Brett Flower
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Sustainability in Law Practice Seminar
Ordinances Relating to Retention/Detention Basins

I. INTRODUCTION

The typical method for treating storm water is flushing precipitation to the gutter or combined sewer, funneling the water into the nearest creek, as fast as possible to avoid localized flooding. Improved methods of storm water management should be a concern of every locality in Pennsylvania, with an annual average of 41.45 inches of precipitation and $343,648,500.00 spent on damages caused by flooding in 2011 alone.[1] Traditional, on site stormwater management employs large retention basins sized to hold a majority of the runoff from a developed site. Environmental site/low impact designs reflect the latest technology in stormwater treatment though comprehensive site design to managing rainfall at the source using uniformly distributed, decentralized micro scale basins. The designs are created with the natural topography of the land to reduce the ability of runoff to aggregate and flood. The result is increased infiltration, reduced pollutant loads, and minimization of the amount of runoff entering the municipal sewer system. Low impact designs reflect an improvement the traditional retention basin technology, built to collect large amounts of water from acres of land.

Current storm water treatment methods are environmentally and economically ineffective with the current climate model. The changing climate will only intensify the damages by producing precipitation events characterized by a decrease in the duration and an increase in the intensity, yielding more precipitation over a shorter period.[2] The Environmental Protection Agency estimates there are three to ten billion gallons of sewage released by combined sewer

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[1] NOAA, U.S. CLIMATE DATA: PENNSYLVANIA – PHILADELPHIA; U.S. FLOOD LOSS REPORT (2011).
[2] GERALD A. MEEHL, JULIE M. ARBLASTER, & CLAUDIA TEBALDI, UNDERSTANDING FUTURE PATTERNS OF INCREASED PRECIPITATION INTENSITY IN CLIMATE MODEL SIMULATIONS, 32 Geophysical Research Letters 1 (2005).

system overflows due to storm events overwhelming municipal sewers annually. [3] The resulting effects of higher intensity events are a decrease in infiltration, increased runoff and more flood events. Municipalities are in a unique position with the opportunity to mitigate damages by implementing new technologies through the municipal code. This narrative serves as support for the adoption of a low impact designs based on stormwater attenuation ordinance (see attached) to be imposed on new developments. The topics addressed are: the shortcomings of the current approach to stormwater mitigation; outlining the possible economic, social and environmental benefits of the new techniques; examples of municipalities successfully implementing environmental site designs; the concerns and potential roadblocks to adoption; and finally, a draft model ordinance is attached. A proposed model ordinance is attached as an appendix.

II. IN SUPPORT OF A NEW ORDINANCE

Stormwater regulation in Pennsylvania rests on the interplay of several state statutes outlining the bare minimum stormwater controls, while distributing to the municipalities authority to enumerate stricter guidelines. [4] The relevant state law is the Clean Streams law, which sets the lax guidelines for hydrologic disturbances.[5] In 1969, the Pennsylvania Municipalities Planning Code was adopted, requiring townships and municipalities to create a comprehensive development plan, including watershed management objectives for larger municipalities. The threshold to meet the watershed management objectives portion of the plan is not a high standard. To aid local governments in the creation of the watershed management plans and to encourage the use of best practices, the Pennsylvania Department of Environmental Protection (PaDEP) published storm water management guidelines in 1985.[6] Although, the

[3] ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY SCORECARD, 2 (2009).
[4] 53 P.S. § 2862
[5] 32 P.S. § 680.13
[6] PADEP, STORMWATER MANAGEMENT: GUIDELINES AND MODEL ORDINANCES (1985).

preferred best practices for stormwater management have changed drastically in the last thirty years, Pennsylvania governments are addressing the issue with outdated legislation.

Watershed management plans are a voluntary segment of the required comprehensive development plan for most counties and municipalities.[7] Federal storm water discharge permits are issued through PaDEP pursuant to the federal Clean Water Act for large cities and construction sites disturbing more than one acre of land.[8] However, starting in 2010, 940 of Pennsylvania's smaller municipalities must now meet the National Pollutant Discharge System permitting requirements for the first time.[9] Development plans may be rejected by municipalities if the maximum rate of stormwater runoff is increased by the development orOR the quantity, velocity and direction of the runoff will likely cause damage to health and property.[10] Rarely are design specifications or best practices included within the ordinance other than pertaining to the engineering specifications for drains and sewers.

The goal of implementing an ordinance requiring the use of various environmental site design features is to reduce the nonpoint source pollution entering the waterways, reduce peak flows, and increase infiltration and groundwater recharge.[11] Peak flow after a rainfall event is the maximum water flow in cubic feet per second attained before the water level begins to subside.[12] The post development peak flow is measured against the pre development peak flow; if unavailable, a comparison stream with similar watershed characteristics minus the development is used.[13] The peak flow is vital because the current model of storm water treatment and zoning practices in the United States emphasizes impervious surfaces and the movement of water to

[7] 25 P.S. § 111.11
[8] PADEP, PENNSYLVANIA INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT 14 (2014).
[9] *Id.* at 15.
[10] Royalton Borough, Pa., Ordinances art. 15(A)(1)(a) (1990).
[11] JOHN RANDOLPH, ENVIRONMENTAL LAND USE PLANNING AND MANAGEMENT, 442 (Island Press 2004).
[12] A.R. JARRETT, EFFECTIVELY MANAGING WATER, 251 (PSU 2008).
[13] *Id.* at 252.

drains and ultimately receiving surface waters. This decreases the time required to reach the maximum flow and increases the amount of runoff involved in creating the peak flow.[14] The consequences of quick, high peak flows are flash floods, more property damage from a higher volume flood, and stream channel degradation because the increased volume of runoff also results in a higher velocity.

A municipality has two options when addressing storm water management in relation to peak flows: (1) limit development designs to those in which the runoff rate post development would not exceed the predevelopment runoff rate for the same site; or (2) adopt a release rate where the post development peak runoff rate must not exceed a percentage of the peak rate prior to development.[15] The municipality must set specific goals based on the selected return period events. A return period is the estimated probability of a storm (event) of the same magnitude occurring in terms of frequency. For example, the goal may be to limit the peak flow to predevelopment levels for all two year period events; essentially eliminating flooding for smaller storms and then attenuating runoff from more substantial storms. The goals must be reasonable based on the magnitude of the event selected. Setting a goal to eliminate flooding for a 100 year storm event would be foolish, but a goal not to exceed a percentage of predevelopment peak flow is malleable and more realistic.[16]

The second environmental concern with increased run off rates is the pollution carried by the high velocity water directly into the stream. Pennsylvania has approximately 83,483 miles of rivers and streams, of which about 18,849 miles were considered category five impaired by PaDEP in 2014. [17] Category five is awarded when the water is unfit for one or more of the

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[14] *Id.* at 254.
[15] *Id.*
[16] *Id.*
[17] PaDEP, 2014 PA INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT 40 (2014).

following: aquatic life, drinking water, fish consumption, or recreation.[18] Impairments were attributed to four major causes, one of which being urban storm water runoff.[19] Pollutant loads in runoff are directly correlated to the level of connected, impervious surfaces. An eighteen percent increase in urban area in Indiana resulted in an eighty percent increase in runoff volume and annual loads of lead, copper, and zinc by more than fifty percent.[20] Natural groundcover undisturbed by development generally results in ten percent of the precipitation traveling as runoff. [21] Reducing the pollutants entering streams with runoff involves slowing the high velocity water and thus allowing the suspended particles to settle out.

The proposed method of retaining storm water is the integration of low impact development basins and swales densely dispersed throughout a development. There are three design options for basins: (1) Retention basins as wet basins that are designed for the permanent or long term storage of water; (2) detention basins, or dry basins, designed to only contain water during precipitation events; and (3) mixed, which combines both wet and dry basins in a segmented treatment approach.[22] Swales are vegetated, earthen drains designed to convey the storm water to basins or other low areas of infiltration.[23]

Reducing the speed at which water moves across the ground will attenuate the high runoff rates, the lack of groundwater recharge and the steep peak flows seen by suburban and urban streams. Retention basins were historically designed to catch large volumes of runoff from acres of land impacted by new development.[24] These design principles are largely being replaced

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[18] *Id.*
[19] *Id.*
[20] Stephen J Gaffield, PhD., et al., *Public Health Effects of Inadequately Managed Stormwater Runoff*, 93 Am. J. Public Health. 1527, 1528 (Sept. 2003).
[21] PRINCE GEORGE'S COUNTY, LOW IMPACT DEVELOPMENT HYDROLOGIC ANALYSIS, 4 (1999).
[22] CITY OF SACRAMENTO, ET AL. STORMWATER QUALITY DESIGN MANUAL DB-1 (2007).
[23] Christopher J. Walsh, et al., *Stream Restoration in Urban Catchments through Redesigning Stormwater Systems: Looking to the Catchment to Save the Stream*. 24 N.A. Benthological Society 690, 691 (2005).
[24] Jarrett, *supra* note 12 at 255.

by low impact designs which minimize large structural disturbances and place smaller detention areas in a higher density to increase the infiltration rates in a more natural pattern closer to where the precipitation landed.[25] Small basins (≤.2 acres) have been shown to reduce runoff rates by thirty percent and remove over fifty percent of pollutants from the runoff.[26]

As little as ten percent of an area covered in impervious surfaces will lead to degradation of local aquatic habitats.[27] It is offered that the most important factor in reducing negative impacts on urban streams is to reduce the quantities of untreated runoff entering the waterway by employing a basin system designed to handle storm events of one half inch of precipitation or less.[28] The small storms are the most common events and therefore subject to the highest pollutant loading. Also, a smaller storm producing a lower volume of runoff is the easiest to design for.

The decentralization of large storm water systems will benefit municipalities by reducing the number of large structures requiring maintenance and inspections, reducing the volume of water entering the sewer system needing treatment, and reducing damages associated with flooding, such as erosion and property damage. Municipalities need to address the challenges of storm water management now that it has become apparent the traditional methods are damaging to surface water quality.

The social benefits of replacing traditional storm water management techniques are an improvement in water quality from a decrease in the level of pollutants entering the water supply, and a more attractive, greener place to live. Safe drinking water is taken for granted in the United States, but this assumption is not wholly accurate. Approximately 99 million people

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[25] LOW IMPACT DEVELOPMENT HYDROLOGIC ANALYSIS, *supra* note 21 at 10.
[26] Betty Rushton, *Low Impact Parking Lot Design Reduces Runoff and Pollutant Loads*, J. Water Resources Planning and Management 172 (May/June 2001).
[27] *id.* at 173, 175.
[28] Walsh, *supra* note 23 at 699.

suffer gastrointestinal illnesses each year, with up to forty percent a result of contaminated drinking water.[29] Since 1948, more than half the documented waterborne disease outbreaks have followed extreme rainfall events.[30] Untreated runoff entering surface waters are not the only source of public health issues.

Sewer systems are breeding grounds for bacteria as dark, moist environments; by adulthood, approximately thirty-two percent of United States residents have evidence of infection by the microorganisms *cryptosporidium* and *giardia*.[31] When the municipal sewer is overwhelmed during a storm the result is untreated sewage discharged directly into receiving surface waters. We rely on the water treatment facilities to provide clean drinking water, but the treatment techniques are not always effective. Traditionally, drinking water is treated with chlorine, but bacteria and microorganisms can develop a resistance, as well as being a gastrointestinal irritant in humans.[32] The next option is ozone, but this is difficult to neutralize and is considered a human carcinogen.[33] The most cost effective and beneficial method for managing stormwater is to reduce the need for drinking water treatment by managing runoff purity at the beginning.

The economic impacts of employing environmental site designs to create a greener, more inviting and livable space often have the effect of increased property values. Homeowners typically see a three to five percent increase in property values with the use of low impact stormwater management techniques compared to traditional methods.[34] Traditional, large retention basins serving an entire development are viewed as ugly and unsafe, thus, negatively

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[29] Gaffield, *supra* note 20 at 1527.
[30] *id.*
[31] *id.*
[32] *id.* at 1528
[33] *id.*
[34] PATRICK BEGGS & CHRISTY PERRIN, LOW IMPACT DEVELOPMENT: AN ECONOMIC FACT SHEET, NC Cooperative Extension at 4, available at www.ncsu.edu/weco.

affecting property values.[35] Property values have been shown to increase fifteen percent along bodies of water subject to significant improvements in water quality.[36]

Neighborhoods with green spaces instead of concrete and asphalt are spaces people prefer to live. In a case study discussed below, the turnover rate of rental apartments was reduced by fifty percent and vacant properties disappeared after undergoing a retrofit of the stormwater system.[37] Examples of communities successfully adopting low impact storm water retention basins for improving regional hydrology through water quality and decreased peak flows are highlighted in the next section.

III. CASE STUDIES

Prince George's County, Maryland

In response to the new federal storm water requirements Prince George's County enacted the Watershed Restoration and Protection Program in 2013.[38]The program is funded through fees charged to property owners based on the size of the impervious footprint in nine counties and the city of Baltimore.[39] In 1999, Prince George's County had already begun investigating the benefits of low impact designs by creating a complete hydrologic analysis framework for the implementation of low impact development basin design.[40]

House Bill 987, signed into law in 2012, codified the principles of low impact design by requiring the preservation of natural features, minimizing the use of impervious surfaces, reducing peak runoff rates and minimize the use of structures to abate stormwater. As of July 1,

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[35] Jae Su Lee, Ming-Han Li, *The impact of Detention Basin Design on Residential Property Value: Case Studies Using GIS in the Hedonic Price Modeling*, 89 Landscape and Urban Planning (July 2009).
[36] *id.*
[37] BUILDING AND SOCIAL HOUSING FOUNDATION, ECO-CITY AUGUSTENBORG, SWEDEN: WORLD HABITAT AWARD 1, 5 (2010).
[38] CITY COUNCIL OF PRINCE GEORGE'S COUNTY, WATERSHED RESTORATION AND PROTECTION PROGRAM, CB-045-2013 (2013).
[39] *Id.*
[40] *See* LOW IMPACT DEVELOPMENT HYDROLOGIC ANALYSIS, *supra* note 21.

2013 all municipalities were required to have adopted ordinances consistent with the watershed restoration and protection program which includes the creation of a watershed restoration fund.[41]

The stormwater management ordinance adopted by the county mandates the exhaustion of all nonstructural techniques such as low impact design basins and transition zones, prior to allowing the construction of any permanent structures.[42] The designs are sized based on recharge volume, water quality volume, and channel protection storage volume criteria according to the Maryland Design Manual and the Prince George's County Design Manual.[43] The manual is to be used in the permitting and approval process for new developments, encouraging the onsite treatment of stormwater "to the fullest extent possible", discourage the removal of natural vegetation, and encourage the use of innovative designs.[44]

Ordinance success is measured by the design meeting a minimum standard of replicating 100 percent predevelopment groundwater recharge and the stabilization of affected stream channels.[45] Also, systems must attenuate two and ten year rainfall events as to eliminate downstream erosion and flooding.[46]

City of Roseville, California.

The City of Roseville had a population of approximately 120,000 residents who endured six major floods between 1986 and 2005, with the flood of 1995 costing the city $8,000,000.00 in damages.[47] After the flood of 1995, Roseville partnered with the Federal Emergency Management Agency (FEMA) to try and mitigate flooding and the associated damages.[48]

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[41] PRINCE GEORGE'S COUNTY, MD., MUNICIPAL CODE § 32-201.06 (2009).
[42] PRINCE GEORGE'S COUNTY, MD., MUNICIPAL CODE § 32-178 (2009).
[43] *id.*
[44] PRINCE GEORGE'S COUNTY, MD., MUNICIPAL CODE 27-130 (2009).
[45] PRINCE GEORGE'S COUNTY, MD., MUNICIPAL CODE § 32-178(a)1 (2009).
[46] PRINCE GEORGE'S COUNTY, MD., MUNICIPAL CODE § 32-178(a)2 (2009).
[47] THE CITY OF ROSEVILLE, MULTI-HAZARD MITIGATION PLAN: FLOODING 13-6 (2011).
[48] *id.* at 13-2.

Roseville joined FEMA's community rating system program (CRS) as a guideline to implement the city wide changes necessary to reach their goals of withstanding a 100 year event and stop further property loss or worsening of flood conditions.[49] Roseville is now the only community to reach a level 1 CRS rating, which earns 93 percent of the citizens a 45 percent annual discount on flood insurance.[50]

Roseville partnered with The City of Sacramento to create the Stormwater Quality Design Manual to which the storm water municipal ordinances refer when addressing storm water mitigation designs.[51] The first goal listed in the manual is to "[p]rotect the quality of our local creeks and rivers[,]" which can be contrasted with the traditional goal of preventing the "loss of life and damage and destruction to property…."[52] The initial incentives for remediation of the flood plains in the City of Roseville were due to floods costing significant amounts of private and public funds. The team behind the movement in Roseville realized the protection of the people and property is not an adversarial relationship with the quality of the hydrology in the area or the economic interests of the community.

The City's stormwater ordinance furthers the goals of the storm water manual by adopting low impact designs intended to be applied as site specific developments that emphasize the natural topography integrated with small scale storm water control mechanisms.[53] Neither the manual nor the municipal ordinances require specific storm water and flood control techniques for development. However, the ordinances only allow for a waiver of the design criteria in the

[49] *id.* at 13-3.
[50] *id.*
[51] ROSEVILLE, CA, MUNICIPAL CODE § 14.20.230 (2010).
[52] STORMWATER QUALITY DESIGN MANUAL *supra* note 22 at 1-1; Albany Township, PA., § 513.A (1994).
[53] STORMWATER QUALITY DESIGN MANUAL *supra* note 22 at 1-8.

manual, which only contains low impact designs, if an impracticability for a specific site can be shown, and then, if granted, a fee is imposed.[54]

Roseville measures their success by the reduction of property damage ninety-one percent since the adoption and implementation of the storm water management plans and projects.[55]

Augustenborg, Sweden

Augustenborg is an urban city with high density, typically lower income housing, a combined sewer system, and a flooding problem.[56] In 1997 the City partnered with the major landowner to try and reduce flooding by seventy percent.[57] The first step was to disconnect the storm water treatments from the combined sewer, creating an open stormwater management system, thereby reducing the amount of water overwhelming the municipal sewers.[58] The goals of the project were to reduce peak runoff, conserve the limited remaining open space, and reduce stormwater induced flooding.[59]

The City constructed a number of best management practices including green roofs, pervious pavement, swales, dry detention basins and created wetlands.[60] The result was over six kilometers of stormwater structures, collecting ninety percent of the runoff.[61] In 2007, the designs were tested when a fifty year storm left the city with little damage as compared to surrounding municipalities; this exceeded the design goal of the city withstanding a fifteen year event with no damage.[62]

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[54] ROSEVILLE, CA., MUNICIPAL CODE § 14.20.230 (2010).
[55] MULTI-HAZARD MITIGATION PLAN *supra* note 47 at 13-21.
[56] Edgar L. Villarreal, Annette Semadeni-Davies & Lars Bengtsson, *Inner City Storm Water Control Using a Combination of Best Management Practices*, 22 Ecological Engineering 279, 280 (2004).
[57] *id.*
[58] *id.*
[59] *id.* at 297.
[60] *id.* at 282.
[61] ECO-CITY AUGUSTENBORG, SWEDEN *supra* note 37 at 13.
[62] FOREST RESEARCH, SUSTAINABLE DRAINAGE SYSTEMS IN MALMO, SWEDEN: THE BENEFITS OF GREEN INFRASTRUCTURE at 2, available at http://www.cabe.org.uk/case-studies/ekostaden-augustenborg.

One project analyzed the application of the open system through a study of the impact environmental site design structures have on pollutant and stormwater runoff loads within the city.[63] The structures were designed to accommodate .5, 2, 5, and 10-year return periods based on the area of watershed serviced.[64] The comparative results of the dry retention basins reduced the surface runoff by 100 percent for five and ten year events compared to the conventional systems.[65] The wet retention basins reduced surface run off in the area by eighty-five percent as compared with the original system.[66] The authors found the mix of wet and dry basins particularly effective because the dry basins were more valuable in diffusing the higher intensity rainfall events and the wet basins were preferable to the more frequent, smaller events resulting in almost no runoff being discharged into the sewer system.[67]

IV. FUNDING

The ordinance applies to all new developments, which are already bound by NPDES permits, Pennsylvania Clean Streams Law and county level regulations. Counties and municipalities may adopt stricter guidelines, but under state law a developer may not build so as to result in damage to property or health from the improper management of stormwater. Developers must also limit the post-development runoff rate to the pre-development rate.[68]

There is no funding component to the ordinance because the costs associated with the mitigation of stormwater remains on the developer; this ordinance simply serves as a requirement that the developer use preferred methods. With the expectation of new requirements being met with opposition, it has been shown developers integrating environmental site designs

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[63] Villarreal, *supra* note 56 at 279.
[64] *id.* at 286.
[65] *id.* at 296.
[66] *id.*
[67] *id.* at 297.
[68] 32 P.S. § 680.13.

into projects typically see a cost reduction in the construction phase as well as increased sale prices. With the goal of low impact designs to move as little soil as possible, developers save by negating the construction usually needed to build large retention ponds, this may also lead to additional lots by freeing up that space. Less money is also spent on infrastructure because traditional sewers, pavement, curbs, site preparation costs, and gutters are replaced. One developer saved $70,000.00 per mile through the use of roadside swales and basins over a traditional sewer.[69] Lots in another neighborhood featuring low impact designs sold for $3,000.00 more than lots in surrounding, competing developments that used traditional designs.[70] Another study of developments in Illinois and Maryland showed a savings of $3,500.00 - $4,500.00 per lot by removing the need for traditional stormwater systems.[71]

V. KEY POLICY CONCERNS

Difficulties with the adoption of design techniques for a watershed appear to be the initial cost of gathering information because a consultant is typically required in order to create and collect the hydrologic data necessary to the guide the local government. The extensive knowledge necessary to create a functioning system of minimally invasive hydrologic basins limits the ability of local government staff to evaluate the stormwater design plans submitted by a developer without an engineer knowledgeable in the environmental site design techniques and goals. The transition to implementing these designs might be limited at the municipality level because additional resources might be necessary beyond the local engineer for the review of stormwater design plans. Without a specialized engineer the integration of innovative ideas may be stifled when the design most likely to be approved is the one that has been in use for decades.

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[69] Beggs, *supra* note 34 at 5.
[70] *id.*
[71] CHRISTOPHER KLOSS & CRYSTAL CALARUSSE, GREEN STRATEGIES FOR CONTROLLING STORMWATER AND COMBINED SEWER OVERFLOWS 17-19; 37-39 (Natural Resource Defense Council June 2006).

A system of education for the municipalities and communities will be necessary for the transition to more sustainable stormwater management designs. However, the pecuniary incentives associated with environmental site designs for the private developer may be enough to drive a substantive change.

In order to convey those benefits the success of the projects must be measured and communicated to the public. This is difficult for basins because they are not usually an isolated measure implemented alone. After the expense of creating a watershed plan the result should be a holistic approach to the issue of storm water management involving the use of multiple designs such as rain barrels, green rooftops, pervious pavements, porous pipes, etc. The large scale measure of success across a municipality can be assessed by the amount of water treated in the wastewater treatment plant. The municipal water supply and treatment facility also must conduct extensive testing, recording and reporting, which may reflect an improvement in water quality depending on the level of environmental site design implementation.

Surface water monitoring outside of the municipal water supply is generally out of the hands of the municipality and a responsibility of the state. PaDEP is currently set up to continuously monitor eighteen streams across Pennsylvania and publish a water quality report annually for the Clean Water Act. This monitoring would serve as another indicator for the adopted ordinance.

Finally, installing basins throughout a development may still seem daunting and impractical to some developers. Opponents may argue that the space converted to basins will take away from modern conveniences such as parking. However, the Florida Aquarium converted twenty percent of an 11.25 acre parking lot into swales and basins without losing a single parking space; the length of the parking spots was reduced two feet, so that when parked, the front of the vehicle rested over the grassed area.[72]

Despite the foregoing limitations, the adoption of an ordinance supporting the use of low impact design basins dispersed throughout new and existing development is the best way to manage the health of aquatic resources for the benefit of the ecosystem of which we depend. The minor structural impacts of basins are an affordable mitigation technique, aesthetically pleasing and proven to reduce peak runoff, flow and pollutants entering the waterways. The current methods of storm water treatment are ineffective strategies to mitigate the deleterious effects of development, reflected in the increasingly strict environmental regulations.

[72] Rushton, *supra* note 26, at 172, 174.

APPENDIX

CHAPTER 1
Stormwater Mitigation
Ordinance No:_______

An ordinance of ____________ Municipality, Pennsylvania, stating the design requirements for post development stormwater attenuation.

WHEREAS, the State of Pennsylvania governs stormwater through the adoption of the Stormwater Management Act of 1978, and disseminates local regulatory authority to municipalities through the Municipal Planning Act 247; and

WHEREAS, the Municipality has determined that in order to meet technical developments in stormwater management since the adoption of state stormwater control methods, it is in the best interest of the Municipality and its residents to reenact an entirely new stormwater management ordinance; and

WHEREAS, the Pennsylvania Clean Streams Law[73] provides the citizens and visitors of Pennsylvania with the right to clean, unpolluted water for recreational enjoyment, preservation of the State's economic interests, protection of the public welfare; and

WHEREAS, the authority invoked in this ordinance emanates from Pennsylvania's interest in protecting and enhancing the health, welfare, and safety of the public though the care and conservation of both surface and ground water quality; and

WHEREAS, inadequately managed stormwater causes damage to property, the environment, and public health through the contamination of drinking water; and

WHEREAS, minimum requirements are hereby established pursuant to the Pennsylvania Stormwater Best Management Practices Manual for the reduction of the adverse impacts associated with increased pollution and volume of stormwater runoff resulting from development.

NOW THEREFORE, it is hereby ORDAINED and ENACTED by the Board of Commissioners of the Municipality of ___________and is hereby enacted by the Authority of same as follows:

Section 1. Short title.

This ordinance shall be known and may be cited as the Stormwater Mitigation Ordinance of _____________ Municipality, Pennsylvania.

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[73] 32 P.S. § 691.4.

Section 2. Definitions.

The following words and phrases when used in this act shall have the meanings given to them in this section unless the context clearly indicates otherwise:

Acre. A parcel of land having an area of 43,560 square feet.

Adverse impact. Any deleterious effect on waters or wetlands, including their quality, quantity, surface area, species composition, aesthetics or usefulness for human or natural uses which are or may potentially be harmful or injurious to human health, welfare, safety or property, to biological productivity, diversity, or stability or which unreasonably interfere with the enjoyment of life, property, and including outdoor recreation.[74]

Construction activity. Activities subject to NPDES construction permits; including, but not limited to, clearing and grubbing, grading, demolition, excavation, and utility work.[75]

Detention structure. A permanent structure for the short term, temporary storage of runoff designed so as not to create a permanent pool of water.[76]

Development. Any construction activity, land disturbing activity, road building, pipe laying, or other activity resulting in a change in the physical character of any parcel of land.

Environmental site design (ESD). A design that employs small scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources.[77]

Infiltration. The passage or movement of water into the soil surface.[78]

Natural land gradient. The existing topography of the parcel if previously undeveloped, or undisturbed. The natural land gradient also includes the reclamation of the original topographic features of the site to the extent feasible, if the proposed design does not make use of the altered topographic features of the parcel.

National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit. A permit issued under the Clean Water Act to regulate point and non-point source pollution entering United States bodies of water.

[74] Prince George's County, Md., Municipal Code § 32-171 (2009).
[75] City of Roseville, Ca., § 14.20.040 (2010).
[76] Prince George's County, *supra* note 2.
[77] *id*.
[78] *id.*

Non-point source pollution. Any diffuse source of pollution which does not meet the definition of a point source.

On-site stormwater management. The design and construction of systems necessary to control stormwater within the proposed area of development.[79]

Pennsylvania Stormwater Best Practices Manual. The most recent version of the 2006 manual specifying design criteria, operation and maintenance for stormwater control measures promulgated by Pennsylvania Department of Environmental Protection.

Point source pollution. Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.[80]

Retention structure. A permanent structure for the extended storage of runoff.

Return period. The estimated probability of an equal magnitude storm occurring in terms of frequency.

Runoff. Stormwater travelling along the surface of the land.

Stormwater. Water from precipitation events such as rain, snow, sleet, or hail, that has reached the land surface.[81]

Section 3. Applicability.

The requirements of this ordinance shall apply to all construction activities affecting at least one acre.

Section 4. Administration.

(a) Application. Building permit applications intended for submission to the appropriate entity for the municipality shall include a Stormwater Design Plan. Development or construction activities not requiring a building permit, but disturbing at least one acre of land, shall submit a Stormwater Design Plan to the appropriate entity for approval.
(b) Review. Review and subsequent denial or approval of the plan shall be conducted by a professional engineer.
(c) Plan. The plan shall include the following:[82]
    (1) number of planned dwelling units or lots;
    (2) proposed project density;
    (3) proposed size and location of all land uses for the project;

[79] *Id.*
[80] 40 C.F.R. § 502(14)
[81] City of Roseville, Ca., Municipal Code14.20.040 (2010).
[82] Prince George's County, Md., Municipal Code § 32-171 (2009).

(4) current and proposed drainage patterns;
(5) location of all points of discharge from the site;
(6) stormwater management requirement computations;
(7) map of all wetlands;
(8) map of riparian zones and floodplains; and
(9) identification and mapped location of any other hydrologically sensitive sites within the parcel.

Section 5. Specifications.

(a) Technical authority. Stormwater management planning techniques, nonstructural practices, and design methods used in the Stormwater Design Plan shall emphasize the environmental site design methods set forth in the most recent publication of the Pennsylvania Stormwater Best Practices Manual.
(b) Specifications. In meeting the specifications the design must minimize site disturbance, articulate the natural land features and protect the natural hydrology of the site as much as possible.
(c) Methods. The natural land gradient shall be used to maximize on site stormwater retention and detention to meet the requirements set forth in Section 6 of this ordinance.

Section 6. Stormwater management and site development requirements.

(a) The design must provide for the following:
  (1) detain the first one half inch of precipitation within 100 feet of the point of contact with the land surface;
  (2) minimize runoff by limiting the distance surface water is conveyed across the surface of the land;
  (3) dispersed small detention structures throughout the project to promote infiltration on-site;
  (4) include a feature, or features, capable of retaining excess precipitation beyond the initial one half inch during a 25 year storm event;
  (5) runoff from the 25 year storm event shall not exceed 125% of pre development peak flow;
  (6) minimize the volume of stormwater entering the municipal sewer system; and
  (7) shall not result in the post development maximum rate of storm water runoff being greater than prior to development activities, or result in adverse impacts to property, human health, or environmental quality.[83]

Section 7. Building permits.

(a) Stormwater design plan required. No building permit shall be granted by the appropriate entity for the Municipality without review and approval of the Stormwater Design Plan accompanying the building permit application.

[83] 32 P.S. § 680.13.

(b) Construction and development activities requiring the submission of a Stormwater Design Plan only shall be reviewed and approved by the appropriate entity for the Municipality.
(c) Exception for impossibility. A waiver from the requirements of the Stormwater Design Plan may be requested if impossibility for a specific property can be established, which shall be granted only when all other stormwater control measures have been considered and rejected as infeasible.[84]

Section 8. Denial of permits.

Failure of a building permit application to be accompanied by a Stormwater Design Plan, or failure of the Stormwater Design Plan to meet the criteria set forth herein, shall result in the rejection of the building permit application and denial of a building permit. Where no building permit request accompanies the Stormwater Design Plan, rejection of the plan by the reviewing Municipal entity operates as a permanent injunction on all construction and development activities until a satisfactory Stormwater Design Plan has merited approval by the appropriate entity for the Municipality.

Section 9. Civil remedies.[85]

(a) Public nuisance. Any Activity conducted in violation of the provisions of this ordinance is hereby declared a public nuisance.
(b) Civil remedy. Suits to restrain, prevent or abate violation of this ordinance, may be instituted in equity or at law by the affected municipality, or any aggrieved person.
(c) Exceptions. In cases of emergency, where in the opinion of the court, the circumstances of the case require immediate abatement of the unlawful conduct, the court may, in its decree, fix a reasonable time during which the person responsible for the unlawful conduct shall correct or abate the same.
(d) Recoverable expenses. The expense of such proceedings shall be recoverable from the violator in such manner as may now or hereafter be provided by law.
(e) Damages. Any person injured by conduct which violates the provisions of this ordinance may, in addition to any other remedy provided under this act, recover damages caused by such violation from the landowner or other responsible person.

Section 11. Disclaimer of liability. [86]

This chapter shall not create liability on the part of the Municipality or any agent or employee thereof for any damages that result from any discharger's reliance on this ordinance or any administrative decision lawfully made thereunder.

Section 11. Severability. [87]

[84] City of Roseville, Ca., Municipal Code § 14.20.230 (2010).
[85] 32 P.S. § 680.15.
[86] City of Roseville, CA., Municipal Code § 14.20.100 (2010).
[87] 101 Pa. Code 15.69.

If any provision of this ordinance or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or applications of the ordinance which can be given effect without the invalid provision or application, and to this end the provisions of this ordinance are declared to be severable.

Section 12. Effective Date.

This ordinance shall take effect in five (5) days.