009".
- ▶ Brian Prunty: Water Quality Technician a.k.a. "Stream Action Hero";
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