

SW 1: REDUCE EXCESSIVE PAVING OF SITES

New York City Building Code
Proposal developed by the Homes Committee

Summary

Issue:

Due to excess stormwater, 27 billion gallons of sewage are released directly into New York harbor each year.¹ Paving over the ground exacerbates this problem.

Recommendation:

In new construction projects, require that half of the non-built lot be permeable.

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code

1. Add a new Chapter 34 to read as follows:

CHAPTER 34 SITE AND LANDSCAPING

3402.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

AREA, IMPERMEABLE. Any portion of a lot on which the soil is covered with impervious materials such as asphalt or concrete, or bricks or pavers over a concrete or asphalt sub-base

AREA, NON-BUILT SITE. Any area of a lot that is not covered by a building.

3403.1 Impermeable surfaces. Sites shall comply with the following standards on impermeable surfaces:

3403.2 For new buildings, a maximum of fifty percent of the non-built site area of the zoning lot may be impermeable area.

3403.3 For alterations, the impermeable area of the non-built site area of the zoning lot shall not be increased to greater than fifty percent.

3403.3.1 Where over fifty percent of the existing non-built site area of the zoning lot is impermeable area, any impermeable area that is removed shall be replaced only with pervious materials.

Exceptions:

1. Any building classified in occupancy groups F or H and motor fuel-dispensing facilities classified under occupancy group M.

2. Subject to approval of the Commissioner, where compliance would result in flooding within existing buildings.

Effective Date: July 1, 2010

Supporting Information

Issue – Expanded

Impervious pavement is common in urban environments because it is perceived as the lowest cost solution for parking,

plazas, and other hard surfaces. However, impervious surfaces cause hardship for cities by increasing local flooding, combined sewer overflows and other environmental degradation that could be avoided by through alternative paving techniques. An increasing number of design options, including pervious pavements of many sorts, can satisfy building functional needs without creating as much runoff and allowing for some re-establishment of natural process and hydrological cycles, such as infiltrations into soils, evaporation, and evapo-transpiration. Alternatives to pavement also often involve planted systems, which create habitat, and cool the city, along with restoring the hydrological cycles.

Environmental & Health Benefits

Greater surface permeability in New York City will reduce local flooding, combined sewer overflows, and allow for filtration and groundwater recharge. Permeable areas retain moisture, which evaporates during hot periods, reducing the urban heat island effect.

This proposal was found to have a high, positive environmental impact per building and to impact a large number of buildings. It was thus given an environmental score of 3.

Pollutants in stormwater runoff can have damaging effects on human health and aquatic ecosystems. Since New York City has a combined sewer system in many areas, and intense storms flood the system, which can result in the overflow of untreated stormwater and septic sewage (Combined Sewer Overflow) to be discharged directly into the rivers. Limiting the amount of water flowing directly into the system from intense storms can lessen the occurrences of CSOs.

This proposal was found to have no significant positive health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to lower capital costs if implemented.

Precedents

Several cities require new and redeveloped sites to reduce impervious areas of sites and limit driveway paving.

The City of Philadelphia requires new developments and redevelopments over 10,000 square feet to reduce the impervious area of a site connected to sewers by 20% compared to preexisting conditions. Philadelphia offers the reduction of impervious areas on a lot as an option to meet criteria to reduce peak flow stormwater volumes that are led to sewers. Other structural stormwater management practices may be used that detain water and release it over a longer period of time than unabated runoff.

The City of Chicago requires redeveloped sites over 7,500 square feet that discharge to combined sewers to reduce impervious cover by 15% from previous conditions. Its stormwater management manual recommends landscaping and permeable pavement as ways to meet stricter regulation. Methods to reduce flooding on-site include vegetated filter strips, which are designed to receive stormwater runoff from impervious surfaces and disperse it over permeable areas, and bioinfiltration systems, which are depressed areas containing plants, mulch, and prepared soils.

Berkeley limits the amount of paved off-street parking allowed in a yard, and requires permeable surfaces and landscape strips surrounding paved parking.²

Toronto provides a maximum front yard driveway width and requires 50-60% of front yards to be landscaped.³

LEED

LEED for Homes SS cr.4.1 states lot must be designed such that at least 70% of the built environment, excluding the area under the roof, is permeable or designed to capture water runoff for infiltration on-site.

For existing homes seeking certification under the LEED EB rating system, this proposal will facilitate achieving SS cr. 5.1 & 5.2 Stormwater Management, Rate and Quantity Reduction.

Depending on the permeable surface that is utilized, project teams may also be eligible for LEED for Homes SS cr.3 Local Heat Island Effects or LEED EB-SS cr. 6.1 Heat Island Reduction, non-roof. These sections award points to projects for reducing irrigation, tempering the outdoor environment, and reducing cooling loads.

Implementation & Market Availability

Nearly any surface that is paved with a traditional impervious surface may be converted to a porous pavement system. Porous pavements are especially applicable to sites that are in high-density area where space is too limited for other methods of stormwater management including lawns or soil beds for infiltration. A simple option for permeable driveway alternatives is crushed gravel, but where this is undesirable there are an increasing number of options available, and several systems have histories of success.

Porous asphalt was developed in the 1970's and has been implemented where standard asphalt would otherwise be used. It is installed just as standard asphalt is, but uses larger aggregate so that water can pass through voids in the material. Thomas Cahill, P.E. has used porous asphalt for projects such as walking paths at Swarthmore College and many large-scale parking lots throughout Pennsylvania. Porous asphalt has proven to be at-least as durable as impermeable pavement.

Similar to porous asphalt is porous concrete, which likewise is made of larger sized aggregate so that water can trickle through. The Florida Concrete Association developed porous concrete and it has been used in Florida and other southern states.

Porous asphalt and concrete need regular maintenance; otherwise after time the pores tend to clog up. Vacuuming or power washing annually, or using a leaf blower more frequently all satisfactorily restore permeability. During the winter months sand should never be used to increase friction because the sand will obstruct voids in the pavement. Salts may still be used though they should be used sparingly because chlorides that pass through the pavement may corrode piping and damage plant life. Permeable pavements tend to require less salt anyway because precipitation passes through instead of ponding on top thus mitigating the formation of ice.

Reinforced turf is an especially appealing alternative to paving on sites which experience relatively infrequent traffic. Reinforced turf is comprised of a grid of either plastic or concrete with openings that can be filled with soil. Turf grass can take root in this soil and aid in retaining stormwater. A popular brand of reinforced turf called "Grasscrete", marketed by a UK based company, is a concrete, heavy-duty interlocking system that has been used for decades.

If the owner or designer deems turf unwanted then permeable pavers can be used. Permeable pavers are paving units, often made of concrete, with openings in between that can be filled with relatively pervious material such as gravel. They can be combined in a variety of patterns and are suited to areas such as patios and plazas.

One need not choose a single variety of permeable pavements over others. On large-scale projects a designer would be smart to apply different permeable pavement systems where they are most appropriate. This has been accomplished very successfully at the New Sunrise Yards in Queens, a light industrial facility for NYC DOT with a need for truck access, extensive parking, and fire code access. Here a varied palette of solutions, which included permeable pavers in the parking area and Grasscrete in the side yard where fire truck access was required, limited the impermeable paving to the truck loading dock areas.

ENDNOTES:

¹ State of New York, DEC, A Gathering Storm - New York Wastewater Infrastructure in Crisis, <http://www.dec.ny.gov/chemical/48803.html> (last visited January 14, 2010).

² BERKELEY MUN. CODE § 23D.12.080 (2006), *available at* <http://www.ci.berkeley.ca.us/citycouncil/2006citycouncil/packet/072506/2006-07-25%20Item%2003%20Ord%20>

%20Off%20Street%20Parking%20Yards.pdf.

³ City of Toronto, Front Yard Parking, <http://www.toronto.ca/zoning/frontyard.htm> (last visited Oct. 14, 2009).

SW 2: REDUCE STORMWATER RUNOFF FROM NEW DEVELOPMENTS

Rules of the City of New York (Department of Environmental Protection)
Proposal developed by the Site & Site Stormwater Committee

Summary

Issue:

While wastewater discharged by the city into New York Harbor must meet increasingly stringent national and state standards, the city's own stormwater detention standards have not changed in 25 years. For this reason, DEP is considering increasing detention standards for properties with new or altered sewer connections.

Recommendation:

The Task Force supports more rigorous standards for new and altered sewer connections, which should be accompanied by model detention system designs that would meet these standards. Future permit applications and decisions should also be made publicly available. DEP began considering these measures through a process that was independent of the Task Force, prior to the issuance of this report.

Proposed Legislation, Rule or Study

Expression of Support for the New York City Department of Environmental Protection to increase storm-water detention requirements.

The New York City Department of Environmental Protection (DEP) is exploring changes to sewer regulations and codes to increase stormwater detention standards for new development. DEP is studying options to increase detention requirements because of the city's endemic problems with stormwater runoff that overwhelms sewage treatment plants, resulting in combined sewage overflows (CSOs) that pollute NYC's waterways. Detention at the source of stormwater runoff is generally more cost effective than collective detention downstream, so increasing site-based detention requirements is a good strategy.

Given these problems, the Committee supports the creation of more stringent standards, and the ones DEP is studying are in keeping with the current methodology for storm-water calculations, a methodology that is well understood by the industry. The Committee recommends that when DEP releases their proposal requirements, the agency to explain how it arrived at the specifics of its requirements and their expected impact over time. In particular, the Committee recommends that DEP analyze the impact of proposed new standards on a variety of prototypical sites. At a minimum, for each prototypical site, the analysis should assess how storage volumes would increase, how this could be accommodated on each site through one or more alternative designs, and the estimated cost. This explanatory material should be made available to the engineering and development community.

In addition, in order to promote better understanding of DEP detention requirements and means of compliance, the Committee recommends that future permit applications and DEP decisions be made available to the public.

Supporting Information

Issue - Expanded

During dry conditions, the city's sewage treatment plants can easily treat the volume of wastewater produced in New York City. When there are rainstorms, however, the addition of stormwater into pipes that carry both stormwater and sewage overwhelm the capacity of treatment plants, carrying partially treated sewage into New York Harbor – these incidents are called Combined Sewage Overflows (CSOs). CSOs undermine the ecology of the harbor and can cause illness as they contain human waste that can carry pathogenic organisms. Some of the common diseases include hepatitis, gastric disorders, dysentery, and swimmer's ear. Other forms of bacteria found in untreated waters can cause typhoid, cholera, and dysentery. Human health is also impacted when fish or shellfish that have been contaminated by combined-sewer discharges are consumed.

Increased stormwater runoff from excess paving not only increases CSOs but also flooding of some city neighborhoods. More than 75% of New York City is covered with impervious surfaces and buildings and developed lots account for 45% of the city's land area. The situation is exacerbated as runoff from low-density development (one- and two- family homes) has increased 50% since 1950 because residents have paved over their yards, often in order to obtain more parking spaces. An analysis conducted by the Department of City Planning and Department of Buildings, predicts over 52 million square feet of new development greater 10,000 square feet will be built between 2010 and 2030. Even if the

recent slowdown in construction in New York City is taken into account when interpreting these estimates, the projections for new development make it even more urgent to address the current stormwater problems.²

On-site detention regulations have been in place since the mid 1980s. Since then, water standards for New York Harbor have increased in order to allow for recreation and habitat. There has been no parallel change in on-site detention requirements to match the change in water standards and increased development and paving of yards. Therefore, the detention requirements should be updated to reflect these new regulations and city conditions.

Environmental & Health Benefits

Reduction of combined sewage overflow (CSO) reduces the risk of exposure to disease causing bacteria and viruses.

This proposal was found to have high positive environmental impact per building and to impact a small number of buildings. It was given an environmental score of 2.

This proposal was found to have no significant positive health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to increase first capital costs by 0.02% to 0.3%, depending on building type. It was thus categorized as incurring a low to medium capital cost increment.

Precedents

Performance standards for new construction approaches have been adopted by Chicago, Philadelphia, Seattle, Portland, and other major cities.

LEED

LEED credits retention but does not reward detention. Retention removes stormwater permanently from the system through infiltration into the site or through productive use, a strategy that is more appropriate for suburban areas where the level of paving and development is not that high. In comparison, detention temporarily detains stormwater and slowly releases it to the system and thus decreases CSOs by slowing down the flow to sewage treatment plants. Detention is a more effective technique for reducing runoff in urban areas that should be credited under LEED.

Nevertheless, various LEED credits across all the rating systems refer to detention facilities as one possible implementation to mitigate stormwater runoff. These LEED credits include:

- NC SS 6.1 Stormwater Design: Quantity Control Option 1B
- LEED for Schools SS cr.6.1 Stormwater Design: Quantity Control
- LEED ND-GCT cr.9 Stormwater Management
- LEED CI-SS cr.1B Site Selection
- LEED for Homes SS cr. 4 Surface Water Management.

Though the standards do not currently address existing building sites, LEED EB-SS cr. 5 Stormwater Management also makes reference to detention facilities. Should the standards change as a result of this proposal, these credits would be more attainable.

Should the standards be revised to implement alternative strategies such as vegetated roofs, rainwater collection, or on-site wastewater treatment, then the recommendation will also result in easier compliance with Water Efficiency credits across the various rating systems.

Implementation & Market Availability

There are no known implementation issues for this proposal.

The technology and materials required to support reductions in stormwater runoff are widely available.

ENDNOTES:

¹ CENTER FOR MARINE CONSERVATION, SEWAGE TREATMENT: AMERICA'S PIPE DREAM – A REPORT ON COMBINED-SEWER OVERFLOWS (1992).

² CITY OF NEW YORK, PLANYC, SUSTAINABLE STORMWATER MANAGEMENT PLAN 2008 (2008) *available at* http://www.nyc.gov/html/planyc2030/downloads/pdf/sustainable_stormwater_plan.pdf.

SW 3: REDUCE STORMWATER RUNOFF FROM CONSTRUCTION SITES

New York City Building Code

Proposal developed by Site & Site Stormwater Committee

Summary

Issue:

While state and federal regulations limit stormwater discharge from construction sites that are larger than an acre, smaller sites are unregulated. In New York City, many construction sites are well under an acre.

Recommendation:

Require construction sites of less than an acre to reduce runoff, soil loss, sedimentation, and the generation of dust and particulate matter.

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code:

1. Add a new section BC 3321 to read as follows:

SECTION BC 3321

Construction Activity Pollution Prevention

3321.1 Erosion and sedimentation control plan. No permit shall be issued for the construction or demolition of a building until an erosion and sedimentation control plan in accordance with rules promulgated by the Commissioner has been approved by the department. The Commissioner shall promulgate rules establishing requirements for erosion and sedimentation control plans. In promulgating such rules, the Commissioner shall consider the standards of the 2003 EPA Construction General Permit and New York State Pollutant Discharge Elimination System and consider measures to accomplish the following objectives:

1. Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse;
2. Prevent sedimentation of storm sewer or receiving streams; and
3. Prevent polluting the air with dust and particulate matter.

Exception: Construction or demolition projects where a total of less than 2,000 square feet of the construction or demolition site is impacted by construction or demolition, or the siting or transportation of construction materials or equipment. Such projects shall submit a site plan clearly showing the total area in which construction or demolition, or the siting or transportation of construction materials or equipment, will occur.

Supporting Information

Issue - Expanded

In New York State, stormwater discharges from construction activities that disturb one acre or more of land must receive a New York State Pollution Discharge Elimination System (SPDES) permit. These permits require the contractor to prepare a stormwater pollution prevention plan. With certain exceptions (such as construction in the “East of Hudson” watershed), sites less than one acre do not require a SPDES permit.

While a one-acre minimum may make sense as the cut-off in rural areas, very few construction sites in New York City are this large. As a result, construction sites in New York City are not covered by NYS stormwater mitigation requirements. This proposal would fill the regulatory gap by requiring all construction sites in New York City that disturb more than 2,000 square feet to develop a stormwater pollution prevention plan.

Environmental & Health Benefits

Reduced runoff results in a reduction of combined sewage overflow (CSO) that in turn reduces the risk of exposure to

disease-causing bacteria and viruses.

This proposal was found to have a low, positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 1.

This proposal was found to have no significant positive health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to increase first capital costs by 0.05% to 0.06%, depending on building type. It was thus categorized as incurring a low to a medium capital cost increment.

Precedents

The City and County of Denver¹ as well as the Virginia Department of Conservation & Recreation² have stormwater management plans in place that limit the runoff of stormwater from construction sites.

Note: One acre is the common trigger for Construction Activities Stormwater Management. General permits cover smaller sites. However, it is common for special situations to require permits for disturbances typically greater than 2,500 square feet. Special situations include historic districts, environmentally sensitive areas, etc.

LEED

All projects pursuing LEED certification must meet the requirements of the EPA Construction General Permit (CGP), as this is a prerequisite of the rating systems (with the exception of LEED CI). Since the code revisions outlined in this proposal reference the EPA guidelines directly, this proposal will have a significant positive impact on achieving LEED certification.

Although the CGP only applies to construction sites greater than 1 acre. The requirements are applied to all projects for the purposes of the LEED prerequisites. Therefore, these recommended code revisions are applicable.

The following LEED prerequisites apply: NC-SS prerequisite 1 Construction Activity Pollution Prevention; EB-SS prerequisite 1 Erosion & Sedimentation Control; LEED for Schools SS prerequisite 1 Construction Activity Pollution Prevention Required; LEED for Retail (pilot program) SS prerequisite 1 Construction Activity Pollution Prevention; LEED ND (pilot program) GCT prerequisite 1 Construction Activity Pollution Prevention.

Implementation & Market Availability

There are no known implementation issues associated with this proposal.

The technology and materials required to support the reduction in stormwater runoff are widely available.

ENDNOTES:

¹ CITY AND COUNTY OF DENVER, WASTEWATER MGMT. DIV., DEP'T OF PUB. WORKS, CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT PLANS: AN INFO. GUIDE (2006) available at www.denvergov.org/Portals/528/documents/DftGuide452007.pdf.

² Virginia Department of Conservation & Recreation, Virginia Stormwater Management Program, http://www.dcr.virginia.gov/soil_and_water/stormwat.shtml (last visited Jan 31, 2010).

SW 4: SEND RAINWATER TO WATERWAYS

Rules of the City of New York (Department of Environmental Protection)
Proposal developed by the Site & Site Stormwater Committee

Summary

Issue:

Most properties located on the waterfront direct their rainwater into the sewer system, which contributes to more frequent combined sewer overflows during storms.

Recommendation:

Require waterfront properties to treat and discharge rainwater into the adjacent water body, unless it is technically infeasible.

Proposed Legislation, Rule or Study

Amendments to the Rules of the City of New York:

1. Add a new paragraph (j) to Section 19-02 of Title 15 as follows:

(j) For properties located adjacent to tidal waterways, permits for the discharge of stormwater into public sewers shall require, at a minimum, a finding by the Commissioner that it is not feasible to discharge all or part of the site's stormwater into the adjacent waterbody in compliance with the requirements of the Army Corps of Engineers and New York State Department of Environmental Conservation and the New York State Department of Environmental Conservation.

Supporting Information

Issue - Expanded

Excess stormwater is an important environmental and health issue in New York City due to the incidence of combined sewer overflows. Sites situated next to water bodies could entirely eliminate their burden on the sewer system by discharging stormwater directly into the water body.

Sending stormwater directly to waterways is already a common practice with the Department of Environmental Protection, though it is not yet formalized in code.

Environmental & Health Benefits

Redirection of waterfront runoff results in a reduction of combined sewage overflow (CSO) that in turn reduces the risk of exposure to disease-causing bacteria and viruses.

This proposal was found to have a low positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 1.

This proposal was found to have no significant positive health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to lower capital costs if implemented.

Precedents

As noted above, DEP has permitted many sites to discharge their stormwater directly into waterways. Projects where this has occurred include the following: 184 Kent Avenue (Brooklyn), 155 West Street (Brooklyn), Ferry Point Park (Bronx), Bronx River Greenway (Bronx), Silvercup (Queens), Fresh Kills (Staten Island) and Baker Field (Manhattan).

LEED

For existing buildings, projects must meet LEED EB-WE prerequisite 2 Discharge Water Compliance which concerns protecting natural habitat, waterways and water supply from pollutants carried by building discharge water. Under Option A, if regulated by EPA National Pollution Discharge Elimination System (NPDES) Clean Water Act requirements, a project must demonstrate NPDES permit compliance including use of any required oil separators, grease interceptors and other filtration for in-building generated discharges and proper disposal of any wastes collected. Under Option B, if the facility is not regulated by a NPDES Permit, this prerequisite is achieved.

Since this proposal requires that all discharges into waterbodies comply with the requirements of NYSDEC, the recommendations will assist in achieving LEED EB credits.

Implementation & Market Availability

There are no known implementation issues for this proposal. The technology and materials required to support the redirection of stormwater runoff are widely available.

Notes

The federal Clean Water Act requires all municipal, industrial and commercial facilities that discharge wastewater or stormwater directly from a point source into a water of the United States to obtain a National Pollutant Discharge Elimination System (NPDES) permit. All permits are written to ensure the receiving waters will achieve their Water Quality Standards. In order for this proposal to be implemented, the method of discharge must comply with existing NPDES permits.

SW 5

ENCOURAGE INNOVATIVE STORMWATER PRACTICES

Administrative Code of the City of New York

Proposal developed by the Site & Site Stormwater Committee

Summary

Issue:

Modern stormwater control systems incorporate both civil engineering strategies, such as underground detention tanks, and landscape-based strategies, such as green roofs and natural landscaping. New York City's regulations, however, do not properly account for the impact of landscape-based strategies.

Recommendation:

Revise stormwater regulations to account for landscape-based strategies.

Proposed Legislation, Rule or Study

Amendments to the Administrative Code of the City of New York:

1. Add a new Section 24-528 as follows:

§ 24-528.1 Stormwater flow control. a. On or before Jan. 1, 2013, the department shall promulgate rules establishing runoff coefficients for green roofs, woodlands, gravel, native vegetation with prepared soils, dry bottom detention basins and wetlands. Such rules shall exclude approved best management practice areas from site flow rate calculations.

b. The runoff coefficients provided under this section shall not permit a site to provide less detention storage volume than required under rules in place on July 1, 2009.

§ 24-528.2 Stormwater volume control. On or before Jan. 1, 2013, the department shall promulgate rules, which may incorporate by reference a design manual, establishing a comprehensive system for alternative stormwater detention strategies. Such rules shall include:

a. Detention storage values for alternative strategies that may be used to decrease the size of structural stormwater detention storage facilities that would otherwise be required by the department.

b. Standard designs to simplify compliance and streamline enforcement.

c. Standard designs and detention storage values for the following alternative strategies: green roofs, rooftop runoff BMPs (planter boxes, rain barrels and cisterns), permeable paving, natural landscaping, vegetated filter strips, bio-infiltration systems, drainage swales and infiltration vaults. Such detention storage values shall only apply with respect to reductions in permissible stormwater outflow the department may enact after July 1, 2009. The detention storage values provided under this section shall not permit a site to provide less structural detention storage volume than required under rules in place on July 1, 2009. Any project that utilizes the standard designs shall receive the established detention storage credit. Rooftop runoff BMPs may not contribute more than a ten percent (10%) of the site's required detention storage volume.

Supporting Information

Issue – Expanded

How Stormwater Became A Problem

When it rains in a natural area, like a forest or grassland, most rainwater soaks into the ground or is captured by leaves, with the remainder running into rivers and streams. Stormwater is a problem in cities because hard surfaces, such as roofs and streets, reduce the area where rain can infiltrate into the soil and reduce evapotranspiration from vegetation.

In New York and many other cities, proposed developments with excess stormwater must construct onsite detention tanks and sometimes replace sewer pipes downstream of the project site to avoid flooding and sewer surcharge. This traditional approach to stormwater management addresses a problem caused by interference with the hydrological cycle (paving of permeable surfaces) by further bypassing that natural system (instead of the ground absorbing water, constructed tanks now do so).

As a result of the green building movement, some cities are now revisiting their approach to stormwater management. Many cities now seek to mimic natural systems for capturing stormwater with approaches like permeable pavement and detention basins, rather than relying solely on structural solutions to stormwater. Indeed, Staten Island's "Bluebelt" is a famous and enormously successful effort to reduce stormwater through both structural and non-structural systems such as engineered ponds, wetlands, outlet silting basins and sand filters. Cities are also beginning to treat stormwater as a potential water resource, rather than a problem that must be removed from sites.

New York City's Approach to Stormwater

The New York City Department of Environmental Protection (DEP) regulates the amount of sanitary and stormwater inputs to the combined sewer system. Specifically, the Drainage Review Section of the Division of Sewer Regulation and Control reviews new and proposed redevelopment projects to ensure that flow rates are within the carrying capacity of existing sewer pipes. These flow rates are specified in the City's Drainage Plan. Developers must submit Site Connection applications to DEP, specifying the total developed site storm flow and the amount of detention and retention incorporated into the site design. If a proposed development produces flows that are above those specified in the Drainage Plan, the developer must also produce an Amended Drainage Plan. The Amended Drainage Plan may involve replacing sewer pipes downstream of the project site in order to avoid flooding and sewer surcharge. The developer is also required to provide a certain amount of onsite detention of stormwater runoff.

DEP determines the flow rate off a building site by multiplying the site area and rainfall intensity with a runoff coefficient.¹ This "runoff coefficient" represents the ability of a surface to absorb rainfall. For example, roof surfaces have a coefficient of 1.0, whereas grass has a coefficient of 0.20 (meaning 80% of the rain is assumed to be absorbed by the ground).²

The amount of required stormwater detention is determined by comparing the estimated flow rate off a site (based on the types of surfaces) with its permissible flow rate under the Drainage Plan. Developers are required to provide detention that is equal to the delta between the estimated and permissible flow rates.

DEP does not, however, provide runoff coefficients for green roofs and other permeable surfaces that are now widely used by green building projects to reduce stormwater rate. In addition, DEP provides coefficients for grass areas and undeveloped areas, but no further nuance according to types of plantings and soil. In comparison, the Chicago Stormwater Ordinance Manual distinguishes between 11 types of lawns and other vegetated surfaces.³ In addition, DEP does not credit many types of volume reduction systems such as green roofs, drainage swales and rooftop runoff BMPs (planter boxes, rain barrels and cisterns).

DEP is currently considering reducing the allowable stormwater runoff to 10% of current levels. This 900% reduction in runoff volume reflects the enormous uncertainty in calculations of sewer carrying capacity. The city's stormwater calculations evidently have sufficient uncertainty to tolerate some variability inherent in site-based stormwater management systems. Indeed, DEP is currently studying volume reduction strategies.

DEP's Upcoming Design Manual

DEP is developing a source control design manual that will contain approved designs and design considerations for use in New York City to comply with applicable codes and economic incentive packages. Many cities and states have recently published design manuals, but these do not describe New York City regulatory requirements and New York City-specific climate, geologic, hydrologic, and built conditions. The Design Manual will address different land use and building classifications; soil, bedrock, and groundwater conditions specific to different areas of New York City; climate conditions specific to New York City; and Administrative Code and permitting requirements for installing source controls, using examples from pilot and demonstration projects in New York City. The Design Manual will also include minimum maintenance requirements and procedures that will ensure effective source control performance over their design life. Maintenance requirements will take into consideration the sedimentation that can cause source controls to fail or perform less effectively over the years.

Task Force Proposal

This recommendation proposes that DEP build upon its existing efforts and enhance its own runoff coefficients by also using the nuanced coefficients developed by Chicago. It also proposes that DEP credit the detention storage capacity of site-based stormwater controls.

Environmental & Health Benefits

By facilitating the use of site-based stormwater management practices, this proposal will reduce combined sewage overflow (CSO). CSO events can expose swimmers to disease-causing bacteria and viruses, contaminate fish and shellfish and otherwise harm the New York Harbor.

This proposal was found to have no significant positive environmental impact.

This proposal was found to have no significant positive health impact.

Cost / Savings

This proposal is for a code allowance, which will have no direct impact on construction costs.

Precedents

This proposal would bring New York City closer to Chicago's Chicago Stormwater Ordinance Manual. Under the proposal, NYC would align with Chicago in terms of the types of surfaces with runoff coefficients and the types of volume reduction strategies credited. Many other cities, such as Seattle, have stormwater plans similar to Chicago. For example, the Seattle Stormwater Facility Credit program:

- Gives credit for many BMPs including: green roofs, cisterns, bioretention, pervious pavement, etc.
- Developed to recognize that stormwater flowing through privately-owned flow control or treatment systems has less impact than stormwater that directly enters the City's stormwater system or area waterways.
http://www.seattle.gov/util/stellent/groups/public/@spu/@fom/documents/webcontent/spu01_003921.pdf

LEED

The effectiveness of this proposal relative to LEED certification will depend on the precise regulations that are adopted by the city when the program is implemented.

Various LEED credits across all the rating systems refer to detention facilities as one possible implementation to mitigate stormwater runoff. These LEED credits include

- NC SS 6.1 Stormwater Design: Quantity Control Option 1B
- LEED for Schools SS cr.6.1 Stormwater Design: Quantity Control
- LEED CI-SS cr.1B Site Selection; LEED for Homes SS cr. 4 Surface Water Management
- LEED EB-SS cr. 5 Stormwater Management
- LEED ND-GCT cr.9 Stormwater Management (pilot program).

This proposal will assist in achieving credits which govern the reuse of treated wastewater, recycled wastewater and graywater, or captured rainwater for landscaping:

- LEED NC-WE cr. 1.1 & 1.2 Water Efficient Landscaping
- LEED for Schools-WE cr. 1.1 & 1.2 Water Efficient Landscaping
- LEED CI-SS cr.1 Options G&H Water Efficient Irrigation
- LEED EB-WE cr.1 Water Efficient Landscaping
- LEED ND-GCT cr. 16 Wastewater Management (pilot program).

For projects that reduce potable water use for building sewage conveyance through the use of water-conserving fixtures or non-potable water, the recommendation will result in easier compliance with:

- LEED NC-WE cr.2 OPTION 1 Innovative Wastewater Technologies
- LEED CI-SS cr.1 Option I Innovative Wastewater Technologies
- LEED for Schools-WE cr.2 OPTION 1 Innovative Wastewater Technologies
- LEED for Homes WE cr.1 Water Reuse
- LEED EB-WE cr.2 Innovative Wastewater Technologies.

Implementation & Market Availability

There are no known implementation issues associated with this proposal. The technology and materials required to support the reduction in stormwater runoff are widely available.

Notes

- The Department of Environmental Protection expressed concern about providing credit for alternative strategies that may have variable capacity for stormwater detention, such as cisterns or rain barrels. Rain barrels may not function following freezing periods, and water captured during one rainfall by rain barrels and cisterns may not be used prior to the next rainfall. On the other hand, rain barrels and cisterns offer the potential for reductions not only in stormwater, but also potable water use (by providing an alternative water source for landscaping). Other cities, such as Chicago, have approached the conflicting goals of predictability in stormwater retention and maximizing opportunity for reductions by limiting the credit that may be claimed by variable BMPs. This proposal follows this same approach by limiting the detention storage for cisterns and rain barrels to no more than 10% of the allowable flow rate.
- Definitions for terms used in the proposed code language can be found in the Chicago Stormwater Ordinance Manual.
- This proposal should be considered in the context of SS5, which establishes maintenance requirements for BMPs. As a result of the maintenance requirements, some of the alternative strategies in this proposal could only be utilized by larger sites with maintenance staff.

ENDNOTES:

¹ NYC DEP'T OF ENVIRONMENTAL PROTECTION, BUREAU OF WATER AND SEWER OPERATIONS, CRITERIA FOR DETERMINATION OF DETENTION FACILITY VOLUME, (2008) http://www.nyc.gov/html/dep/pdf/water_sewer/30.pdf.

² Ibid. (DEP's runoff coefficients are as follows: 1.0 roof areas; 0.85 pavement; 0.75 porous asphalt; 0.30 undeveloped areas; and 0.20 grass areas.).

³ CITY OF CHICAGO, IL., DEP'T OF ENVIRONMENT, STORMWATER MANAGEMENT ORDINANCE MANUAL, 23 (2008).

SW 6: MAINTAIN SITE-BASED STORMWATER DETENTION SYSTEMS

Administrative Code of the City of New York

Proposal developed by the Site & Site Stormwater Committee

Summary

Issue:

Site-based stormwater diversion and detention systems must be properly maintained to be a reliable component of the city's stormwater infrastructure.

Recommendation:

Establish maintenance standards for site-based stormwater systems, and require property owners to verify compliance.

Proposed Legislation, Rule or Study

Amendments to the Administrative Code of the City of New York:

1. Add a new Section as follows:

Maintenance and Performance Standards.

a. No later than July first, two thousand eleven, the department shall promulgate rules establishing maintenance and performance standards for stormwater detention systems constructed pursuant to a permit or requirement issued by the department. For the purposes of this section, "stormwater detention systems" shall include, but not be limited to, detention tanks, roofwater detention systems, drywells, gravel pits and any other stormwater detention systems allowed by the department.

b. No later than July first, two thousand eleven, the department shall promulgate rules requiring the owners of buildings that have received a permit pursuant to section 24-507 of the administrative code to submit an operations and maintenance plan for any stormwater detention systems included in such permit. Such rules shall require building owners to:

1. Include in the operations and management plan any activities required to keep the stormwater detention system in compliance with the rules promulgated pursuant to subdivision (a) of this section.
2. Maintain an inspection and maintenance logbook and make such logbook available for review by the department upon request.
3. Obtain certification no less than every five years from a third-party inspector authorized by the department to inspect stormwater detention systems. The department shall develop the documentation and performance standards and the testing protocols for such certification. The department shall establish an audit program, which will inspect no less than five percent of the certification reports submitted annually. The department shall be authorized to establish fines for failure to comply with the requirements of such certification program and fees for participation.

Supporting Information

Issue – Expanded

As a result of the green building movement, some cities are revisiting their approach to stormwater management. Many cities now seek to mimic natural systems for capturing stormwater, with approaches such as permeable pavement and detention basins, rather than relying solely on structural solutions to stormwater. Indeed, Staten Island's "Bluebelt" is a famous and enormously successful effort to reduce stormwater through both structural and non-structural, site-based systems such as engineered ponds, wetlands, outlet silting basins and sand filters.

Another proposal from the Task Force, *SW5: Encourage Innovative Stormwater Practices*, would require the NYC Department of Environmental Protection to develop regulations that will encourage site-based stormwater detention and diversion systems. These site-based systems, however, can only become a reliable part of the overall city stormwater system if they are maintained to ensure proper function. For example, permeable pavement requires periodic cleaning to remain porous, as do rooftop detentions systems and silting basins that can become clogged or silted up.

This proposal would require the department to develop maintenance standards to ensure that site-based stormwater systems can be reliable components of the citywide stormwater system.

Environmental & Health Benefits

Reduced runoff results in a reduction of combined sewer overflow (CSO) that in turn reduces the risk of exposure to disease-causing bacteria and viruses.

This proposal was found to have a positive, indirect environmental impact.

This proposal was found to have a positive, indirect health impact.

Cost & Savings

This proposal is for a study, which will have no direct impact on construction costs.

Precedents

The City of Durham, North Carolina requires submittal of *BMP Annual Maintenance Certifications* (http://www.durhamnc.gov/departments/works/stormwater_bmp.cfm). Additionally, a certification is required of the person making the submittal (http://www.durhamnc.gov/departments/works/pdf/bmp2_maintenance_certifier.pdf).

LEED

The effectiveness of this proposal relative to LEED certification will depend on the precise regulations that are adopted by the city when the program is implemented.

This proposal may facilitate achieving the following credits that govern the reduction of stormwater volumes:

- LEED NC-SS cr. 6.1 Stormwater Design, Quantity Control
- LEED CI-SS cr.1B Stormwater Management, Rate and Quantity
- LEED EB-SS cr.5.1 & 5.2 Stormwater Management
- LEED for Schools SS cr. 6.1 Stormwater Design, Quantity Control
- LEED for Homes SS cr.4 Surface Water Management
- LEED ND-GCT cr.9 Stormwater Management (pilot program)
- other LEED pilot programs under development.

LEED for New Construction SS cr. 6.2 Stormwater Design, Quality Control requires the implementation of a stormwater management plan to reduce or eliminate water pollution. This plan must utilize acceptable Best Management Practices (BMPs). The BMP's are considered to meet with LEED if they are in accordance with standards and specifications from a state or local program that has adopted the LEED performance standards. Therefore, revisions to the code under this proposal may result in achieving LEED credits, provided that the standards comply with the criteria outlined in the reference guides.

Implementation & Market Availability

There are no known implementation issues associated for this proposal.

SW 7: ANALYZE STRATEGIES TO REDUCE STORMWATER RUNOFF FROM EXISTING DEVELOPMENTS

Study

Proposal developed by the Site & Site Stormwater Committee

Summary

Issue:

To reduce combined sewer overflows, New York City must address already developed buildings and lots. These make up nearly 50% of the city's impervious surfaces, and they often release more runoff than permitted, largely due to new paving after initial construction.

Recommendation:

Undertake a study to assess the potential for reducing stormwater runoff from existing properties.

Proposed Legislation, Rule or Study

The City of New York should study options for increasing on-site stormwater management requirements for existing properties. The study should analyze and propose potential changes to the Building Code, Zoning Resolution, and sewer connection rules.

This study should focus on three specific areas:

1. **Upgrades During Reconstruction.** Evaluate the feasibility of requiring properties undergoing renovations to come into compliance with the requirements of the City Drainage Plan that were in effect at the time of the property's construction. Many existing properties release more runoff than their original allowance due to increased paving on-site or through a lack of maintenance for stormwater control systems. The study should determine the types, number, and location of properties that were subject to detention requirements at the time of their construction and analyze the ways that many properties have come out of compliance. The study should also evaluate methods to bring properties back into compliance and the costs associated with these actions. In addition, the study should analyze options for sites developed before any detention regulations were in place.
2. **Rooftop Detention.** Evaluate the feasibility of requiring buildings undergoing roof replacements to install rooftop detention systems (i.e. "blue roofs"). The study should evaluate the potential depth of water that could safely be detained on a rooftop both with and without requiring a full structural rooftop analysis. The study should analyze the effect that roof pitch and drainage configurations have on the performance of rooftop detention systems and develop recommendations for maximum allowable pitch. The study should propose a methodology to assess the storage and rate-of-flow impacts of rooftop detention. The study should also examine the effectiveness of rooftop detention systems at the time of freezing temperatures; analyze waterproofing and rooftop membrane surfacing; and offer recommendations for establishing a methodology for crediting rooftop detention systems by DEP for volume and rate of flow control.
3. **Rain Barrels.** Evaluate the feasibility of requiring residential properties undergoing renovations to install rain barrels on-site such that each rain barrel would be connected to the building downspout and equipped with an overflow mechanism that connects to the sewer system. The study should evaluate the size and quantity of rain barrels required by lot size; develop standards for overflow mechanisms; and examine the efficacy of rain barrels in both warm and cold weather.

For each of the three areas of investigation, the study should analyze the magnitude of renovation that could trigger a potential requirement; the threshold of property types and sizes that could be required to comply with potential new requirements; potential obstacles for adoption; and which exemptions might be necessary for adoption of these potential requirements.

The study should analyze the costs and benefits of any potential requirement. To analyze the costs of requiring on-site stormwater controls, the study should develop at least 5 scenarios showing the impact of how potential requirements could be implemented on prototypical sites. The study should also evaluate the costs for the City to review and enforce any new requirements.

This study should be a multi-agency effort, to include the Office of Long Term Planning and Sustainability (OLTPS), the Department of Buildings (DOB), and the Department of Environmental Protection (DEP).

Supporting Information

Issue – Expanded

While it is essential to reduce water runoff from new development, New York is an older and developed city so most stormwater comes from already developed sites. Buildings and developed lots account for 45% of New York City's land area. Therefore, it is essential to address runoff from existing sites and Part 1 of the study looks at how that can be achieved.

Part 2 of the study looks specifically at rooftop detention, which is a less expensive strategy for new development. Here a methodology must be developed to properly credit this detention technique. In addition, it could potentially be used as a central strategy for detention on existing sites. Because of a number of technical issues, including structural concerns, this technique needs to be studied in order to determine how and where it can be utilized.

Part 3 of the study relates to small sites. Currently, the method for controlling water runoff on small sites is too coarse. Adopting prescriptive rather than performance regulations may be the only feasible solution. The study should determine if rooftop detention and rain barrels are appropriate means to reduce runoff on small sites.

Environmental & Health Benefits

Reduced runoff results in a reduction of combined sewage overflow (CSO) that in turn reduces the risk of exposure to disease-causing bacteria and viruses.

This proposal was found to have a low, positive environmental indirect environmental impact.

This proposal was found to have no significant positive health impact.

Cost & Savings

This proposal is for a study, which will have no direct impact on construction costs.

Precedents

Historically, stormwater regulations have applied to new developments. However, municipalities have started to place regulations on previously developed sites to reduce runoff. For example, within the City of Portland, Oregon, projects are subject to the requirements of their 2008 *Stormwater Management Manual*¹ if they:

- propose new offsite discharges or new connections to the public system, are required to comply with stormwater requirements for the impervious area draining to the discharge point, or
- develop or redevelop over 500 square feet of impervious surface.

The Maryland Department of the Environment composed the following stormwater management requirements for all redevelopment projects:

- reduce existing site imperviousness by 20%,
- provide water quality for 20% of the site's imperviousness,
- or a combination of both.

The Code of Maryland Regulations (COMAR 26.17.02.02) defines redevelopment as any construction, alteration, or improvement exceeding 5,000 square feet of land disturbance performed on sites where the existing land use is commercial, industrial, institutional, or multifamily residential.²

LEED

Under the LEED for Existing Buildings rating system, this proposal will facilitate achieving SS cr. 5.1 & 5.2 Stormwater Management, Rate and quantity reduction. This proposal requires that buildings achieve the site detention of their original permits, while LEED EB requires that measures be implemented to mitigate a percentage of the annual stormwater falling on the site. Project teams must determine for each individual project whether the code revisions result in the acquisition of LEED credits.

For any project with substantial improvement that is seeking certification under another rating system, this proposal will facilitate achieving similar LEED Sustainable Sites credits for Stormwater control by utilizing pervious site surfaces.

Depending on the permeable surface that is utilized, project teams may also be eligible for LEED credits relating to Heat Island Reduction as a result of this proposal. These Sustainable Sites subsections award points to projects for reducing irrigation, tempering the outdoor environment, and reducing cooling loads.

Implementation & Market Availability

The technology and materials required to support the reduction in stormwater runoff are widely available.

There are no known implementation issues for this proposal.

ENDNOTES:

¹ CITY OF PORTLAND, OR., 2008 STORMWATER MANAGEMENT MANUAL (2008), *available at* <http://www.portlandonline.com/BES/index.cfm?c=47952>.

² MD. CODE REGS. § 26.17.02.02 (2000) *available at* <http://www.dsd.state.md.us/comar/getfile.aspx?file=26.17.02.02.htm>.