AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

AquaStorm™ Pile Cloth Media Filtration

How Does Peak Flow Management Help Utilities Meet Monthly Permit Limits and Regulatory Requirements?

John Dyson
Product Manager – AquaPrime®/AquaStorm™

PNCWA wef

AquaStorm™

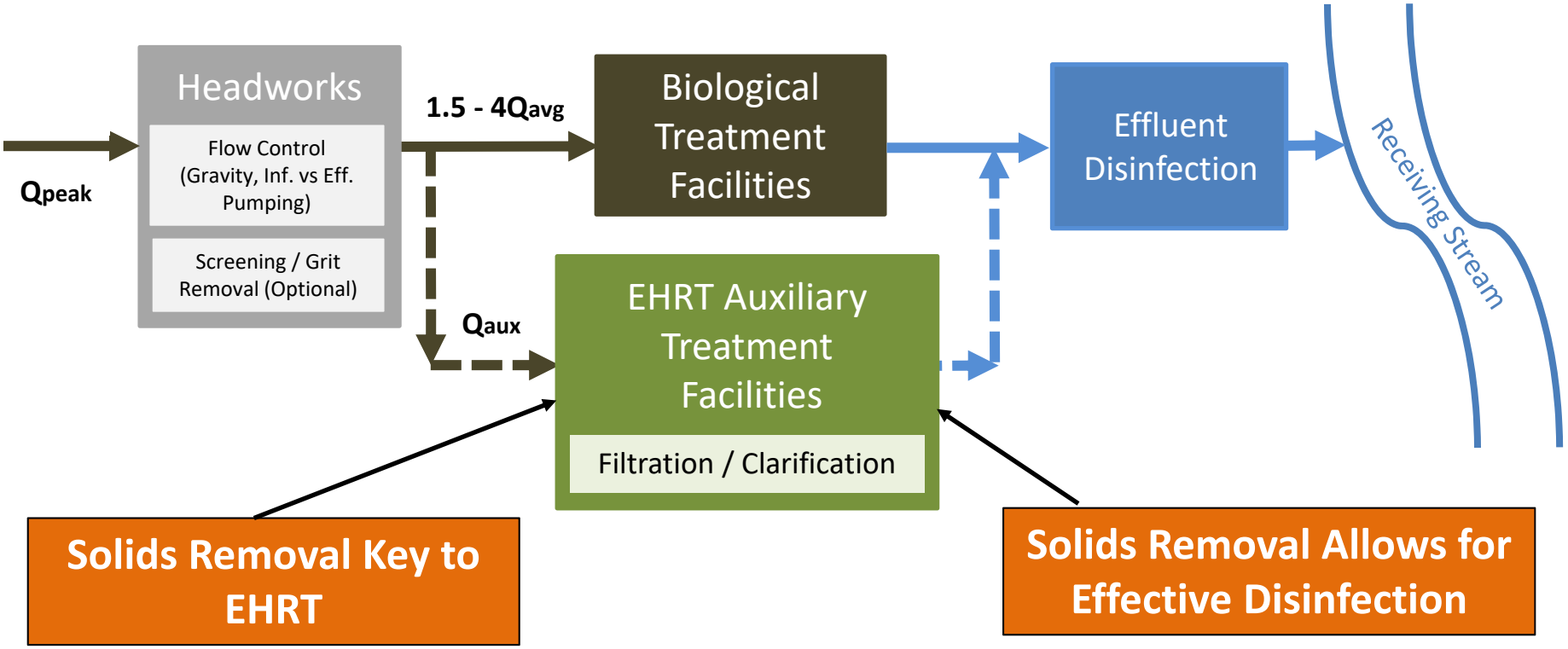
Outline

- Wet Weather Treatment
- AquaStorm Operation
- Case Studies
  - Elkhart, IN
  - Rushville, IN
  - MSD of Greater Cincinnati, OH
- Regulatory Update
- Questions

Wet Weather Treatment

WW Optimization of Facility

Parallel Auxiliary Treatment Capacity



Instead of diversion or bypass, either split or intercept peak flows for auxiliary treatment.

Technologies

Wet Weather Technologies

Settling-Based	Filtration-Based	Flotation-Based
1. Conventional Settling - Rectangular, Circular, Square, RTB, Etc.	1. Shallow Granular Media	1. Conventional Floatables Removal - Skimmers, Scum Baffles
2. Vortex - Swirl Concentrator	2. Deep Granular Media	
3. Lamella Settler	3. Microscreens, Woven Media - Salsness, Armor Forty-X, Hydrotech DiscFilter, etc.	2. Dissolved Air Flotation (DAF)
4. Chemically Enhanced Settling	4. Floating Media - Metawater CSO Filter, BKT BBF-F	
a. Conventional Basin - With chemical addition		
b. Sequencing Batch - e.g. ClearCove Flatline EPT	HRF	
c. Lamella Settler HRC	5. Pile Cloth Media AquaStorm	3. Polymer-aided DAF - Various suppliers
d. Solids Contact / Recirculation - DensaDeg, ContraFast	6. Compressible Media - Fuzzy Filter, FlexFilter	
e. Ballasted Flocculation - Actiflo, RapidSand, DensaDeg XRC, CoMag	7. Fixed Film Contact - Biological Aerated Filter (BAF), BioFlexFilter	4. Biocontact + DAF - Captivator
5. Suspended Growth Contact - BioActiflo, BioMag, Bio-CES		

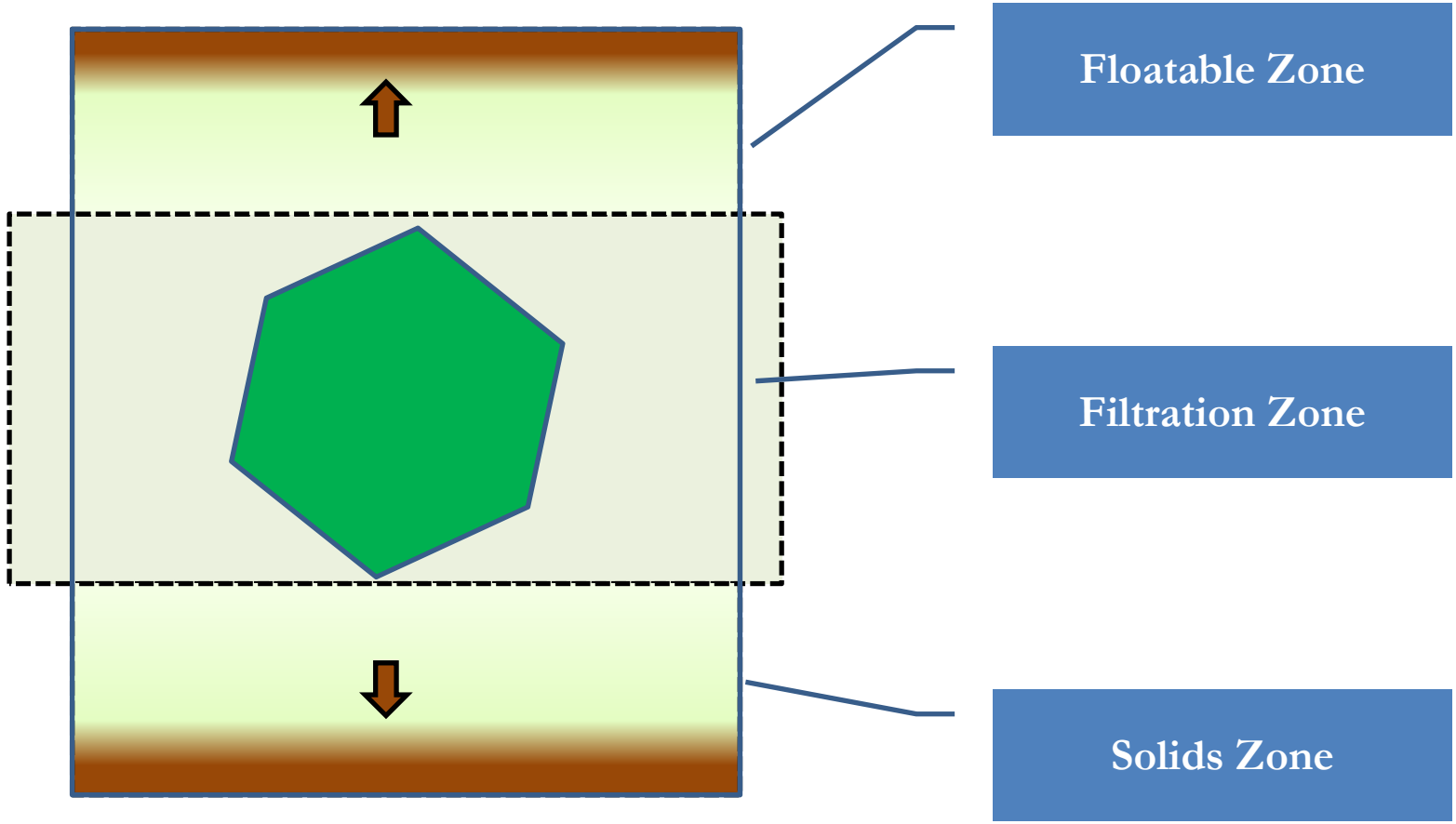
Primary Removal Equivalent* | Small Footprint (HRT) | Enhanced Removal

* If Coagulation/flocculation provided, HRT → EHRT (in some cases)

AquaPrime® /AquaStorm™ Pile Cloth Media Filter Operation

AquaPrime®/AquaStorm™

Basics - Differentiation



AquaPrime®/AquaStorm™

PCMF Operational Sequence

AquaStorm™ Procedures

Startup, Shutdown & Storage

Startup

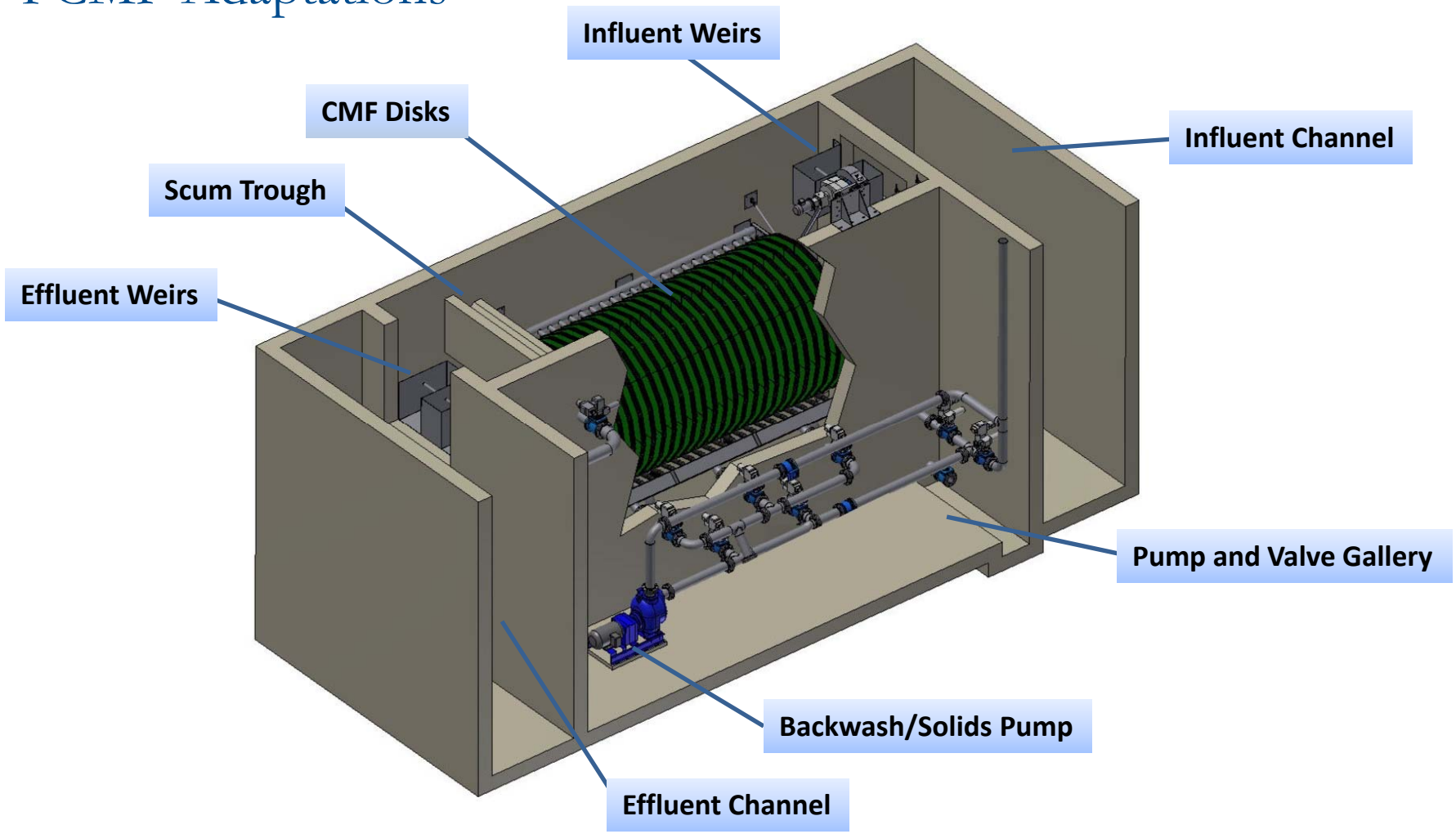
- Open Unit Influent Gate
- Allow the tank to Fill
- In Filtration Mode
- Backwashing and Wasting are all automatic.

Shutdown/Storage

- Close Unit Influent Gate
- Initiation Shutdown Procedure
  - Empty Scum Trough
  - Continuous Backwash
  - Solids Removal
  - Drain remaining water – 1’
- Wash tank down

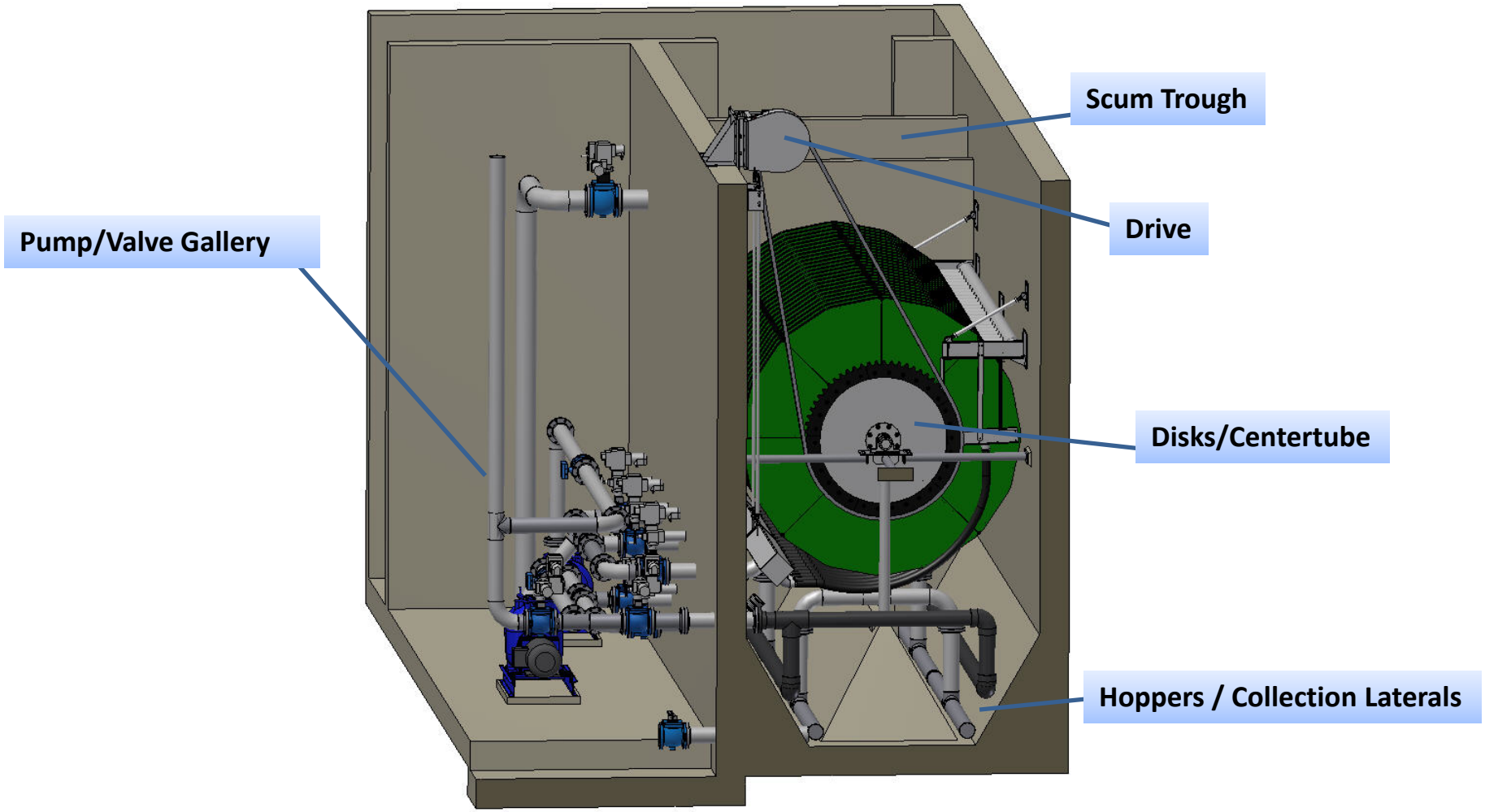
AquaStorm™

PCMF Adaptations



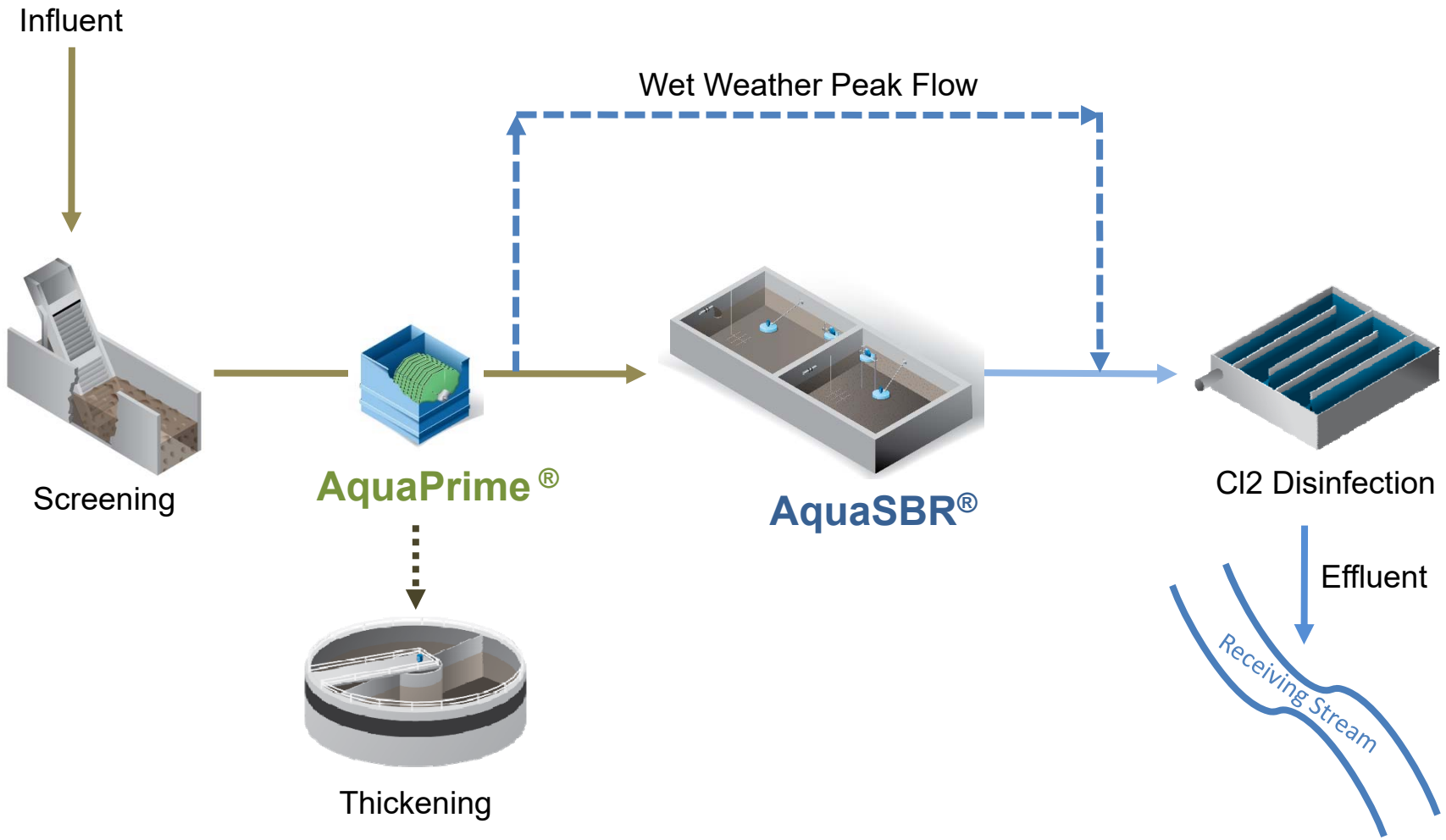
AquaPrime®/AquaStorm™

PCMF Adaptations



AquaPrime® Locations

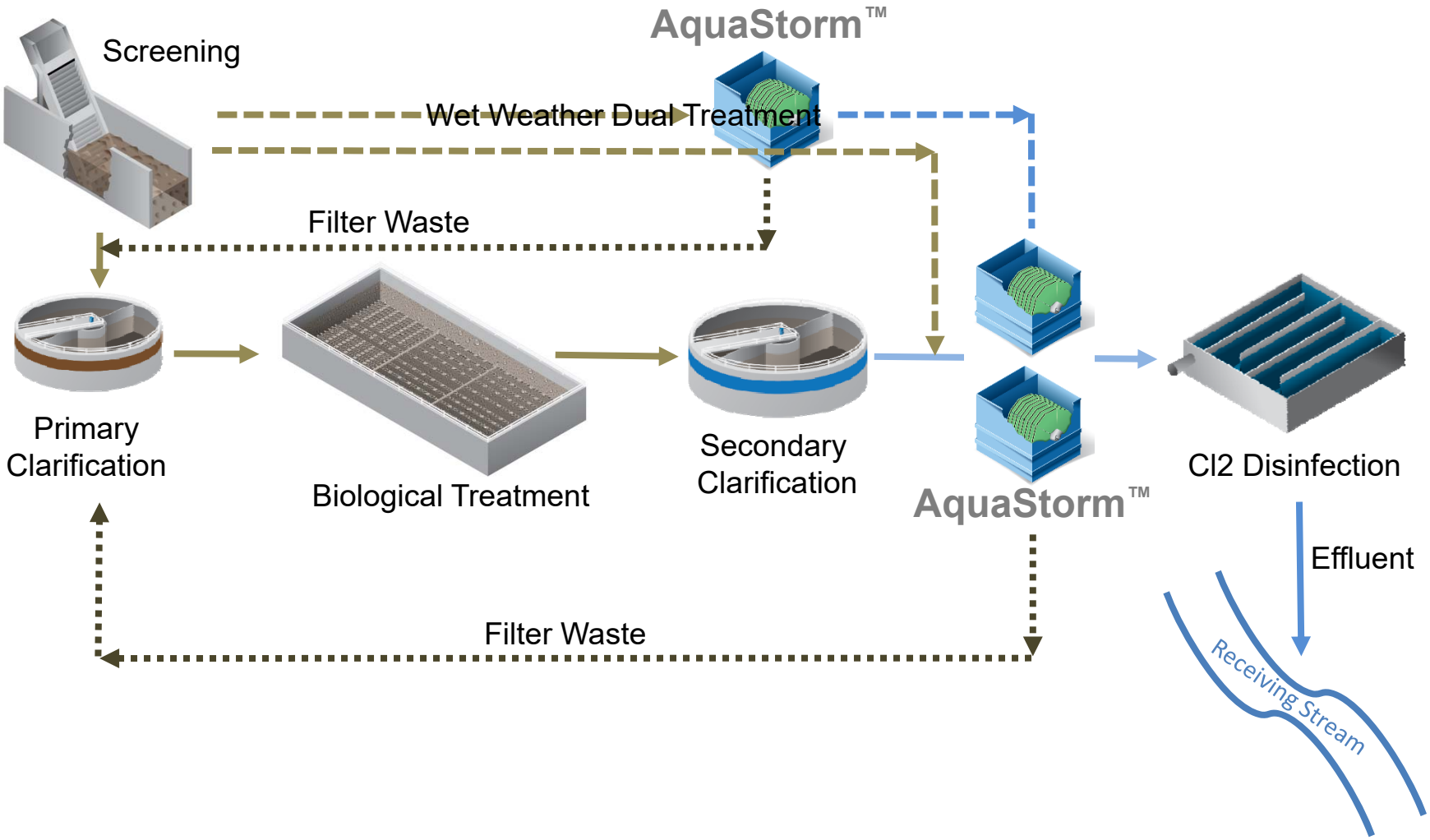
Dual Use – Primary/WW



AquaStorm™ Locations

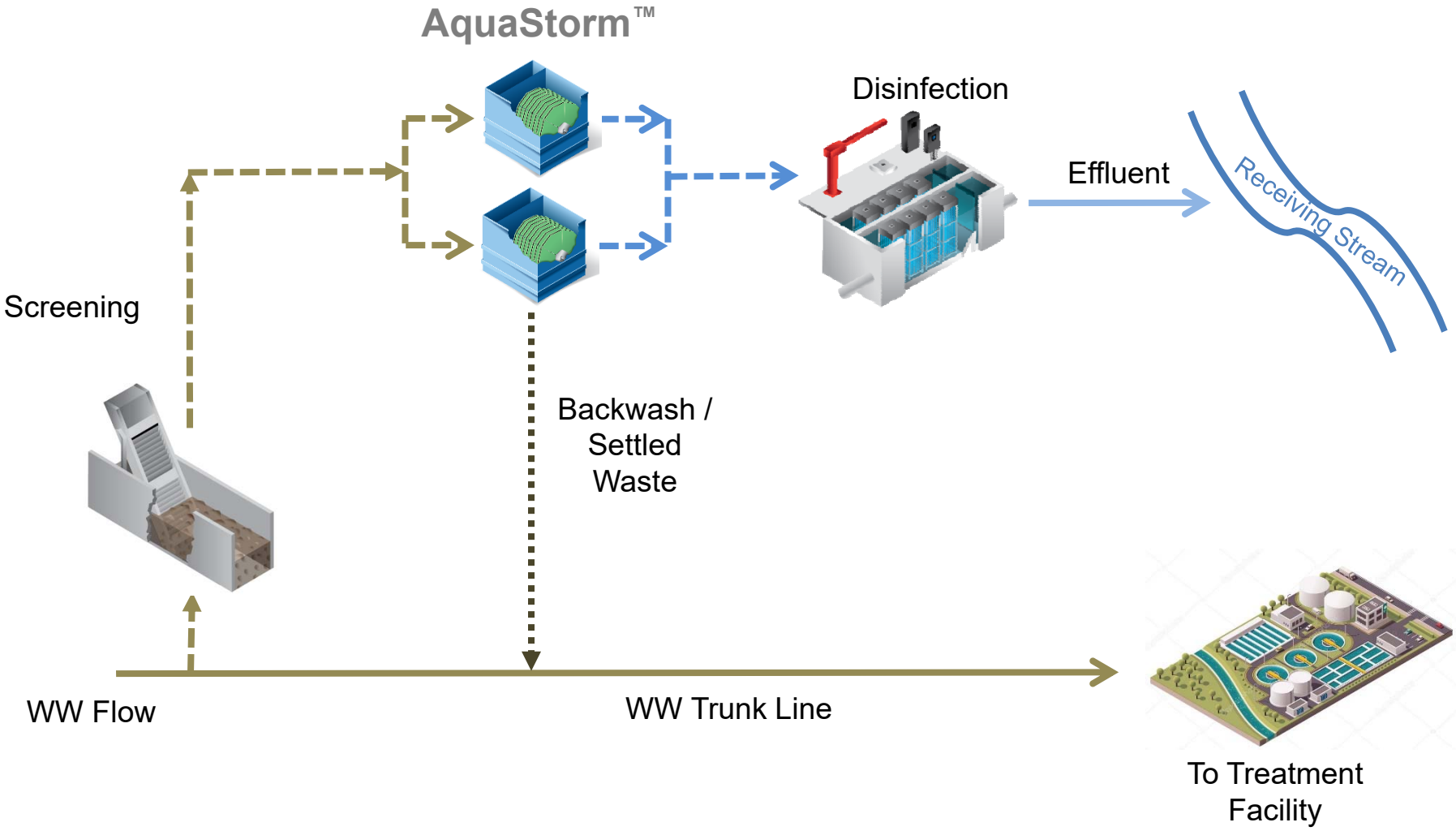
AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Arrangements



Remote Wet Weather Treatment

Typical Auxiliary Arrangement



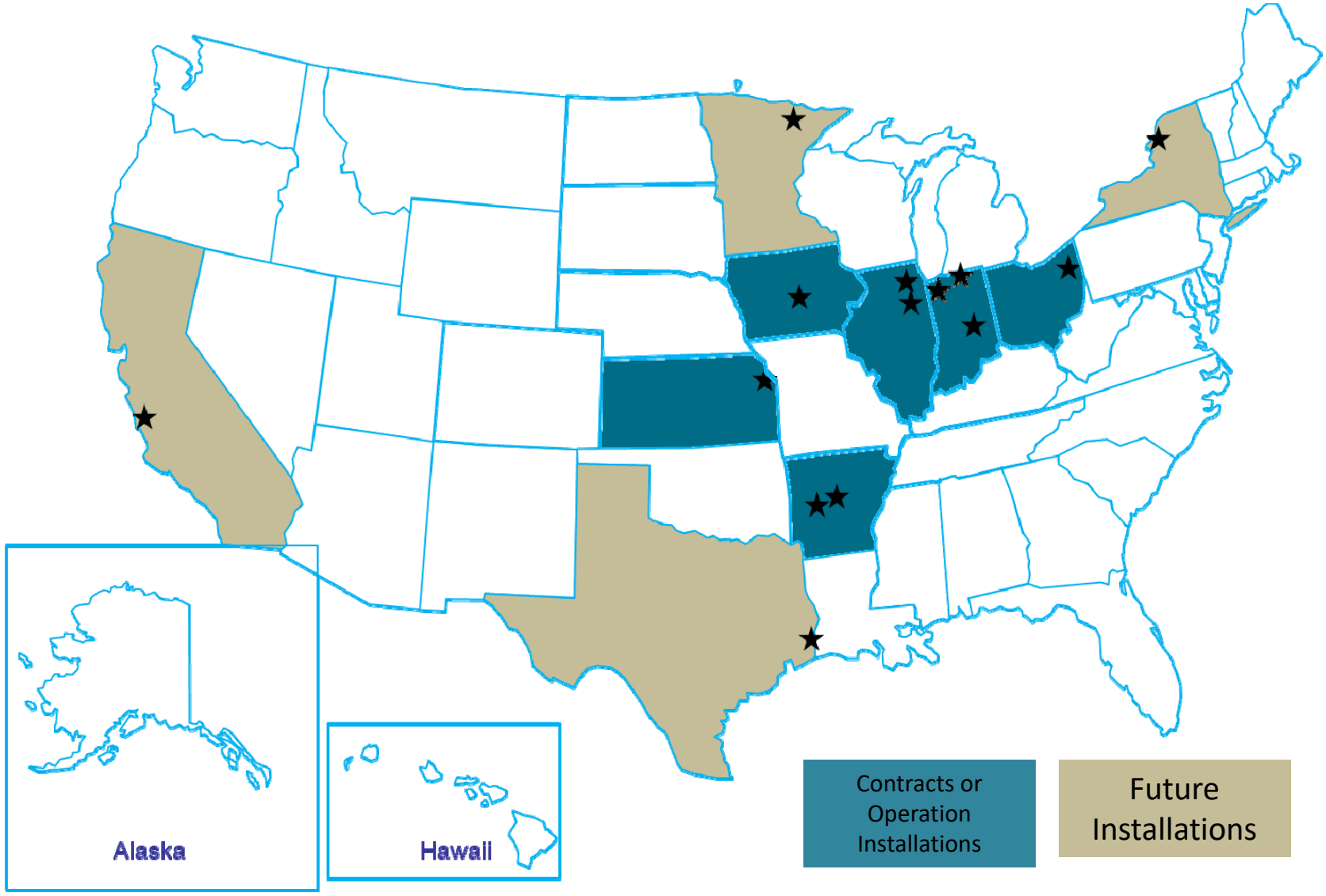
Case Studies

Elkhart, IN, Rushville, IN

&

MSD Cincinnati, OH

AquaStorm™ Location Map



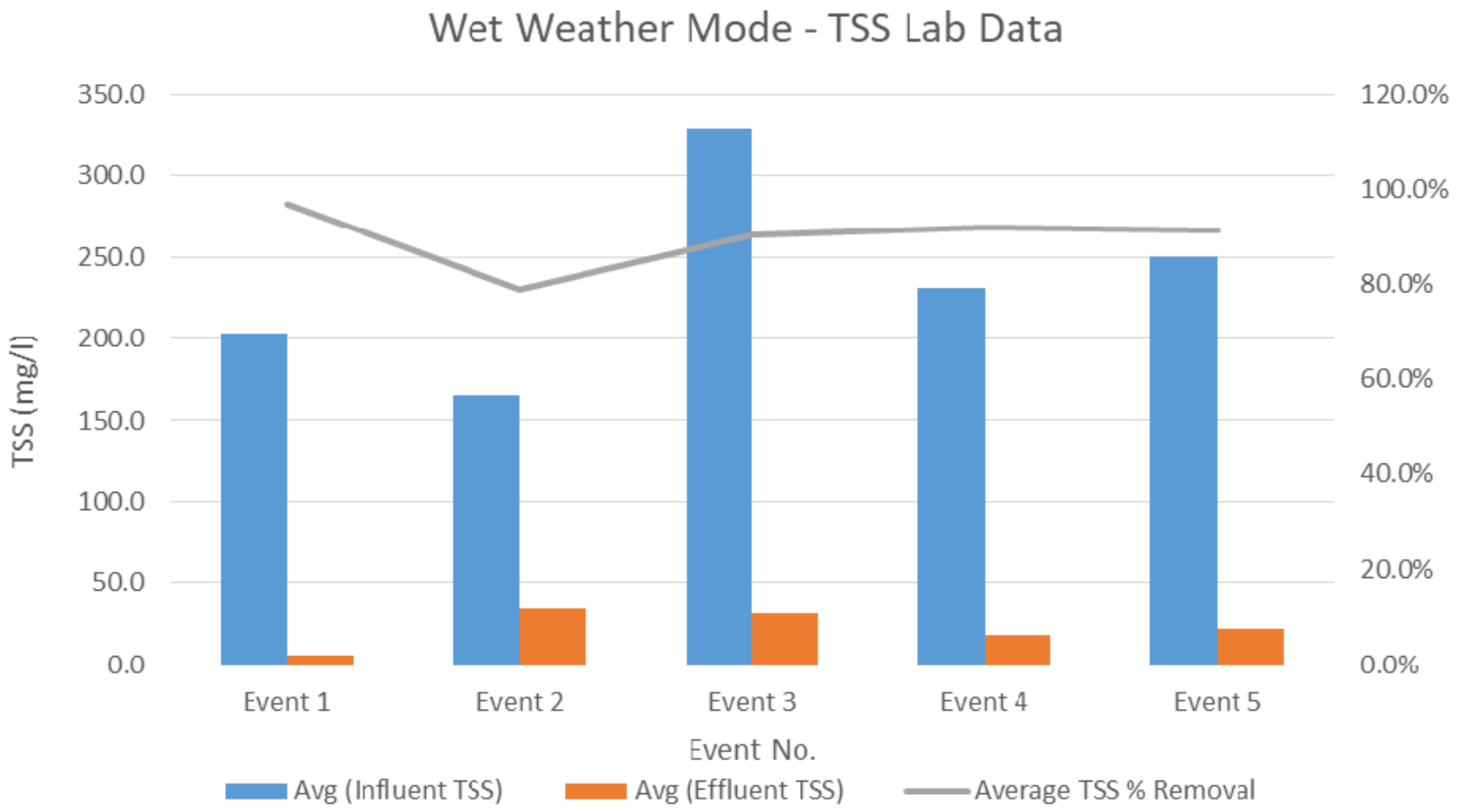
Elkhart, IN

Project Background

- Existing WWTP Design
  - 14 MGD Avg Flow
  - 30 MGD Peak Biological Capacity
  - Limited due to secondary clarifiers
- Consent Decree requires 60 MGD during WW conditions

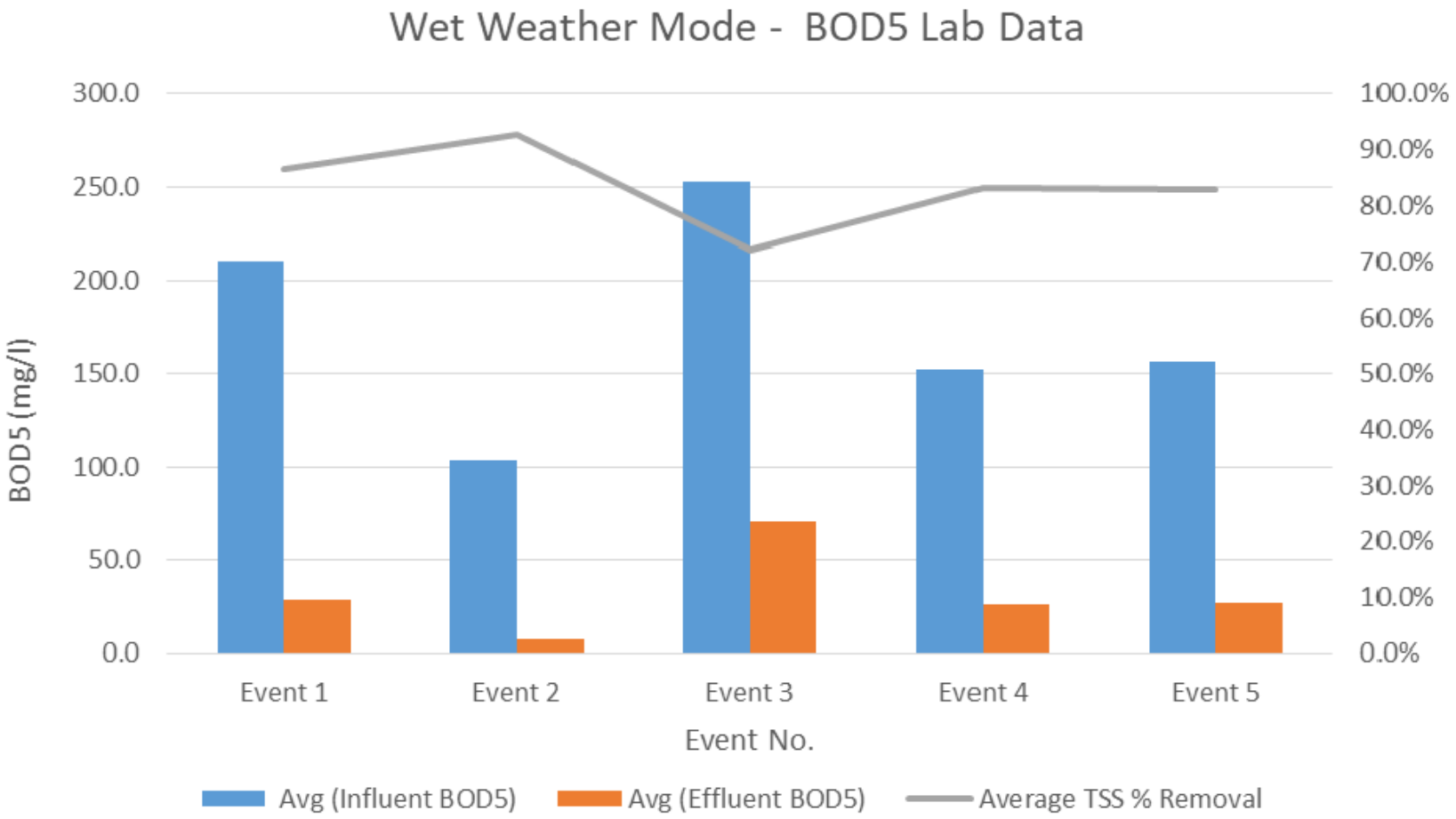
Elkhart, IN

Wet Weather Event Testing



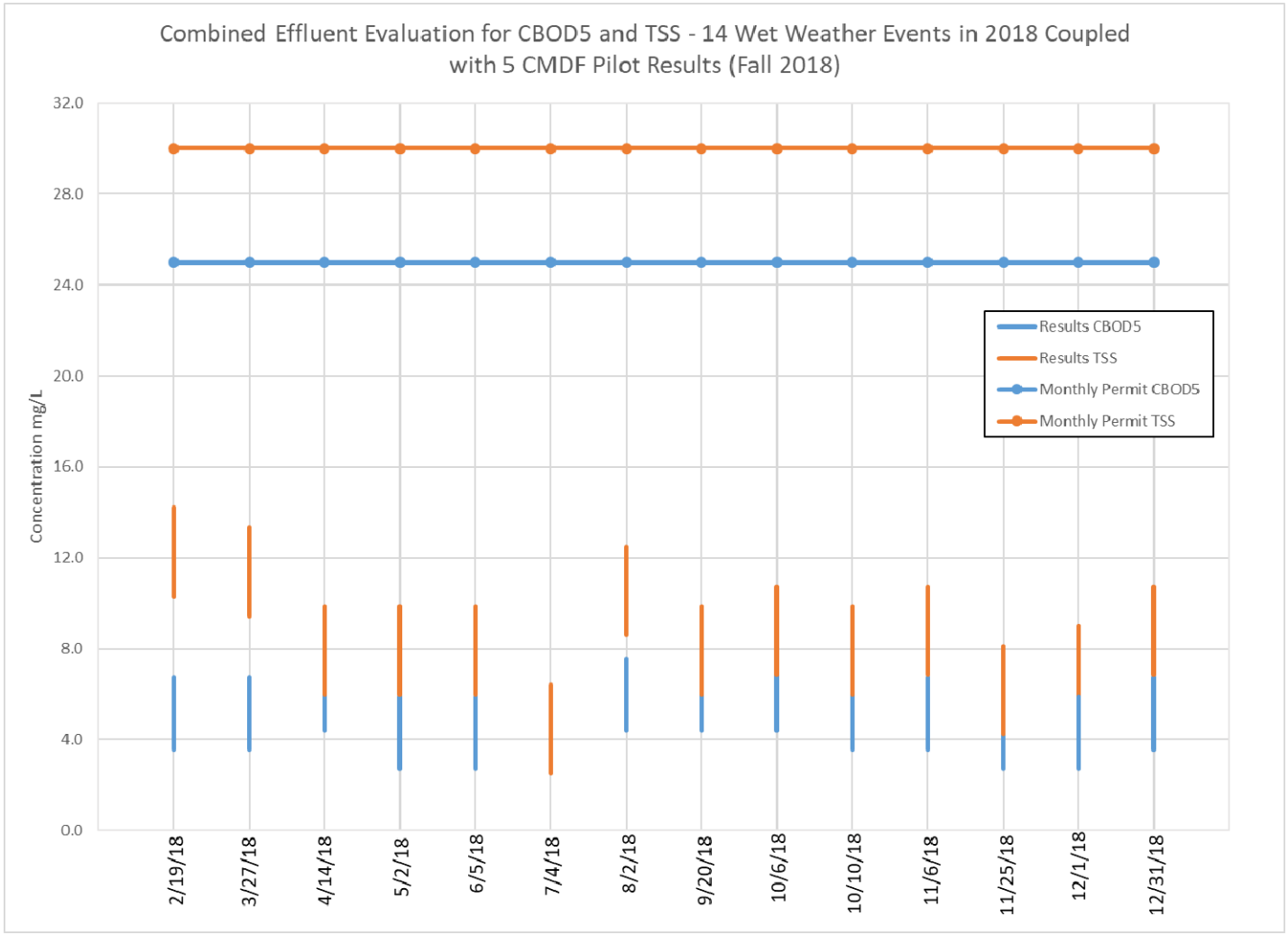
Elkhart, IN

Wet Weather Event Testing



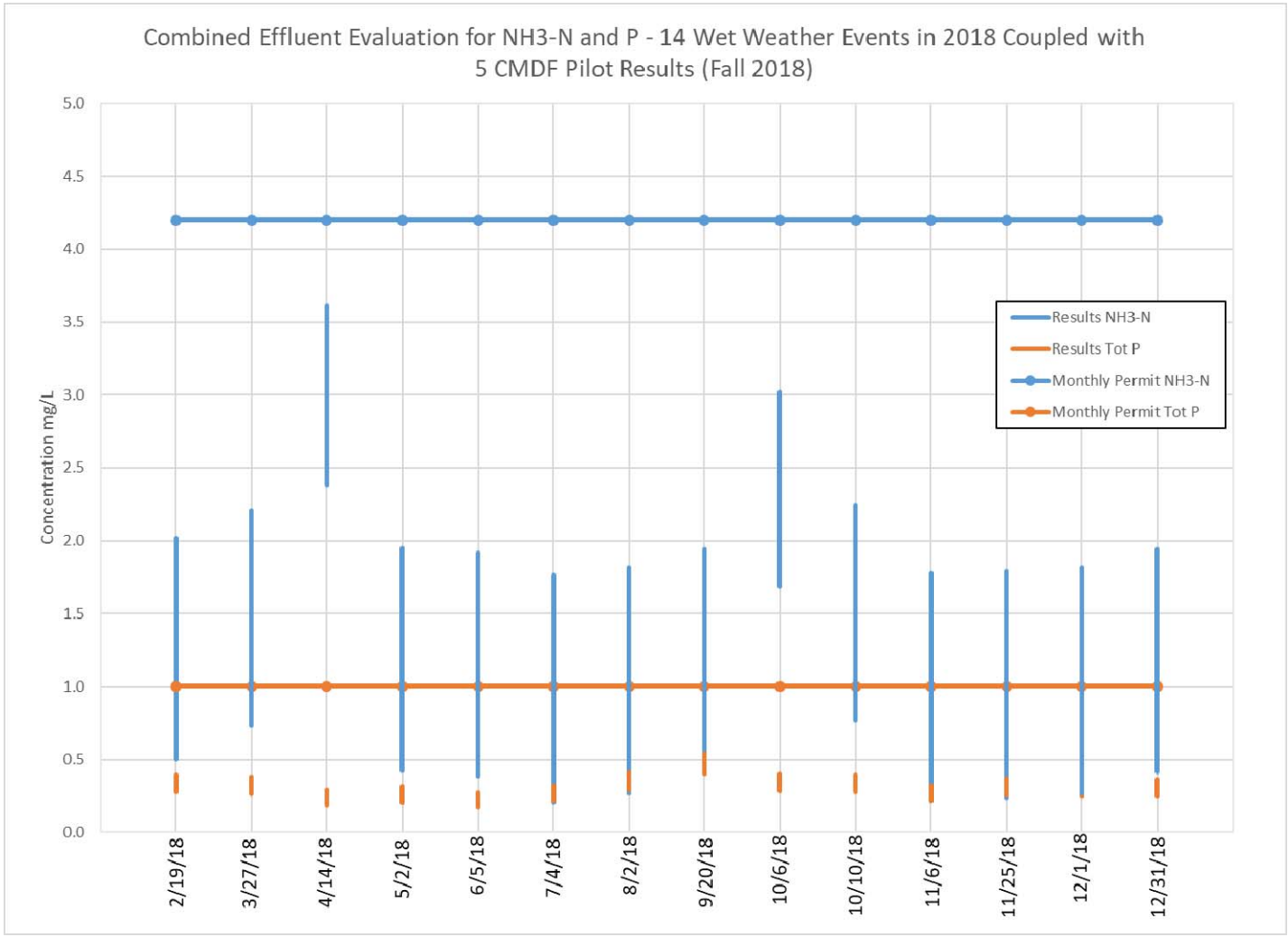
Elkhart, IN

Modeling



Elkhart, IN

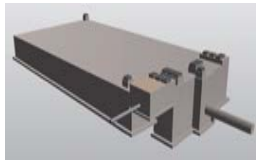
Modeling



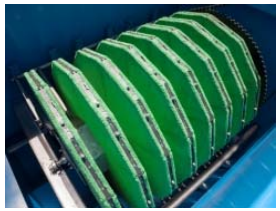
Rushville, IN Project

Phase 3 Wet Weather Improvements

Original Concept Storage Tank



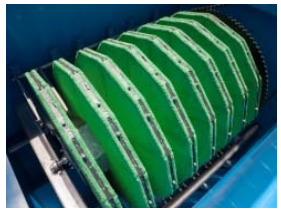
Introduction of Technology to IDEM



Owner interested in Alternative Delivery

Final Design Starts

Designed Submitted to IDEM

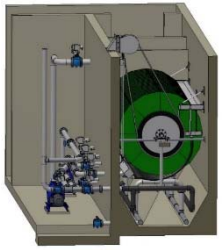


Final Inspection

2014 | **2015** | **2016** | **2017**

REP Presented PCMF to Owner

IDEM Meeting on Testing Protocol Piloting Commenced on Spring



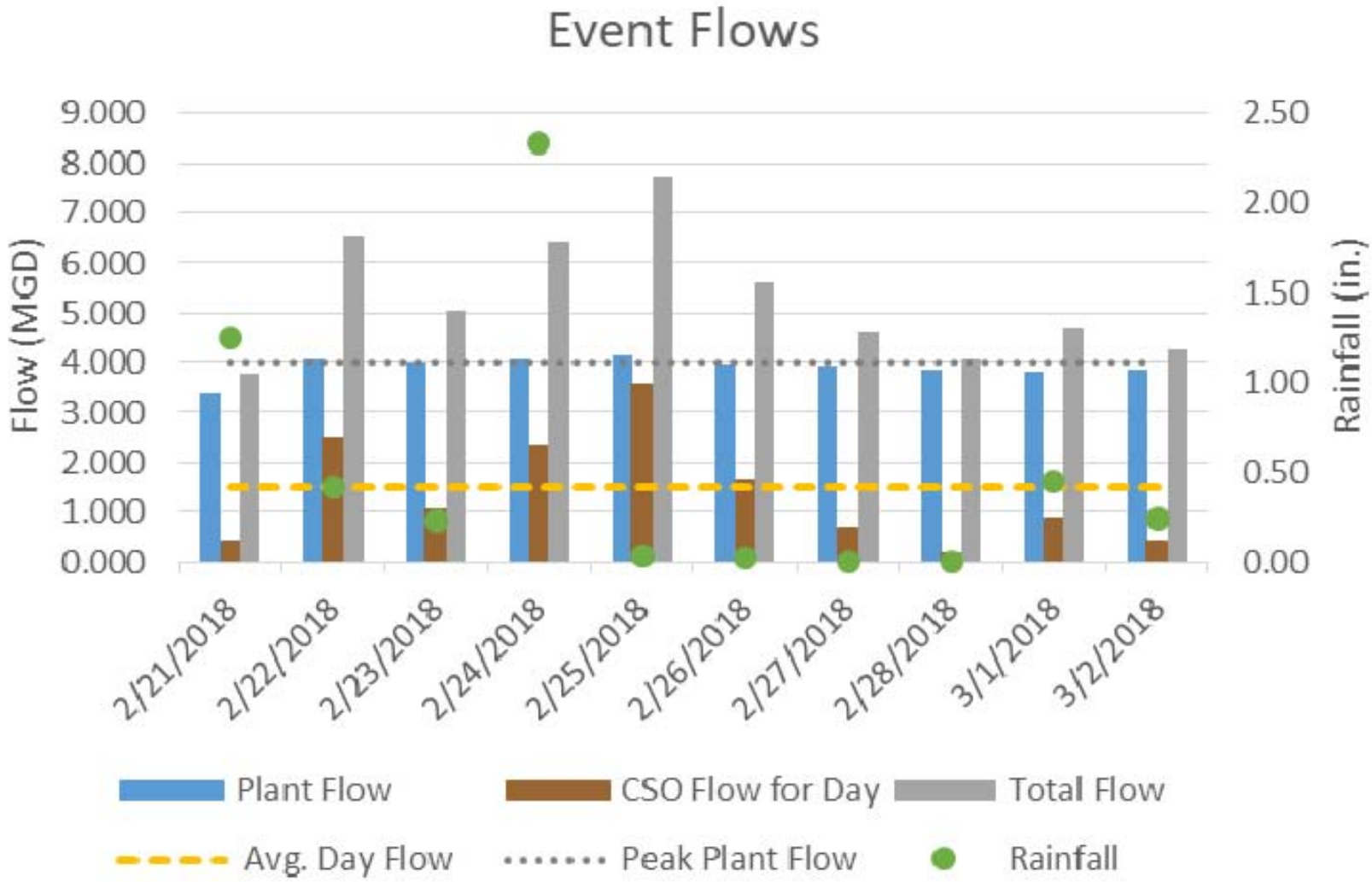
Scope is Defined

Construction NTP

Substantial Completion

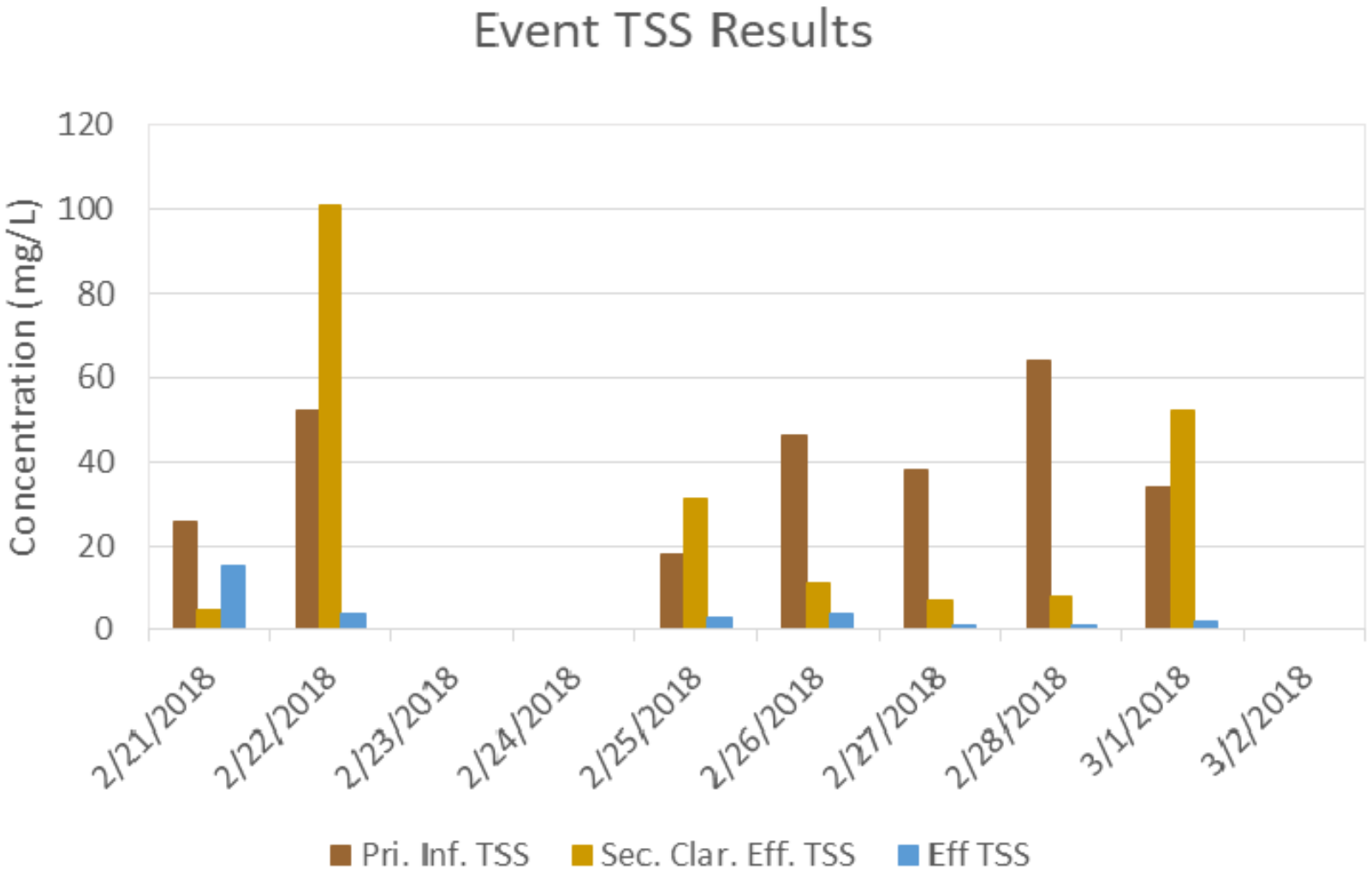
Rushville Performance

Wet Weather Event – Feb 21, 2018



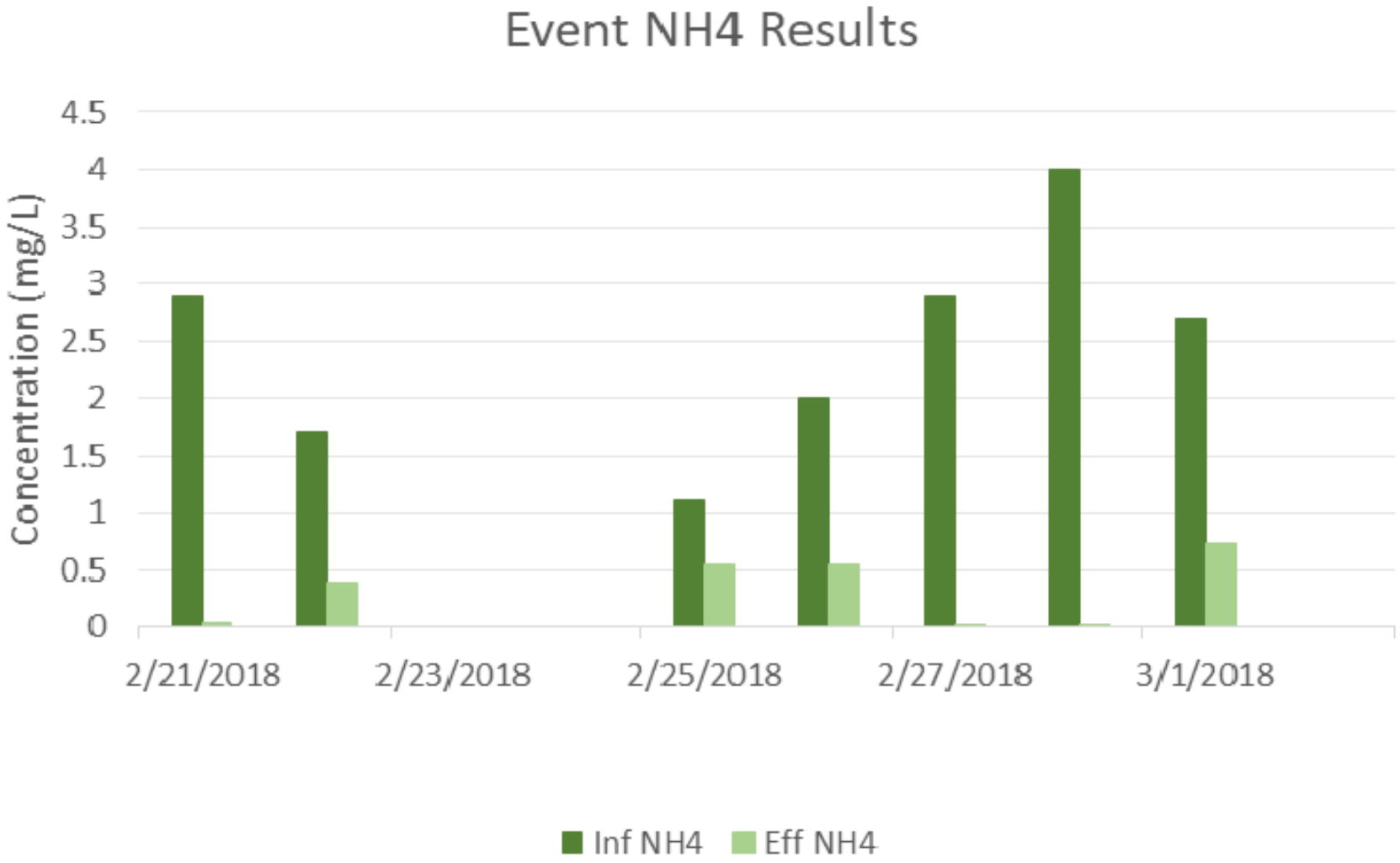
Rushville Performance

Wet Weather Event – Feb 21, 2018



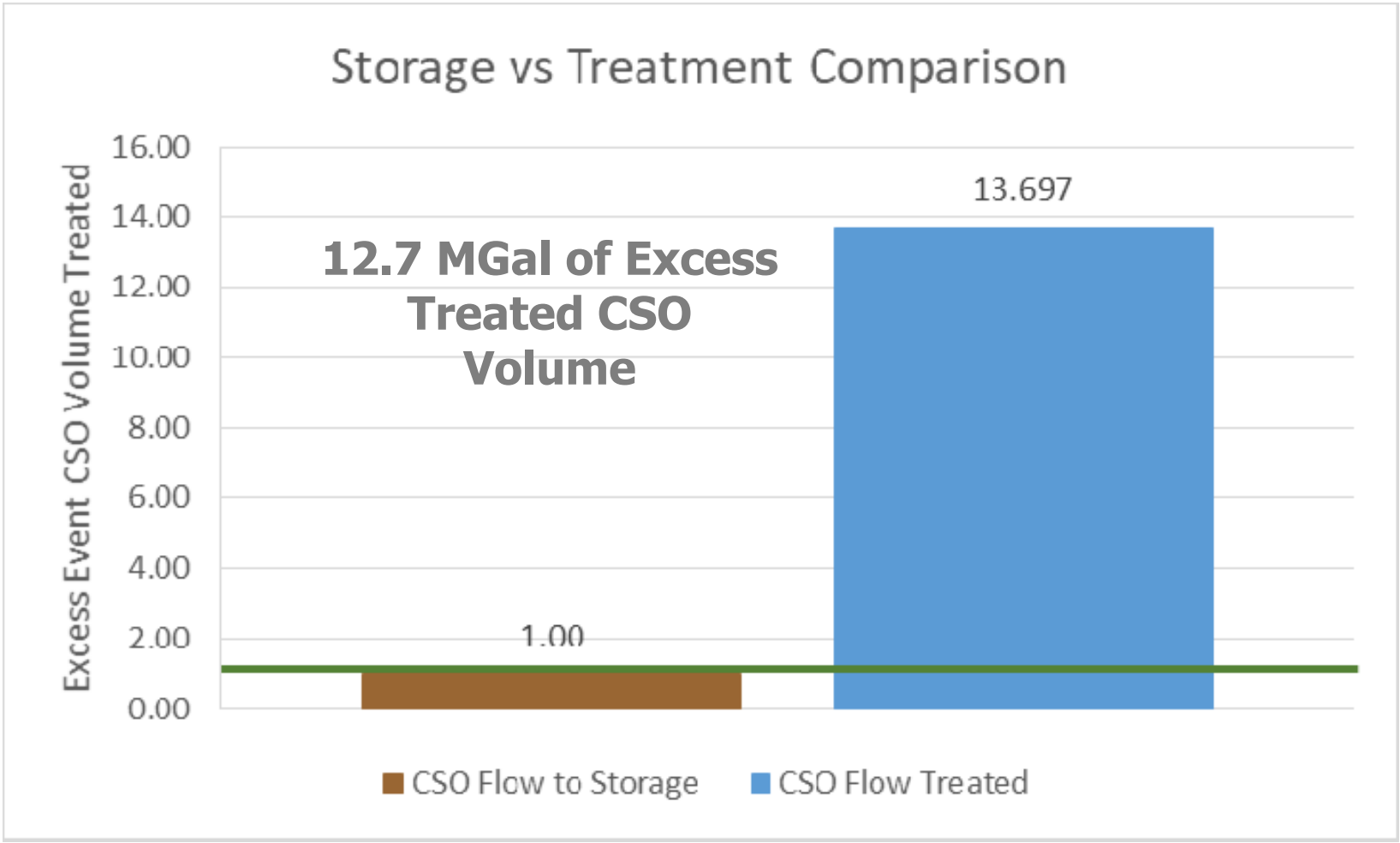
Rushville Performance

Wet Weather Event – Feb 21, 2018



Rushville Performance

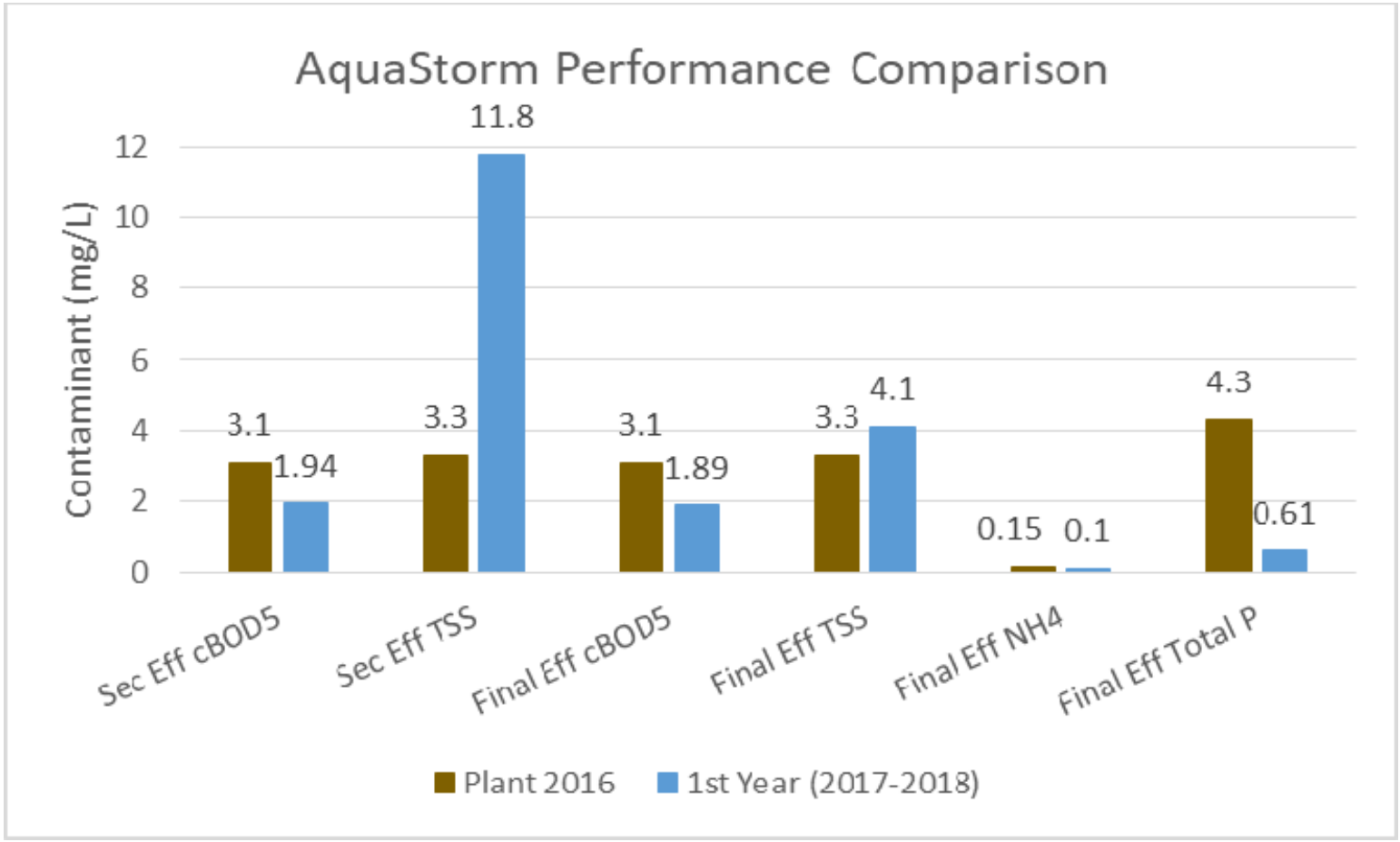
Wet Weather Event – Feb 21, 2018



Rushville Performance

1 Year of Operation

Comparison NPDES Permit vs. Monthly Average Effluent after CMDF Start-up



MSD Greater Cincinnati - MSDGC

Remote Site - CSO Treatment

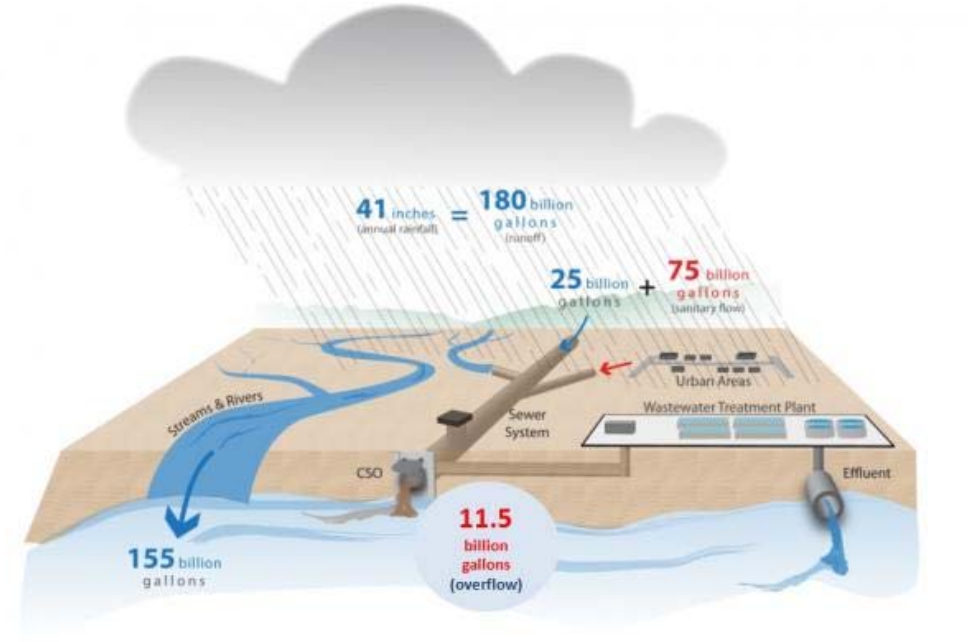


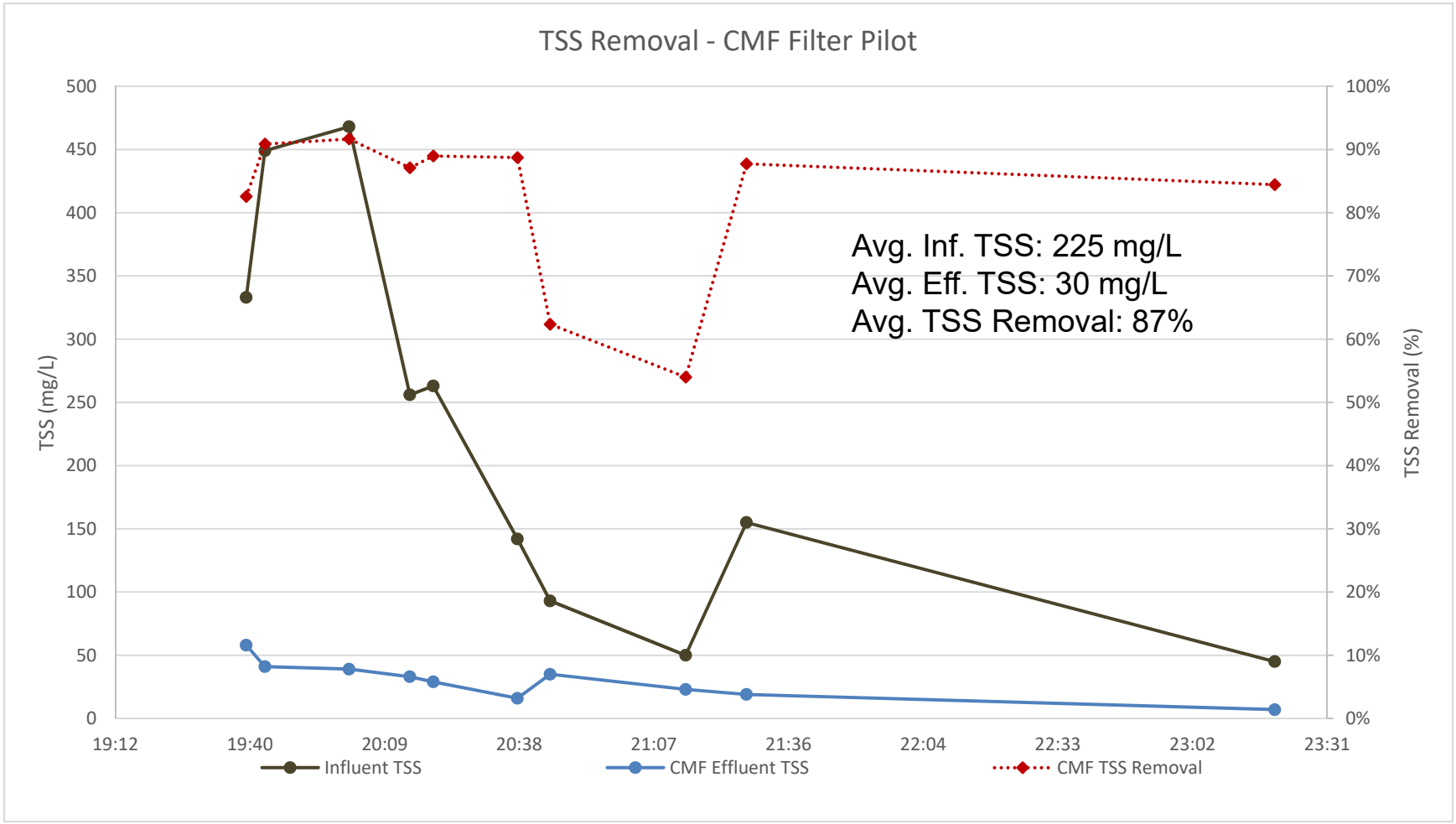
Figure: CSO Flow Balance (Courtesy of MSDGC Website)

- Average Overflows Totaling >11.5 billion annually
- System is comprised of SSO and CSO network areas
- 13 Large Overflow Sites needing additional treatment – presently screening and disinfection
- Investigating new solutions which are easy to startup and operate at remote sites.

Value	TSS (mg/L)	$CBOD_5$ (mg/L)	E. Coli (ct/100 mL)
Min	60	10	10^5
Avg	154.6	39.2	10^6
Max	470	91	10^7

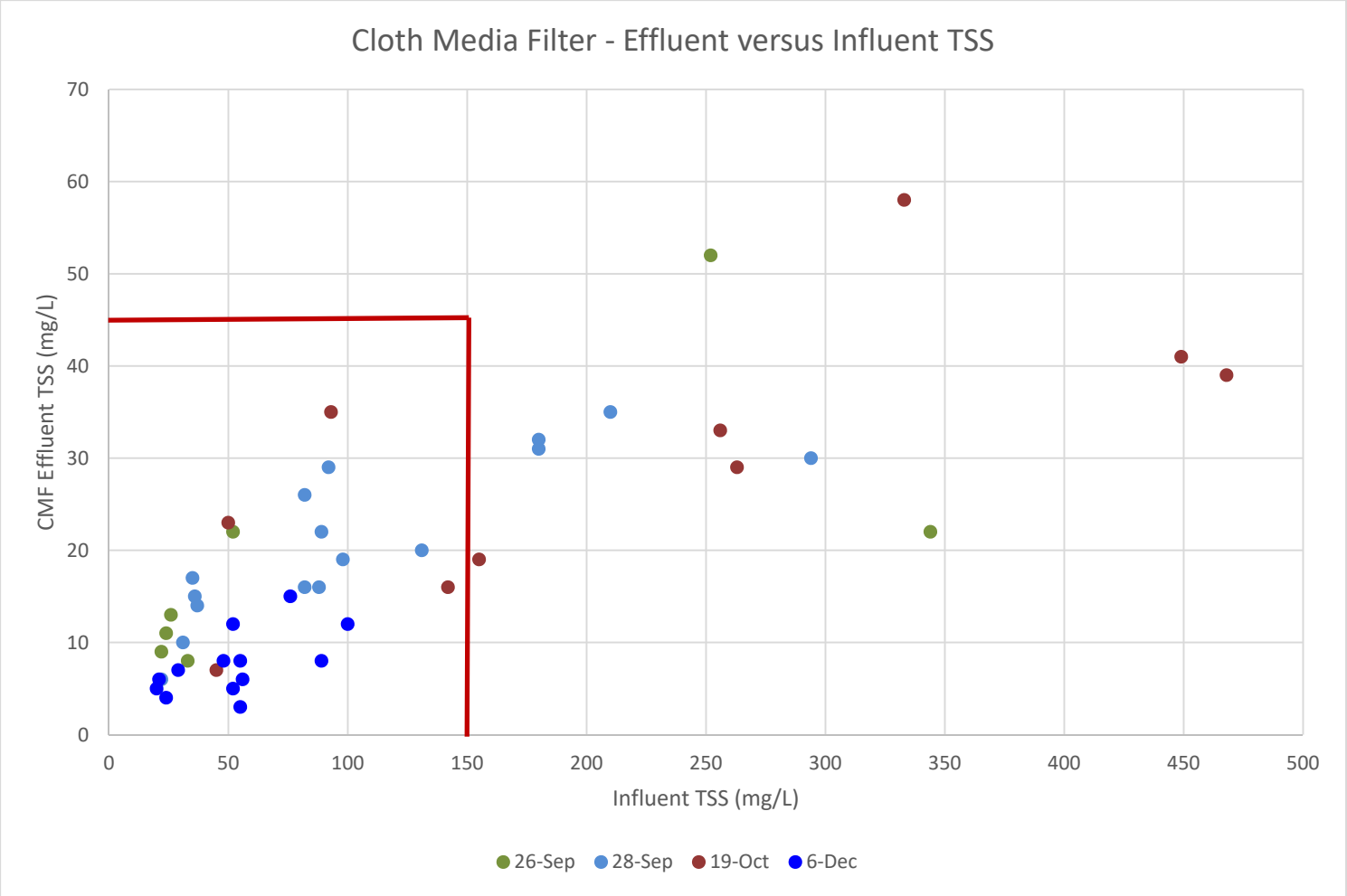
MSDGC Remote Site

CSO Treatment – 10/19/16



MSDGC Remote Site

CSO Treatment



Regulatory Update

Cause of Impairments

Cause of Impairment	Number of Causes of Impairment Reported
Pathogens	**9,874**
Nutrients	7,092
Metals (other than Mercury)	7,066
Organic Enrichment/Oxygen Depletion	6,602
Polychlorinated Biphenyls (PCBs)	6,060
Sediment	5,964
Mercury	4,860
Cause Unknown - Impaired Biota	4,741
pH/Acidity/Caustic Conditions	4,450
Temperature	3,007

Source: https://iaspub.epa.gov/waters10/attains_nation_cy.control?p_report_type=T

EPA Standards

40 CFR 133.102 & 133.105

40 CFR 133.102

(Secondary Treatment)

Parameter	7-Day Avg (mg/L)	30-Day Avg (mg/L)	30-Day %
BOD_5	45	30	85%
TSS	45	30	85%
$cBOD_5$	40	25	85%

40 CFR 133.103
Special Considerations

(a) Combined Sewers

(b) Less concentrated influent wastewater for separate sewers and combined sewers and percent removal.

40 CFR 133.105

(Equivalent to Secondary Treatment)

Parameter	7-Day Avg (mg/L)	30-Day Avg (mg/L)	30-Day %
BOD_5	65	45	65%
TSS	65	45	65%
$cBOD_5$	60	40	65%

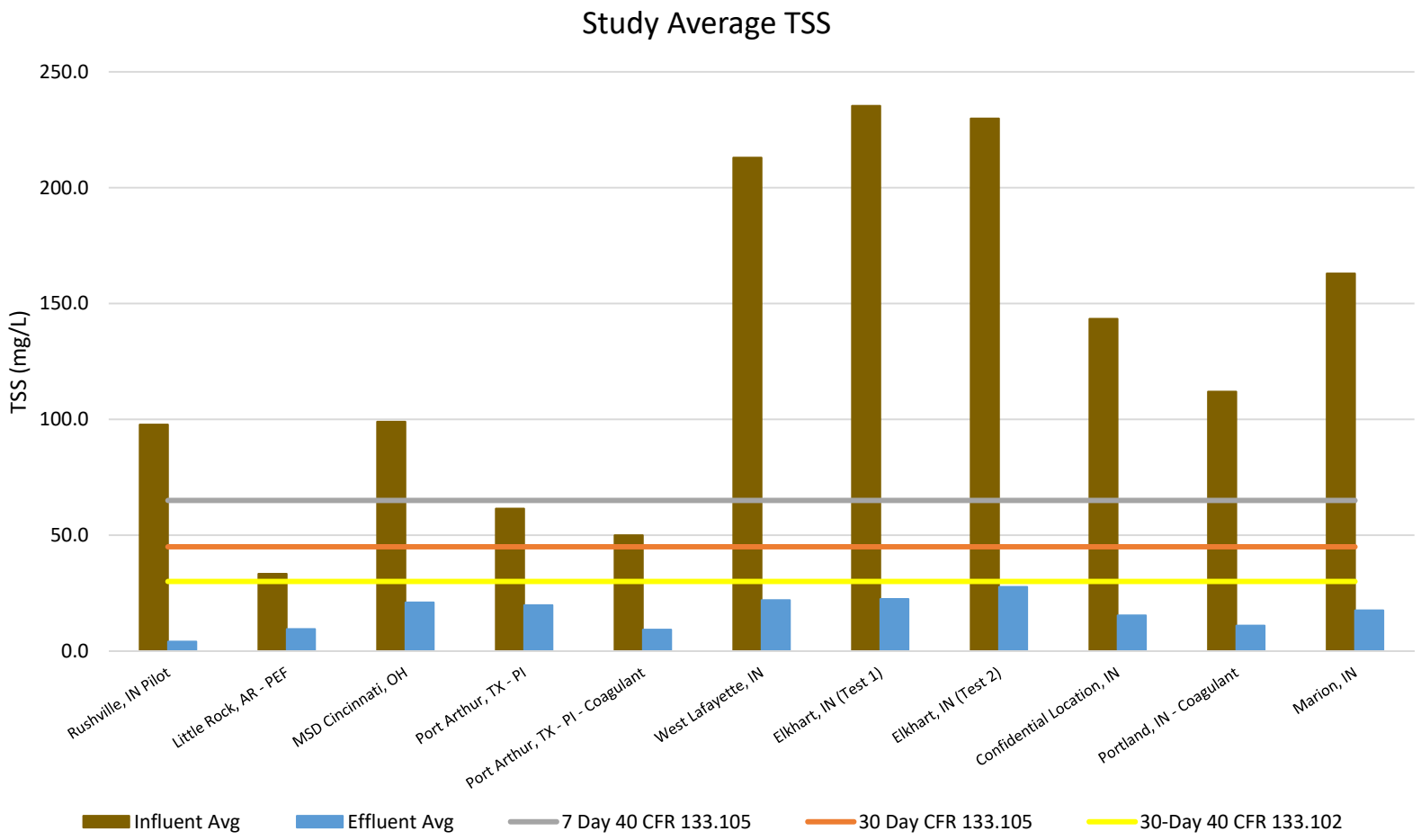
40 CFR 133.105
Eligible for Equivalent to Secondary Treatment

(1) The BOD & SS effluent concentrations consistently achievable through proper O&M of the treatment works exceed the minimum level of effluent quality set forth in 133.102 (a) & (b).

(2) Significant biological treatment.

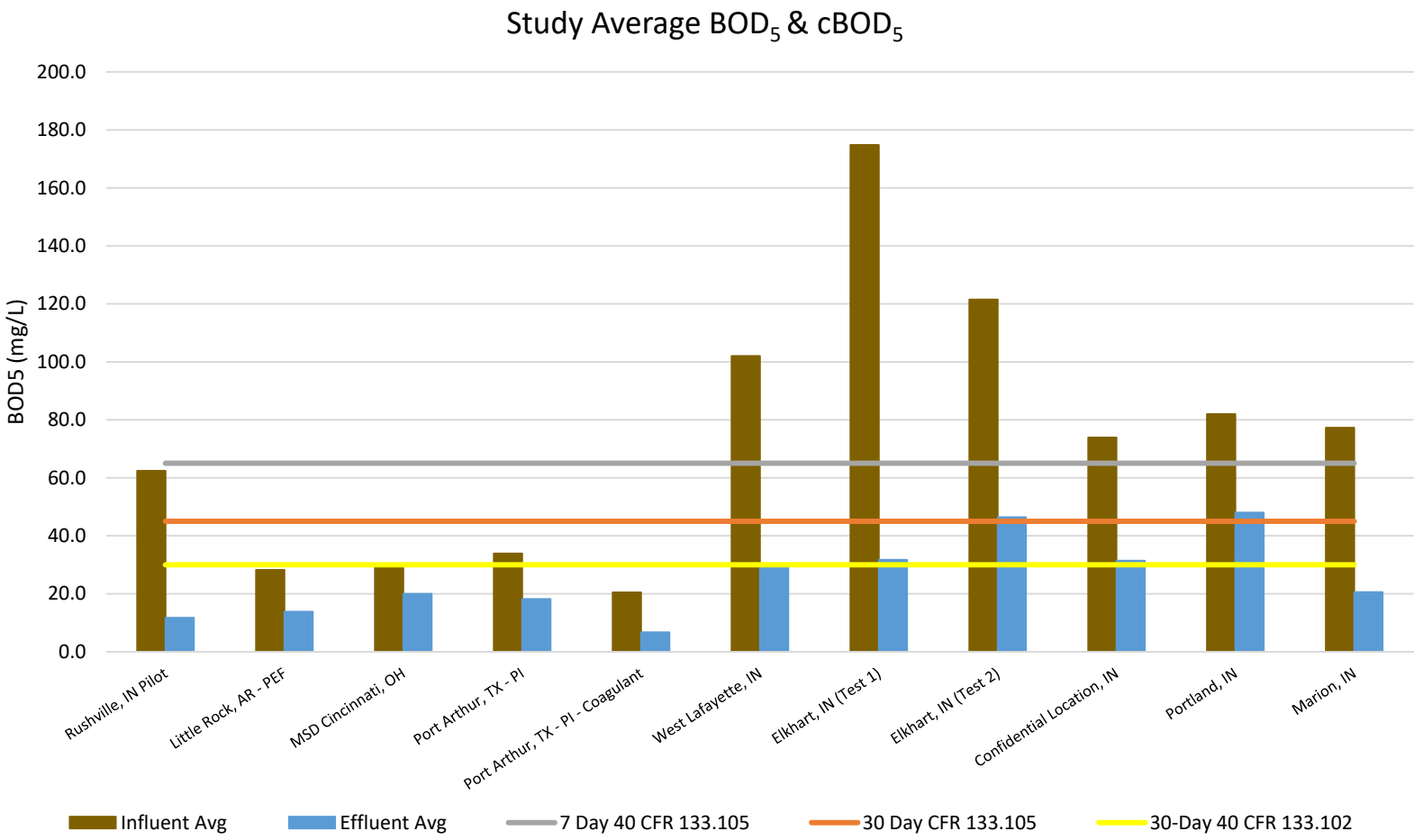
Wet Weather Piloting

Study Influent/Effluent TSS Averages

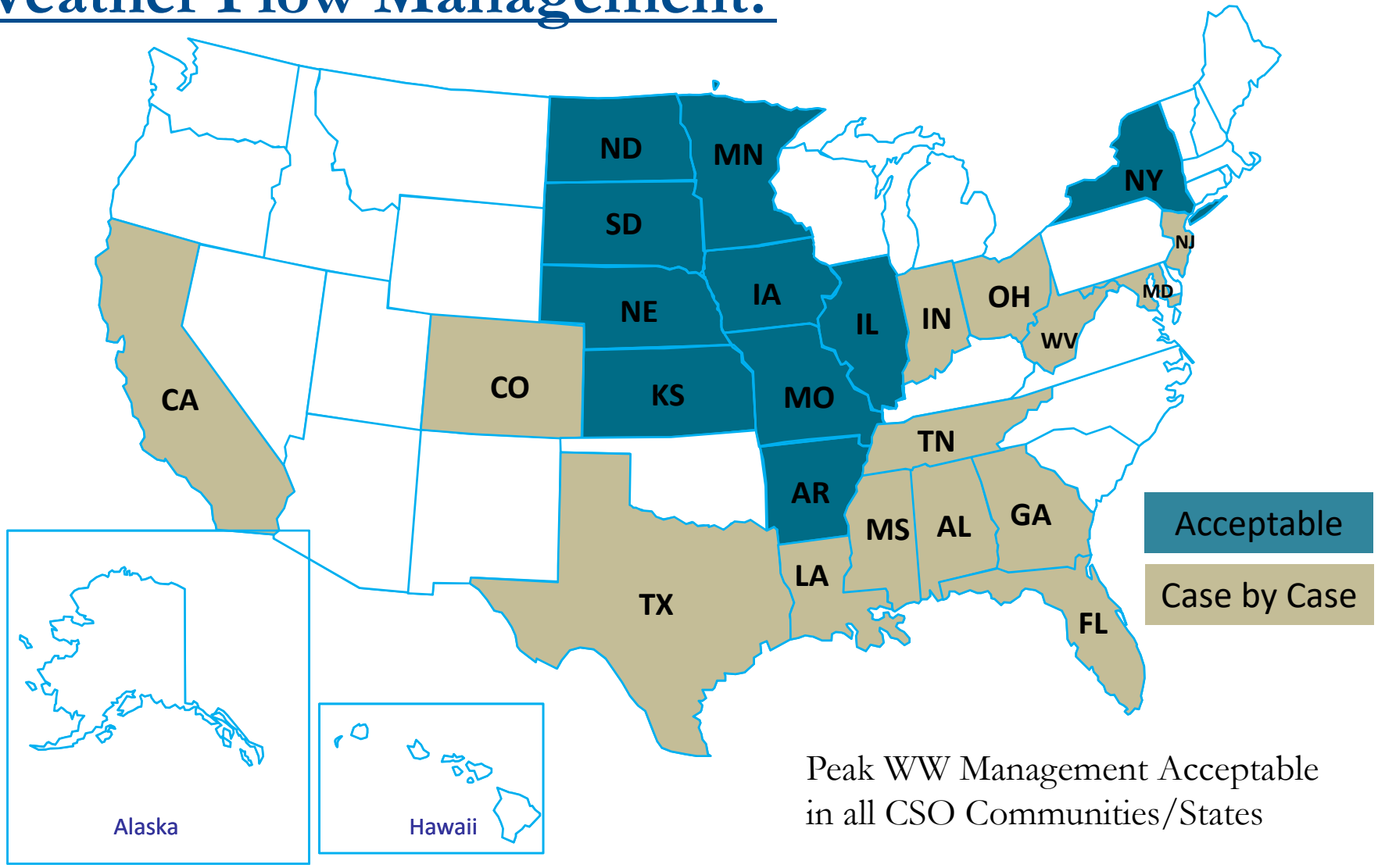


Wet Weather Piloting

Study Influent/Effluent BOD_5 & $cBOD_5$ Averages



What States Accept SSS Peak Wet Weather Flow Management?



Peak WW Management Acceptable in all CSO Communities/States

General Permit Language

Bypass / Auxiliary Treatment

- Bypass and Upset
  - (a) Any bypass is prohibited except as provided in b. and c. below:
  - (b) A bypass is not prohibited if:
    - It does not cause any discharge limitation specified in Provision I. A. of this permit to be exceeded;
    - It enters the same receiving stream as the permitted outfall and;
    - It is necessary for essential maintenance of a treatment or control facility or system to assure efficient operation of such facility or system.

General Permit Language

Bypass / Auxiliary Treatment

- Bypass and Upset
  - (c) A bypass is not prohibited and need not meet the discharge limitations specified in Provision I. A. of this permit if:
    - It is unavoidable to prevent loss of life, personal injury, or severe property damage;
    - There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime (this condition is not satisfied if adequate back-up equipment….);

Conclusion

Why AquaStorm™ EHRT?

Pile Cloth Media Filtration

- High Effluent Quality w/o Chemical
- Equivalent to Secondary Quality at Lower Cost
- Better Disinfection
  - Due to Solids Removal
  - Lower Disinfectant Dose Required
- Minimizes Pathogen Risk
- Considered BADCT by some regulators
- Lower cost than biological expansion

Why AquaStorm™ EHRT?

Pile Cloth Media Filtration

- "Non-biological peak flow secondary treatment process" per 8th Circuit Court
- Dual Use (Tertiary / Wet Weather Filtration)
- Small Footprint
- Simple to Operate, Maintain, Startup & Shutdown
- Easily enclosed in a building for remote sites
- Automatic & Remote Operation

Questions?

John Dyson
Product Manager – AquaPrime®/AquaStorm™
jdyson@aqua-aerobic.com

A certificate for (1) PDH credit will be emailed following the presentation