

Stormwater Utility Literature Review

Overview

Formation of stormwater utilities and collection of stormwater fees is one mechanism that communities can use to maintain, replace, and upgrade their stormwater infrastructure and to comply with their Municipal Separate Storm Sewer (MS4) National Pollutant Discharge Elimination System (NPDES) permits. Most stormwater utilities bill based on Equivalent Residential Units (ERUs), which is usually defined as the average amount of impervious surface on a residential parcel (Campbell 2013). Other stormwater utilities charge customers flat fees or link stormwater fees to water usage or on the amount of runoff generated from a residential parcel for a given design storm (Campbell 2013). The ERU system is based on the “polluter pays” principle (Brooks 2010). Increases in impervious area result in more stormwater runoff that causes flooding, erosion, and water quality problems that communities need to address. Rosenbloom et al. (2013) and U.S. EPA (2009) illustrate how stormwater utility fees can contribute to a larger community-wide strategy to promote effective stormwater management.

Western Kentucky University has identified 1,412 stormwater utilities in 39 states and the District of Columbia in the United States (Campbell 2013). Nationwide, the median monthly single family residential stormwater fee is \$3.75 and the average is \$4.57 (Campbell 2013). The average ERU is 3,050 square feet of impervious cover (Campbell 2013).

Campbell (2013) found 100 stormwater utilities in Ohio. Of these, eleven have stormwater fee credit manuals available online. Many Ohio stormwater utilities do not offer credits for reducing their fees. Of the Ohio stormwater utilities that offer fee credits, maximum credit amount varies from 50% to 100%. Lucas County, Butler County, Lake County, the City of Lancaster, and the City of Toledo allow for a maximum credit of 50% of the fee. Portage County allows for a maximum credit of 75% of stormwater fees for churches and schools; other non-residential property owners can receive a maximum credit of 50% of the fee. Groveport’s maximum credit is 60%. Hamilton’s maximum credit of 65% is well justified in its manual with a statement that 35% of the utility’s costs are related to services that customers cannot provide including planning, administration, and regulatory compliance. The City of Hilliard offers up to 80% fee credit. The Northeast Ohio Regional Sewer District and the City of Columbus offer up to 100% fee credit.

Stormwater utility fee credits can achieve a range of objectives for communities, which are often linked to the reasons why the stormwater utility was formed. Some communities use them to incentivize installation of stormwater control measures on private property that communities do not have direct jurisdiction over in order to help address water quantity or quality problems. The City of Toledo is an example of a community that used this approach with its fee credit system. This strategy can be taken further to incentivize specific types of stormwater control measures such as green infrastructure that communities would like to encourage. It can also grant bonuses for installing stormwater control measures in high need areas. Many communities credit activities that help comply with MS4 permit requirements such as public education and public involvement. Some communities use stormwater fee credits to compensate property owners for doing maintenance on components of the MS4. Butler County and the City of Lancaster reward brownfield reuse with stormwater fee credits. Butler County also offers credit for stream restoration. Sometimes credit availability is offered to increase the perception of fairness of stormwater fees since then property owners that contribute to



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stormwater management pay less than those that do not (American Rivers (no date)). In addition to fee credit programs, U.S. EPA (2009) notes that stormwater utility fees can incentivize reduction of impervious area if stormwater fees are based on impervious area.

Stormwater Quantity and Quality Credits

Incentivizing installation and maintenance of stormwater control measures on private properties is the primary goal of some stormwater utility fee credit programs. Stormwater utility fee credits are most effective at encouraging stormwater control measure installation when fee and credit amounts are high enough that fee savings exceeds the cost of stormwater control measure installation in a reasonable timeframe (Valderrama and Levine 2012).

NEORSD offers credit for peak discharge control, volume reduction, and water quality treatment. For peak discharge control, 25% credit is available for SCMs designed using the critical storm method, 15% for meeting member community or NEORSD Title IV detention standards other than the critical storm method, and 10% for existing on-site detention SCMs that lack documentation that they meet critical storm or current community detention standards. For runoff reduction, SCMs receive a 25% credit for preventing post-development runoff from exceeding pre-development runoff for the 2-year, 24-hour design storm for sites that are < 50% existing impervious. For sites > 50% impervious, SCMs must reduce the pre-development 2-year, 24-hour design storm by 25%. SCMs that prevent the post-development 100-year, 24-hour design storm from exceeding the pre-development runoff receive a 50% credit. If wetlands or streams are present on the site development must abide by riparian or wetland setbacks in order to be eligible for runoff reduction credits. NEORSD grants credit for water quality SCMs that treat the water quality volume. 25% credit is given for bioretention, infiltration basins, constructed wetlands, subsurface gravel wetlands, and rainwater harvesting; 15% credit is granted for sand/media filtration, permeable pavement, tree filters, infiltration trenches, wet extended detention, and enhanced water quality swales; 10% credit is received for vegetative swales, dry extended detention basins, and manufactured units that remove 80% TSS. Only impervious areas that drain to SCMs are eligible for reductions of stormwater fees. NEORSD requires annual recertification of credits. Stormwater quality, quantity, and education credits can be combined up to a maximum credit of 100%.

The City of Columbus offers credits for peak flow management and green infrastructure. Customers can receive credit for managing peak flow from the 100-year storm in a manner that exceeds City requirements (runoff from the 100-year post-development storm must be less than the 10-year pre-development storm). The rate of critical storm discharge must also be less than the predevelopment 1-year, 24-hour storm to receive peak flow credit. An engineering analysis is required for the peak flow credit. Customers eligible for this fee can also receive a reduction in the "Clean River Fee," which is a sanitary sewer charge related to helping the City reduce wet weather overflows from its sewers. Maximum peak flow credit is 80%. Columbus also grants non-residential property owners credit for using green infrastructure (bioretention, permeable pavement with infiltration, green roofs, and rainwater harvesting) to meet stormwater management requirements. Property owners can receive 25% credit for meeting water quality requirements using only green infrastructure and 100% credit for meeting water quantity and water quality requirements using only green infrastructure.

Lucas County grants 10% credit for detention or retention basins built prior to 2003 in compliance with the *Lucas County Subdivision Regulations Manual*. Lucas County grants up to



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30% credit for detention/retention exceeding County standards, water quality ponds, vegetated swales/grass filter strips, grass lined conveyance channels/dry swales, riparian water quality buffers, percolation/infiltration trenches, constructed wetlands, permeable pavement, green roofs, and bioretention/rain gardens. Water quality credits are granted at the discretion of the utility.

Portage County grants 25% credit for green roofs, 5% credit for rain barrels with a water use program, 10% credit for rain gardens, 20% credit for managing the volume of water such that the runoff volume from a 2 year event does not exceed predevelopment conditions, up to 10% credit for maintaining SCMs designed to treat the water quality volume, and 50% credit for adjacency to undeveloped parcels protected with conservation easements. These regulations indicate that other forms of green infrastructure can be credited if approved by the utility.

The City of Toledo offers credits for water quality SCMs, water quantity SCMs, and offers an extra 25% discount for properties within priority zones with SCMs. Toledo's credits are based on the portion of the impervious area treated by an SCM. At least 10% of the impervious area on a site must be treated by an SCM for a property to be eligible for the 25% discount. Water quantity credit is available based on the size of the design storm. Detaining the 100-year storm year qualifies for a 100% credit on the property fee portion of the stormwater fee, while managing the 25-year storm year qualifies for a 25% credit. Permeable pavement, infiltration basins/trenches, rain gardens, sand filters, and swales are eligible for 50% water quality credit of the property fee component of the stormwater fee. Catch basin inserts, green roofs, retention basins, grassed channels, and vegetated filter strips can receive 25% water quality credit. Property owners must reapply for credits every 5 years and when the property transfers ownership.

The City of Lancaster offers a 10% credit for retention/detention facilities that meet City standards, an additional up to 10% credit for providing additional retention/detention for water quality purposes or benefitting upstream or downstream properties by providing more than required storage, and an additional 10% for demonstration projects. Lancaster also offers credits of up to 20% for preservation of special flood hazard areas or creation of flood storage basins.

The City of Hamilton offers water quality credits to property owners that have vegetated swales and filter strips, infiltration and percolation basins, percolation trenches, buffer strips and swales, permeable pavement, extended detention basins, retention basins, constructed wetlands, or media filtration constructed according to Urban Runoff Quality Management – WEF Manual of Practice No. 23. Detention basins, retention basins, storm sewers, storm culverts, and stormwater channels may be eligible to receive quantity credit. Nonresidential property owners can receive water quality and/or water quantity credits if they manage stormwater from upstream drainage areas in addition to managing stormwater generated on their property. Property owners receive some credit if they manage stormwater from an upstream area larger than the size of their property but less than or equal to 0.5 square mile. Property owners that manage stormwater from an upstream area larger than the size of their property larger than 0.5 square mile receive more credit. Separate credits are granted for capital expenditures and operation and maintenance of stormwater control measures. Property owners can receive a maximum quantity credit of 25.2% and a maximum quality credit of 39.6%.

The City of Groveport offers 10% credit for detention/retention facilities that exceed the City's peak discharge requirements. Additional credits of 10% (each) can be received if the detention/retention facilities benefit upstream or downstream properties not covered by a joint



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use agreement and for demonstration projects for specific site conditions approved by the City Engineer.

Butler County, Ohio grants credits for vegetative stream buffers, grass filter strips, infiltration trenches, water quality ponds, and stream channel restoration. However, their credit manual indicates that properties that fall under the statewide construction general permit are not eligible for credits. Up to 50% credit is available for water quality stormwater control measures. 10% credit is granted for 100-foot vegetated stream buffers, 15% credit is granted for 125-foot vegetated stream buffers, and 20% credit is granted for 150-foot vegetated stream buffers. 15% credit is granted for infiltration trenches. The following pond retrofits or components each earn a 10% credit: extended detention, wet pool and reverse flow pipe, aquatic benches and wetlands, optimum flow length and optimum pool depth, and a forebay and shading. Grass filter strips with a 75% particulate trapping efficiency receive 15% credit; those with 90% particulate trapping efficiency receive 30% credit. Stream restoration can receive up to 100% credit for up to 20 years.

The City of Hilliard stormwater utility has a credit program, but no property owners have applied for credit as of the 2015 annual stormwater report. Non-residential property owners can receive 10 to 50% for peak flow reduction. Peak flow credits are based on the percent reduction in the 100-year storm peak flow rate and the amount of impervious surface draining to the stormwater control measure. Property owners can also receive additional credit of up to 10% for exceeding the City's detention requirements – each percent of detention volume in excess of City requirements yields on tenth of a percent of credit. Property owners can also earn up to 10% for installing infiltration basins, infiltration strips, rain gardens, or bioretention as demonstration projects.

Lake County offers up to 20% credit for stormwater quantity management and up to 20% for water quality management. Non-residential customers can receive credit for retrofitting flood control basins to provide water quality treatment or by installing stormwater control measures that improve water quality on sites developed prior to 2003. Quantity credit can be received for substantially reducing stormwater volumes through infiltration and/or rainwater harvesting or for exceeding local stormwater detention requirements. Applicants only receive credit for rainwater harvesting systems if the system is allowed by the municipality or township in which the site is located. Quantity and quality credit amounts are determined by Lake County on a case-by-case basis based on the benefits provided.

NEORS, Lancaster, and Lucas County require annual documentation of stormwater management practice maintenance for applicants to continue to receive credit for these stormwater management practices. Toledo requires recertification of credits every 5 years, and Portage County requires recertification each NPDES Phase II permit term.

Industrial NPDES Permits

NEORS grants a 25% credit to businesses in compliance with an Industrial General Permit, Marina General Permit, or an Individual Industrial Permit with stormwater provisions. NEORS also credits industries with a no exposure certificate from Ohio EPA. NEORS does not allow businesses to receive both water quality and Industrial NPDES credit. Lucas County offers credits of up to 10% for compliance with an Industrial NPDES permit. Lancaster gives up to 30% credit to property owners complying with Industrial Stormwater or their own MS4 permits. Butler County grants a 20% credit for industries complying with individual industrial



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stormwater permits or to other MS4s complying with an MS4 permit. Lake County offers 15% credit for complying with an Industrial General Permit or an Individual Industrial Permit with stormwater provisions.

Education Credits for Schools

Many utilities offer schools credits for incorporating stormwater education into their curricula. The Northeast Ohio Regional Sewer District (NEORS) offers a fee reduction of 25% if schools provide approved education to at least 25% of the grade levels of the school or district. NEORS offers curriculum materials for grades 3, 5, 7, and 10. Portage County schools that implement Project Learning Tree, Project WILD, or Project WET curricula and engage in staff training are eligible for 50% credit. Schools that install a water quality SCM with an education component or install and use a land lab and implement Project Learning Tree, Project WILD, or Project WET curricula and staff training receive 75% credit. Lucas County grants credits up to 50% for using Project Aquatic WILD, Project WET, GLOBE or other similar curricula to teach 20% of the student body each year and conduct one awareness activity such as a water festival day, poster contest, or litter collection for 20% of the students. Groveport offers a credit of up to 50% for stormwater education provided by schools and does not require a credit application fee for the education credit. Schools need to reach at least 35% of students to receive credit. They may use curriculum materials such as Project WET or Project Aquatic WILD, an essay or poster contest, provide website, brochure, or public service announcement development, or do a service project with participation of 5% of the students to receive credit. Lancaster grants education credits of up to 50% to schools that reach 15% of the students with a stormwater curriculum, engage 15% of students in a poster or essay contest, involve 5% of students in a service project, or provide website, brochure, or public service announcement development. Butler County provides 30% credit to schools that integrate stormwater education into their curriculum using materials such as Project WET or Project Aquatic WILD and including activities such as essay and poster contests. The City of Hilliard offers up to 50% credit to schools for reaching 35% of the student population through incorporation of stormwater education curriculum materials such as Project WET or Project Aquatic WILD or activities such as essay or poster contests or involving 5% of students in public service activities such as stream clean ups or assisting with the City's production of educational materials. Lake County grants 15% credits to schools for educating 20% of the students annually through presentations by Lake County stormwater staff or its partners or use of materials such as Project WET, Project Aquatic WILD, or GLOBE. Utilities generally require annual reporting for schools to demonstrate compliance with requirements.

Public Involvement or Adult Education Credits

Lucas County offers 30% credit for participation in an Adopt-a-Stream/Road or stream clean-up program, and 5% credit for participation in the following activities: water festival day, storm drain stenciling program, poster contest, brochure development, essay contest, public service announcement, litter collection day, multimedia, or County staff presentation to business facility. Butler County offers 5% credit for participation in each Adopt-a-Stream event up to a maximum of 30%. Lancaster grants up to 10% credit for participating in an Adopt-a-Road program or up to 10% credit for participating in a City sanctioned clean-up program. The City of



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Groveport offers credits up to 20% for participation in Adopt-a-Stream/Park/Road or a City sanctioned clean-up program.

Portage County offers schools 25% credit for classroom staff participating in curriculum workshops (Project Learning Tree, Project WILD, or Project WET) and non-classroom staff participating in pollution prevention workshops led by Portage SWCD staff. Portage County grants churches 25% credit for distributing educational stormwater literature and having a water quality display, 50% credit for installing a SCM and educating the congregation annually about it and distributing educational stormwater literature and having a water quality display, and 75% credit for conducting an annual service event related to water quality, installing a SCM and educating the congregation annually about it and distributing educational stormwater literature and having a water quality display. Portage County grants nonresidential property owners (other than schools, churches, and farmers) 5% credit for display of stormwater educational materials.

Maintenance Credits

Columbus grants non-residential customers fee reductions for maintaining open stormwater conveyances that would otherwise be maintained by the City. Credits are \$0.75 per linear foot per year for channels draining less than 10 acres and \$1.50 per linear foot per year for channels draining more than 10 acres. To receive the maintenance credit, property owners must keep the channel free of materials that limit the flow of water, repair erosion, and remove accumulated sediment. A site plan and maintenance plan is required for the maintenance credit. Credit amount cannot exceed fee amount.

The City of Groveport offers credits for private maintenance of open channels that would otherwise be maintained by the City. Up to 30% credit is given for maintaining public open channels (requires a \$500 application fee). Lancaster and Hilliard both grant up to 30% credit for maintaining public open channels.

Agricultural Credits

NEORS and Portage County grant credits to agricultural property owners implementing conservation plans. Property owners with Conservation Plans certified by a U.S. Department of Agricultural National Resources Conservation Service (NRCS) District Conservationist or Forest Management Plans approved by an Ohio Department of Natural Resources (ODNR) Service Forester receive 15% credit from NEORS. Property owners with Comprehensive Nutrient Management Plans or Prescribed Grazing Plans certified by a NRCS District Conservationist receive 25% credit. NEORS classifies these credits as water quality credits, and the total amount of water quality credit cannot exceed 25% of the fee amount. Property owners in Portage County with more than 4 parcels operated by a producer following a farm plan approved by NRCS or Portage Soil and Water Conservation District can receive up to 50% credit. Portage County property owners with multiple adjacent parcels less than two acres enrolled in the Current Agricultural Use Valuation program can also receive up to 50% credit.

Residential Credit Programs

NEORS is the only Ohio stormwater utility that offers a residential fee credit program. Individual residential property owners can receive a 25% credit for effectively implementing rain gardens, on-site-stormwater storage, impervious surface reduction, permeable pavement, or vegetated filter strips. In order to receive credit, rain gardens must treat runoff from at least 25%



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of the house's roof or equivalent impervious area. 50% of the house's roof must be directed to rain barrels, cisterns, or rain bladders that provide at least 40 gallons of storage per downspout and storage containers must be drained in no less than 24 hours and no more than 4 days after a rain event. Cisterns or rain bladders can also be used as long as they hold the runoff from an inch of rain for at least 50% of the property's area. A simple calculation is provided to help homeowners size their cisterns. Replacing 500 or more feet of impervious area with vegetated pervious area earns the impervious surface reduction credit. Residents can earn the permeable pavement credit by installing at least 1,000 square feet of permeable pavement that has a stone reservoir depth of at least 10 inches and meets municipal standards for driveway installations. If 50% of a property's roof area travels through a fully vegetated area at least 50 feet long with a minimal slope, a vegetated filter strip credit is granted. Documentation of maintenance of these SCMs is required to continue to receive credit (recertification occurs every 3 years). Residential property owners can also receive credit for stormwater storage provided by stormwater control measures that detain water from their subdivisions with appropriate documentation of their function.

At least a few stormwater utilities outside of Ohio also offer fee credit reductions for residential customers. The City of Minneapolis, Minnesota offers residential credit users the opportunity for credit reductions. Residents can receive water quality credits if they install and maintain rain gardens, permeable pavers, wet ponds, dry wells, sand filters, filter strips, infiltration trenches, or green roofs. Credit discounts are based on the percent of impervious area treated by SCMs. Residential property owners can also receive credit for stormwater storage provided by SCMs that detain water from their subdivisions with appropriate documentation of their function.

Oshkosh, Wisconsin offers residential customers stormwater fee credit for installing rain gardens or rain barrels or equivalent stormwater control measure with documentation of function. Rain gardens receive up to a 75% stormwater fee credit and rain barrels receive up to a 25% fee credit. Oshkosh also offers credits to residents that drain directly into a water body without using City storm sewers. Oshkosh residents must pay a \$10 application fee to apply for stormwater fee reduction.

The City of Harrisonburg, Virginia offers credits for downspout disconnection, rain gardens, vegetated filter strips, rain barrels/cisterns, tree planting, conservation landscaping, homeowner nutrient management and lawn care agreement, impervious cover reduction. If 50% of the roof is disconnected from the storm sewer network by traveling through a lawn or to an SCM, the property owner receives a 10% credit. If 100% of the roof is disconnected, the property owner receives a 20% credit. Rain gardens that treat runoff from 25% of the impervious surface on a parcel receive a 25% credit and rain gardens that treat runoff from 50% of the impervious surface on a parcel receive a 50% credit. Residents can receive a 10% vegetated filter strip credit if downspouts are directed into fully vegetated areas with minimal slope that are at least 25 feet long and not treated with fertilizers and pesticides. The City waives its Tall Grass and Weeds Ordinances within dedicated vegetated filter strips that meet these criteria. Harrisonburg offers 20% credit to homeowners that use rain barrels or cisterns. Tree planting credit of 10% is given to homeowners that have canopy coverage on at least 20% of their parcel. Planting mulch beds with perennials, shrubs and/or small trees earns a credit of 10%. Native plants and organic mulch are recommended for this conservation landscaping credit. Homeowners that commit to adhering to measures to reduce fertilizer and pesticide use



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receive a 10% credit. Impervious cover reduction results in fee savings because Harrisonburg's fees are based on each 500 feet of impervious surface. Homeowners must grant the City the right to inspect the SCMs and must provide evidence of maintenance at least every 5 years to continue receiving the credit. Homeowners whose stormwater is treated by a regional SCM that they contribute to the maintenance of are eligible for 15-50% credit depending on whether the SCMs were built to comply with the Virginia Stormwater Management Program and the City's Stormwater Management Ordinance.

Lynchburg, Virginia allows its residential customers to earn up to 50% reduction of their stormwater fees by implementing stormwater control measures. Treating 50% of a property's impervious area with a rain garden receives 20% credit. If 50% of a property's roof area drains to vegetated filter strips that have a minimum flow length of 50 feet with a slope of 5% or less and a splash block is used, residents receive 20% credit. Residents can direct 50% or more of their roof area to self-emptying rain barrels that drain 24-48 hours after a rainfall for a 20% credit. At least one gallon of storage must be provided for every 3 square feet of roof area with the goal of storing the 0.5 inch rain event. If at least 1,000 square feet of permeable pavement is installed with at least 10 inches of reservoir storage, the property owner receives a 20% credit. The City requires photos of installed stormwater control measures with credit applications. A construction photo illustrating the depth of stone underlying permeable pavement is required for permeable pavement credit.

Portland, Oregon allows residents to receive discounts of up to 35% of their stormwater fee by managing their roof runoff using downspout disconnection, rain gardens, dry wells, infiltration trenches, or green roofs. Residents can also receive discounts for having less than 1,000 square feet of impervious surface on their properties and/or more than 4 trees taller than 15 feet.

Conclusions

Maximum credit amounts of Ohio stormwater utilities that grant stormwater fee credits range from 50 to 100%. For utilities that credit stormwater quantity management (all that have credit programs except Butler County), credit amounts range from 20% to 80%. All Ohio stormwater utilities offer some form of water quality credits – amounts range from 10% to 50%. 10% to 30% credit is granted by five Ohio stormwater utilities for compliance with an industrial NPDES stormwater permit. Education credits for schools range from 15% to 75% of the stormwater fee amount for the eight utilities that credit schools for education. Four utilities grant between 30% and 100% credit for private maintenance of publicly owned open channels within the MS4. Utilities that credit public involvement or adult education award 5% for 35% for this activity. One Ohio stormwater utility offers 25% credit to residential properties that install stormwater control measures.

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