

The following recommendations are made based on the National Ordinance Review and accompanying Technical Memorandum. The intent is to bring to the Steering Committee's attention specific modifications that can be considered for inclusion in the current Ordinance Update. The recommendations reflect practices that other progressive programs across the Country are using based on their experience and studies.

I. Release Rate

Review 0.1 cfs/acre post development release rate requirement.

1. The 0.1 cfs/acre requirement was guided though not actually based upon one study that is more than 20 years old^{1,2}. A new study should be conducted to redefine acceptable rates and/or to devise management measures that meet the County's stormwater and development program objectives going forward.
2. From the National Ordinance Review it was found that Philadelphia has a 0.24 cfs/acre peak discharge requirement. While their hydrology is different than the County's, it is an indication that peak discharge requirements may be used as a limiting but not necessarily the sole means of achieving stormwater management objectives. A restudy can also determine if developers are implementing the peak discharge requirement adequately to meet flood management without unnecessarily creating unwanted environmental degradation such as stream erosion^{3,4}.

¹ As referenced by Novotny (1999), a study conducted by the Northeastern Illinois Planning Commission concluded in 1989 that to prevent increases in downstream post-development flood peaks, detention ponds need to be designed to release peak flows at pre-development rates based on a cfs per acre basis. For Northeastern Illinois the recommended release rates are 0.0028 m³/ha (0.04 cfs/acre) for a 2-year storm, and 0.01 m³/ha (0.15 cfs/acre) for a 100-year storm, respectively.

² A decision was made in DuPage County to select a single release rate of 0.1 cfs, rather than regulating with a dual release rate requirement per the NIPC study.

³ Studies (McCuen, 1979; McCuen and Moglen, 1988; US EPA, 1997) have demonstrated that excessive streambank erosion can occur if the release rate from an extended detention facility is at or near to the channel forming discharge. This discharge has been determined through numerous sources to be between the peak discharges associated with one-year and two-year storm events. Since many municipal stormwater management requirements resulted in the detention of stormwater runoff from the 10-year and larger storms and the discharge at the 2-year storm event, the result was to extend the duration of a peak discharge near to the channel forming rate which had the effect of creating extreme channel erosion.

⁴ In the early 1980s, the City of Rockville, Maryland wanted new development to meet more stringent stormwater management requirements to compensate for past development that occurred before adequate stormwater management requirements existed. The City of Rockville required future development to detain excess runoff from the 10-year, 24-hour storm event and release it at the 2-year, 24-hour peak discharge. The result may have eased downstream flooding but it caused severe erosion of stream banks below detention facilities designed to meet this new requirement. The City modified their requirements to specifically address flooding and stream protection.

II. Water Quality

3. Identify pollutant of concern. Specify the pollutants of concern that DuPage's BMPs should address by determining how these BMPs can best achieve the desired level of stream health. Most communities focus on phosphorus and sediments using indicators such as total phosphorus and total suspended solids. Nitrogen also is a concern, but it is harder to manage cost effectively with typical stormwater BMPs, so a decision on how best to meet overall County needs will need to be developed. Identify other countywide measures that can be taken outside of the ordinance, such as road salt reduction/mitigation actions, etc.
4. Define a process that developers and permit reviewers will use to determine compliance. Require project applicants to demonstrate control of pollutant discharges within the permit application, through actual calculation and determination of existing and proposed pollutant loads. The county should do the following based on results of a future study and analysis:
 - a. Select Target nutrients:
 - i. TP (yes)
 - ii. Sediments using TSS (maybe)
 - iii. TN (probably not because difficult to remove but could be specified as a secondary nutrient that should be reduced in discharge loads)
 - iv. Metals (only if required by TMDLs)
 - v. Oils (probably not but this should be a target of Construction Stormwater Pollution Prevention Plans (SWPPPs) and IDDE plans)
 - b. Specify which pollutant loads need to be removed (or maximum loads that cannot be exceeded)
 - i. Define the technique on how to calculate nutrient loads for predevelopment and developed areas (such as Schueler's simple method).
 - ii. Specify the maximum permissible loads and to what area they are specific to, such as
 1. Per site
 2. Per shed
 3. Stormwater management plan wide
 4. County wide
 5. Etc.
 - c. Specify BMP removal efficiency descriptions to be used in the calculations (this must be accompanied by a detailed design manual (such as from the County, IDOT, other state agency, etc.))
 - d. Recommend that County website be used to update BMP efficiencies; this "live" site would then be able to add new BMPs and to revise pollutant load reductions and percent efficiencies as new data become available locally or nationally (e.g., such as from the International Stormwater BMP Database)

5. Various national studies show a direct relationship between impervious cover in watersheds and stream degradation⁵. For this reason, reduction of impervious area is a useful metric to monitor stream health within specific sub-watersheds. DuPage County should structure its ordinance to incentivize impervious area (IA) reduction as one of several practices to preserve and restore stream health. Detention volume requirements for projects that recognize and set aside green space and reduce IA through clustering and LID techniques should be useful. The same applies for significant reduction of IA for redevelopment. However, under all cases, the permit applicant should at a minimum demonstrate that the project will not increase peak flow in the receiving stream for the 1-yr and 2-yr storm events, for both the 24-yr duration as well as the critical duration for the site. This will reduce unstable erosion in the receiving streams. A BMP volume capture requirement, as described in recommendation 6 below, should also be applied to all projects.
6. DuPage should set numerical water quality treatment requirements for its BMP program based on a water quality storm of the 90 to 95 percentile annual rainfall event, such that runoff from storms up to this value are captured, treated and kept on site to the maximum extent technically feasible (METF). The approved BMP selection hierarchy should stress Low Impact Development (reduced impervious area and grading, cluster development) as well as BMPs that infiltrate, retain, or evapotranspire runoff. The actual storm event can later be adjusted to meet EPA standards that are due to be issued with its new rules in November 2012. Of the stormwater programs reviewed for the National Ordinance Review, Baltimore, Lenexa, Portland, Santa Clara Valley, Montgomery County, Seattle, Philadelphia, and Maryland all have specific water quality volume requirements based on a design storm or an annual runoff volume treatment goal. These programs analyzed and defined what they felt was the best manner to protect water quality in streams subject to point stormwater runoff. They determined that setting a specific water quality treatment volume together with a focus on runoff reduction will provide more consistent stormwater treatment from site to site and reduce erosion in receiving streams for more frequent events.
7. Nationally there are many programs that credit the provided water quality volume within the permit requirements for water quantity control. All volume provided for water quality treatment, when shown to capture and retain stormwater on-site, should be reduced from the detention volume requirements for water quantity.

⁵ Recent studies (Schueler, 2009) indicate that this relationship has a wider variability at smaller imperviousness levels. In particular, the relationship between impervious cover and stream quality becomes less defined below the roughly 10 to 20 percent impervious cover than at higher percentages of impervious cover. The relationship is stronger for smaller watersheds than larger watersheds, which can have a greater diversity of land use practices and stream geomorphology (i.e., stream hydrologic, physical, chemical, and biological responses). The relationship for smaller percentages of impervious cover is more influenced by additional factors such as forest cover, cropland practices, density of road crossings and riparian continuity.

8. The provision of proper maintenance is essential for Stormwater Facilities to function properly, and specifically improper BMP maintenance greatly reduces the effectiveness of pollutant removal. When such maintenance responsibility is left to the property owner, the maintenance is often not performed, due to factors such as inadequate funding, a lack of knowledge that a facility is present or skill with proper maintenance procedures, and/or uncertainty about who is responsible for maintenance. DuPage County should consider requiring property owners to contract with a pre-approved vendor to carry out operation and maintenance of the stormwater facilities and BMPs. Alternatively, as part of the design and construction approval process, the responsible parties could be required to provide fees to DuPage County or the municipalities that go to an enterprise fund that is dedicated to the maintenance of BMPs.

References

- McCuen, R., 1979. Downstream Effects of Stormwater Management Basins. *Journal of the Hydraulics Division, American Society Civil Engineers* 105(HY11).
- McCuen R. and G. Moglen, 1988. Multicriterion Stormwater Management Methods. *Journal of Water Resources Planning and Management* (114)4.
- Schueler, T., L. Fraley-McNeal and K. Cappiella, 2009. Is Impervious Cover Still Important? Review of Recent Research. *Journal of the Hydrologic Engineering, American Society Civil Engineers* (14)4.
- U.S. EPA, 1997. *Urbanization and Streams: Studies of Hydrologic Impacts*. Office of Water, Washington, D.C., 841-R-97-009.
- Novotny, V and O'Reilly, N, 1999. Technical Report No. 3 - Water Quality, Ecological, and Flood Control Benefits of Urban Stormwater Management Practices. Institute for Urban Environmental Risk Management, Marquette University