



KANE COUNTY

Rudd, Young, Feltman, Podraza, Wallers, Slowinski, Bardol, Wills, Olsem,
Culp, Lobbes, Huddleston- Ag Chair

Non-Voting: Wilford, Finke, Custic, Polzin



STORMWATER MANAGEMENT TECHNICAL ADVISORY COMMITTEE

APRIL 25, 2018

Auditorium

Agenda

12:00 PM

Kane County Government Center, 719 S. Batavia Ave., Bldg. A, Geneva, IL 60134

1. **Call to Order**
2. **Approval of Minutes:** April 4, 2018
3. **Public Comments**
4. **Buffer Topics**
 - A. Buffer Definitions
 - B. Buffer Application
 - C. Buffers Replanted or Reseeded
 - D. Disturbed During Construction
 - E. Free from Development Once Established
 - F. Buffer Widths
 - G. Exemptions
5. **BMP Topics**
 - A. Definition
 - B. General
 - C. Exemptions
 - D. Thresholds
 - E. Water Quality
 - F. Credits
 - G. Fee-In-Lieu
6. **Sediment and Erosion Control**
7. **New Business**
 - A. TAC Updated Meeting Schedule
8. **Adjournment**

April 25, 2018

Recommendations

Continued Buffers, Best Management Practices & Sediment Erosion Control

I. Overview:

ERA has provided TAC with additional background and research on the topics that were tabled at last month's meeting. Also, ERA has provided topics for Sediment Erosion Control discussion.

II. Objectives:

To obtain a consensus from TAC on the direction for the following:

A. Buffer Topics

- a. Buffer Definition*
- b. Buffer Application*
- c. Buffers Replanted or Reseeded*
- d. Disturbed During Construction*
- e. Free from Development Once Established*
- f. Buffer Widths*
- g. Exemptions*

B. BMP Topics

- a. Definition*
- b. General*
- c. Exemptions*
- d. Thresholds*
- e. Water Quality*
- f. Credits*
- g. Fee-In-Lieu*

C. Sediment and Erosion Control

** The details and ordinance language will be discussed with TAC during future phases of this project.*

III. Topics

A. Buffer Topics – See Table A for comparison of surrounding counties and USACE.

1. Buffer Requirements

a. Buffer Definition:

Current Ordinance: An area of predominantly deeply rooted native vegetated land adjacent to channels, wetlands, lakes or ponds for the purpose of stabilizing banks, reducing contaminants, including sediments, in stormwater that flows to such areas.

Background: Under the current ordinance existing land uses, such as agriculture, mowed turf, impervious areas, etc. would not qualify as buffer. It could be argued that these existing land uses, if occurring within the buffer, could be developed. Based upon last week's TAC meeting, it appears that some communities have been enforcing the buffer width vs the actual definition of a buffer. Based upon our review of the definitions, technical manual and original meeting notes it appears that the intent of the ordinance was only to provide buffers on land currently serving the purpose of a buffer as defined however because of the different interpretations of this section, it would be prudent to clarify this in the update. In addition, not much thought was given to water quality in the original ordinance. Times have changed, and water quality and ecological diversity protection are given more consideration now.

Suggested Change: Predominantly vegetated upland areas within a defined width adjacent to wetlands and waters of the U.S. that provide a **function** that eliminate or minimize adverse impacts to those areas. Buffer functions include: reducing flood flow rates, velocities and volumes; promoting bank stability; filtration of sediment, nutrients and other pollutants; insulation and moderation of daily water temperatures; and habitat for aquatic and terrestrial fauna and flora. Areas that do not provide buffer functions include: impervious non-vegetated surfaces, permanent structures or buildings, land in agricultural production within the past 5 years, and maintained turf as of the inception of this ordinance or previously permitted.

b. Buffer Application:

Current Ordinance: The current Ordinance does not clearly define when the buffer requirements apply

Suggested Change:

Add the following language to Section 94 to better define when the section applies:

- i. Areas in Conservation/Drainage Easements (94.A.1) that were established under this Ordinance for the purpose of protecting, enhancing or reestablishing a buffer shall be preserved in accordance with section 94.A and if disturbed, shall be re-established.
- ii. Developments that require stormwater management (section 26-B) shall meet section 94 for areas meeting the definition of a buffer. Areas not defined as buffer adjacent to linear and non-linear waterbodies shall be assessed for potential buffer function. Areas defined as high potential buffer function shall be re-established in accordance with section 94.A (note: Technical Manual shall address how an area is determined to be high potential buffer function, in the section, areas with existing improvements such as buildings, parking areas, etc., should be excluded);
- iii. Developments that require a stormwater management permit (Section 101) but do not require stormwater management (section 26-B) shall meet Section 94 for areas defined as a buffer. The buffer, for these developments is not required to be defined within an easement unless required by the Administrator. A potential buffer function analysis is not required as in "ii" above. The developer may, however, with approval of the Administrator, re-establish high potential buffer function areas to meet buffer averaging requirements.

c. Buffers Replanted or Reseeded:

Current Ordinance: Buffers shall be replanted or reseeded using appropriate predominately native deep rooted vegetation, appropriately managed and maintained.

Background: The ordinance is rather vague on this and additional language is needed to clarify when this is required. While we agree with not requiring a homeowner to re-establish buffer on his mowed lot it is a rather arbitrary way of doing this since it isn't written that way.

Suggested Change: Rename to "Buffer Establishment" Establishment/Reestablishment includes revegetating with seed or plants using appropriate predominately native deep-rooted vegetation, appropriately managed and maintained.

d. Disturbed During Construction:

Current Ordinance: If a buffer area is disturbed by permitted activities during construction, the buffer strip shall be stabilized in accordance with subsection B of this section.

Background: This is the only section that references "Buffers Replanted or Reseeded" section. Therefore, it may be misinterpreted that only permitted disturbances within native vegetated areas of the buffer need to be re-established. This is likely not the intent of the ordinance and many communities require reestablishment of buffers that aren't disturbed (example: agricultural field turned housing development). It also is silent with regard to unauthorized impacts.

Suggested Change: Rename this section "Buffer Disturbances." If a buffer area is disturbed the buffer shall be stabilized in accordance with subsection B of this section.

e. Free from Development Once Established:

Current Ordinance: All buffer areas once established or re-established shall be maintained free from development, except as follows:

- i. A buffer area may be used for passive recreation (e.g., birdwatching, walking, jogging, bicycling, horseback riding and picnicking) and it may contain pedestrian, bicycle or equestrian trails, provided that the created path is no wider than ten feet (10'). If the path leads to a wetland, it must be a winding path to help prevent erosion.
- ii. Nonhabitable structures (i.e., toolshed) and impervious surfaces may occupy a maximum of fifteen percent (15%) of the portion of the required buffer that extends onto or is part of an individual property.
- iii. Utility maintenance, and maintenance of drainage facilities and drainage easements shall be allowed provided the maintenance activity meets all other federal, state and local regulations.
- iv. Anchoring and placement of boat docks and piers shall be allowed provided the structure meets all other federal, state and local regulations.

Background: The current standard allows path up to 10' wide. Consider allowing paths up to 14' wide. This is the widest path requirement per the latest version of AASHTO Guide for Development of Bicycle Facilities.

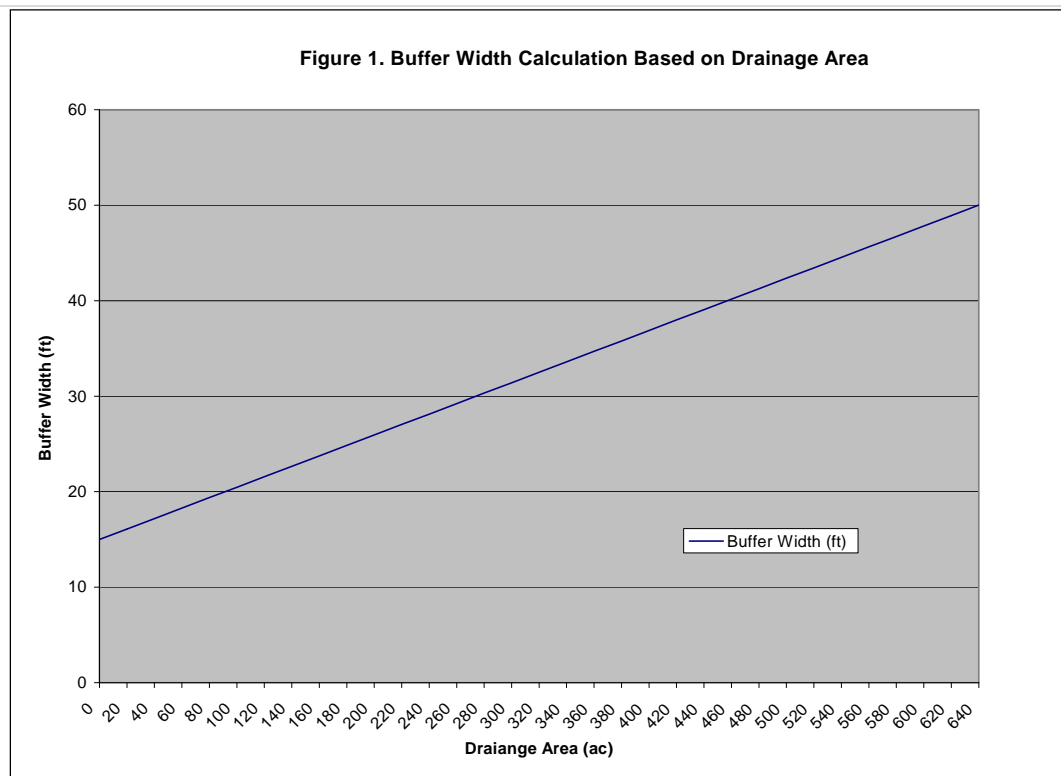
Suggested Change: A buffer area may be used for passive recreation (e.g., birdwatching, walking, jogging, bicycling, horseback riding and picnicking) and it may contain pedestrian, bicycle or equestrian trails, provided that the created path is no wider than fourteen feet (14'). If the path leads to a wetland, it must be a winding path to help prevent erosion.

f. Buffer Widths

Linear Buffers

Current Ordinance: The requirements of this section are not applicable to isolated wetlands or waters of the U.S. that are below the threshold size limitations for mitigation requirements under the USACE section 404 permit program (currently, less than 0.10 acre). Buffer widths required as a part of a USACE permit supersede the widths required in this section, unless the width required herein is greater. Buffer widths are to be fifty feet (50') wide unless otherwise determined using the criteria specified below.

- i. Linear buffers shall be designated along waters of the U.S. and wetlands associated with watercourses, i.e., swales, creeks, streams, rivers, etc. Refer to water body buffers in cases where wetlands are adjacent to and not part of the main channel, i.e., floodplain wetland, backwater slough, oxbow, bordering wetland complex.
 1. When the lineal waters of the U.S. have a drainage area greater than six hundred forty (640) acres, measured at the downstream property line, or are designated as ADID because of high habitat value or an adjacent wetland has a calculated FQI greater than sixteen (16), the buffer shall be fifty feet (50'). Note: this does not apply to redevelopments on the main channel of the Fox River.
 2. When the lineal waters of the U.S. have a drainage area less than six hundred forty (640) acres, measured at the downstream property line, the buffer width shall be determined utilizing the formula, $X = (A * 0.0547) + 15$, where "X" equals the buffer width in feet and "A" equals the drainage area in acres. The width calculated by this formula shall be rounded up to the nearest multiple of five (5). Figure 1 of this section may be used to determine buffer widths provided the resultant width is increased to the nearest multiple of five (5)." The current Table is below in Figure 1.



Background: The State of Illinois has adopted water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. The States water quality standards should:

- provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water ("fishable/swimmable"), and
- consider the use and value of State waters for public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation.

The State carries out regular appraisals of waterways with the purpose of determining compliance with the goals of the Clean Water Act. These appraisals are used to guide the NPDES permit updates for area Publicly Owned Treatment Works (POTWs) and will likely be used increasingly for NPDES Phase II permits. Many of assessed waterways in Kane County are not in compliance with the aquatic life designated use. Continued failure to meet the aquatic life use goal will likely lead to increased and more costly permit requirements for public agencies.

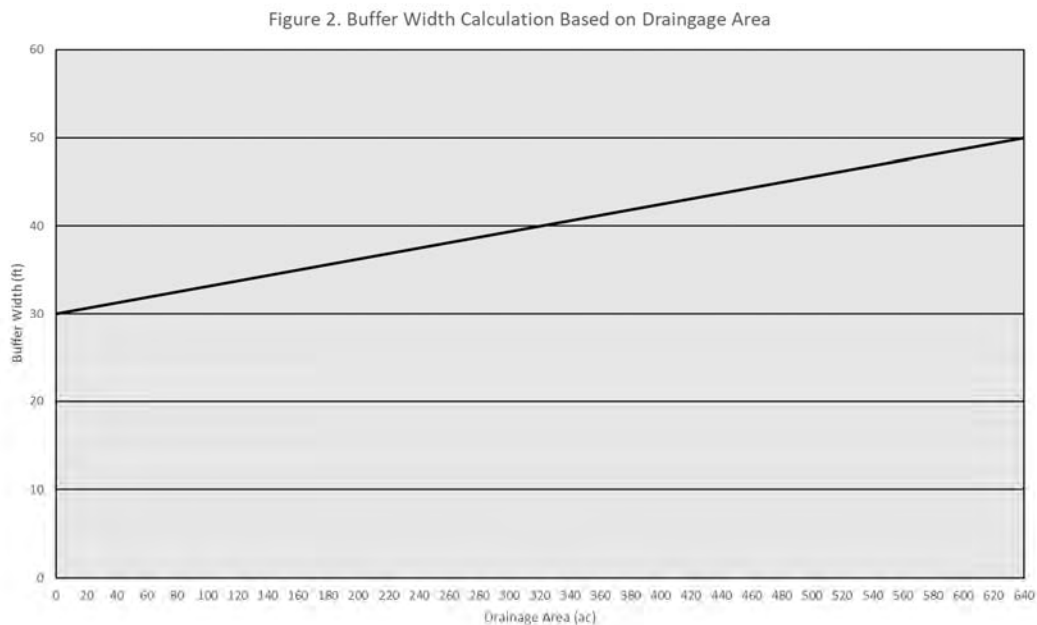
Research (see attached) indicates that the buffer width for nutrient retention should be between 5-30 meters (16.4-98 feet); while the effective buffer width for protection of aquatic wildlife and stream temperature is between 10-30 meters (33-98 feet).

Research indicates that buffering low order streams has greater positive influence on water quality than wider buffers on portions of larger order streams already carrying polluted water. Failure to protect to the smaller headwater streams ignores important sources of

sedimentation and pollution. The USACE requires a 50-foot buffer for Waters of the U.S. and most other collar counties require between 30 and 50 feet.

Suggested Change: We recommend increasing the minimum buffer of 15 feet to at least 30 feet for linear water bodies with less than 640 acres of tributary area. If 30 feet is the desired width the new equation would be:

$X = (A * 0.03125) + 30$. See revised Table Below in Figure 2:



We also recommend considering a 100' buffer for streams rated A or B for Diversity or Integrity, or mapped as Biologically Significant: as described in the Integrating Multiple Taxa in a Biological Stream Rating System published by the Illinois Department of Natural Resources. These include: Tyler Creek, Ferson Creek, Little Rock Creek, Big Rock Creek, Welch Creek, Mill Creek, and Blackberry Creek. This is consistent with the USACE requirement of a 100 foot buffer for High Quality Aquatic Resources.

Recommendation Summary:

- 100 feet for Streams rated A or B for Diversity or Integrity or mapped as Biologically Significant
- 50 feet for streams with a tributary area greater than 640 acres, and
- 30-50 feet for streams with a tributary area less than 640 acres.
- Buffer averaging, and all other requirements of this section will still be applicable.

Water Body Buffers

Current Ordinance: The requirements of this section are not applicable to isolated wetlands or waters of the U.S. that are below the threshold size limitations for mitigation requirements under the USACE section 404 permit program (currently, less than 0.10 acre). Buffer widths required as a part of a USACE permit supersede the widths required in this section, unless the

width required herein is greater. Buffer widths are to be fifty feet (50') wide unless otherwise determined using the criteria specified below.

- ii. Water body buffers shall encompass nonlinear bodies of water meeting the definition of waters of the U.S., including wetlands.
 1. If protective measures are installed along the perimeter of a buffer, the width may be reduced by up to ten percent (10%) immediately adjacent to the protective measure. The reduction in width that may be applied due to installation of protective measures may not be applied where buffer width averaging has been used and the buffer would be more than twenty percent (20%) less than originally specified. Protective measures may consist of fencing, sediment basins, biological filter strips or other methods approved by the administrator.
 2. For all nonlinear water bodies or wetlands with an FQI greater than sixteen (16), a minimum buffer width must be established in accordance with table 9-94A of this section.
 3. For wetlands with an FQI of seven (7) to sixteen (16) a minimum buffer width must be established in accordance with table 9-94B of this section.
 4. For wetlands with an FQI of less than seven (7) a minimum buffer width must be established in accordance with table 9-94C of this section.

These tables are provided below:

HIGH QUALITY WETLANDS - FQI>16

Buffer Ratio	Wetland Area (Acres)	Buffer Area (Acres)	Buffer Width (Feet)
0.5	0.10	0.050	15.0
0.5	0.25	0.125	15.0
0.5	0.50	0.250	20.0
0.5	0.75	0.375	25.0
0.5	1.00	0.500	30.0
0.5	1.25	0.625	30.0
0.5	1.50	0.750	35.0
0.5	1.75	0.875	35.0
0.5	2.00	1.000	40.0
0.5	2.25	1.125	40.0
0.5	2.50	1.250	45.0
0.5	2.75	1.375	45.0
0.5	3.00	1.500	50.0
0.5	3.25	1.625	50.0
0.5	3.50	1.750	50.0
0.5	3.75	1.875	50.0
0.5	4.00	2.000	50.0
0.5	4.25	2.125	50.0
0.5	4.50	2.250	50.0

0.5	4.75	2.375	50.0
0.5	5.00 or more	2.500	50.0

MEDIUM QUALITY WETLANDS -
7<FQI>16

Buffer Ratio	Wetland Area (Acres)	Buffer Area (Acres)	Buffer Width (Feet)
0.4	0.10	0.04	15.0
0.4	0.25	0.10	15.0
0.4	0.50	0.20	15.0
0.4	0.75	0.30	20.0
0.4	1.00	0.40	25.0
0.4	1.25	0.50	25.0
0.4	1.50	0.60	30.0
0.4	1.75	0.70	30.0
0.4	2.00	0.80	30.0
0.4	2.25	0.90	35.0
0.4	2.50	1.00	35.0
0.4	2.75	1.10	35.0
0.4	3.00	1.20	40.0
0.4	3.25	1.30	40.0
0.4	3.50	1.40	40.0
0.4	3.75	1.50	45.0
0.4	4.00	1.60	45.0
0.4	4.25	1.70	45.0
0.4	4.50	1.80	45.0
0.4	4.75	1.90	50.0
0.4	5.00 or more	2.00	50.0

LOW QUALITY WETLANDS - FQI<7

Buffer Ratio	Wetland Area (Acres)	Buffer Area (Acres)	Buffer Width (Feet)
0.3	0.10	0.030	15.0
0.3	0.25	0.075	15.0
0.3	0.50	0.150	15.0
0.3	0.75	0.225	15.0
0.3	1.00	0.300	20.0
0.3	1.25	0.375	20.0
0.3	1.50	0.450	20.0

0.3	1.75	0.525	25.0
0.3	2.00	0.600	25.0
0.3	2.25	0.675	25.0
0.3	2.50	0.750	25.0
0.3	2.75	0.825	30.0
0.3	3.00	0.900	30.0
0.3	3.25	0.975	30.0
0.3	3.50	1.050	30.0
0.3	3.75	1.125	35.0
0.3	4.00	1.200	35.0
0.3	4.25	1.275	35.0
0.3	4.50	1.350	35.0
0.3	4.75	1.425	35.0
0.3	5.00 or more	1.500	35.0

Buffer ratio	=	Percent of total wetland area
Wetland area	=	Total on and off site area of the wetland = (% * Acres)
Buffer width	=	$[(Area * 43560) / 4] / [\text{Sqrt}(Acres * 43560)]$

Suggested Changes:

5. The High Quality Wetland Table currently allows for a buffer between 15' and 30'. Consider changing the table to FQI > 16 < 20 with a minimum width of 30' and a max width of 50'.
6. The current standard for wetlands with an FQI greater than 25 the buffer width is 50 feet per 9-94.A.3. However, wetlands with an FQI greater than 20 are considered High Quality Aquatic Resources by the USACE and a 100 foot buffer is required. Most other collar counties require a 100 foot buffer for high quality wetlands. Consider changing the buffer width for wetlands that are considered a High Quality Aquatic Resource or those with a FQI greater than 20 to 100 feet.

Recommendation Summary:

- Low Quality Wetlands FQI < 7, buffer 15-35 feet
- Medium Quality Wetlands 7 > FQI < 16, buffer 15-50 feet
- High Quality Wetland 16 > FQI < 20, buffer 30-50 feet
- High Quality Aquatic Resource Wetlands, 100 feet
- Buffer averaging, and all other requirements of this section will still be applicable.

g. Exemptions

Current Ordinance: The following are exempt from buffer requirements provided they do not meet the definition of "waters of the U.S.":

- i. Roadside drainage ditches;

- ii. Channels;
- iii. Conveyance systems between site runoff storage facilities;
- iv. Excavated site runoff storage facilities, compensatory storage and sediment basins;
- v. Roadway crossings and their associated installations;
- vi. Downspout and sump pump discharge; and
- vii. Constructed stormwater management facilities.

Background: The wetland delineation section will determine what qualifies as a wetland. This was discussed and approved during the February TAC meeting and those will be removed from this list as they are not wetlands. Concerns were raised about when drainage swales would require buffers. The intention is not to require buffers for swales that do not have a defined bed and bank that are not Waters of the U.S. or wetlands. Additionally, channels were included as exempt. The definition of a channel is as follows: Any river, stream, creek, brook, branch, natural or artificial depression, ponded area, flowage, slough, ditch, conduit, culvert, gully, ravine, wash, or natural or manmade drainageway which has a definite bed and bank or shoreline, in or into which surface, groundwater, effluent, or industrial discharges flow either perennially or intermittently. If this exemption were to remain all of these areas would be exempt unless they were determined to be jurisdictional by the USACE. As the definition of a waters is always being challenged we recommend including "Channels" in the event that the USACE no longer has jurisdiction over intermittent streams.

Suggested Changes: The following are exempt from buffer requirements provided they do not meet the definition of a wetland or "waters of the U.S.":

- i. Roadside and agricultural drainage ditches;
- ii. Swales that do not have a defined bed and bank; and
- iii. Roadway crossings and their associated installations.

B. Best Management Practices – See attached Table for comparison of surrounding counties.

Current Ordinance: Currently Kane County requires BMPs through the Site Runoff Storage Requirements (Detention) - Hydraulically Connected Impervious Area section. The ordinance states that, "The runoff from a 0.75 inch rainfall event over the hydraulically connected impervious area of the new development shall be stored below the elevation of the primary gravity outlet (retention) of the site runoff storage facility. The facility may be designed to allow for evapotranspiration or infiltration of this volume into a subsurface drainage system and shall not be conveyed through a direct positive connection to downstream areas. Wherever the retention depth is less than three feet (3') the retention facility shall be constructed by over excavating the required retention volume by one foot (1') and replacing such volume with one foot (1') of topsoil suitable for growing wetland plants." The ordinance also allows for use of BMPs in lieu of detention. Permeable pavements as well as rain gardens and rain garden infiltration trench systems receive credit for their effectiveness in reducing site runoff.

Based upon the April 4, 2018 TAC meeting, some communities and the County have been requiring BMPs for developments in areas where a known drainage issue is present. The section of the Ordinance that they require this under is as follows:

9-27: GENERAL STORMWATER REQUIREMENTS:

A. No development shall:

1. Result in any new or additional expense to any person other than the developer for flood protection;
or
2. Increase flood elevations or decrease flood conveyance capacity upstream or downstream of the site.

F. The design of any development shall incorporate the following specific planning principles:

4. Best management practices have been used in the site drainage plan.
6. Retention and infiltration of stormwater on site have been enhanced to the extent practicable to reduce the volume of stormwater runoff and the quantity of runoff pollutants.

Background:

Research has indicated that the 90th percentile, and often the 95th percentile, storm contains the vast majority of pollutants. This storm also represents the amount of water that would be retained onsite prior to development. The 90th or 95th percentile rainfall events represent a precipitation amount which 90 or 95 percent of all rainfall events for the period of record do not exceed. For further information regarding this please go to the following links:

90th percentile recommendation:

<https://nepis.epa.gov/EPA/html/DLwait.htm?url=/Exe/ZyPDF.cgi/P1002OLQ.PDF?Dockey=P1002OLQ.PDF>

95th percentile recommendation:

https://www.epa.gov/sites/production/files/2015-08/.../epa_swm_guidance.pdf

Post Construction BMPs are required for developments with disturbance greater than 1 acre by NPDES ILR40. The Illinois Post Development Stormwater Runoff Performance Standards Workgroup recommended that sites disturbing 1 acre of ground or more must either demonstrate no net increase in runoff due to the development or retain runoff from a 1 inch 24 hour storm event for development sites and 0.8 inch 24 hour for redevelopment sites in 2013. The Workgroup recommended implementation of post-development stormwater management requirements through NPDES permits - Stormwater Discharges from Construction Sites (ILR10) and Municipal Separate Storm Sewer Systems (MS4) by updating ordinances and in reviewing site construction plans & site inspections. To date their recommendations have not been implemented but may be in future changes to NPDES permit requirements. A link to a presentation summarizing their recommendations may be found here:

www.aiswcd.org/wp-content/.../1_IL-Workgroup-Stormwater-Performance-Stds.pdf

All of the collar counties require Volume and Water Quality BMPs (See Attached).

Suggested Changes:

- Definition: A Best Management Practice (BMP) is a measure used to control the adverse stormwater related effects of development, designed to remove pollutants, reduce runoff rates and volumes, and protect aquatic habitats. Example practices include, but are not limited to: watershed benefit measures, swales, filter strips, infiltration trenches, dry wells, rain gardens, permeable pavements and site runoff storage basins.

- General: BMPs should provide both water quality treatment and runoff reduction in the form of Volume Control. Numerous BMPs provide both volume control and water quality benefits. The applicant should identify the pollutants that may be generated by the proposed development. In the event that no pollutants are generated (e.g. new house on existing manicured turf grass) by the development the applicant may provide a BMP that provides Volume Control only.
- Exemptions: Parking lot or roadway resurfacing; streambank stabilization, wetland mitigation, natural area restoration; pedestrian walkways/bike trails less than 14' wide (16' including the shoulder); underground or overhead utility projects are exempt from BMP requirements.
- Threshold: Require Category I BMPs or Watershed Benefit Measures for developments or redevelopments where a stormwater permit is required and:
 - A known drainage issue is in the immediate vicinity of the project; or
 - 5000 SF-24,999 SF of new impervious is proposed in aggregate (after credit for removal of existing impervious is applied). (This would likely only be applicable to a new large house outside of a subdivision, a commercial/multifamily development or redevelopment project in an urban area, or an agricultural pole barn and drive. Projects such as a detached garage, patio and shed would all be below this threshold.); or
 - >50% total impervious on the site and < 1 acre property. This would address urban flooding issues on small lots with high amounts of impervious and no stormwater management; or
 - The detention threshold is met for a linear project
 - Technical Manual to provide a simple 1" over impervious area volume calculation with stone pore space chart that an owner or builder can easily use to calculate the volume requirement without an engineer for Category I BMP's. Owner can opt to implement other engineered methods if they so choose.
- Threshold: Require Category II BMPs or Watershed Benefit Measures for developments or redevelopments where:
 - 25,000 SF of new impervious is proposed in aggregate (after credit for removal of existing impervious is applied).
 - Volume Control: We recommend eliminating *Directly Connected Impervious* in favor of *New Impervious (after credit for any removed impervious is calculated)*. Several TAC members at the April 4, 2018 TAC meeting showed interest in allowing the use of continuous simulation modeling for BMPs. The recommendations below would allow the applicant to choose the method (single event vs. continuous simulation) to determine the required volume. However, please note that the resulting BMP would be larger using continuous simulation vs. single event method (see the attached RECARGA Comparison).
 - Retain the 90th percentile storm (i.e. 1" over new impervious surfaces). Lake County provides a Table that provides the Runoff Volume Reduction quantity (ft³/ac). This method may be an easy way to determine the volume that is required to be stored or treated. (see attached Appendix O: Runoff Volume Reduction); or
 - Infiltrate sufficient runoff volume, based on an average annual rainfall, so that the post-development infiltration volume shall match the following percentages of the pre-development infiltration volume:

- For development with up to 40 percent imperviousness, the post-development infiltration volume shall be at least 90 percent of the pre-development infiltration volume. This may include developments such as parks, cemeteries, and low density residential development.
 - For development with more than 40 percent and up to 80 percent imperviousness, the post-development infiltration volume shall be at least 75 percent of the pre-development infiltration volume. This may include developments such as medium and high density residential, multi-family development, industrial and institutional development, and office parks.
 - For development with more than 80 percent imperviousness, the post-development infiltration volume shall be at least 60 percent of the pre-development infiltration volume. This may include developments such as commercial strip malls, shopping centers, and commercial downtowns.
 - NOTE: These percentages are based upon Wisconsin's WI Administrative Code NR 151.1.
- Pre-treatment: Before infiltrating runoff, pretreatment shall be required for runoff from parking lot or roadway areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality. Pretreatment options may include, but are not limited to, hydrodynamic separators, biofiltration, swales, or filter strips.
 - Exemptions: Gas stations, areas with seasonally high ground water, areas within 400' of a community well or 100' of a residential well, areas where contaminants are present in the soil (brownfield, etc.), soils classified as Hydrologic Group A by NRCS, etc.
- Water Quality: Recognize that there are numerous areas in the County that do not infiltrate well. The NRCS is currently mapping areas where it would be feasible to construct infiltration based BMPs. Areas that do not infiltrate well should provide water quality treatment through detention based or flow through practices (swales, filter strips, etc.).
 - Treat the 90th percentile storm (i.e. 1" over new impervious surfaces) through detention based or flow through practices (swales, filter strips, hydrodynamic separators, etc.) that remove the pollutants that may be generated by the proposed development;
 - Remove a minimum of 70% hydrocarbons from developments with vehicle fueling, vehicle servicing, roadway development projects exceeding the detention threshold, and parking lots with greater than 30 new stalls (this is about 5000 SF). This may be in combination with the above flow through practices.
 - Credit: Continue to allow quantifiable volume provided by BMPs in lieu of site runoff storage.
 - Fee-in-lieu: In areas where infiltration is not possible or recommended (gas stations, areas with seasonally high ground water, etc.) allow to the developer to pay a Fee-In-Lieu of constructing BMPs.

C. Erosion and Sediment Control

Current Ordinance:

9-26: GENERAL INFORMATION:

A. Requirements: All developments shall meet the requirements of sections [9-27](#) and [9-28](#) and articles III and VI of this chapter. Article III is the Erosion and Sediment Control section.

Suggested Changes:

The County currently requires Sediment and Erosion Control for all earth disturbing actives regardless of whether a stormwater permit is required. We will need to make sure that is clear in this section and/or Article III that this applies to ALL developments in the County whether they require a stormwater management permit or not.

Current Ordinance:

9-51: Erosion and Sediment Control Planning:

B. Standards and specifications for erosion and sediment control measures shall be in accordance with the "Illinois Urban Manual" (1995, or current edition). Erosion and sediment control planning shall be in accordance with "Procedures And Standards For Urban Soil Erosion And Sedimentation Control In Illinois" (revised, July 1988), by the urban committee of the association of Illinois soil and water conservation districts (the "Green Book"), chapters 1 - 5. Where the "Illinois Urban Manual" conflicts with the "Green Book", the "Illinois Urban Manual" shall prevail.

Suggested Changes:

The "Green Book" is obsolete and has been incorporated into the Urban Manual.

B. Standards and specifications for erosion and sediment control measures shall be taken from one of the following sources:

1. The current edition of the "Illinois Urban Manual"
2. The Technical Reference Manual; and
3. IDOT Standard Specifications for Road and Bridge Projects;
4. Other design criteria, standards or specifications may be approved by the Director;
5. Where the "Illinois Urban Manual" conflicts with the other sources, the Illinois Urban Manual shall prevail.

Current Ordinance:

9-51: Erosion and Sediment Control Planning:

E. In the hydraulic and hydrologic design of major erosion control measures (those whose tributary drainage area is greater than 3 acres) such as sediment basins and traps, diversions and the like, the design frequency shall be commensurate with the risk of the design event being exceeded. The following design frequencies shall be regarded as minimum design frequencies for the construction period:

1. If development is estimated to be completed in less than six (6) months, the storm event having a fifty percent (50%) chance (2-year event) of being exceeded in any year shall be used for design purposes.
2. If development is estimated to be completed in more than six (6) months but less than one year, the design frequency for major sediment basins shall be a rainfall event with a twenty percent (20%) (5-year event) chance of being exceeded in any one year.
3. If development is estimated to take more than one year to complete, major sediment basins shall be designed for a rainfall event with a ten percent (10%) (10-year event) chance of being exceeded in any one year.
4. All sediment basins shall be designed for a minimum residence time of ten (10) hours for detained runoff and shall include a volume for sediment storage reflective of the clean out schedule for the basin.

Suggested Changes:

4. All sediment basins shall be designed for a minimum residence time of ten (10) hours for detained runoff and draw down the storage within a 24-40 hour period at discharge rates, that at a minimum do not increase over pre-construction conditions for the 2-year frequency, 24-hour storm. The basin should have a maintenance schedule that restores its original design dimensions once the sediment has accumulated to two thirds the design depth of the dead sediment storage per the Illinois Urban Manual.

Current Ordinance:

9-51: Erosion and Sediment Control Planning:

G. The area of disturbance on site at any one time shall be limited to twenty (20) acres. An additional twenty (20) acres (a maximum of 40 acres of disturbance at any one time) may be disturbed if necessary to balance cut and fill on site. The administrator may approve a larger area of disturbance pursuant to a plan for phased construction or after development has begun, if the developer adequately demonstrates the need therefor and the administrator finds that adequate temporary and permanent erosion and sediment control measures can be maintained and that the developer is proposing an area of disturbance which at any one time is the smallest practical area consistent with the intent to limit disturbed area and minimize the risk of sediment being introduced into site runoff and being carried off site. No additional area may be disturbed without the permission of the administrator until the previously disturbed areas have been temporarily or permanently stabilized. All disturbed areas shall be stabilized within fourteen (14) days of final grading or when left idle for more than seven (7) days. Maintained haul roads and the area of sediment basins, site runoff storage facilities, utility corridors having a maximum width of twenty feet (20'), and any permanently stabilized areas are excluded from this limitation.

Suggested Changes:

Separate the Permanent Stabilization from the phasing section.

Stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization of disturbed areas must be initiated within 1 working day of permanent or temporary cessation of earth disturbing activities and shall be completed as soon as possible but not later than 14 days from the initiation of stabilization work in an area. Exceptions to these time frames are specified below:

1. Where the initiation of stabilization measures is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.
2. On areas where construction activity has temporarily ceased and will resume after 14 days, a temporary stabilization method can be used.

Current Ordinance:

9-51: Erosion and Sediment Control Planning:

H. Erosion and sediment control plans shall be in accordance with article V of this chapter and shall include the following:

1. Detailed construction phasing plan identifying erosion and sediment control measures to be in place for each phase shall be submitted.
2. Erosion and sediment control measures to be installed initially prior to stripping existing vegetation or mass grading shall be indicated on the plans.
3. Permanent stabilization measures shall be indicated on a separate plan.

4. The expected 2-year and 10-year runoff rates from all off site areas draining into the site shall be identified on the plan.
5. Methods for conveying flows through the site during construction shall be indicated. These methods must include the temporary and permanent stabilization measures to be used to reduce velocity and erosion from flow through the construction zone.
6. A maintenance schedule of each measure used shall be indicated on the plan. As a minimum, all erosion and sediment control measures on site shall be inspected weekly or after a one-half inch (1/2") or greater rainfall event and any required repairs shall be made to keep these measures functional as designed.
7. Special management areas and any required buffers shall be indicated on the erosion and sediment control plan.

Suggested Changes:

Separate the maintenance schedule from the inspection schedule and revise to 1/4" per ILR10.

5. A maintenance schedule of each measure used shall be indicated on the plan.
6. At a minimum, all erosion and sediment control measures on site shall be inspected weekly or after a one-quarter inch (0.25") or greater rainfall event and any required repairs shall be made to keep these measures functional as designed.

Current Ordinance:

9-51: Erosion and Sediment Control Planning:

J. Stockpiles of soil and other building materials (sand, limestone, etc.) shall not be located in special management areas or required buffers. If a stockpile is to remain in place for more than three (3) days, erosion and sediment control shall be provided.

Suggested Changes:

J. Stockpiles of soil and other building materials (sand, limestone, etc.) shall not be located in special management areas or required buffers, unless approved by the Director. If a stockpile is to remain in place for more than three (3) days, erosion and sediment control shall be provided.

Suggested Additions:

9-51: Erosion and Sediment Control Planning:

Erosion control blanket placed along streambanks, within a wetlands or buffers shall be 100% biodegradable unless otherwise approved by the Director.

Dust Control: On areas of exposed soils, minimize the generation of dust through the appropriate application of water or other dust suppression techniques.

Pollution Prevention: The applicant shall design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, such measures must be designed, installed, implemented and maintained to:

1. Ensure and demonstrate compliance with applicable State and/or local waste disposal, sanitary sewer or septic system regulations;
2. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;

3. Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to storm water;
4. Minimize the exposure of fuel, oil, hydraulic fluid and other petroleum products by storing in covered areas or containment areas; and
5. Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.

Inspections – For sites that require an Illinois Environmental Protection Agency General NPDES Permit No. ILR 10 permit, the applicant shall provide qualified personnel to inspect disturbed areas of the construction site for compliance with the plan at least once every seven calendar days and within 24 hours of the end of a storm or by the end of the following business or work day that is 0.25 inches or greater. Areas inaccessible during inspections due to flooding or other unsafe conditions shall be inspected within 72 hours of becoming accessible. Inspections may be reduced to once per month when construction activities have ceased due to frozen conditions. Weekly inspections will recommence when construction activities are conducted, or if there is 0.25 inches or greater rain event, or a discharge due to snowmelt occurs.

Permit - An applicant with land disturbing activities greater than 1 acre shall provide a copy of the Notice of Intent, Stormwater General Permit under IEPA NPDES ILR10 or a statement that the site complies with the IEPA NPDES ILR10 permit, if applicable.

A. REFERENCE

Table A - Current County Ordinance Wetland & Buffer comparison:

County	Regulated Wetlands Jurisdictional (Jur.) Isolated (Iso.)		Corps Wetland Determination (Det.) & Permit Review Delegation (Rev.)		Wetland Classification High Quality Regulatory (Reg.)		Mitigation Ratio High Quality Regulatory (Reg.)			Wetland Buffers Linear (Lin.) Water Body (WB)				
	Jur.	Iso.	Det.	Rev.	High Quality	Reg.	Impact Threshold	High Quality	Reg.	High Quality		Regulatory		
										Lin	WB	Lin	WB	
DuPage				1	FQI>25 MDNR>5 HQAR	FQI<25 MDNR<5	0.1ac	3:1	1.5:1	100ft		Limits of Regulatory flood plain or Trib area < 100 ac = 15' Trib area > 100 ac = BFE study		50ft
Kane					FQI > 16 ADID HQAR IBI	FQI<16	0.1ac ₂	FQI >16 3:1 FQI >25+ 10:1+	7<FQI<16 2:1 FQI <7 1:1 ₂	50ft	50ft	Trib area >640ac, 15-50ft ₃ Trib area >640ac, 50'		FQI<7, 15-35ft FQI>7<16, 15-50ft FQI>16, 15-50ft FQI>16, 50ft
Lake				4	HQAR ADID IBI>40	All Others	0.1ac	HQAR 3:1 ADID/ Forested 6:1	1.5:1 ₅	100ft		Tributary >1mi ² 30ft <1mi ² 50ft		1/3<X<1ac,30ft 1<X<2 1/2ac, 40ft >2 1/2 ac, 50ft
McHenry					HQAR HFVW HQHS	All Others	0.1ac	HFVW 3:1 ₆ HQAR/H QHS 5:1 ₆	1.5:1 ₇	100ft		Tributary >20acres 50ft		.25ac<X<.5ac, 30ft X>.5 ac, 50ft
Cook					FQI>20 C-val>3.5 HQAR	All Others	0.1	3:1	1.5:1	100ft	100ft	Isolated 30ft Jurisdictional 50ft		.1ac<X<.5ac, 30ft X>.5ac, 50ft
USACE					HQAR HQHS	All Others	0.1	1.5:1 ₈	1.5:1 ₈	100ft	100ft	50ft ₉		.25<X<.5 30ft X>.5 50ft

1. DuPage County reviews impacts to jurisdictional wetlands under GP25.
2. Mitigation is not required for dredging a wetland with an FQI less than 7.
3. When the lineal waters of the U.S. have a drainage area less than six hundred forty (640) acres, measured at the downstream property line, the buffer width shall be determined utilizing the formula, $X = (A * 0.0547) + 15$, where "X" equals the buffer width in feet and "A" equals the drainage area in acres.
4. Lake County performs jurisdictional determinations.
5. 1:1 for approved and fully certified wetland mitigation bank credits, or open water not considered HQAR's.
6. 1:1 ratio may be allowed for IWMC impacts under Categories I, II and III, including HQAR, HQHS, an HFVW, provided that IWMC mitigation occurs onsite according to the requirements of this Ordinance.
7. May be reduced to 1:1 in wetland banking credits.
8. District has the discretion to require additional mitigation to ensure that the impacts are no more than minimal.
9. Water of the US with no associated wetland fringe may use buffer of 50 ft.

C - 1 :

Riparian Buffer Zones: Functions and Recommended Widths

Prepared by

Ellen Hawes and Markelle Smith

Yale School of Forestry and Environmental Studies

For the

Eightmile River Wild and Scenic Study Committee

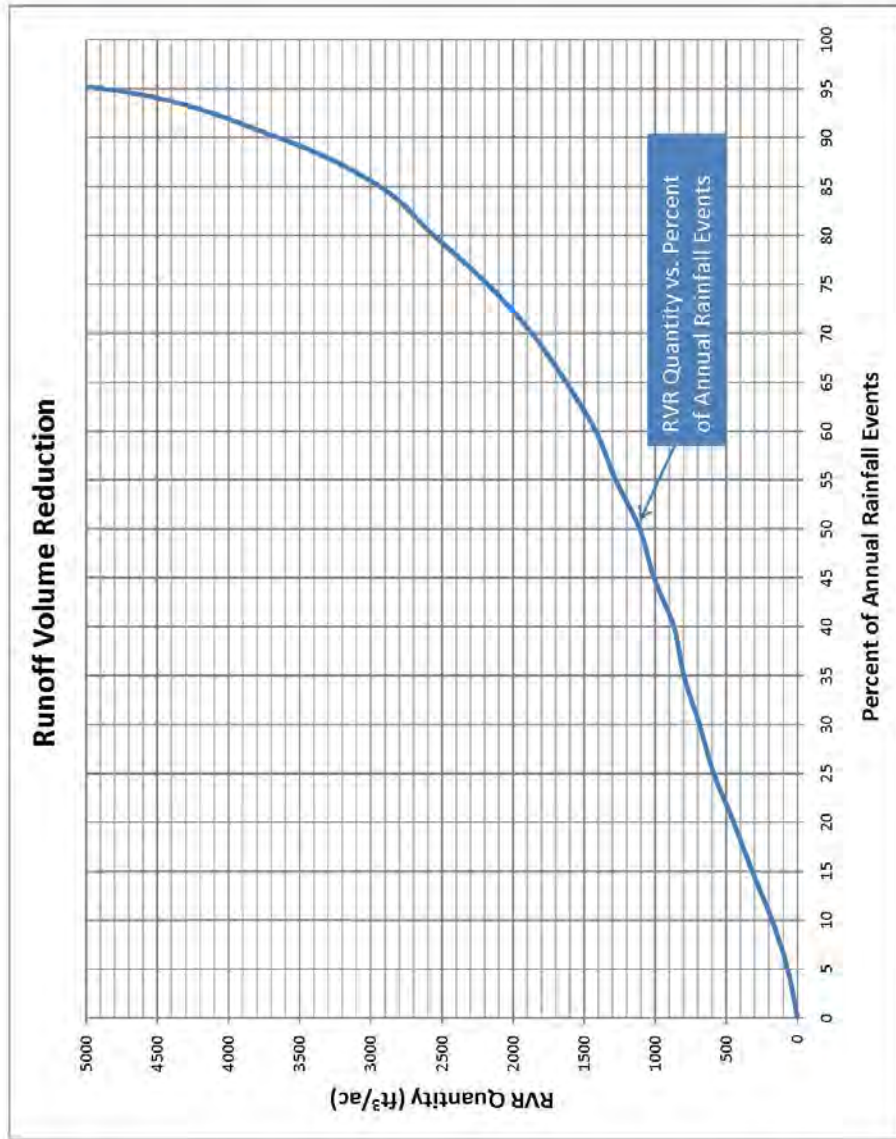
April 2005

(as attachment)

Northeastern Illinois BMP Design Standards

BMP Standards:	Model Ordinance-Recommended	DuPage County (2013)	Cook County WMO (2014)	Lake County (2015)	McHenry County (2016)	Will County (2004)		Kane County
						Incorporated	Unincorporated	
Stormwater Volume Reduction		List of BMPs (15-64)	Hierarchy (503.3)	Hierarchy & BMPs (503)	Hierarchy & BMPs (Article VI.B.6)	As required by CWA (55.022.J)		List of BMPs (9-29.N)
Threshold for BMPs		Net new impervious ≥2,5000 sf (15-40.F)	<u>Residential:</u> Parcel ≥ 1 acre (503.1.A) <u>Multi-Family Residential:</u> Parcel ≥ 0.5 acre (503.1.B) <u>Non-Residential:</u> Parcel ≥ 0.5 acre (503.1.C) <u>ROW:</u> New impervious area ≥ 1 acre where practicable (503.1.D)	<u>Minor/Major Development:</u> ≥ 1 acre disturbance and ≥0.5 acre new impervious (503.02) <u>Redevelopment:</u> ≥ 1 acre disturbance (503.02) <u>Public Road Development:</u> ≥1.5 acre new impervious and ≥1.5 acres new impervious per mile (300.07)	Minor/Major, Public Road and Mining Developments ≥1 acre disturbance (Article VI.B.6)	As required by CWA (55.022.J)		When detention is required: > 3 acre multi-residential, >1 acre Commercial >1 acre roads
Water Quality/Storm Volume		1.25" for all new impervious (15-64.A.1)	1.00" for all new impervious (503.2)	0.01" for every 1% impervious (0.2" minimum) (504.02) 0.5" for all tributary new impervious for hydrocarbon removal technology (504.04)	No minimum	As required by CWA (55.022.J)		0.75" for hydraulically connected impervious area of new development (9-29.G)
BMP Exemptions		Net new impervious ≤2,500 sf since 04/23/13 (15-63.A.1) Bridge/culvert replacement; Roadway resurfacing or reconstruction with < 2,500 sf net new impervious per ¼ mile (15-63.A.2) Regional Stormwater Management or Flood Control Development (15-16.A.3) Streambank stabilization, natural area restoration, wetland mitigation bank or off-site wetland mitigation (15-63.A.4) Construction or reconstruction of pedestrian walkway/bike path ≤16' wide (includes shoulders) (16-63.A.5) Modification of ex. stormwater facility to incorporate BMPs (15-63.A.6) Water or sewer improvement (15-63.A.7) Construction or maintenance of underground or overhead utility with supports and appurtenances (15-63.A.8)	Redevelopments w/ site constraints preventing use of retention based practices can reduce volume control storage by 25% for every 5% of reduced impervious area and shall: • Demonstrate site limitations prevent providing full volume onsite • Provide volume onsite to the maximum extent practicable with retention based practices (503.C) Single Family Homes (501.Table 2) Open Space Developments (501.Table 2)	N/A	N/A	N/A		N/A
Credit for Detention		Yes (15-64.C.2)	Yes (Page 5-61 TGM)	Yes (503.B.1 & 504.01)	N/A	N/A		Yes
Fee-In-Lieu of BMPs		Yes (15-98)	N/A	N/A	N/A	N/A		No

Appendix O: Runoff Volume Reduction



Percent of Annual Rainfall Events	Runoff Depth (in)	RVR Quantity ft ³ /ac new impervious
0	0	0
5	0.02	70
10	0.05	180
15	0.09	320
20	0.12	450
25	0.16	590
30	0.19	690
35	0.22	800
40	0.24	870
45	0.28	1010
50	0.30	1110
55	0.35	1280
60	0.39	1420
65	0.45	1630
70	0.51	1870
75	0.60	2180
80	0.70	2560
85	0.81	2940
90	1.01	3660
95	1.35	4900
99	2.41	8760

Runoff Depth based on Figure 3 of the Center For Watershed Protection Report.

Runoff Depth = P*R, where:

P = Rainfall Depth (inches)

R = Volumetric Runoff Coefficient = 0.95 for 100% impervious cover [0.05 + 0.009(I)], where I is 100% (impervious cover)]

RVR Quantity = Runoff Depth (in) / 1.2 (in/ft) * 43560 (ft²/ac)

BASELINE RUNOFF - UNDEVELOPED SITE CONTINUOUS SIMULATION

RECARGA_2.3

Units: English

RECARGA Version 2.3

Bioretention/Raingarden Sizing Program

Facility Inputs

Planview Data

Facility Area: 1 [sf]

Tributary Area: 1.0 [acre]

Percent Impervious: 0

Pervious CN: 78

Underdrain

Flowrate: 0 [in/hr]

Diam.: 0 [in.]

Files

Regional Ave. ET: 0.13 [in./day]

Simulation Type: Continuous

Input File Length: 183 days

Precip. File Name: Mad1996

Output File Name: Baseline

Summary Record

Target Stay-on: 0 [in.]

Facility Area Ratio (%): Edit Text [%]

FAR [%]

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Poned	427.25	2808.5
Number of overflows		41

Tributary Runoff [in.]

Precipitation: 422.04

Impervious Runoff: 0

Pervious Runoff: 349.3728

Raingarden Water Balance

	[in.]	%
Runon	349.3742	82.7823
Runoff	349.363	82.7796
Recharge	0.0093907	0.0022251
Evaporation	0.0018372	0.00043532
Underdrain	0	0
Soil Moisture	4.0704e-006	9.6445e-007
Stay-on	72.677	17.2204

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussailiant, L. Severson)

**BASELINE "STAY-ON" INCHES
FOR CONTINUOUS SIMULATION**

35% IMPERVIOUS SITE

SINGLE EVENT (1" STORM) TEST

TARGET = 1" STAY-ON

RECARGA Version 2.3
Bioretention/Raingarden Sizing Program

Units: English

REQUIRED RAIN GARDEN SIZE = 780 SQ. FT.

Planview Data

Facility Area: 780 [sf]

Tributary Area: 0.35 [acre]

Percent Impervious: 100

Pervious CN: 78

Files

Regional Ave. ET: 0.13 [in./day]

Simulation Type: Single Event

Rainfall Distribution: Typell

Rainfall Depth: 1 [in.]

Output File Name: <40

Summary Record

Facility Inputs

Soil Texture	Infiltration Rate [in/hr]	Depth [in.]
Depression Zone		12
Root Layer	3.94	24
Storage Layer	5.91	12
Native Soil Layer	.13	

Underdrain Flowrate: 0 [in./hr]
Diam.: 0 [in.]

Target Stay-on: 0 [in.]

Facility Area Ratio (%): Edit Text [%]

Run FAR

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Ponded	60.25	60.25
Number of overflows		0

Tributary Runoff

	[in.]
Precipitation	1
Impervious Runoff	0.8622
Pervious Runoff	0

Raingarden Water Balance

	[in.]	%
Runon	0.8622	86.2205
Runoff	0	0
Recharge	0.43949	43.9492
Evaporation	6.0924e-005	0.0060924
Underdrain	0	0
Soil Moisture	0.14053	14.0526
Stay-on	1	100

Run SIMULATION

CLEAR RESULTS

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussailiant, L. Severson)

NOTE: SINGLE EVENT STORMS MODELED ONLY OVER NEW IMPERVIOUS AREA. TRIBUTARY AREA IS SET TO EQUAL THE PERCENT IMPERVIOUS AREA X 1.0 ACRE.

35% IMPERVIOUS SITE

CONTINUOUS EVENT TEST

TARGET = 65.40" STAY ON (72.67" X 90%)

RECARGA_2.3

Units: English

RECARGA Version 2.3

Bioretention/Raingarden Sizing Program

REQUIRED RAIN GARDEN SIZE = 1,525 SQ. FT.

Planview Data

Facility Area: 1525 [sf]

Tributary Area: 1.0 [acre]

Percent Impervious: 35

Pervious CN: 78

Facility Inputs

Soil Texture	Infiltration Rate [in/hr]	Depth [in.]
Depression Zone		12
Root Layer	3.94	24
Sandy Loam		
Storage Layer	5.91	12
Sand		
Native Soil Layer	.13	
Silt Loam		

Underdrain Flowrate: 0 [in./hr]

Diam.: 0 [in.]

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Poned	427.25	2750.75
Number of overflows		39

Tributary Runoff

	[in.]
Precipitation	422.04
Impervious Runoff	413.7337
Pervious Runoff	349.3728

Raingarden Water Balance

	[in.]	%
Runon	373.3142	88.4547
Runoff	356.6263	84.5006
Recharge	13.6213	3.2275
Evaporation	3.0606	0.72518
Underdrain	0	0
Soil Moisture	0.0059975	0.0014211
Stay-on	65.4137	15.4994

Run Simulation

Clear Results

Target Stay-on: 0 [in.]

Facility Area Ratio (%): Edit Text [%]

Run FAR

FAR [%]

Stayon [in.]

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussalliant, L. Severson)

60% IMPERVIOUS SITE SINGLE EVENT (1" STORM) TEST TARGET = 1" STAY-ON

RECARGA_2_3

Units: English

RECARGA Version 2.3
Bioretention/Raingarden Sizing Program

REQUIRED RAIN GARDEN SIZE = 1,335 SQ. FT.

Planview Data

Facility Area: 1335 [sf]

Tributary Area: 0.6 [acre]

Percent Impervious: 100

Pervious CN: 78

Files

Regional Ave. ET: 0.13 [in./day]

Simulation Type: Single Event

Rainfall Distribution: Typell

Rainfall Depth: 1 [in.]

Output File Name: >40<80

Summary Record

Facility Inputs

Soil Texture: Sandy Loam, Infiltration Rate: 3.94 [in/hr], Depth: 24 [in.]

Storage Layer: Sand, Infiltration Rate: 5.91 [in/hr], Depth: 12 [in.]

Native Soil Layer: Silt Loam, Infiltration Rate: 0.13 [in/hr]

Underdrain Flowrate: 0 [in./hr], Diam.: 0 [in.]

Target Stay-on: 0 [in.]

Facility Area Ratio (%): Edit Text [%]

Run FAR

FAR (%)

Stayon (in)

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Ponded	60.25	60.25
Number of overflows	0	0

Tributary Runoff

	[in.]
Precipitation	1
Impervious Runoff	0.8622
Pervious Runoff	0

Raingarden Water Balance

	[in.]	%
Runon	0.8622	86.2205
Runoff	0	0
Recharge	0.43882	43.8823
Evaporation	6.0832e-005	0.0060832
Underdrain	0	0
Soil Moisture	0.14031	14.0312
Stay-on	1	100

Run SIMULATION

CLEAR RESULTS

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussailiant, L. Severson)

NOTE: SINGLE EVENT STORMS MODELED ONLY OVER NEW IMPERVIOUS AREA. TRIBUTARY AREA IS SET TO EQUAL THE PERCENT IMPERVIOUS AREA X 1.0 ACRE.

60% IMPERVIOUS SITE CONTINUOUS EVENT TEST TARGET = 54.50" STAY ON (72.67" X 75%)

RECARGA_2_3

RECARGA Version 2.3
Bioretention/Raingarden Sizing Program

Units: English

**REQUIRED RAIN GARDEN SIZE =
1,965 SQ. FT.**

Planview Data

Facility Area: (circled)

Tributary Area:

Percent Impervious:

Pervious CN:

Facility Inputs

Soil Texture	Infiltration Rate [in/hr]	Depth [in.]
Depression Zone		12
Root Layer	Sandy Loam (dropdown)	3.94
Storage Layer	Sand (dropdown)	5.91
Native Soil Layer	Silt Loam (dropdown)	.13

Underdrain Flowrate: (Diam.)

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Poned	427.5	2768
Number of overflows		39

Tributary Runoff

	[in.]
Precipitation	422.04
Impervious Runoff	413.7337
Pervious Runoff	349.3728

Raingarden Water Balance

	[in.]	%
Runon	389.1006	92.1952
Runoff	367.5487	87.0886
Recharge	17.529	4.1534
Evaporation	4.0152	0.95138
Underdrain	0	0
Soil Moisture	0.0076533	0.0018134
Stay-on	54.4913 (circled)	12.9114

RUN SIMULATION

CLEAR RESULTS

Regional Ave. ET:

Simulation Type: Continuous (dropdown)

Input File Length: days

Precip. File Name:

Output File Name:

Summary Record

Target Stay-on:

Facility Area Ratio (%):

Run FAR

FAR [%]

Stay-on [in.]

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussailiant, L. Severson)

85% IMPERVIOUS SITE

SINGLE EVENT (1" STORM) TEST

TARGET = 1" STAY-ON

RECARGA_2_3

Units: English

RECARGA Version 2.3
Bioretention/Raingarden Sizing Program

REQUIRED RAIN GARDEN SIZE = 1,895 SQ. FT.

Planview Data

Facility Area: 1895 [sf]

Tributary Area: 0.85 [acre]

Percent Impervious: 100

Pervious CN: 78

Files

Regional Ave. ET: 0.13 [in./day]

Simulation Type: Single Event

Rainfall Distribution: Typell

Rainfall Depth: 1 [in.]

Output File Name: >80

Summary Record

Facility Inputs

Soil Texture: Sandy Loam, Infiltration Rate: 3.94 [in/hr], Depth: 24 [in.]

Storage Layer: Sand, Infiltration Rate: 5.91 [in/hr], Depth: 12 [in.]

Native Soil Layer: Silt Loam, Infiltration Rate: .13 [in/hr]

Underdrain Flowrate: 0 [in/hr], Diam.: 0 [in.]

Target Stay-on: 0 [in.]

Facility Area Ratio (%): Edit Text [%]

Run FAR

FAR (%): 0

Stay-on (in): 0 to 1

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Ponded	60.25	60.25
Number of overflows		0

Tributary Runoff

	[in.]
Precipitation	1
Impervious Runoff	0.8622
Pervious Runoff	0

Raingarden Water Balance

	[in.]	%
Runon	0.8622	86.2205
Runoff	0	0
Recharge	0.43965	43.9649
Evaporation	6.0946e-005	0.0060946
Underdrain	0	0
Soil Moisture	0.14058	14.0576
Stay-on	1	100

RUN SIMULATION

CLEAR RESULTS

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussailiant, L. Severson)

NOTE: SINGLE EVENT STORMS MODELED ONLY OVER NEW IMPERVIOUS AREA. TRIBUTARY AREA IS SET TO EQUAL THE PERCENT IMPERVIOUS AREA X 1.0 ACRE.

85% IMPERVIOUS SITE CONTINUOUS EVENT TEST TARGET = 43.60" STAY ON (72.67" X 60%)

RECARGA_2.3

RECARGA Version 2.3
Bioretention/Raingarden Sizing Program

Units: English

**REQUIRED RAIN GARDEN SIZE =
2,400 SQ. FT.**

Planview Data

Facility Area: 2400 [sf]

Tributary Area: 1.0 [acre]

Percent Impervious: 85

Pervious CN: 78

Facility Inputs

Soil Texture	Infiltration Rate [in/hr]	Depth [in.]
Sandy Loam	3.94	24
Storage Layer		
Sand	5.91	12
Native Soil Layer		
Silt Loam	.13	

Underdrain

Flowrate: 0 [in./hr]

Diam.: 0 [in.]

Results

Plant Survivability
(Less than 48 hours max. ponding is desirable)

	max.	Total
Hrs. Poned	427.75	2775
Number of overflows		40

Tributary Runoff

Precipitation: 422.04 [in]

Impervious Runoff: 413.7337 [in]

Pervious Runoff: 349.3728 [in]

Raingarden Water Balance

	[in.]	%
Runon	404.5837	95.8638
Runoff	378.4197	89.6644
Recharge	21.2759	5.0412
Evaporation	4.8789	1.156
Underdrain	0	0
Soil Moisture	0.009259	0.0021939
Stay-on	43.6203	10.3356

RUN SIMULATION

CLEAR RESULTS

Target Stay-on: 0 [in]

Facility Area Ratio (%): Edit Text [%]

Run FAR

FAR [%]

Stay-on [in]

Developed by the University of Wisconsin-Madison
Civil & Environmental Engineering Water Resources Group
(D. Atchison, A. Dussalliant, L. Severson)

TAC Updated Meeting Schedule

April 25, 2018 – continue Buffer/Best Management Practices (BMPs) and begin Soil Erosion/Sediment Control

May 23, 2018 - Begin General Provisions, Administration, Enforcement

Early Summer 2018 – No Meetings. Consultant to draft ordinance language. Meetings will resume in Summer 2018.