Watershed Management Ordinance

Training Session

Presented by

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Agenda

- WMO Resources
- WMO Amendments
- Clarifications and document improvements
- Stormwater Management Overview

WMO Resources

- mwrd.org/wmo
  - Doing Business > WMO and Infiltration/Inflow
    - *General Information*
      - *Ordinance*
      - *Redline*
      - *Application Forms and Fees*
      - *Permit Flow Charts*

WMO Resources

- **mwrd.org/wmo**
  - Doing Business > WMO and Infiltration/Inflow
    - *Technical Information*
      - *Technical Guidance Manual (TGM)*
      - *Standard Details and Notes*
      - *WMO Design Calculators*
      - *WMO Model Templates*

WMO Resources

- Permit Applicability
  - Development within Flood Protection Area
  - Development greater than 0.5 acre
  - Qualified sewer
  - Modifications to detention facility
  - Direct connections to District facilities
  - New or reconstructed outfalls

WMO Resources

- Not sure if you need a permit?
  - *Permit Determination Request*
- Questions about permit application?
  - *Pre-application Meeting*

WMO Resources

- Previously issued SPO/WMO permits
  - *Email **MWRDPI@mwrd.org** or*
  - *Complete Permit Inquiry (PI)*

- Email list for WMO updates
  - *Send email to WMOupdates@mwrd.org and request to join the list*

WMO Amendments

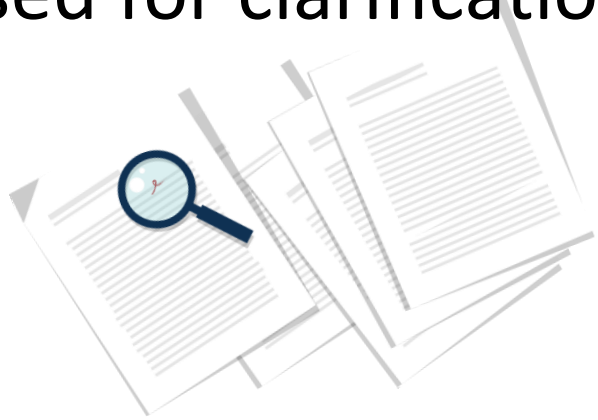
- May 1, 2014: Effective Date
- July 10, 2014: Amendment
  - *Infiltration/Inflow Control Program (Article 8)*
  - *Permit Fees (Appendix F)*
- February 15, 2018: Amendment
  - *Clarifications to align with administrative procedures*
  - *Volume control trading on parcels with site constraints*
  - *Introduction of Earthwork/Limited Foundation Permit*
- May 16, 2019: Amendment
  - *Clarifications*
  - *Watershed Specific Release Rates*
  - *Updated Bulletin 70 Rainfall Data*
  - *New Redevelopment Provisions*

WMO Amendments

- Public Comment Document
  - + *Updated Bulletin 70 rainfall data*
  - ✕ *New TGM Appendix H for stormwater trading*
  - + *§208 Study*
    - ➢ Stormwater Trading Pilot Study
    - ➢ Watershed Specific Release Rate Impacts
      - ▪ *Disproportionally Impacted Communities*
      - ▪ *Development in Collar Counties*
      - ▪ *Stream Erosion and Water Quality*

WMO Clarifications

- Provisions consolidated and reorganized within WMO to appropriate sections
- Redundancies removed
- Guidance Details moved to TGM
  - *Technical Guidance Manual was created after WMO adoption*
- Definitions (Appendix A) revised for clarification
  - *New or merged definitions*
  - *Modified definitions*
  - *Deleted definitions*



Article 2

Applicability and General Provisions:

- New exemption for work in Lake Michigan – *Shore protection work regulated by USACE and IDNR, and can be certified by a Professional Engineer, Professional Geologist, or Structural Engineer*
- New exemption for single-family home development greater than 0.50 acre outside the FPA – *WMO does not regulate single-family home construction, only flood protection elevation*

Article 3

Permit Requirements and Submittals:

- *Guidance moved to TGM*
- *New requirements for Plat of Survey*
  - *Schedule K only required if property holdings are below Stormwater Management thresholds*

Article 5

Article 5 – Stormwater Management

- New rainfall data
- New Runoff methodology
- New Volume Control requirements
- Watershed Specific Release Rates
- Non-qualified development (GI)
- New Detention requirements
- New Redevelopment requirement
- New Calculators

Article 5 - Updated Rainfall Data

Updated Bulletin 70 Rainfall Data

- Report published by Illinois State Water Survey March 2019
- Will result in more water detained throughout the County

Rainfall Data	Published by	Year Published	100-year 24-hour Rainfall Depth
Technical Paper 40	U.S. Weather Bureau	1961	6.00-inch
Bulletin 70	ISWS	1989	7.58-inch
Updated Bulletin 70	ISWS	2019	8.57-inch

- Effective date: January 1, 2020
- Updated time distribution tables will be incorporated when available.

Article 5 – Stormwater Management

Summary of Stormwater Management Requirements

Development Type (See Appendix A for definitions)	**§502** **Runoff Requirements**[1,2]	**§503** **Volume Control Requirements**[1,2]	**§504** **Detention Requirements**[1,2]
Single-Family Home	Exempt	Exempt	Exempt
Residential Subdivision on **property holdings**	≥ 1 acre	≥ 1 acre	≥ 5 acres
Multi-Family Residential on **property holdings**	≥ 0.5 acre	≥ 0.5 acre	≥ 3 acres‡
Non-Residential on **property holdings**	≥ 0.5 acre	≥ 0.5 acre	≥ 3 acres‡
Open Space on **property holdings**	≥ 0.5 acre	Not Applicable	Not Applicable
Right-of-Way when new **impervious area**	≥ 1 acre	≥ 1 acre†	≥ 1 acre†

[1] **Stormwater** management requirements do not apply to **demolition** or **maintenance activities**.

[2] Requirements are applicable when a **Watershed Management Permit** is required under §201 of the **WMO**.

† Where practicable.

‡ Starting the effective date of the **WMO**, any new **development** within the **property holdings** that totals either individually or in the aggregate to greater than or equal to one-half (0.5) of an acre.

Article 5 - Runoff

Design runoff rate

- Rational Method allowed
  - Updated Bulletin 70 Rainfall Data
  - Less than 20 acres
- Runoff section of Schedule D updated
  - Rational Method
  - Offsite discharge location
  - Building protection
    - Must submit cross-sections

Article 5 - Runoff

Schedule D: Runoff

1. RUNOFF REQUIREMENTS: Submit calculations and an exhibit that delineates the 100-year critical storm conveyed by the major stormwater system including cross-sections indicating the HGL at critical points (e.g. overflow weirs)

A. Method used to calculate the 100-year peak design runoff rate:
☐ Hydrologic model ☐ Rational Method → $i_{100\text{-}year}$ _____ in/hr

B. Onsite tributary area to the major stormwater system ..... *CN* or *C* _____ , _____ acres

C. Offsite tributary area to the major stormwater system ..... *CN* or *C* _____ , _____ acres

D. Total tributary area to the major stormwater system ..... *CN* or *C* _____ , _____ acres

E. Ratio of offsite to onsite tributary area ..... _____

F. Time-of-concentration ..... _____ minutes

G. 100-year peak design runoff rate ..... _____ cfs

H. Capacity of major stormwater system discharging offsite ..... cfs

I. Offsite discharge location of the major stormwater system:
☐ ROW/drainage easement ☐ Adjacent property *(submit calculations to comply with §502.3.B)*

J. Type and location of major stormwater system: _____

K. Building lowest entry elevation(s) are located at least 1 foot above the adjacent HGL:
(Submit calculations and cross-sections showing the building lowest entry elevation(s) and adjacent HGL)
☐ Yes ☐ No *(for existing buildings located within the property holdings, submit acknowledgment)*

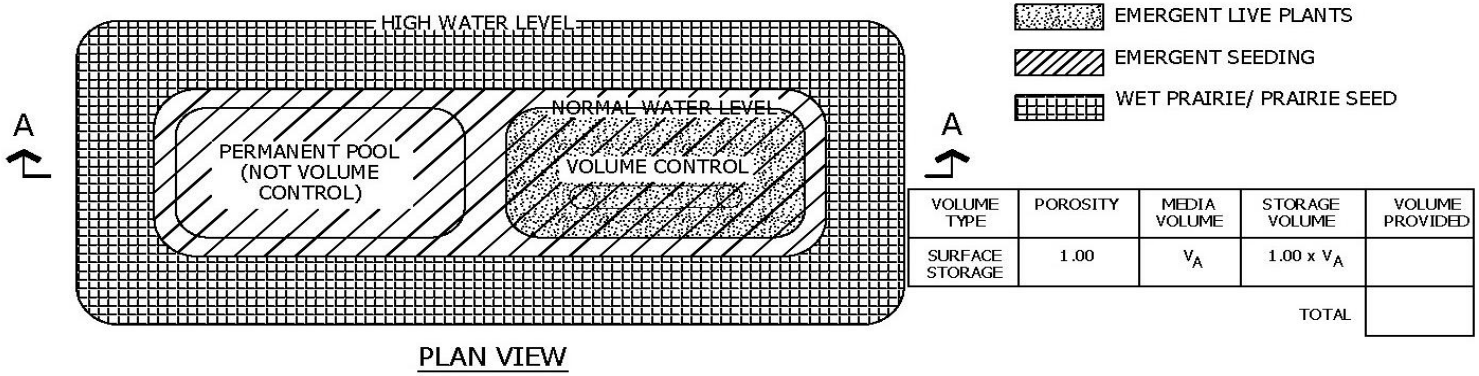
Article 5 – Volume Control

Retention-based practices

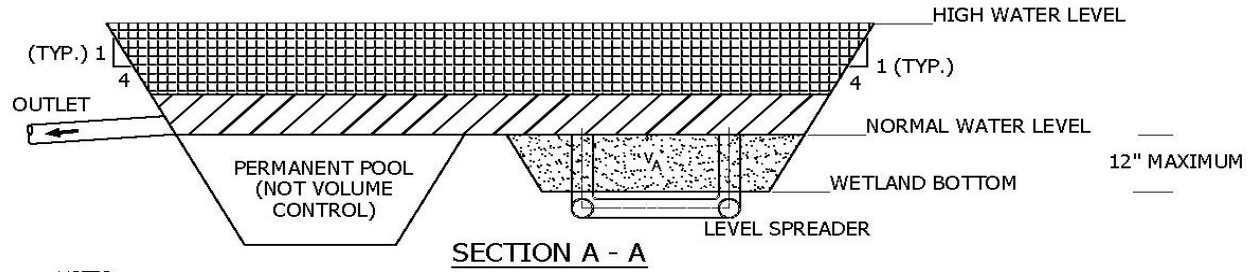
- Must drawdown within 72 hours:
  - Available for next storm
  - Provide suitable habitat for vegetation
  - Prevent mosquito habitat
- Underdrain:
  - Required when soils < 0.5in/hr, unless in-situ infiltration tested
  - Freely drain, connecting and flowing out to a storm system
- Retention provided below the outlet of a detention basin:
  - Typical for retrofit
  - Current detail to be updated to include underdrain requirement
- Incorporate vegetation tolerant to wet-dry cycles (IDOT seed mixes)

Article 5 – Volume Control

- Prior MWRD Typical Storage Below Detention Basin Outlet Detail: drawing illustrated a level spreader with no gravity outlet to the restrictor. This detail has recently been updated.



VOLUME TYPE	POROSITY	MEDIA VOLUME	STORAGE VOLUME	VOLUME PROVIDED
SURFACE STORAGE	1.00	V_A	1.00 x V_A	
			TOTAL	



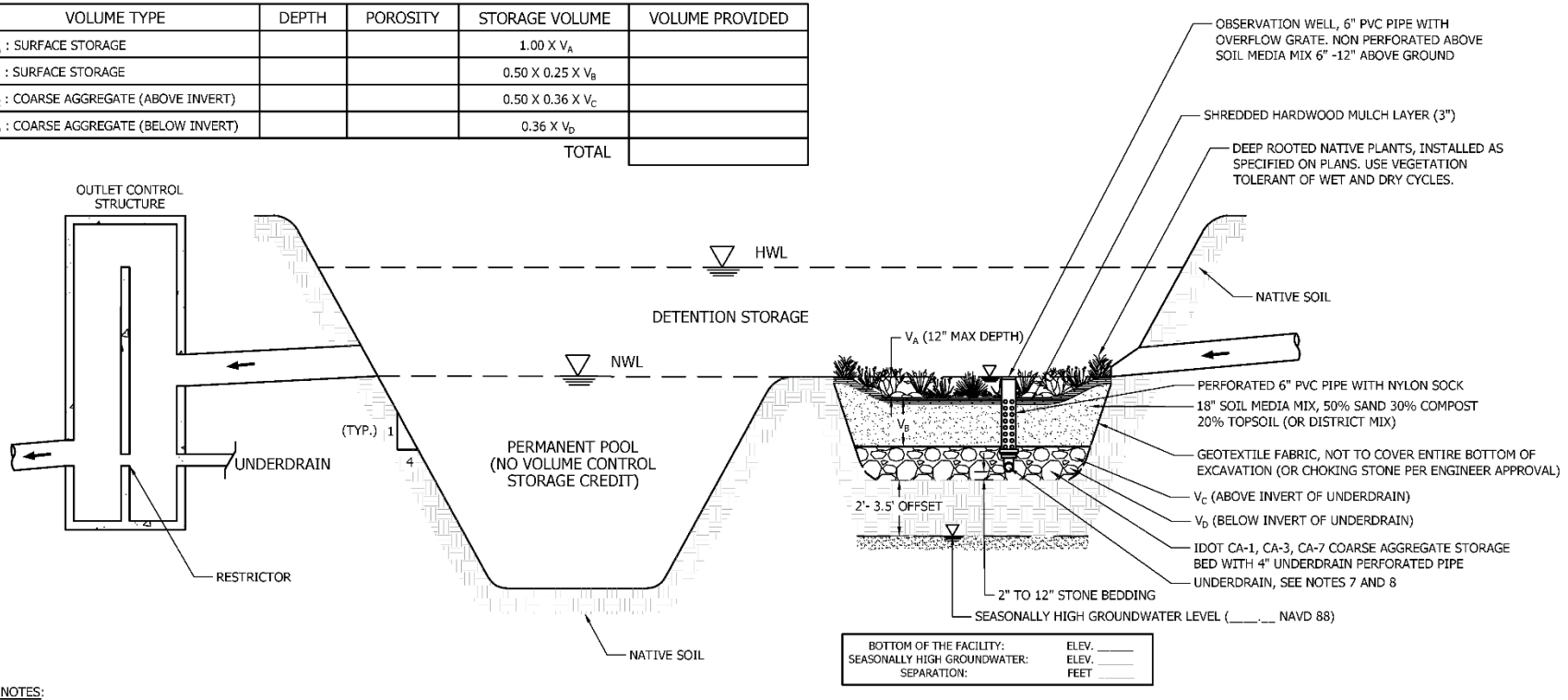
NOTES:
1) BOTTOM OF VOLUME CONTROL FACILITY SHALL BE AS FLAT AS POSSIBLE. BOTTOM SLOPES SHALL NOT EXCEED 20:1
2) LEVEL SPREADER PERFORATED 4-INCH DIAMETER PIPE MUST BE INSTALLED TO DISTRIBUTE STORMWATER OVER THE ENTIRE VOLUME CONTROL FACILITY .
3) DEPTH BELOW OUTLET SHALL NOT EXCEED 12 INCHES.
4) DETENTION BASIN SIDE SLOPES SHALL BE 3:1 MINIMUM.
5) FOLLOW THE REQUIRED PRETREATMENT MEASURES LISTED ON THE VOLUME CONTROL PRETREATMENT MEASURES DETAIL (PAGE 17).

NOT TO SCALE

Article 5 – Volume Control

- New Detail:

VOLUME TYPE	DEPTH	POROSITY	STORAGE VOLUME	VOLUME PROVIDED
V_A : SURFACE STORAGE			1.00 X V_A	
V_B : SURFACE STORAGE			0.50 X 0.25 X V_B	
V_C : COARSE AGGREGATE (ABOVE INVERT)			0.50 X 0.36 X V_C	
V_D : COARSE AGGREGATE (BELOW INVERT)			0.36 X V_D	
			TOTAL	



NOTES:

1. THE PERIMETER OF THE VOLUME CONTROL FACILITY SHALL MAINTAIN THE MINIMUM HORIZONTAL SEPARATION DISTANCE OF: 10 FEET FROM FOUNDATIONS, UNLESS WATERPROOFED; 20 FEET FROM ROADWAY GRAVEL SHOULDER; AND 100 FEET FROM POTABLE WATER WELLS, SEPTIC TANKS/FIELDS, OR OTHER UNDERGROUND TANKS.
2. SANITARY OR COMBINED SEWERS SHALL NOT BE LOCATED WITHIN THE VOLUME CONTROL FACILITY. SANITARY OR COMBINED SEWERS SHALL NOT BE LOCATED BELOW THE FOOTPRINT OF THE VOLUME CONTROL FACILITY. WHEN LOCAL CONDITIONS PREVENT THE SEWER FROM BEING LOCATED OUTSIDE THE FOOTPRINT OF THE FACILITY THE SEWER SHALL BE CONSTRUCTED TO WATER MAIN QUALITY STANDARDS, AND IT SHALL BE ENCASED WITH A WATER MAIN QUALITY CARRIER PIPE WITH THE ENDS SEALED.
3. MINIMUM DISTANCE OF 2 FEET (3.5 FEET IN COMBINED SEWER AREAS) BETWEEN THE BOTTOM OF THE VOLUME CONTROL FACILITY AND SEASONALLY HIGH GROUNDWATER LEVEL IS REQUIRED.
4. STONE STORAGE OPTIONS ARE IDOT CA-1, CA-3, CA-7, OR APPROVED ALTERNATE. NO RECYCLED MATERIALS.
5. BOTTOM OF VOLUME CONTROL FACILITY SHALL BE AS FLAT AS POSSIBLE. BOTTOM SLOPES SHALL NOT EXCEED 20:1. DETENTION BASIN SIDE SLOPES SHALL BE 3:1 MINIMUM.
6. THE DEPTH BELOW OUTLET SHALL NOT EXCEED 12 INCHES AND SHALL BE DEWATERED IN 72 HOURS OR LESS.
7. UNDERDRAINS ARE REQUIRED IN TYPICAL CLAYEY SOILS WHERE INFILTRATION RATES ARE LESS THAN 0.5 INCH/HOUR. UNDERDRAIN SHOULD BE NO LARGER THAN 4 INCHES IN DIAMETER TO ENCOURAGE RETENTION, HAVE AN OBSERVATION WELL INSTALLED AT THE TERMINAL END AND BE SPACED NO MORE THAN 30 FEET ON CENTER ACROSS A RETENTION FIELD. ONE OBSERVATION WELL REQUIRED PER 6,000 SQUARE FEET OF SURFACE AREA.
8. VOLUME CONTROL FACILITY UNDERDRAIN SYSTEM SHALL BE CONNECTED TO A DOWNSTREAM STRUCTURE, UPSTREAM OF THE RESTRICTOR.

NOT TO SCALE

Article 5 – Volume Control

Site Constraints (added to TGM)

- Prevent use of onsite retention-based practice
- Types:
  - Contaminated Soils
  - Seasonal high groundwater table (min. separation)
  - Shallow bedrock
  - Floodway (FIRM map)
  - Existing wetlands/riparian environment
- Submit supporting documentation
  - Environmental report
  - Geotechnical report

Article 5 – Volume Control

Volume control requirement with site constraints

- Explore offsite retention-based practices
  - Contact District/local municipality for inventory
  - Offsite practice requires WMO permit
  - Capture equivalent existing impervious area
  - Provide trade agreement
- If onsite and offsite practices are not feasible
  - Reduce impervious area
  - Provide volume control as detention (CSA)
  - Flow-through (SSA)
    - Vegetated Filter Strips, Mechanical Structures, etc.

Article 5 – Volume Control

Schedule D: Volume Control

2. VOLUME CONTROL REQUIREMENTS: Submit calculations and a detail for the volume control facility including a cross-section indicating relevant elevations and the seasonal high groundwater table (SHGWT).

A. Does the site have any restrictive covenants related to environmental conditions (e.g., NFR letter)?
☐ No ☐ Yes → Explain: _____

B. Site constraint(s) that precludes the use of onsite retention-based practices *(submit documentation)*:
☐ None ☐ SHGWT ☐ Contaminated Soil ☐ Other: _____

C. Proposed impervious area of development ..... _____ acres

D. Gross volume control storage *(2.C / 12)* ..... _____ ac-ft

E. The onsite gross volume control storage may be reduced when a site constraint is present:
1. Existing impervious area within development ..... _____ acres
2. VC storage reduction *(5)(2.D)[1 – (2.C / 2.E.1)]* ..... _____ ac-ft

F. Required volume control storage *(2.D – 2.E.2)* ..... _____ ac-ft

G. Provided volume within retention-based practice ..... _____ ac-ft

H. Volume control facility *(*only when a site constraint is present)*:
☐ Retention-based practice → Type of practice: _____
☐ Flow-through practice* → Type of practice: _____
☐ Detention Storage* → Type of facility: _____
☐ Offsite retention-based practice* → WMO Permit Number: _____

I. Facility designed as an offsite retention-based practice:
☐ No ☐ Yes → Impervious runoff volume tributary to facility ..... _____ ac-ft

Article 5 – Watershed Specific Release Rates

Release rate selection objective:
Determine regulatory release rates that mitigate the impacts of development by maintaining the 1% annual-chance flood event elevations at or below current levels.

Article 5 – Watershed Specific Release Rates

Calumet Sag Channel: 0.30 cfs/acre

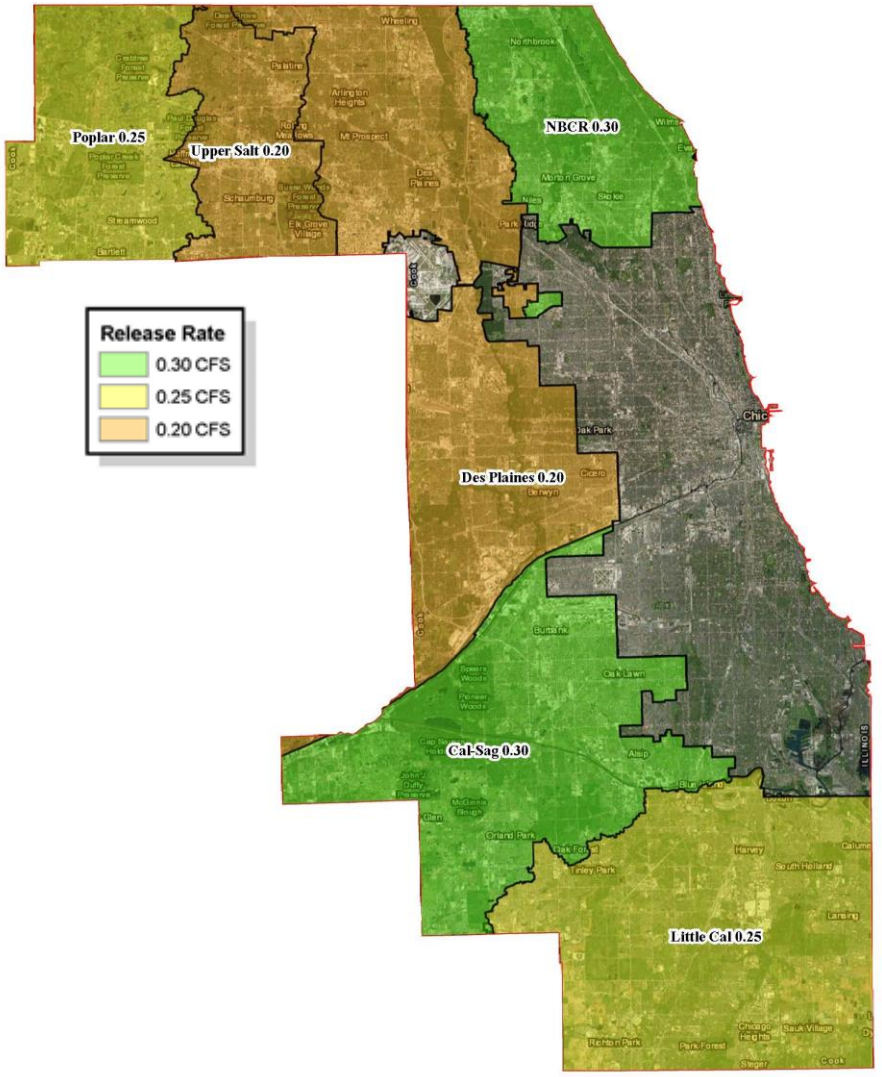
Little Calumet River: 0.25 cfs/acre

Lower Des Plaines: 0.20 cfs/acre

North Branch: 0.30 cfs/acre

Poplar Creek: 0.25 cfs/acre

Upper Salt Creek: 0.20 cfs/acre



Article 5 – Detention

Green Infrastructure Development

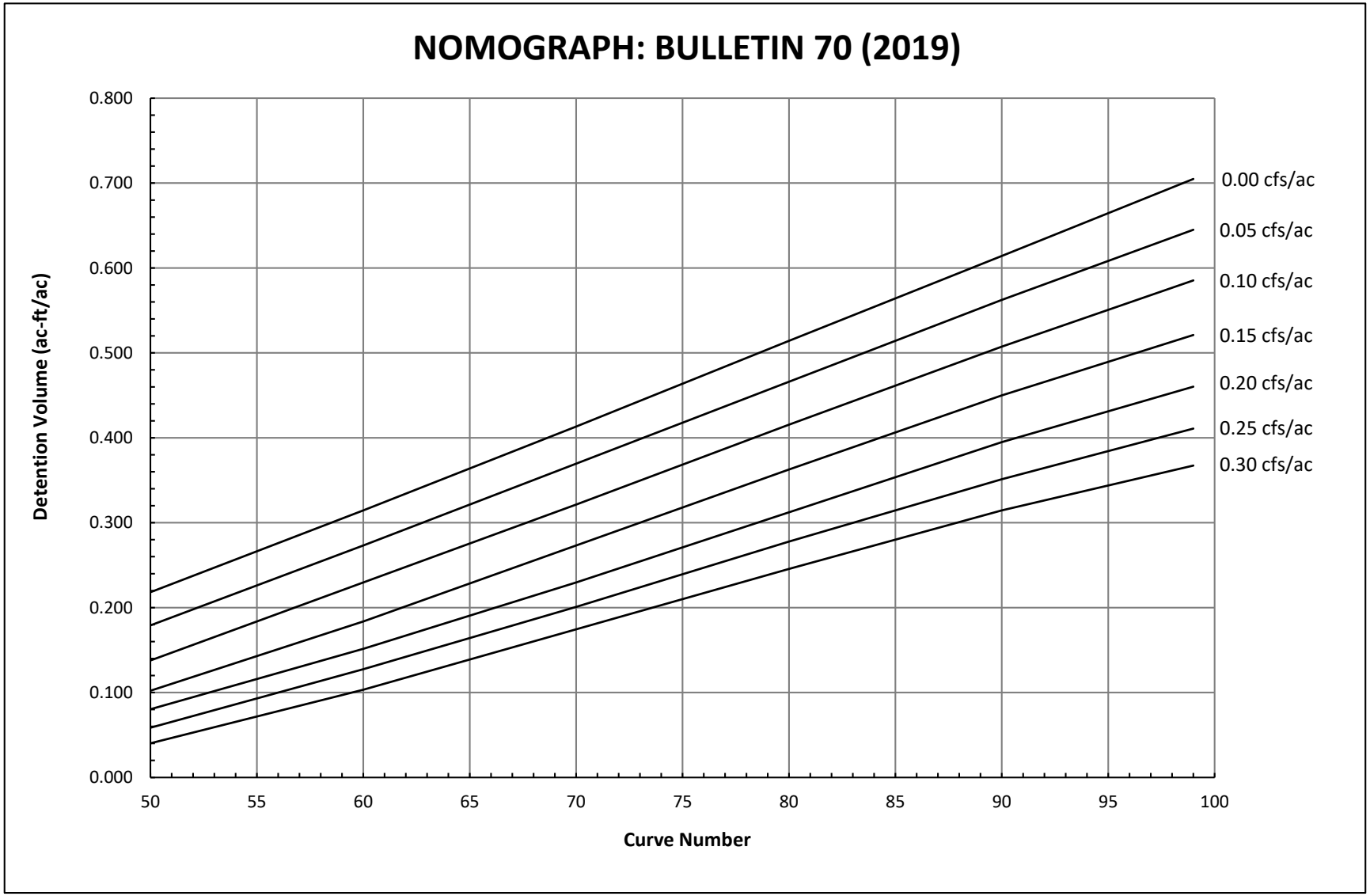
- Green infrastructure that replaces what would otherwise be considered in-kind maintenance can be considered non-qualified development and detention is not required
  - Tradition paved parking lot replaced with permeable pavers is non-qualified development.
  - Other examples provided in TGM

Article 5 – Detention

Methodology: Nomograph

- Newly Developed Nomograph
  - Updated Bulletin 70 Rainfall Data
  - Release rates ranging from 0.00 to 0.30 cfs/acre
- May be used, instead of hydrologic model, when:
  - Development < 20 acres
  - No Depressional Storage
  - No Tailwater conditions (BFE, ponds in series)
  - Not meant to address complex hydrology or hydraulics

Article 5 – Detention



Article 5 – Detention

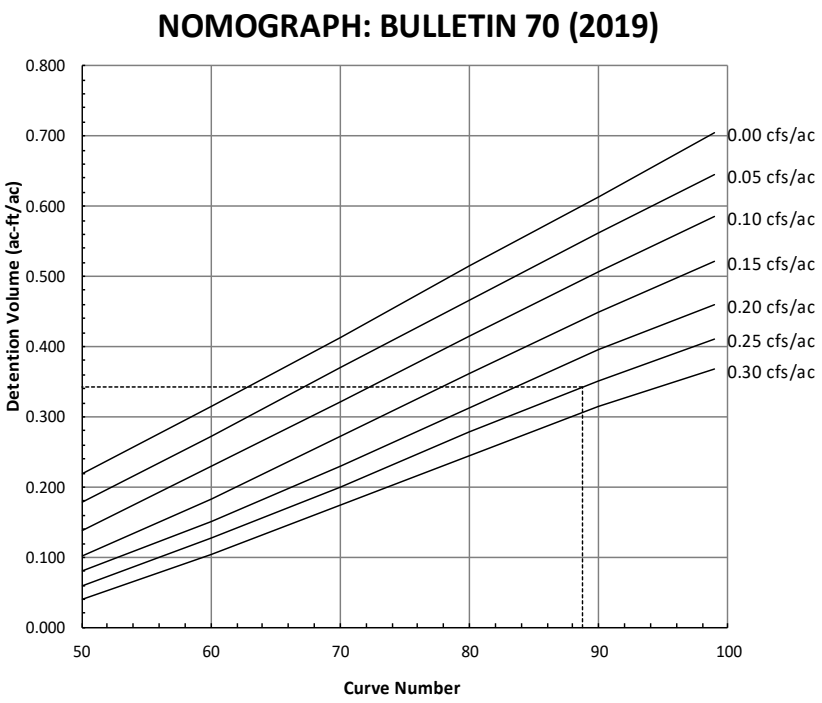
DEVELOPMENT INFORMATION

1. Detained Area	3.000	acres
2. Curve Number	88.77	
3. Actual Release Rate	0.750	cfs

REQUIRED DETENTION VOLUME

4. Required Detention Volume	1.027	ac-ft

NOMOGRAPH



Article 5 – Detention

Methodology: Hydrologic Model

- No major changes
- Types:
  - HEC-HMS (used for District reviews)
  - HEC-1
  - TR-20
  - Other equivalent model
- Must be used when:
  - Development > 20 acres
  - Depressional Storage
  - Tailwater conditions (BFE, ponds in series)

Article 5 – Offsite Detention

Site Limitation (added to TGM)

- Prevent use of onsite detention facilities
- Types:
  - Floodway
  - Shallow Bedrock
  - Extreme topography
  - Existing, fully-developed property without at-grade or underground space
- Submit supporting documentation
- Development must comply with runoff and volume control requirements
- Development may explore offsite detention

Article 5 – Offsite Detention

Exploration of offsite detention facilities

- Within same watershed planning area
- Contact District/local municipality for inventory
- Offsite facilities requires WMO permit
- Capture equivalent runoff volume

Article 5 – Offsite Detention

Offsite detention facilities

- Trade with developments containing site limitations
  - The offsite detention facility (supply site) must obtain a WMO Permit and provide detention for an area that does not require detention
  - The offsite detention facility (supply site) and development (demand site) must provide a copy of the perpetual maintenance agreement and the quantity traded runoff volume
  - Supply Site must perpetually provide detention for traded runoff volume
  - If the traded area is developed in the future, the runoff volume from that area can no longer be traded
    - Detention must be provided for the original supply site; or
    - A new supply site must be utilized

Article 5 – Offsite Detention Example

Hydrologic Equivalent Trading using Runoff Volumes

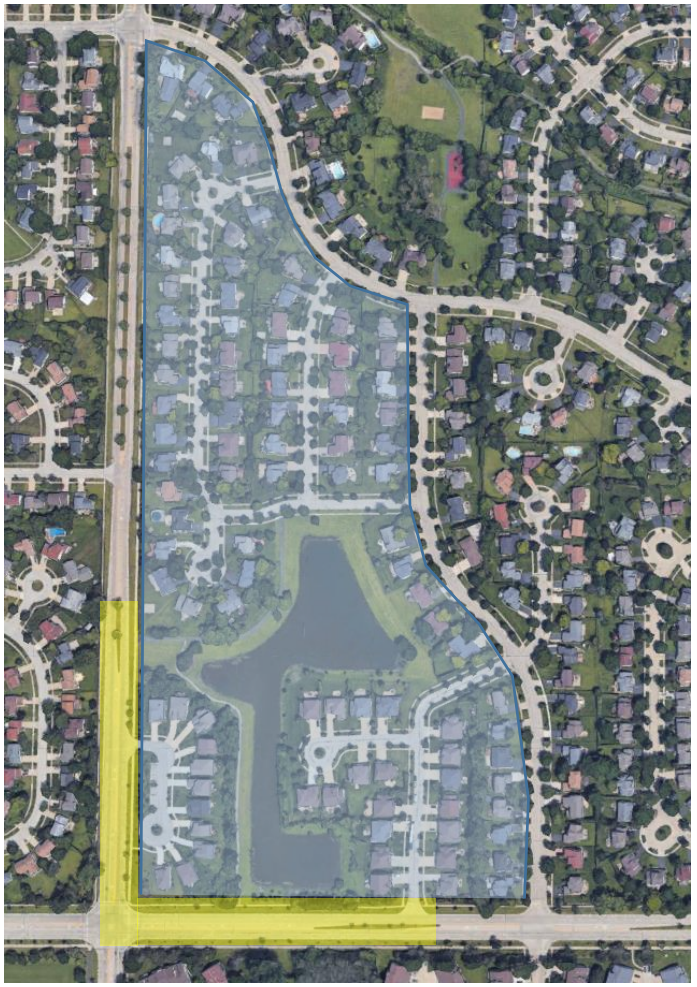
Use NRCS equation to calculate runoff volume (V_R):

$$V_R = \frac{(P - 0.2S)^2}{P + 0.8S}(Area)\left(\frac{1}{12\frac{in}{ft}}\right)$$

$$S = \frac{1000}{CN} - 10; \quad P = 8.57\ inch\ (UB70)$$

- Existing development previously permitted under the WMO (blue highlight)
- ROW (yellow highlight) rerouted to be detained within the detention facility (A = 2.95 acre, CN=98)

$$V_R = 2.05\ ac\text{-}ft$$



Article 5 – Offsite Detention Example

Development with Site Limitation

- Development with extreme topography prevents the use of onsite detention and will utilize an offsite detention facility
- Use NRCS equation to calculate the runoff volume (V_R) produced by the development (1.4 acre, CN=91) with Updated Bulletin 70 rainfall data

$$V_R = \frac{(P - 0.2S)^2}{P + 0.8S}(Area)\left(\frac{1}{12\frac{in}{ft}}\right)$$

$$S = \frac{1000}{CN} - 10; \quad P = 8.57\ inch\ (UB70)$$

$$V_R = 0.87\ ac\text{-}ft$$

	Runoff Volume
Supply Available from ROW	2.05 ac-ft
Demand from Development	0.87 ac-ft
Remaining supply available for trading	1.18 ac-ft

Article 5 – Offsite Detention

Schedule D: Detention (Supply site)

- Added item: indicate whether the detention facility is designed as an offsite detention facility

Q. Designed as an offsite detention facility:
☐ No ☐ Yes → Runoff volume tributary to facility ..... _____ ac-ft

Schedule D: Offsite Detention (Demand site)

4. OFFSITE DETENTION REQUIREMENTS: This item is only applicable when the development utilizes an offsite detention facility to comply with the detention requirements.

A. Site limitation(s) that precludes the use of an onsite detention facility *(submit justification)*:
☐ Floodway ☐ Shallow Bedrock ☐ Other: _____

B. Area requiring detention ..... *CN* _____ , _____ acres

C. Runoff volume from area to be detained offsite ..... _____ ac-ft

D. WMO Permit Number for offsite detention facility ..... _____

Article 5 – Redevelopment

Current method:

- Compare proposed and existing impervious areas
- Marginal increase of storage volume 0.10 ac-ft or 2%

New method (Effective January 1, 2020):

- Additional detention volume may be required regardless of the net change to impervious area due to:
  - Updated Bulletin 70 rainfall data
  - Watershed specific release rates
- Incremental detention volume must be provided for the redevelopment area based on the difference between:
  - Pro-rated existing detention volume
  - Required detention volume for redeveloped area

Article 5 – Redevelopment

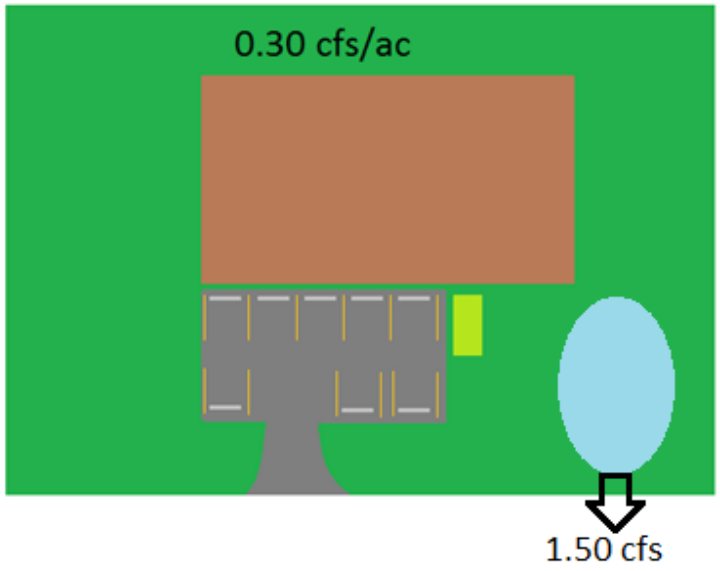
New method - continued

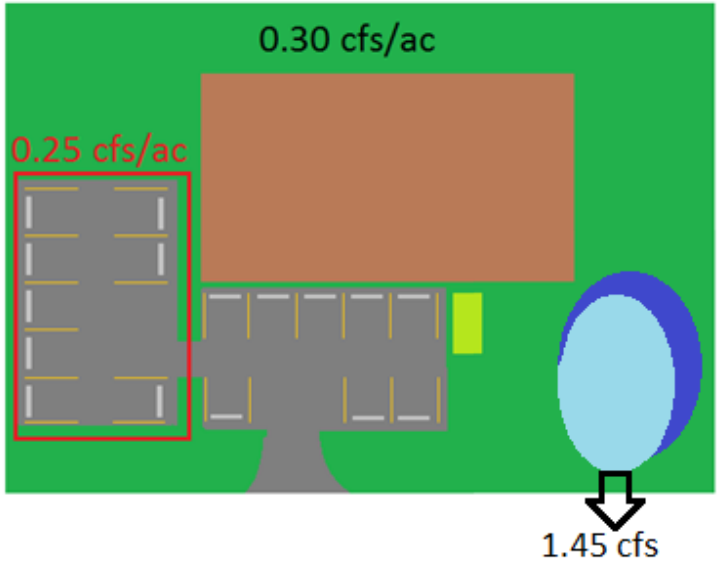
- Use either nomograph or model to determine required detention volume based on method used under approved permit (examples in TGM)
- Control structure updated at milestones
  - At 40%, 80%, and 100% redevelopment of detained area
  - Any individual redevelopment that is 25%
- Verification of existing facilities:
  - Control structure must be verified with each redevelopment
  - Detention volume must be verified and based on information no greater than 5 years

Article 5 – Redevelopment

Example

- Calculate existing required volume based on the approved:
  - Rainfall data, release rate, runoff C or CN
- Calculate required volume for redevelopment based on:
  - Updated Bulletin 70, watershed specific release rate, proposed C or CN
- Provide incremental detention volume for redevelopment area only





Article 5 – Redevelopment

Schedule D-Legacy Revised:

- Runoff and Volume Control sections same as Schedule D
- Redevelopment sections revised:
  - Redevelopment information (watershed specific release rate, percentage redevelopment for control structure modification)
  - Permitted detention facility information
  - Unpermitted detention facility information (SPO methodology)
  - Composite release rate for the detention service area
  - Redevelopment tributary to an SPO detention facility
  - Redevelopment tributary to a WMO detention facility (individual items for modeled or nomograph methodology)

Article 5 – Calculators

New/Revised Design Calculators

- Time of Concentration
- Composite C and CN
- Adjusted CN
- Nomograph
- Modified Rational Method (redevelopment of SPO detention)
- Runoff Volume (detention trading)
- Detention volume provided
- Control structure (restrictors)

Article 7 – Sewer Construction

Permit required for Qualified Sewer construction

- Sanitary sewer
- Combined sewer
- Storm sewer in combined sewer areas or tributary to District
- Sewer replacement and lining
- Direct connection to District Facilities (including Chicago)
- Outfalls to waterway or Lake Michigan

Article 7 – Sewer Construction

Permit is not required for non-qualified sewer

- Single family home service sewer (no public sewer extension)
- Plumbing internal to building
- Storm sewer tributary to waterway in SSA
- Septic systems not tributary to District
- Footing drains protecting building foundations
- Underdrains associated with green infrastructure
- Maintenance and inspection of sewers including grouting, jetting, and root treatment

Article 7 – Sewer Construction

New Requirements

- Qualified sewer must discharge into a system which has an outlet and does not promote septic conditions
- Bypass systems for sewer construction
  - Sized for full sewer capacity
  - Not installed or discharge into an waterway, storm sewer, or flood protection area
- Stream crossings must provide adequate cover
- Where public sewers are unavailable, private-to-private sewer connections allowed and must submit a recorded maintenance agreement

Article 6 – Flood Protection Areas

- Deleted "regulatory" relating to general floodplains and floodways – *Regulatory floodplains and floodways are delineated by FEMA, but do not include all areas that may be considered floodplains and/or floodways. The term "regulatory" remains when referencing a FEMA defined floodplain or floodway.*

- Deleted "substantial improvement" language – *Regulated by local NFIP municipality and causes conflict, since WMO does not regulate inside buildings*

Article 6 – Flood Protection Areas

- Defined foundation expansion is defined to remain consistent with NFIP without regulating building interiors
  - *Either 20% or 2,500 s.f.*
  - *Only non-residential building can be floodproofed*

- LOMR requirements: *If needed from FEMA, required before RFI rather than "building construction"*

❖ *Cook County and Municipalities must maintain separate NFIP compliant ordinance*

Administrative Procedural Rules

- Articles changed to reflect adopted procedural rules
  - *Article 8 - Infiltration/Inflow Control Program*
  - *Article 11 - Variances*
  - *Article 12 – Prohibited Acts, Enforcement, and Penalties*
  - *Article 13 - Appeals*

Article 14 - Administration

Authorized Municipality Program

- New *"conflict of interest" provision* – *Ensures the engineer reviewing the permit application does not have a conflict of interest with the design engineer*

Appendix F

Permit Fees

- *Fees did not change but the table has been clarified*

Section 319 Grant Program

IEPA's Section 319

Water Pollution Control Grant Program

- *Projects that prevent or address stormwater-related water quality issues*
- *10-20 grants per year $80-$150K*
- *Newly approved Watershed Plans*
  - ✓ *Little Calumet River*
  - ✓ *Cal-Sag Channel*
  - ✓ *Lower Des Plaines River (within Cook County)*
  - ✓ *Poplar Creek*
- *Search "Illinois EPA nonpoint grants"*

Thank You

mwrd.org/wmo

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