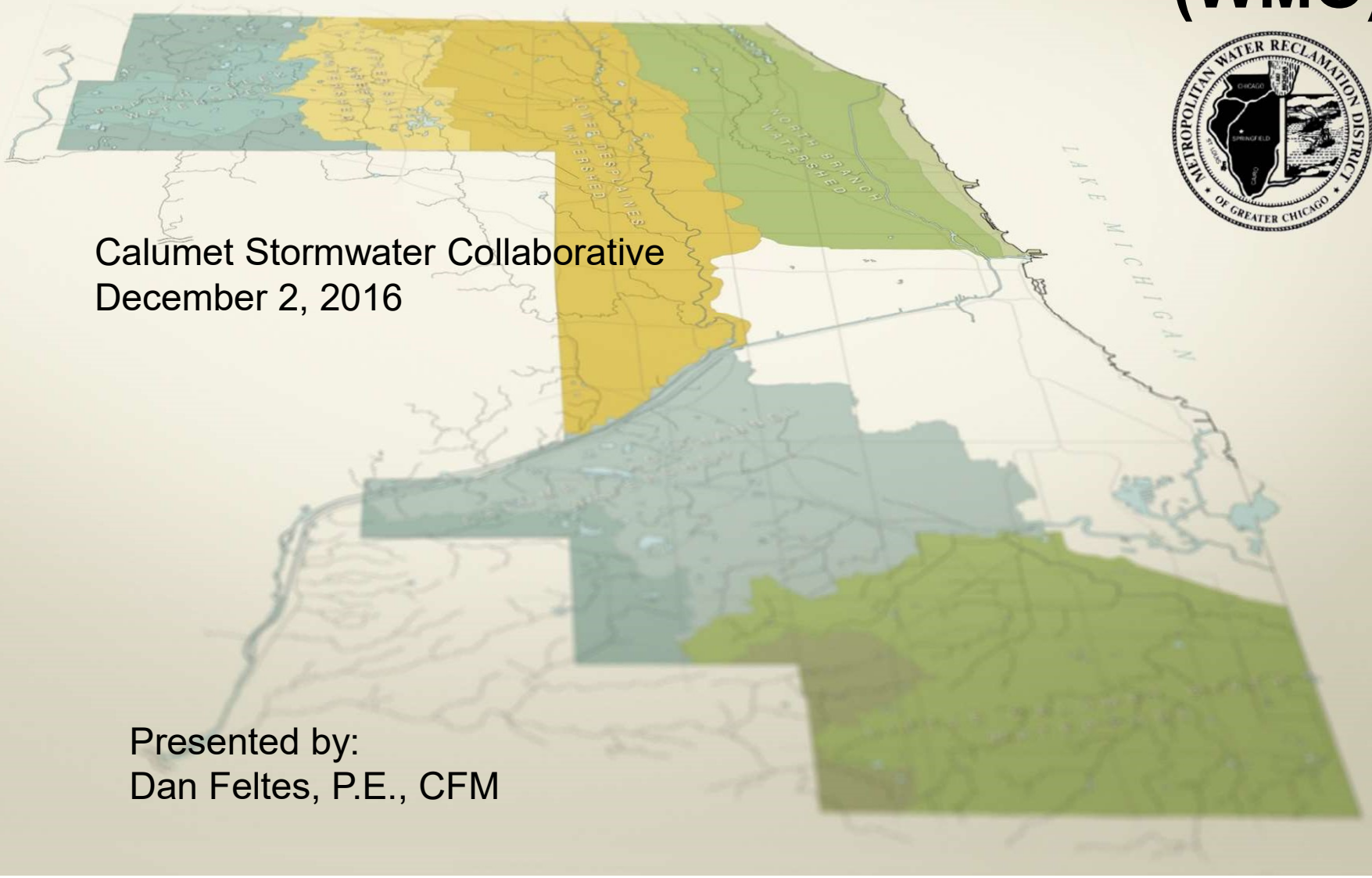
Update on the Watershed Management Ordinance (WMO)



Calumet Stormwater Collaborative
December 2, 2016

Presented by:
Dan Feltes, P.E., CFM

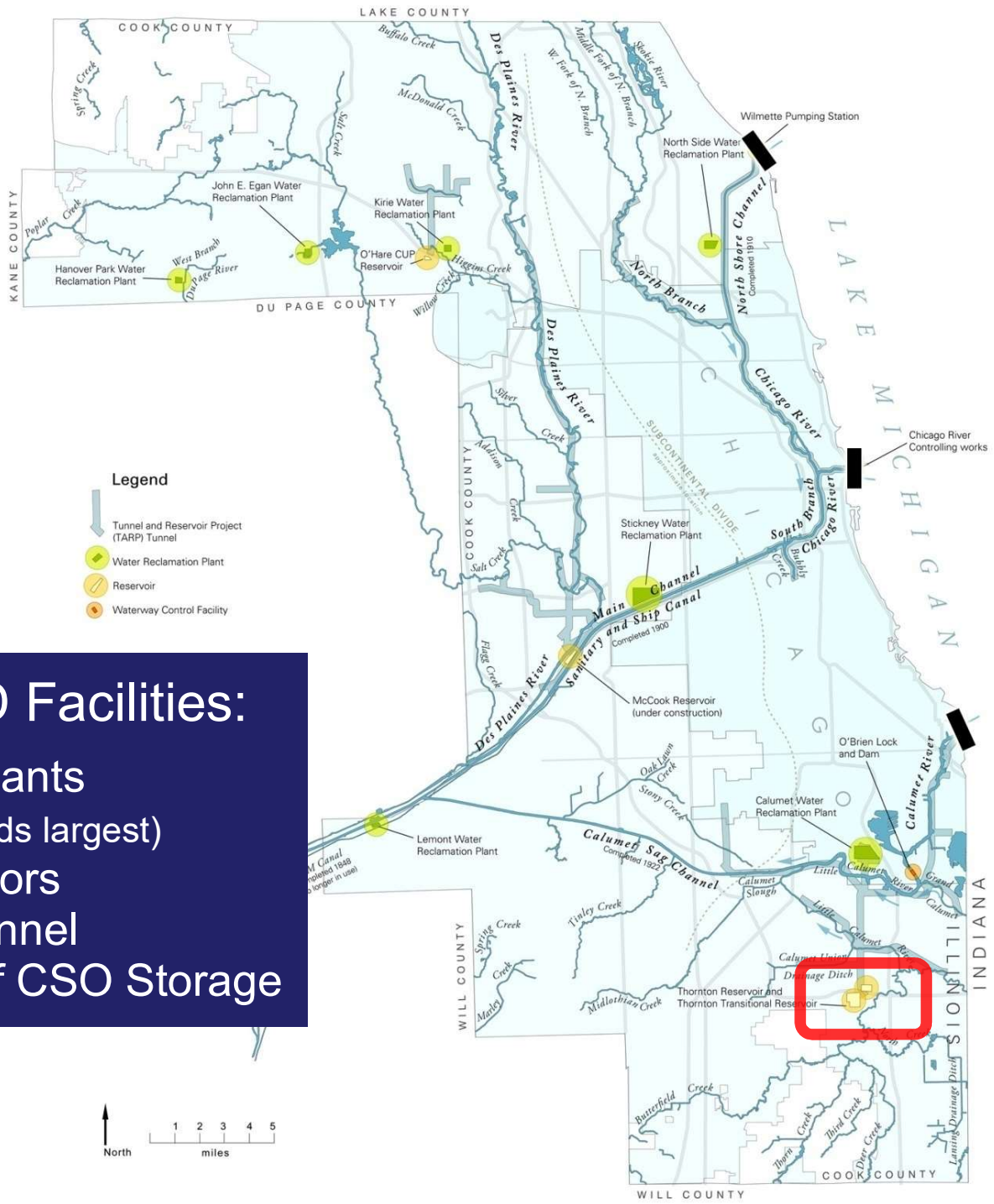
MWRD - WMO
Presentation Agenda

- Brief Background
- Volume Control Compliance
- Permit Review Time
- Importance of Floodplain and “Runoff” Review
- WMO Results and amount of Volume Control
- WMO Draft Amendment
- Questions

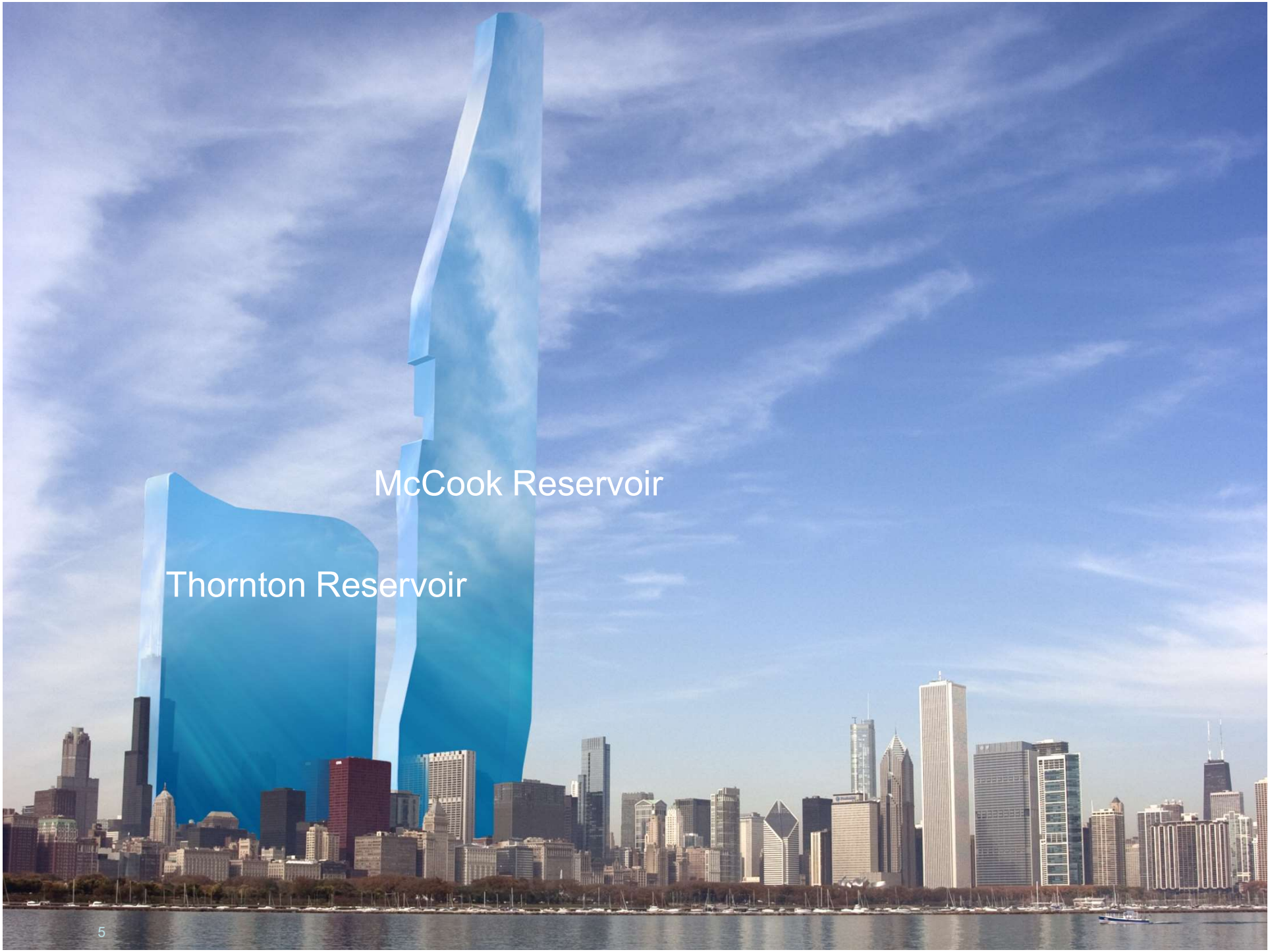
MWRD (District) Background

Summary of MWRD Facilities:

7 Water Reclamation Plants
(including one of the worlds largest)
~ 554 Miles of Interceptors
~ 109 Miles of Deep Tunnel
~ 10.6 Billion Gallons of CSO Storage



Thornton Composite Reservoir


McCook Reservoir
Thornton Reservoir

WMO Objective

Establish uniform, minimum, and comprehensive countywide stormwater management regulations

Enabling Legislation
Watershed Management Ordinance

"Stormwater management in Cook County shall be under the general supervision of the Metropolitan Water Reclamation District of Greater Chicago."

"The District may prescribe by ordinance reasonable rules and regulations for floodplain and stormwater management . . . in Cook County."

Public Act 093-1049

Sewer Permit Ordinance

- Sanitary Sewers
- Stormwater Detention
  - TP-40 Rainfall Data
  - Modified Rational Method
- Inflow and Infiltration (I/I)

Watershed Management Ordinance

- Sanitary Sewers
- Stormwater Detention
  - Bulletin-70 Rainfall Data
  - Flat Release Rate
  - Hydrograph Method
- Volume Control
- Erosion & Sediment
- Flood Protection Areas
  - Floodplain
  - Floodway
  - Isolated Wetlands
  - Riparian Areas
- Inflow and Infiltration (I/I)

Permit Applicability

Table 2.
Summary of Site Stormwater Management Requirements[1]

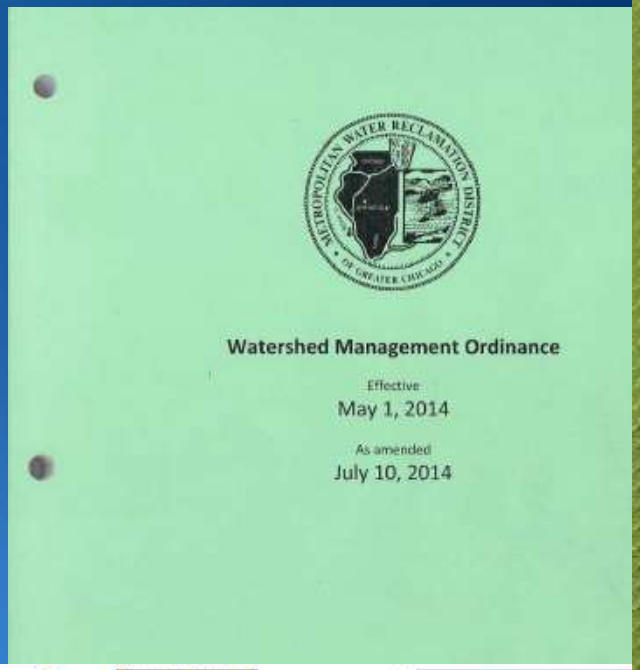
Development Type (See Appendix A for definitions)	§502 Runoff Requirements	§503 Volume Control Requirements[2]	§504 Detention Requirements[2]
Single-Family Home	Exempt	Exempt	Exempt
Residential Subdivision	**Parcels** ≥ 1 acre	**Parcels** ≥ 1 acre	**Parcels** ≥ 5 acres
Multi-Family Residential	**Parcels** ≥ 0.5 acre	**Parcels** ≥ 0.5 acre	**Parcels** ≥ 3 acres ‡
Non-Residential	**Parcels** ≥ 0.5 acre	**Parcels** ≥ 0.5 acre	**Parcels** ≥ 3 acres ‡
Right-of-Way	**New Impervious Area** ≥ 1 acre	**New Impervious Area** ≥ 1 acre †	**New Impervious Area** ≥ 1 acre †
Open Space	**Parcels** ≥ 0.5 acre	Not Applicable	Not Applicable

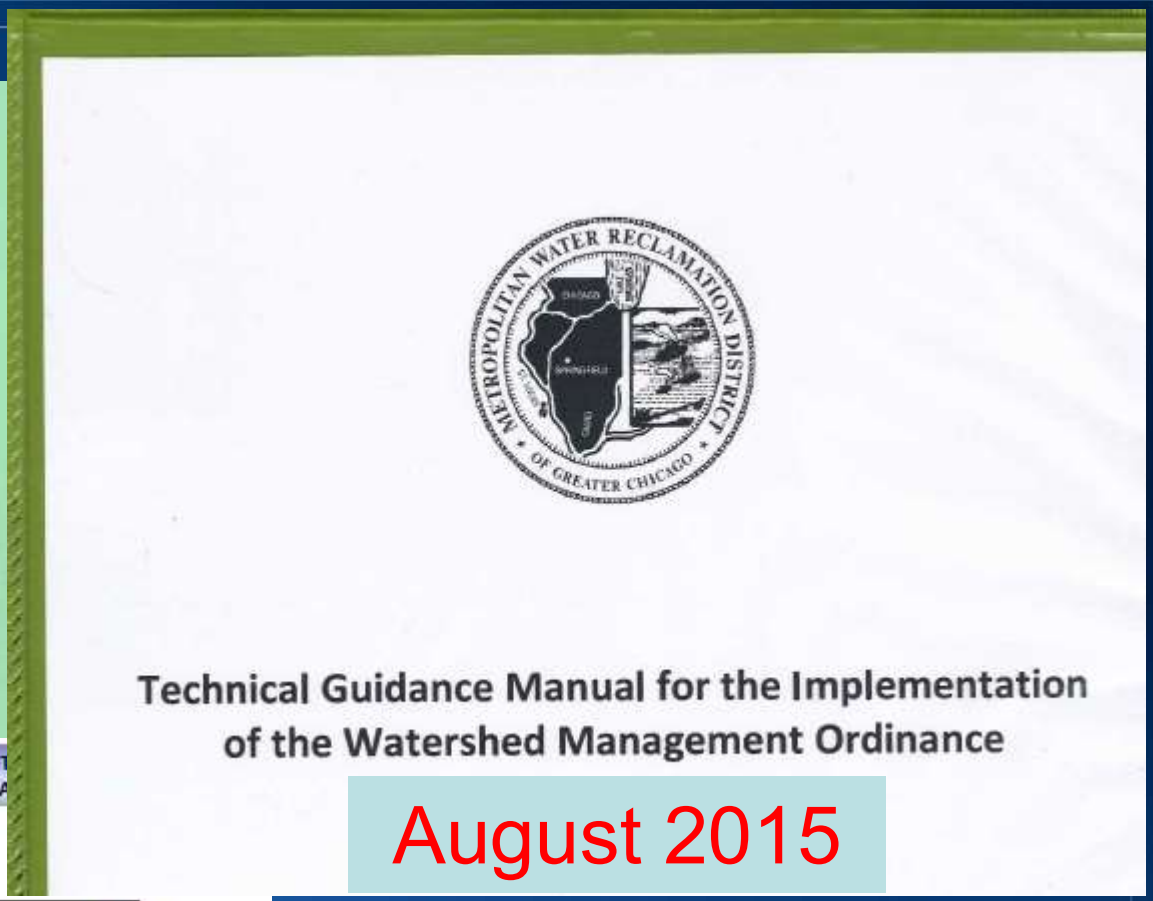
1 **Site stormwater** management requirements are not required for **maintenance activities** as defined in Appendix A.

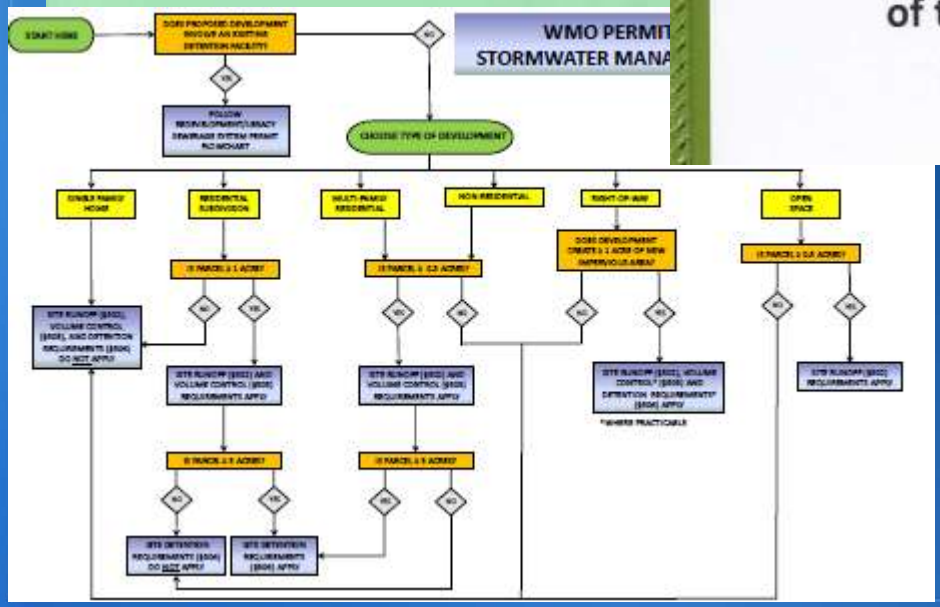
2 Requirements are applicable when a **Watershed Management Permit** is required under §201 of this **Ordinance.**

† Where practicable.

‡ Starting the effective date of this **Ordinance,** any new **development** on the **parcel** that totals either individually or in the aggregate to more than one-half (0.5) of an acre.







August 2015

- Ordinance
- Technical Guidance Manual
- Permit Forms
- Flow Charts
- Checklists

Examples of GI (from EPA)

- Bioswales

Source: *Geosyntech ,Aaron Volkening*

Permeable Pavements

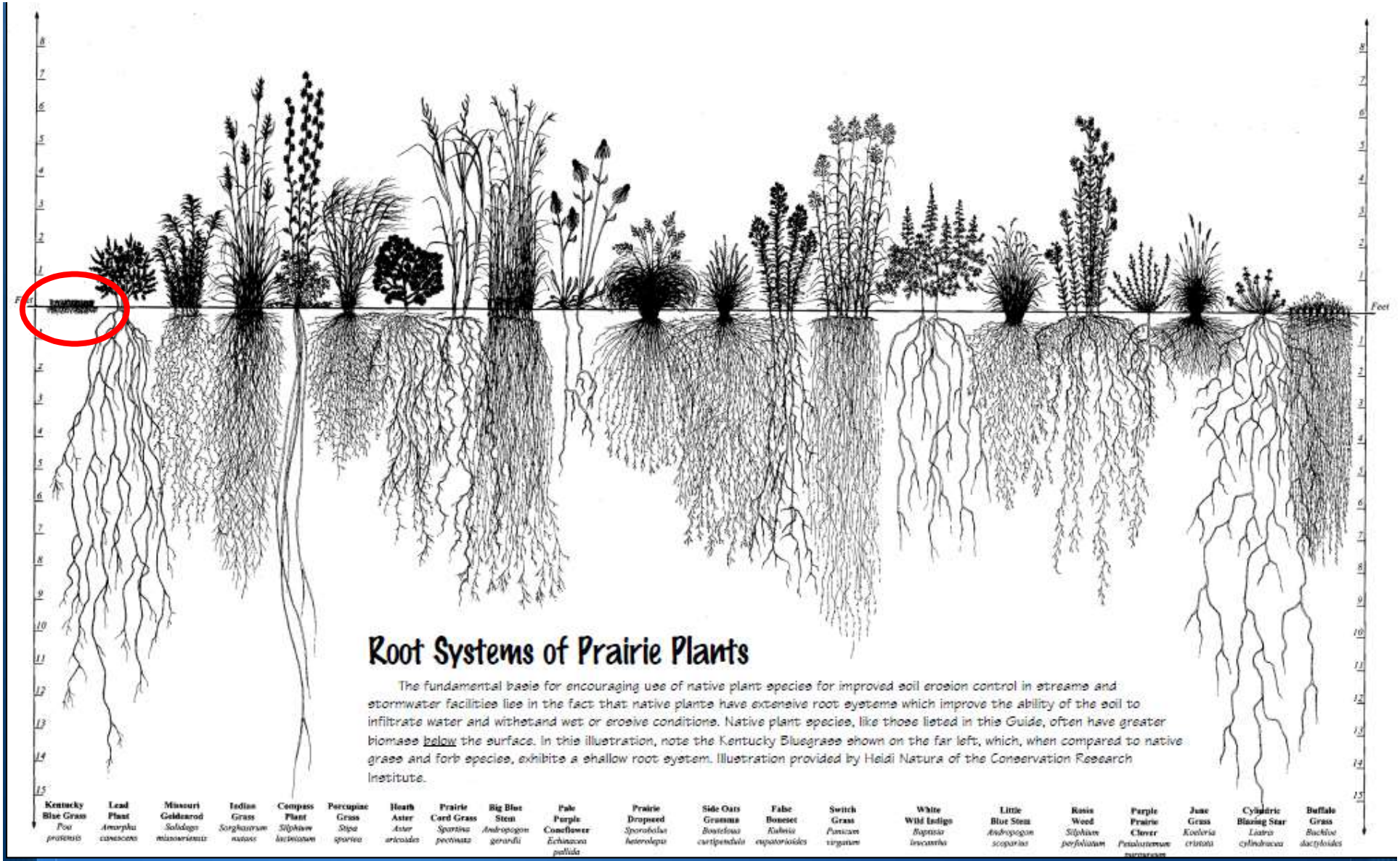
Source: *MWRD, JRW*

- Green Roofs

Source: City of Chicago

Water Harvesting

Source: Aditya Rainwater Harvesters



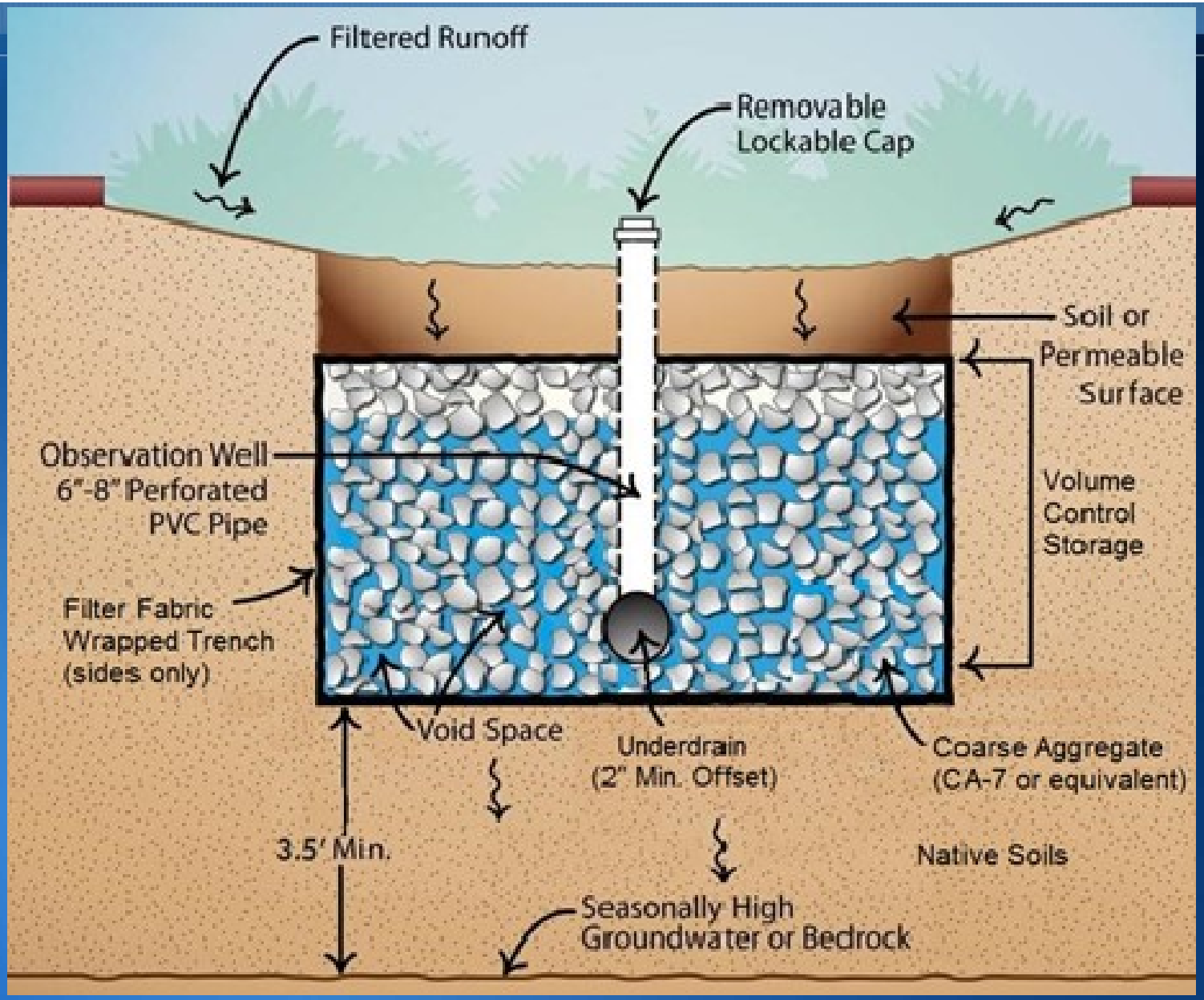
Root Systems:
Turf Grass vs Deep Rooted Vegetation

WMO Volume Control Summary

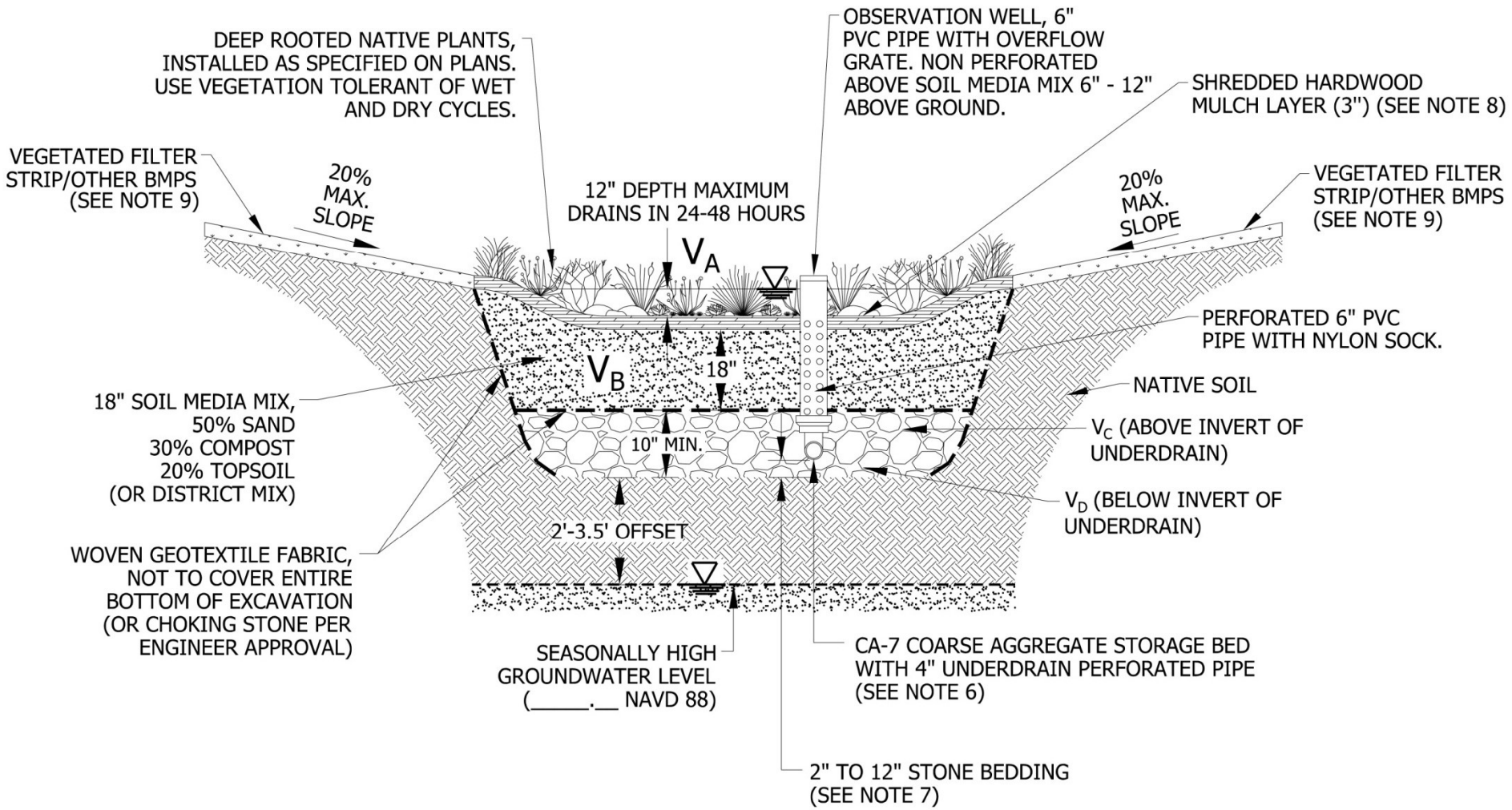
- One inch of volume over total proposed impervious area
- Can be provided in several ways:
  - Infiltration Trenches
  - Infiltration Basins
  - Porous Pavement (storage in the voids below the pavement)
  - Bio-Retention Systems
  - Dry Wells
  - Cisterns
  - Open Channel Practices Fitted With Check Dams
  - Storage Below the Outlet of a Site Detention Facility
- Credit toward required detention volume (CN reduction)

WMO Volume Control Summary

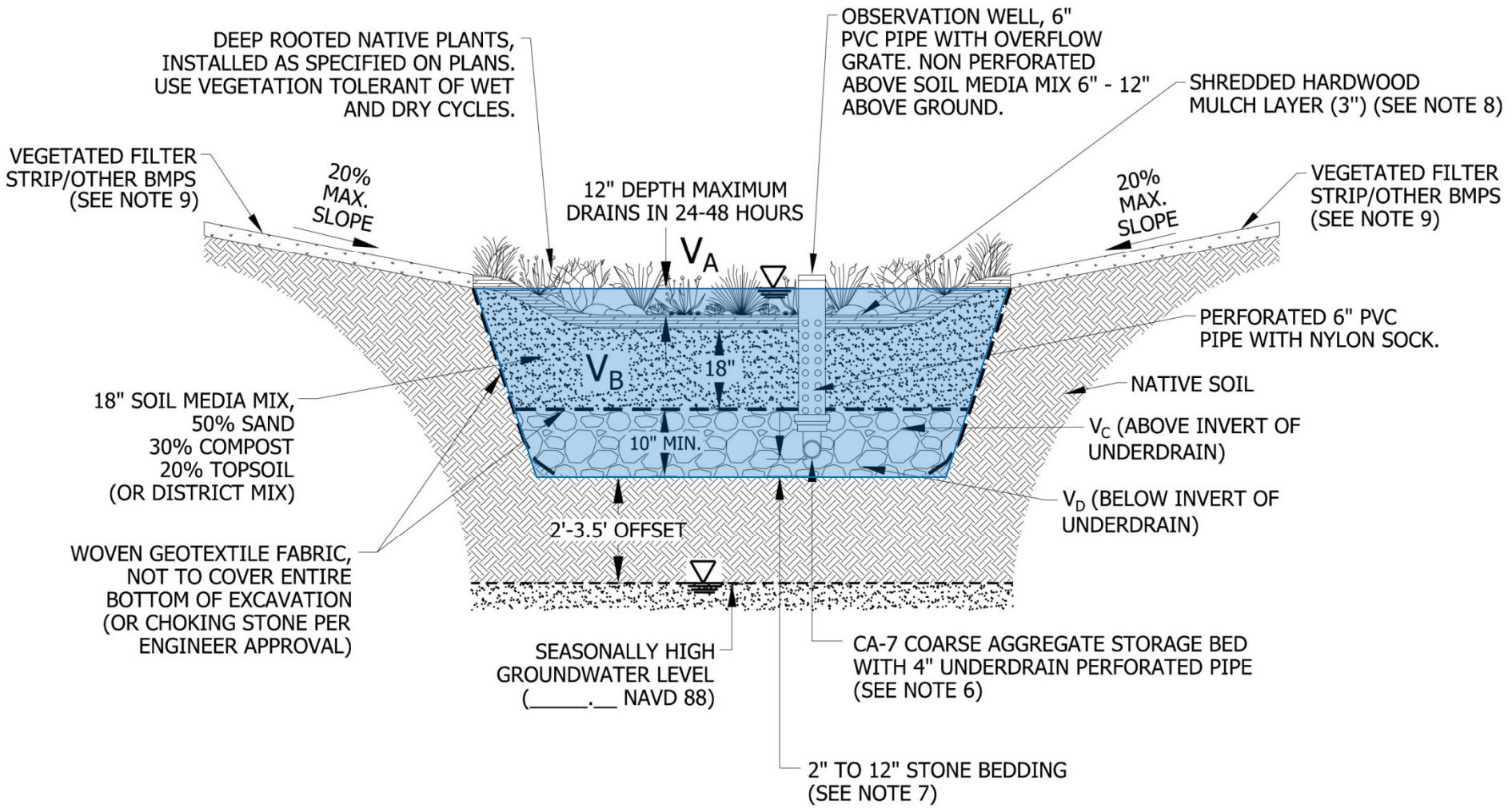
- When providing storage in void space of aggregate, stone must be angular cut and cleaned/washed free of fines. Different aggregate sizes are acceptable
- Underdrains are required, and must be offset at least 2” above bottom of volume control storage
- Bottom of storage must be above groundwater level
  - 2 feet in separate sewer areas
  - 3.5 ft in combined sewer areas
  - Highest seasonal groundwater level established through soil borings
- One monitoring well per 40,000 ft^2 of area



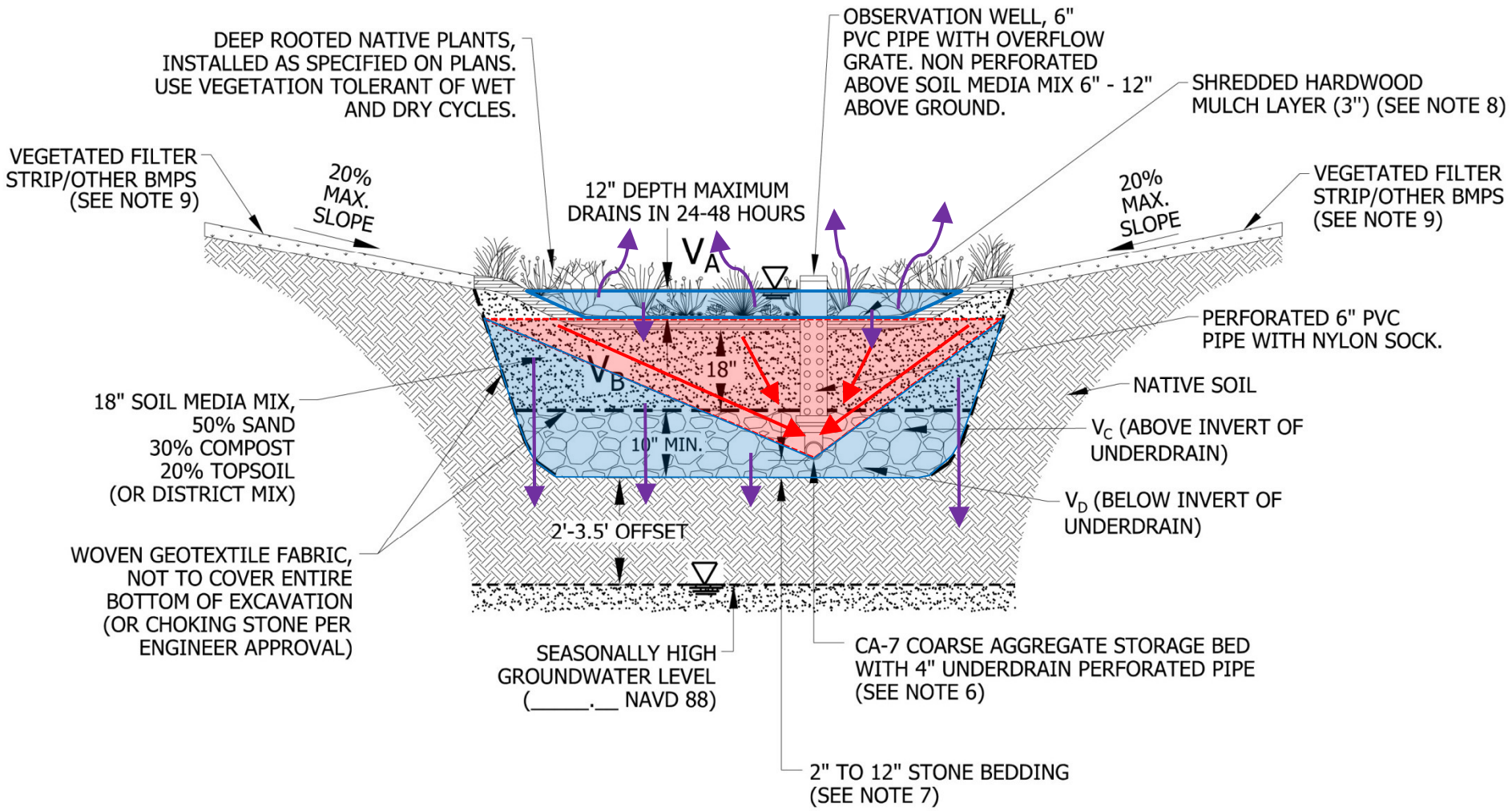
Cross Section - Typical Volume Control System



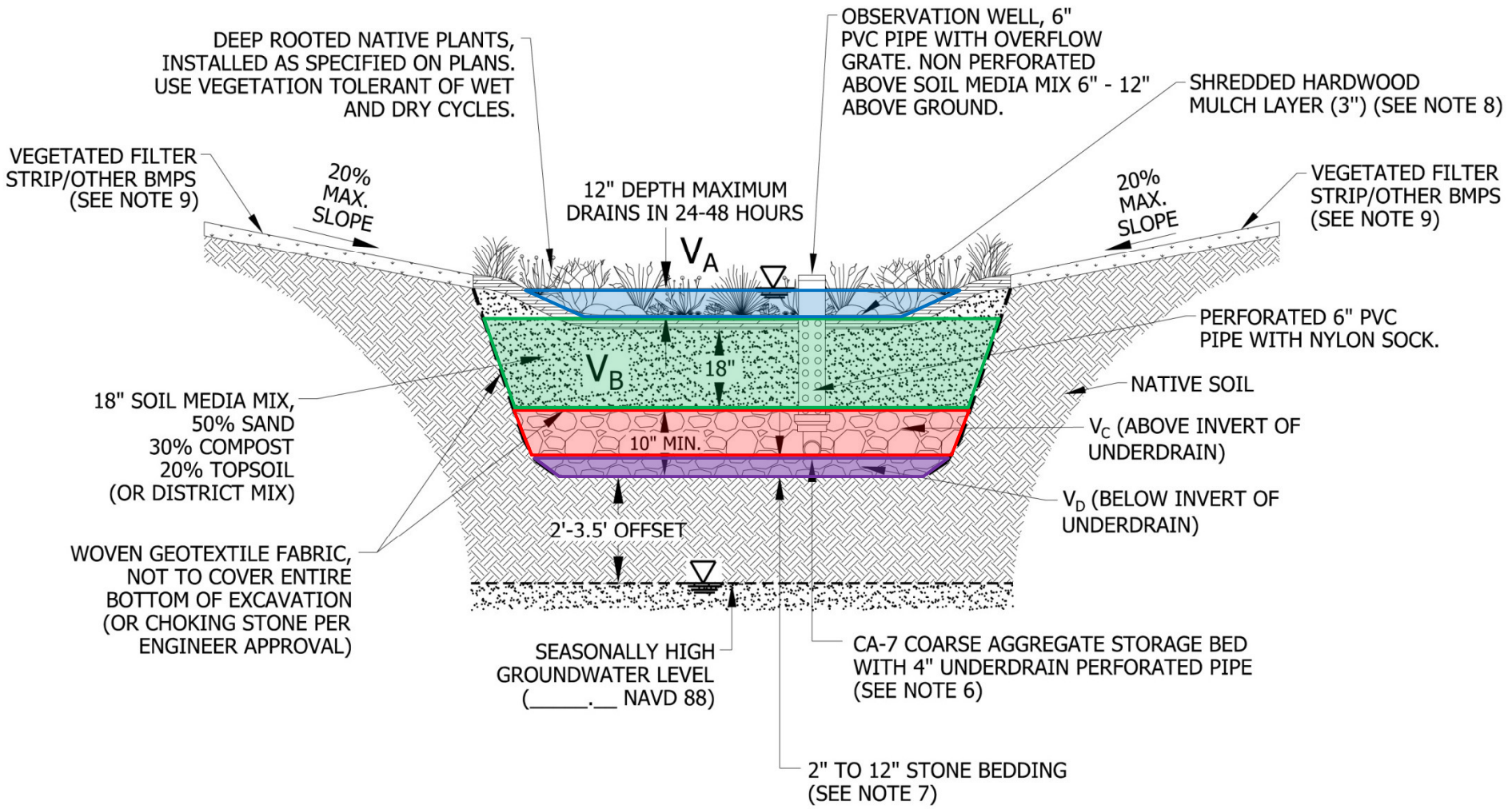
VOLUME TYPE	POROSITY	MEDIA VOLUME	STORAGE VOLUME	VOLUME PROVIDED
SURFACE STORAGE	1.00	V_A	1.00 x V_A	
SOIL MEDIA MIX	0.25	V_B	0.5 x 0.25 x V_B	
COARSE AGG. (ABOVE INVERT)	0.36	V_C	0.5 x 0.36 x V_C	
COARSE AGG. (BELOW INVERT)	0.36	V_D	0.36 x V_D	
			TOTAL	



VOLUME TYPE	POROSITY	MEDIA VOLUME	STORAGE VOLUME	VOLUME PROVIDED
SURFACE STORAGE	1.00	V_A	1.00 x V_A	
SOIL MEDIA MIX	0.25	V_B	0.5 x 0.25 x V_B	
COARSE AGG. (ABOVE INVERT)	0.36	V_C	0.5 x 0.36 x V_C	
COARSE AGG. (BELOW INVERT)	0.36	V_D	0.36 x V_D	
			TOTAL	



VOLUME TYPE	POROSITY	MEDIA VOLUME	STORAGE VOLUME	VOLUME PROVIDED
SURFACE STORAGE	1.00	V_A	1.00 x V_A	
SOIL MEDIA MIX	0.25	V_B	0.5 x 0.25 x V_B	
COARSE AGG. (ABOVE INVERT)	0.36	V_C	0.5 x 0.36 x V_C	
COARSE AGG. (BELOW INVERT)	0.36	V_D	0.36 x V_D	
			TOTAL	



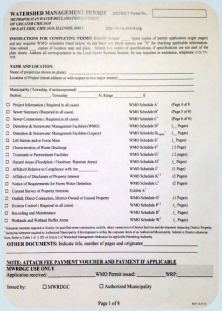
VOLUME TYPE	POROSITY	MEDIA VOLUME	STORAGE VOLUME	VOLUME PROVIDED
SURFACE STORAGE	1.00	V_A	1.00 x V_A	
SOIL MEDIA MIX	0.25	V_B	0.5 x 0.25 x V_B	
COARSE AGG. (ABOVE INVERT)	0.36	V_C	0.5 x 0.36 x V_C	
COARSE AGG. (BELOW INVERT)	0.36	V_D	0.36 x V_D	
			TOTAL	

Permit Review Time

- **Per Ordinance** § 1401:2
  - 15 working days outside FPA
  - 30 working days inside FPA
  - 10 working days for resubmittal
- **3 year approved permit life**
  - 1 year to start construction
  - Extensions to construction start may be granted upon request
  - 3 years total to finish
- **Stagnant permits now canceled quarterly**
  - Applications cannot remain open indefinitely
  - 90 days no resubmittal = 30 day deadline to respond with schedule
  - MWRD is reasonable, but be certain to respond in a letter

When to Apply

Early coordination needed with new regulations



Design Project

Apply for MWRD Permit

Obtain Permit

Mobilize
- MWRD Erosion Inspection

Sewer Work
- MWRD Inspect

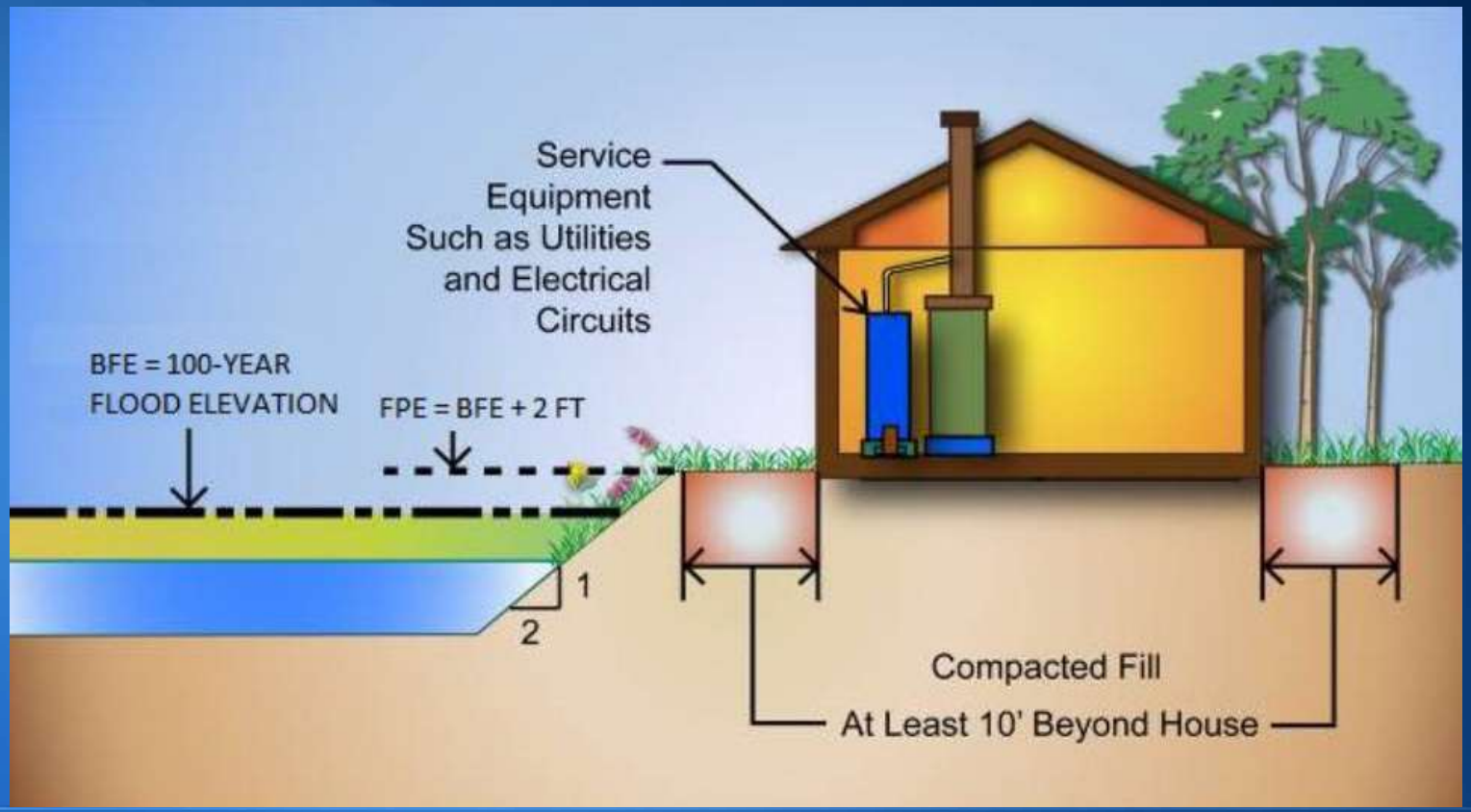
Substantial Completion
- MWRD Inspect

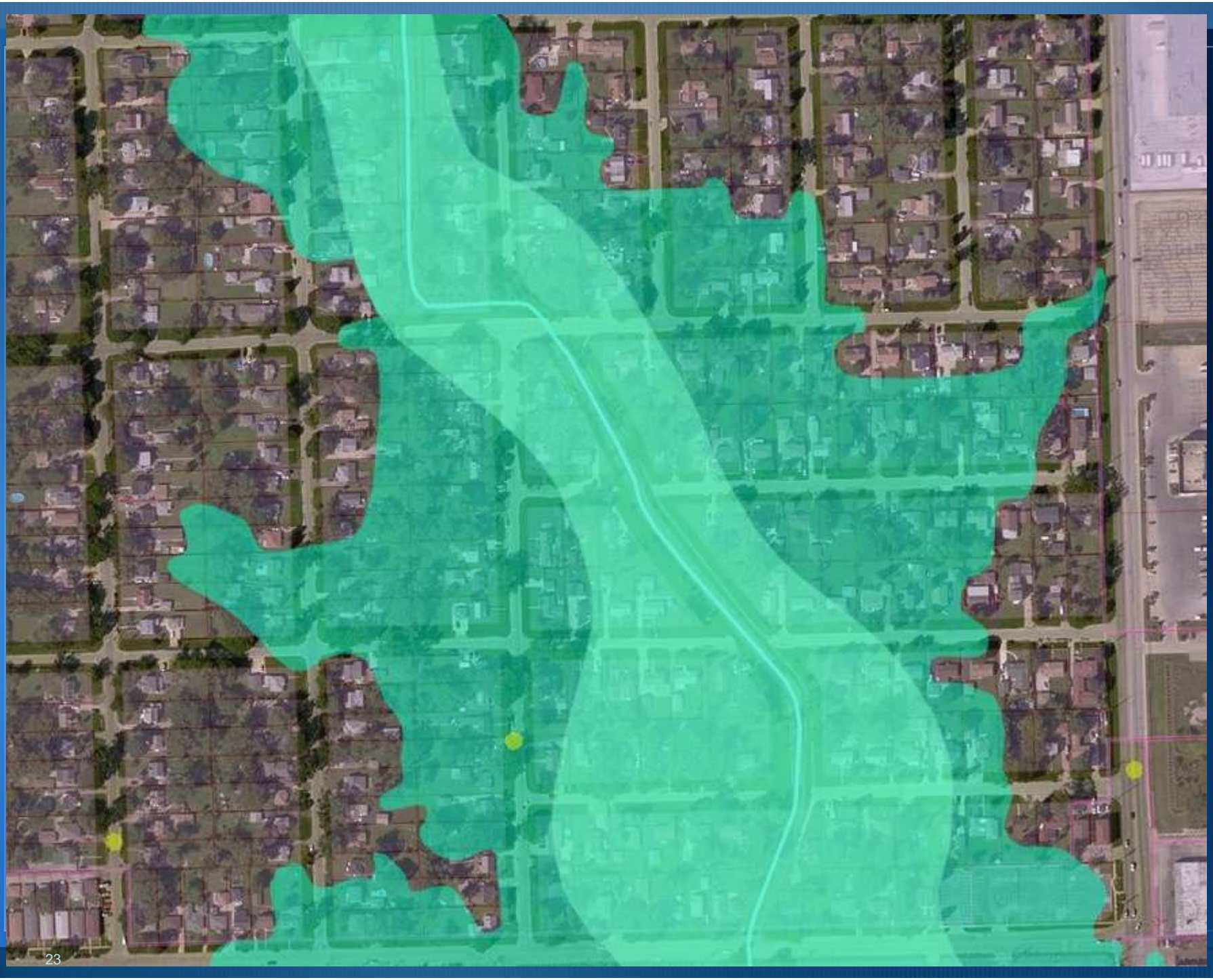
Occupancy

$$

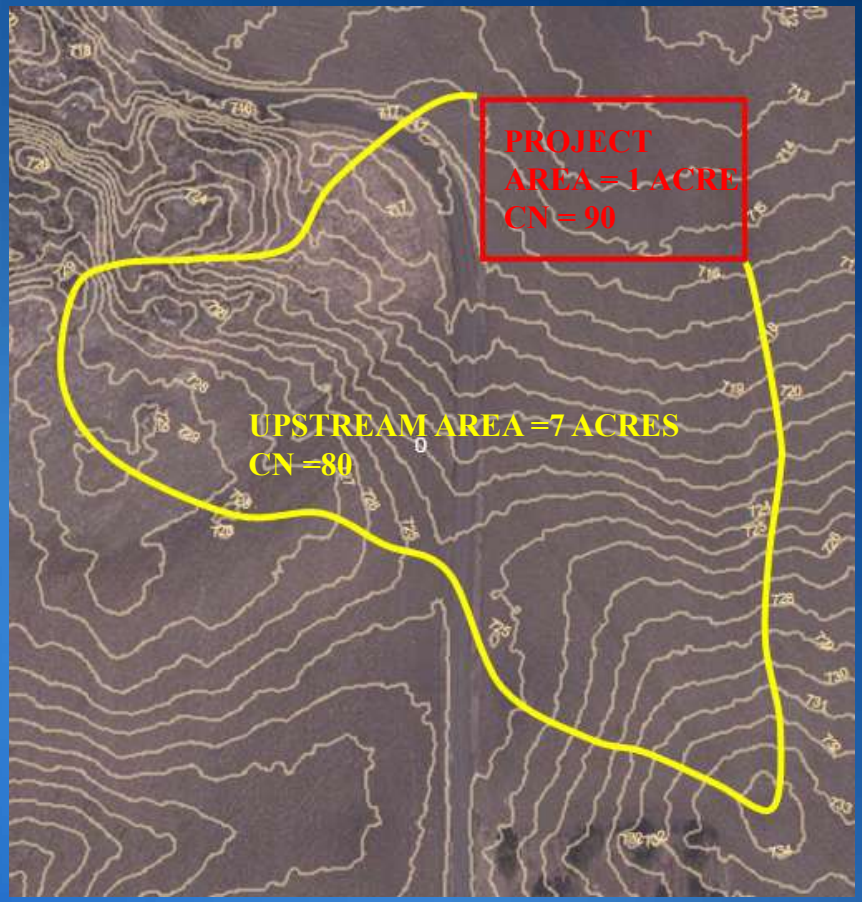
Floodplain

- **Flood Protection Elevation**
  - FPE = BFE + 2 feet





Runoff Requirements



A. DEVELOPMENT INFORMATION

1) Total parcel area: 1 acres
2) Total development area on the parcel: 1 acres

B. SITE RUNOFF REQUIREMENTS

1) On-site development area tributary to overland conveyance system: 1 acres
2) Upstream off-site tributary drainage area: 7 acres
3) Total tributary drainage area to conveyance system *(B.1 + B.2)*: 8 acres
   A. Ratio of upstream tributary area to on-site development area: 7:1
   B. Composite CN for total tributary area: 81.25
   C. Time of concentration for total tributary area: 30 minutes
4) Design 100-year peak flowrate for total tributary area: ..... 37.8 cfs
5) Overland conveyance capacity (actual flowrate provided): ..... 38.73 cfs
6) Describe overland conveyance system type/location: Depressed curb
   (including pond overflow weir)
   Weir length: 20 ft Weir crest HGL elevation: 712.57 ft (NAVD88)
   Weir elev: 712.00 ft (NAVD88) Lowest structure entry elev: 715.00 ft (NAVD88)
   Other (describe):

Revised Schedule D

- **Site Runoff**
  - Replaces Upstream and Bypass
  - Includes weir information (emergency overflow for entire site)
  - Moved to the top of the form
- **Volume Control**
  - Requires explanation for site constraints
  - Describe type of volume control
- **Detention**
  - Open-ended detention facility type
  - Start with unrestricted area and types
  - Calculate release rate reduction to find MWRD require release rate
  - Volume calculation unchanged
  - Move weir information under Site Runoff
  - Add drawdown time (hours)

Watershed Management Permit No. _____

WMO SCHEDULE D
WATERSHED MANAGEMENT FACILITIES

Name of Project: _____

(Submit additional Schedule D for each stormwater facility, as needed)

A. DEVELOPMENT INFORMATION

1) Total parcel area: _____ acres
2) Total development area on the parcel: _____ acres

B. SITE RUNOFF REQUIREMENTS

1) On-site development area tributary to overland conveyance system: _____ acres
2) Upstream off-site tributary drainage area: _____ acres
3) Total tributary drainage area to conveyance system *(B.1 + B.2)*: _____ acres
   A. Ratio of upstream tributary area to on-site development area: _____
   B. Composite CN for total tributary area: _____
   C. Time of concentration for total tributary area: _____ minutes
4) Design 100-year peak flowrate for total tributary area: ..... _____ cfs
5) Overland conveyance capacity (actual flowrate provided): ..... _____ cfs
6) Describe overland conveyance system type/location: _____
   (including pond overflow weir)
   Weir length: _____ ft Weir crest HGL elevation: _____ ft (NAVD88)
   Weir elev: _____ ft (NAVD88) Lowest structure entry elev: _____ ft (NAVD88)
   Other (describe): _____

C. SITE VOLUME CONTROL (VC) REQUIREMENTS

1) Existing impervious area of development: _____ acres
2) Proposed impervious area of development: _____ acres
3) Gross VC storage required *(0.083 x Line C.2)*: _____ ac-ft
4) Site constraints preclude the use of retention-based practices in full? ☐ Yes ☐ No
   If yes, provide a brief rationale: _____
   In lieu of complete volume control, compliance provided via: _____
   A. VC reduced impervious area allowance *(25%)(C.3)(C.1 – C.2)/(C.1 x 5%)*: _____ ac-ft
   B. Area treated by a flow through practice: _____ acres
5) Net VC required *(C.3 – C.4.A)*: ..... _____ ac-ft
6) VC storage provided *(must be greater than line C.5)* : ..... _____ ac-ft
7) VC description and location: _____

Watershed Management Permit No. _____

WMO SCHEDULE D
WATERSHED MANAGEMENT FACILITIES

D. SITE DETENTION REQUIREMENTS

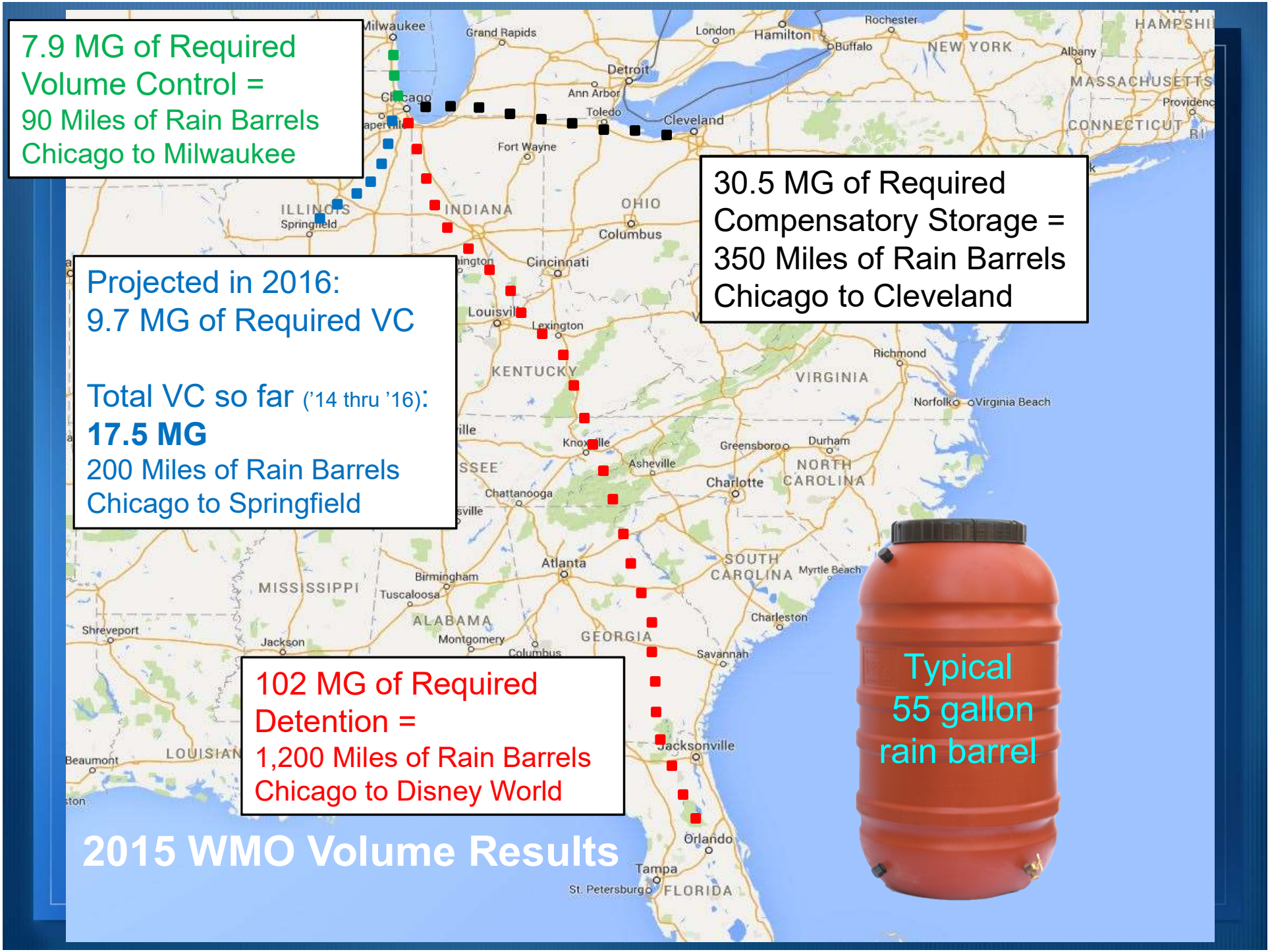
1) Type of stormwater detention facility: _____
2) Total Unrestricted Area: _____ acres
   A. Native Plantings: _____ acres
   B. On-site trade-off *($C_{unrestriced}$ x $A_{unrestricted}$)/($C_{trade-off}$)*: _____ acres
   C. Net Development Area *(Submit calculations)*: _____ acres
3) Release Rate
   A. Allowable release rate *(0.30 x D.2.C)*: _____ cfs
   B. Release rate deduction *(Submit calculations)*
      1. Unrestricted release rate deduction *(100-year, 24-hour storm)*: _____ cfs
      2. Depressional storage deduction: _____ cfs
   C. MWRD required release rate *(D.3.A – D.3.B.1 – D.3.B.2)*: _____ cfs
4) Detention Volume
   (Submit calculations for items D.3.A through D.3.H)
   A. Methodology: ☐ Nomograph ☐ Hydrologic model _____
   B. Composite CN for the development: _____
   C. Adjusted CN for the development, based on volume control: _____
   D. Time of concentration for the development: _____ minutes
   E. Required detention volume at MWRD required release rate: ..... _____ acre-feet
   F. Actual volume provided at MWRD required release rate: ..... _____ acre-feet
   G. Detention restrictor/outlet conveyance structure *(provide details and calculations)*
      1. Release rate at MWRD required volume *(must be ≤ MWRD required release rate)*: _____ cfs at HWL _____ ft (NAVD88)
      2. Type: _____
      3. Discharge coefficient: _____
      4. Diameter: _____ in
      5. Orifice invert elevation _____ ft (NAVD 88)
      6. Drawdown time: _____ hours

Name _____ Title _____

Signature _____ Date _____

Engineering Firm _____

PE SEAL


7.9 MG of Required Volume Control =
90 Miles of Rain Barrels
Chicago to Milwaukee
30.5 MG of Required Compensatory Storage =
350 Miles of Rain Barrels
Chicago to Cleveland
Projected in 2016:
9.7 MG of Required VC
Total VC so far ('14 thru '16):
17.5 MG
200 Miles of Rain Barrels
Chicago to Springfield
102 MG of Required Detention =
1,200 Miles of Rain Barrels
Chicago to Disney World
Typical 55 gallon rain barrel
2015 WMO Volume Results
Milwaukee
Grand Rapids
London
Hamilton
Rochester
Buffalo
NEW YORK
Albany
Detroit
Ann Arbor
Toledo
Cleveland
Fort Wayne
ILLINOIS
Springfield
INDIANA
OHIO
Columbus
Cincinnati
Louisville
Lexington
KENTUCKY
Richmond
VIRGINIA
Norfolk
Virginia Beach
Knoxville
Asheville
Greensboro
Durham
NORTH CAROLINA
Charlotte
Chattanooga
Atlanta
Birmingham
Tuscaloosa
MISSISSIPPI
ALABAMA
Montgomery
Columbus
GEORGIA
SOUTH CAROLINA
Myrtle Beach
Charleston
Savannah
Jacksonville
Shreveport
Jackson
Beaumont
Orlando
Tampa
St. Petersburg
FLORIDA

How Large is the Thornton Composite Reservoir?

The TCR will be able to store 7.9 billion gallons of CSO or the equivalent to 144 million rain barrels… enough to circle the earth 3.64 times when laid end to end!

Suggested Ordinance Changes

Draft Changes (for 2017):

Top Ten Changes to the WMO

1) *Delete reference to the EDPL*
2) *New fee for Earthwork/Foundation Limited Permit ($2,100)*
3) *Input from other agencies (i.e. Forest Preserve District)*
4) *Allow IDNR determination or approval to stand for specific FPA project decisions*
5) *Revise unincorporated responsibility from "township" to "Cook County"*
6) *New maintenance section for unincorporated stormwater projects with no Permittee*
7) *Consolidate and clarify flood protection fill elevation requirements*
8) *Provide direction for off-site wetlands not delineated by the Corps*
9) *Exempt first 0.10 acre of riparian impact to align with wetland procedures*
10) *Volume control trading and build-out for anticipated development*

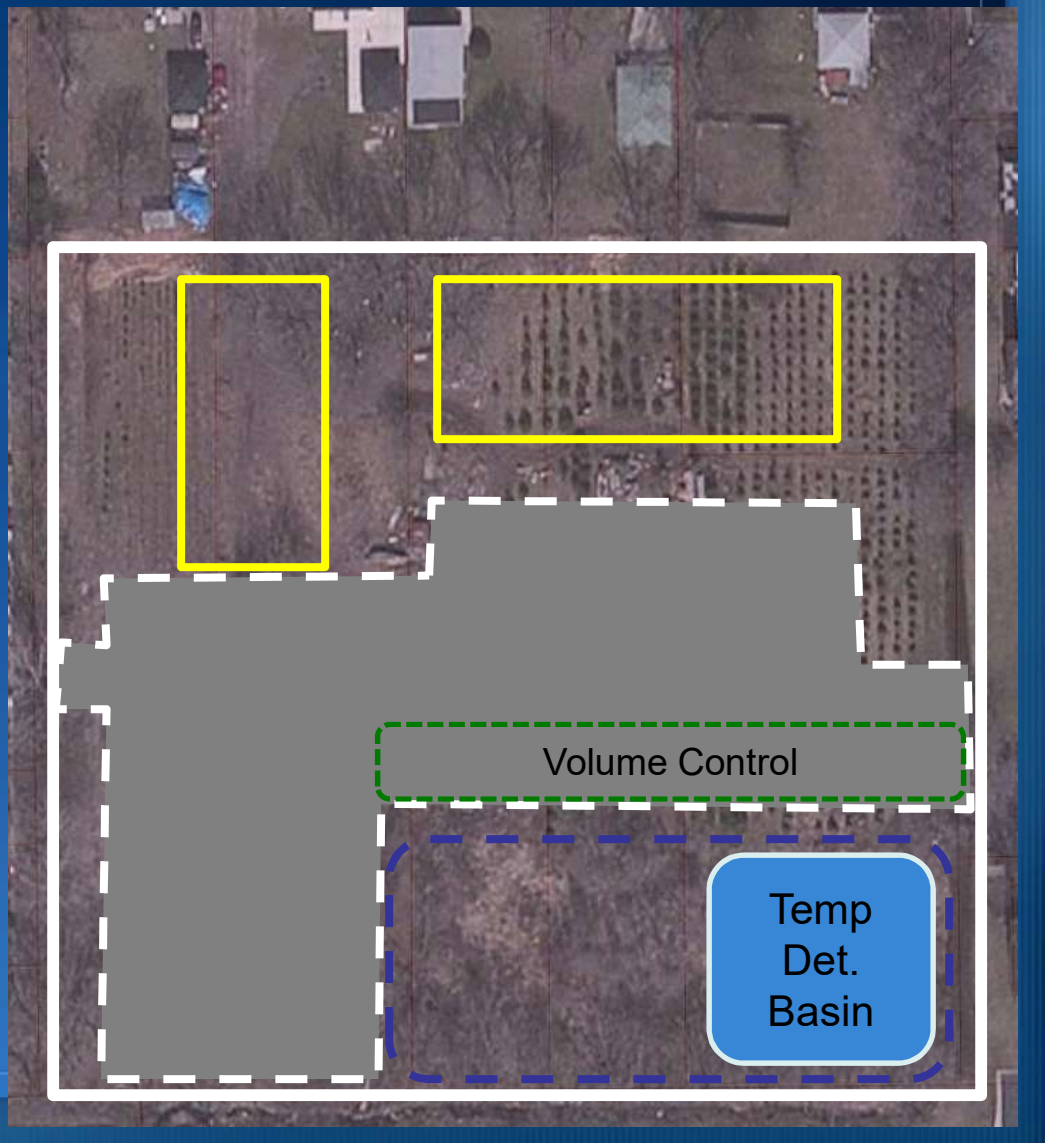
Suggested Ordinance Changes

- Nearly 100 edits to formatting, footer dates, and typographical errors
- Ten corrections to references
- Clarifications to align with administrative procedures
  - § 200.4.A; *Move agriculture exemption to cover all cases (delete from 201.1)*
  - § 200.4.H; *Flood control projects still require permit for 201.2 activities*
  - § 200.4.G/I; *Separate "Development undertaken by the District" exemption*
  - § 201 (Table 1); *"Disturbance" becomes "Development disturbing"*
  - § 201.1.B and Table 1; *Clarify both direct and indirect wetland impacts*
  - § 201.1.C and Table 1; *"existing building" becomes "single-family home"*
  - § 201.1.D.3; *Remove utility work… "not part of other development"*
  - And other minor changes…

Draft Concept
"Foundation / Earthwork Only Permit"

Example #1

- Total Site: 4.5 acres
- Two buildings, parking lot, detention pond
- Permit to start grading and foundation work (yellow area)
- Temporary detention required for impervious area (blue area)
- Volume Control design provided in later permit (green dashed area)

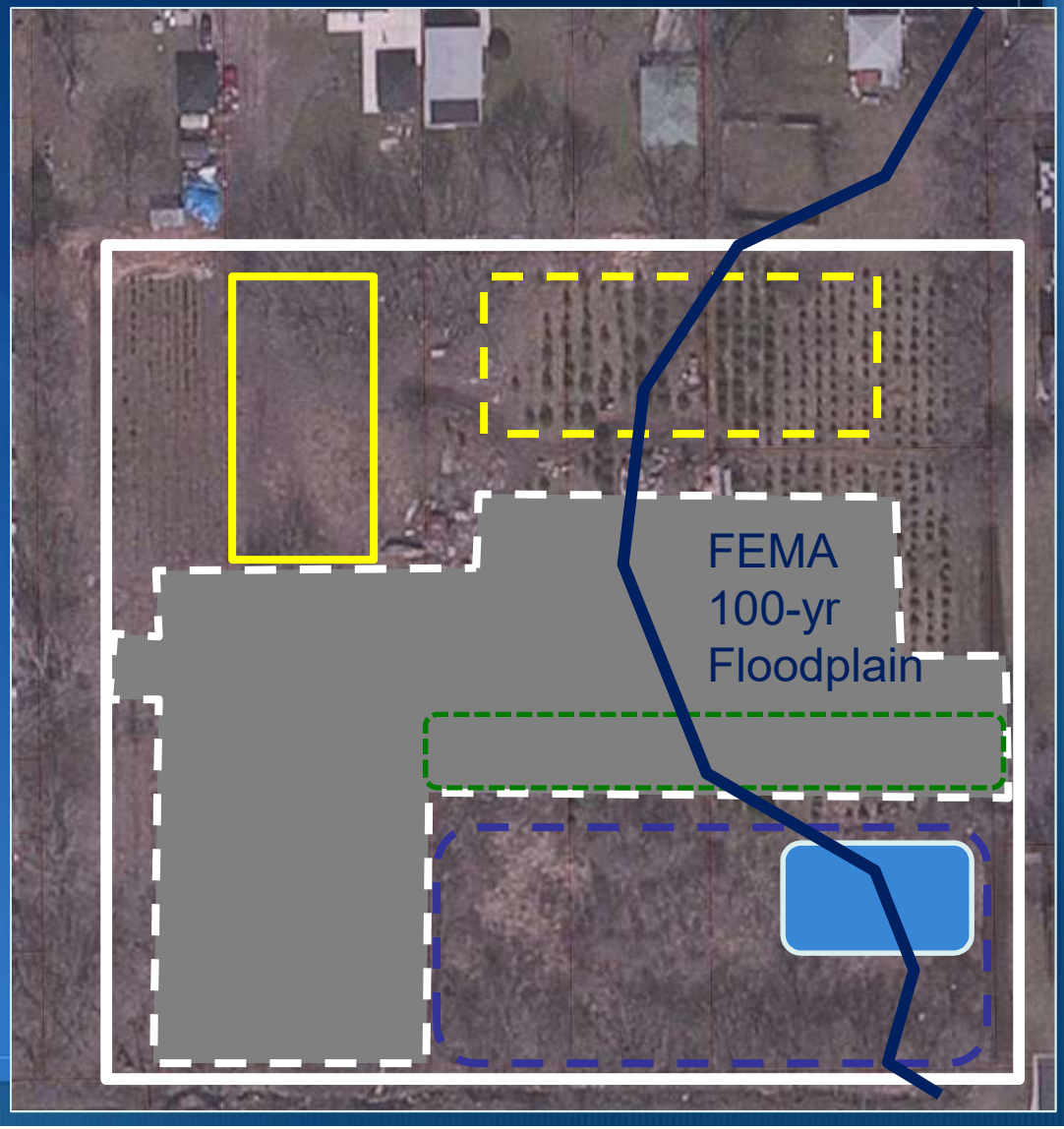


Draft Concept
"Foundation / Earthwork Only Permit"

Example #2 (w/ floodplain)

- Total Site: 4.5 acres
- Two buildings, parking lot, detention pond
- Permit to start grading and foundation work

  (yellow area)
- No foundation work allowed in floodplain
- Temporary detention – cut only – allowed in floodplain (blue area)



Volume Control Trading

Conceptualize

- Allowing a municipality to create an exchange within their community to trade constructed volume control credits towards new development that would otherwise need onsite volume control.

Volume Control Trading

Draft Guidelines:

- Provide for 1-inch over all proposed impervious area
- VC Trading facility must be permitted and inspected by MWRD
- VC Trading facility must exist or be permitted before development is approved
- VC Trading only allowed within boundaries of the sub-watershed
- Site seeking credits must provide flow through device for water quality
- To implement, will require an Ordinance Change

Volume Control Trading (Draft Change)

- Example of a Subwatershed:

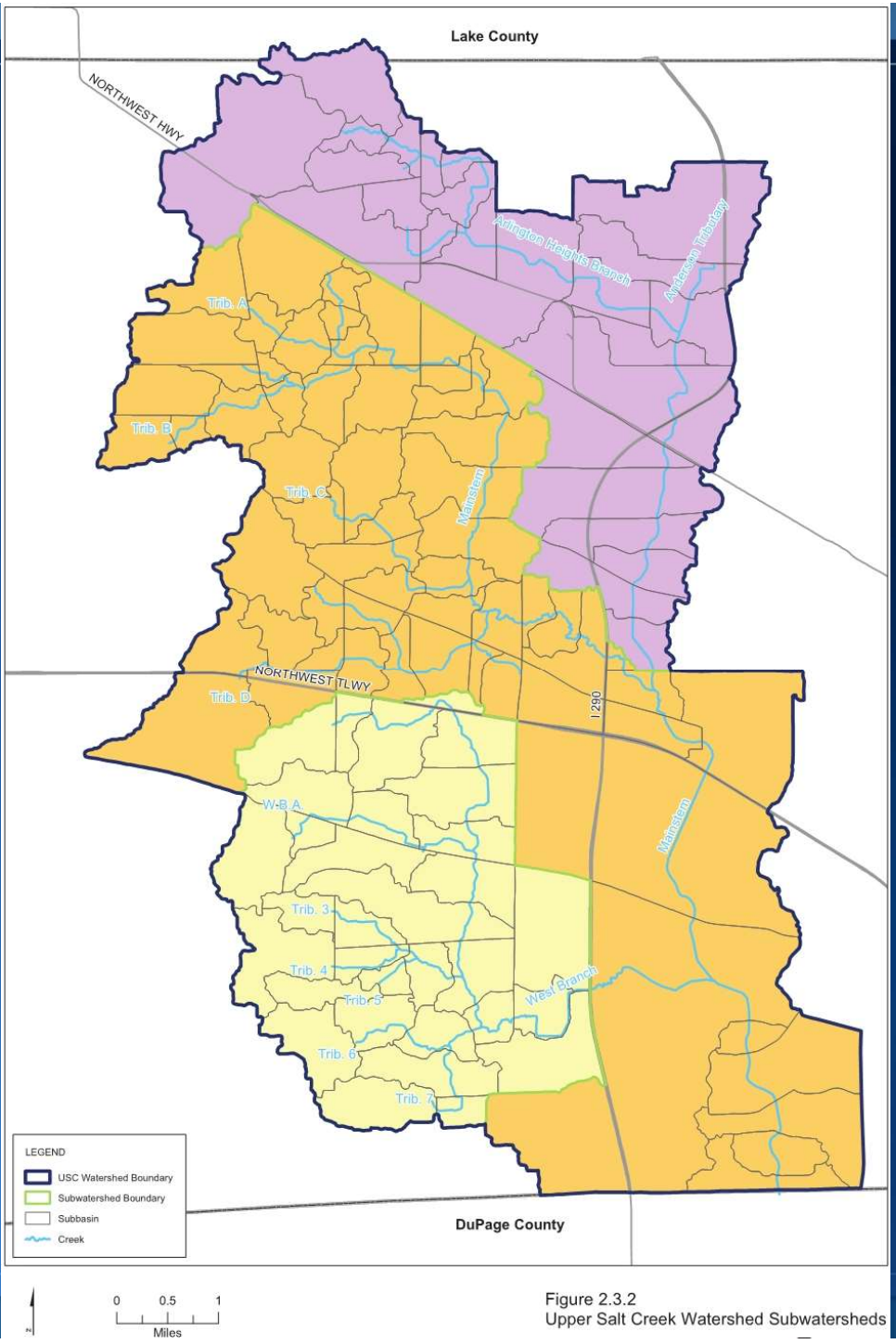


Figure 2.3.2
Upper Salt Creek Watershed Subwatersheds

Public Comment Period

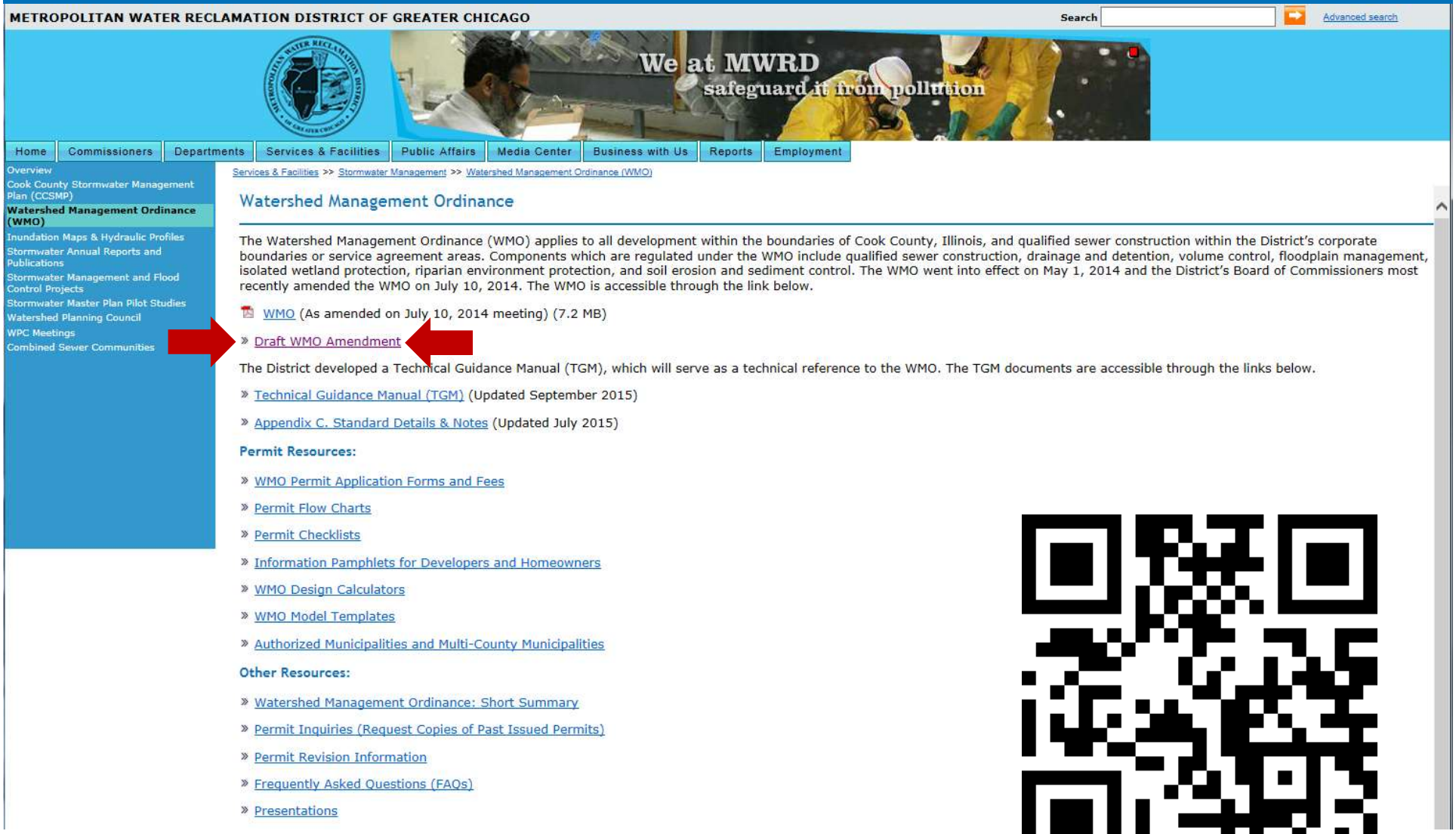
Public Comment period through March 31, 2017

- Draft Amendment is posted on WMO website (wmo.mwrd.org)
- Comment to WMOComments@mwrd.org or mail to:

Metropolitan Water Reclamation District of Greater Chicago
Local Sewer System Section
111 East Erie Street
Chicago, Illinois 60611

Technical Guidance Manual update to follow

Dedicated WMO Website



wmo.mwrd.org

Public Comment Period

Date	Meeting	Time	Location
Jan. 18, 2017	Poplar Creek and Upper Salt Creek WPC	10:30am	Prairie Center for the Arts 201 Schaumburg Court Schaumburg, IL
Jan. 31, 2017	Cal-Sag Channel WPC	6:00pm	Bedford Park Village Hall 6701 South Archer Road Bedford Park, IL
Feb. 9, 2017	Little Calumet River WPC	6:00pm	South Suburban Mayors and Managers Office 1904 W. 174th Street East Hazel Crest, IL
Feb. 16, 2017	Lower Des Plaines River Tributaries WPC	10:00am	Northlake City Hall 55 E. North Avenue Northlake, IL
Mar. 7, 2017	North Branch of the Chicago River WPC	10:00am	Lincolnwood Village Hall 6900 N. Lincoln Avenue Lincolnwood, IL

Thank you
Questions?

Dan Feltes, P.E., CFM
feltesd@mwrd.org
312.751.3247

Metropolitan Water Reclamation District of Greater Chicago
100 E. Erie Street
Chicago, Illinois