

# Supplemental CSO Team

Meeting No. 5

Long-Term Control Plan Permit Compliance

City of Elizabeth and  
Joint Meeting of Essex & Union Counties (JMEUC)

October 26, 2018 – 10:00 am  
Peterstown Community Center  
408 Palmer Street, Elizabeth, NJ 07202

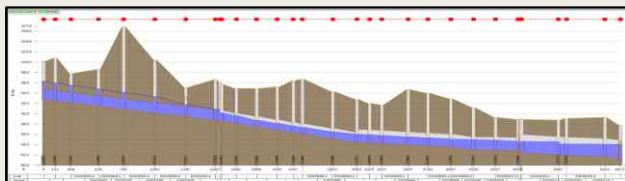
## Meeting no. 5 agenda

- Prior meeting recap
  - Results from member surveys
- Status of DEP review of July 1, 2018 submittals
  - System Characterization Reports, Public Participation Process Report, Consideration of Sensitive Areas Report, and Baseline Compliance Monitoring Program Report
- Public participation process update
- LTCP step 2 - development and evaluation of alternatives
  - Project team schedule and draft report outline
  - Grouping of CSO outfalls/basins for control objectives and planning
  - Initial discussion of CSO control objectives
  - Identification and screening of available CSO control technologies
  - Initial investigation of increasing combined sewer system flow from Elizabeth to JMEUC plant
- Bayonne Wet Weather Demonstration Project treatment technologies
- Next meeting lookahead

## Meeting no. 4 refresher

Material covered in prior meeting (6/5/2018):

- Summaries of the July 1, 2018 submissions
- Interactive surveys
- Alternatives evaluation overview



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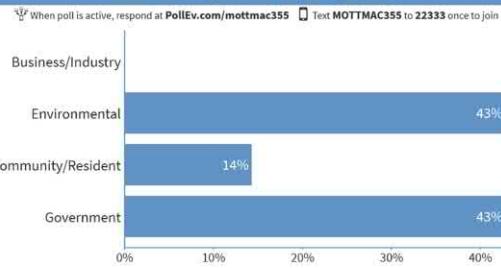
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## Results of member surveys

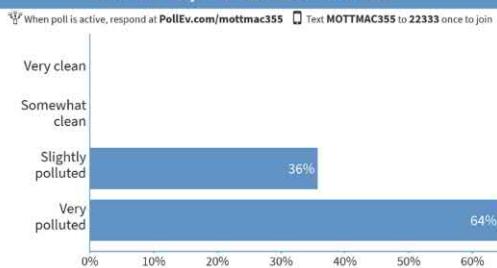
### What kind of organization do you represent?



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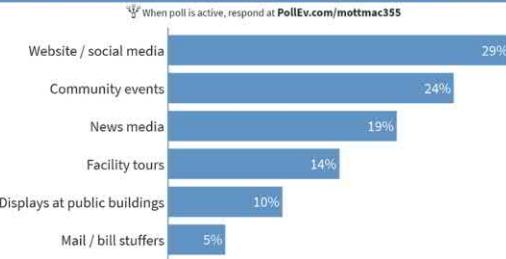
### How clean do you think the Elizabeth River is?



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## Results of member surveys

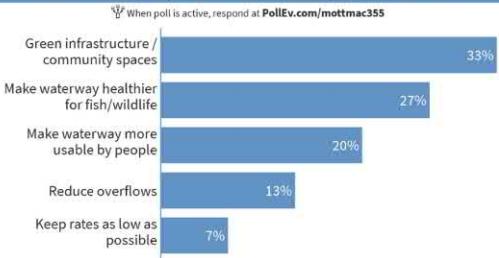
**What is the most effective way to engage with the public for CSO awareness?**



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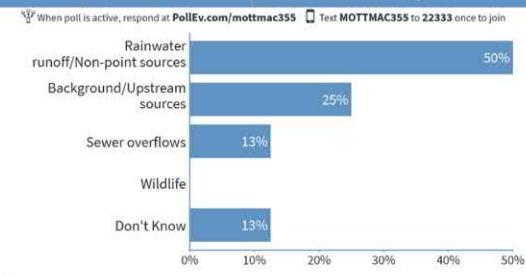
**What is the most important criteria in developing CSO controls?**



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## Results of member surveys

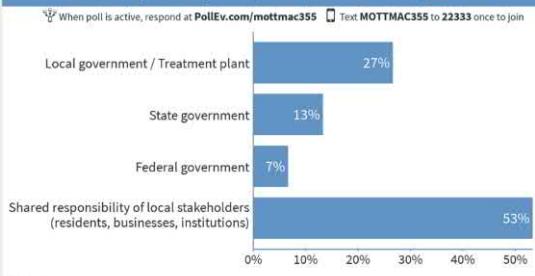
**What is the main cause of pollution in local waterways?**



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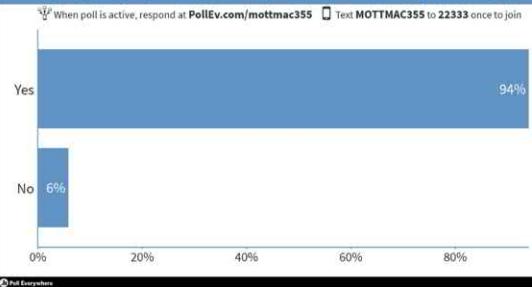
**Whose responsibility is it to protect local waters from pollution?**



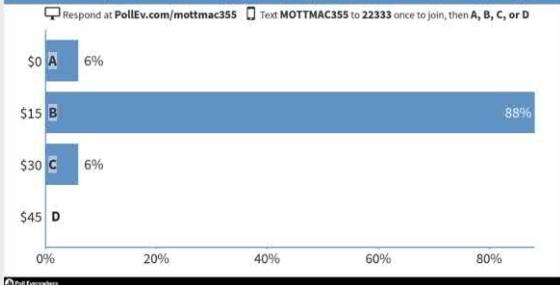
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## Results of member surveys

Would you/your group be willing to add green elements at home, like a rain garden?



What increase per month would you/your group accept for the CSO Control Program?



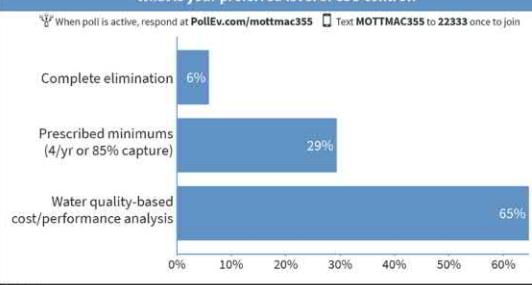
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## Results of member surveys

What is your preferred level of CSO control?



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## DEP review status – July 1, 2018 submittals

Quarterly progress meeting held on October 10, 2018

- **Consideration of Sensitive Areas Report:** NJ CSO Group report; DEP comment letter dated 9/20/2018; revised report submitted to DEP on 10/19/2018.
- **Baseline Compliance Monitoring Program Report:** NJ CSO Group report; DEP comment latter dated 9/7/2018; revised report submitted to DEP on 10/5/2018.
- **System Characterization Reports:** individual JMEUC and City of Elizabeth reports; positive verbal comments, awaiting written comments
- **Public Participation Process Report:** joint report from the City of Elizabeth and JMEUC; comment letter dated 10/12/2018; preparing response

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## Public Participation Report - Summary of NJDEP Comments

- Comment letter received October 12, 2018
- Spreadsheet format:
  1. Does the report include clear discussion of specific topics
  2. Summary of Findings
  3. Action Required
- Overview:
  - Comprehensive variety of outreach and engagement methods
  - Recognition of engagement with hydraulically connected municipalities such as Roselle Park
  - Documentation of entities invited to join Supplemental Team and responses
  - Quarterly Supplemental Team meetings, documentation of agendas and meeting materials
- Response will be provided to NJDEP by November 12, 2018

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## Action Items for Public Participation – DEP Comment Responses

Do	Measure	Identify	Continue	Consider
<ul style="list-style-type: none"> <li>Additional outreach to JMEUC separately sewer communities</li> </ul>	<ul style="list-style-type: none"> <li>Number of attendees, social media posts, flyers distributed, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Specific affected organizations</li> <li>If other languages needed</li> <li>How updates will be provided to public (social media, council meetings, website, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Surveys</li> <li>Recording comments</li> </ul>	<ul style="list-style-type: none"> <li>Public or Supplemental CSO Team review of key draft submittals</li> </ul>

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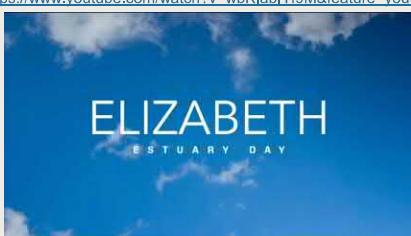
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## Public participation process update

### Public outreach and education

#### Future City – Elizabeth Estuary Day

- October 5, 2018
- Over 250 students and 40 adults
- YouTube video at:  
[Elizabeth Estuary Day 2018 – YouTube](https://www.youtube.com/watch?v=w0KlabIT9M&feature=youtu.be)  
<https://www.youtube.com/watch?v=w0KlabIT9M&feature=youtu.be>



- Elizabeth Environmental Day, scheduled for April 26, 2019



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## Interactive Survey

- We would like your feedback:

Please go to [www.pollev.com/mottmac355](http://www.pollev.com/mottmac355) on your smartphone

## Development and evaluation of alternatives

### Regulatory requirements

NJPDES Permit  
Section G.4.

The permittees shall evaluate a reasonable range of CSO control alternatives that will meet the water quality-based requirements of the CWA

The Development and Evaluation of Alternatives Report shall include a list of control alternative(s) evaluated for each CSO enabling the permittee, ...to select the alternatives to ensure the CSO controls will meet the water quality-based requirements of the CWA

The permittees shall select either the Demonstration or Presumption Approach

The permittees shall evaluate the practical and technical feasibility of the proposed CSO control alternative(s), and water quality benefits and give the highest priority to controlling CSO discharges to sensitive areas

## Which social media method would you suggest for effective LTCP messaging?

City of Elizabeth Twitter feed **A**

New Elizabeth/JMEUC CSO LTCP Twitter feed **B**

Facebook **C**

LinkedIn **D**

City of Elizabeth & JMEUC website **E**

## How would you like to review key draft submittals?

Content and summaries presented at CSO Supplemental Team meeting presentations

Review full draft submittals

Review draft Executive Summary

## What are you most interested in discussing at upcoming meetings?

- CSO receiving water quality impacts
- Approach to financial capability assessment
- Green infrastructure analysis
- Presumption vs. Demonstration approach
- Other?

PollEv event details  
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Start the presentation to see live content. Still no live content? Install the app or get help at PollEv.com/app  
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## Development and evaluation of alternatives

Regulatory requirements

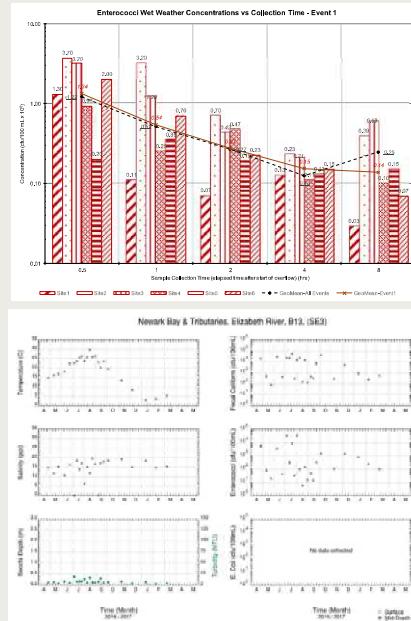
First, let's consider: "What are the pollutants of concern for CSOs?"

## Pathogens & Floatables

In NJ, earlier DEP emphasis on floatables from CSOs has largely eliminated floatables through strategies such as City's netting and screening facilities. So in this LTCP, the focus is:

## Pathogens

Other pollutants should be considered, but are not the focus of the LTCP.



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# Development and evaluation of alternatives report

## Preliminary project schedule

Milestone	Target Date
Project start-up	
Identify logical CSO outfall groups for planning purposes	September 14, 2018 (complete)
Define CSO control objectives for each outfall group	November 2, 2018
Status meeting (11-7-18) with NJDEP	October 10, 2018
Supplemental CSO Team meeting	October 26, 2018
Alternatives screening	
Cochair with NJ CSO Group on adoption/use of PVSC manual with CSO control technology descriptions and unit costs	Confirmed at September 6, 2018 meeting of the NJ CSO Group
Complete initial screening to identify viable alternatives	Mid-to Late November 2018
Status meeting (Q4-2018) with NJDEP	Early December 2018
Supplemental CSO Team meeting	Early to mid-December 2018
Alternatives evaluation – initial presentation	
Substantially complete detailed evaluation of viable alternatives:	Mid-March 2019
▪ Sizing of facilities for a range of control targets	
▪ Characterize and quantify benefits	
▪ Develop cost estimates	
Status meeting (Q1-2019) with NJDEP	Late-March 2019
Supplemental CSO Team meeting	ASAP after DEP meeting
Alternatives refinement	
Complete any additional evaluations based on stakeholder (Board, DEP Team) feedback from presentations of preliminary results	Mid-April 2019
Status meeting (if needed) with NJDEP	Mid-to late April 2019
Supplemental CSO Team meeting (if needed)	ASAP after DEP meeting
Finalization of alternatives and report submittal	
Complete any final evaluations based on stakeholder feedback.	Mid-May 2019
Complete preparation of Draft Report with final results.	
Status meeting (Q2-2019) with NJDEP	Mid-May 2019
Supplemental CSO Team meeting	ASAP after DEP meeting
Complete all revisions to Draft Report based on stakeholder feedback and submit to NJDEP	Week of June 24, 2019

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# Development and evaluation of alternatives report

## Draft report outline

### 1. Introduction

1. Regulatory Context and Report Objectives
2. Combined Sewer System and Service Area Overview
3. Previous Studies
4. Organization of Report
5. Certification

### 2. Overview of Combined Sewer Overflow Locations and Impacts on Receiving Waterbodies

### 3. CSO Control Objectives

[sub-sections for CSO outfall groups as appropriate]

### 4. Identification and Screening of Alternative CSO Control Approaches

[sub-sections for CSO outfall groups as appropriate]

### 5. Basis for Cost/Performance Considerations

1. Levels of Control
2. Estimating Costs of Controls [application of PVSC Technical Guidance Manual]

### 6. Development and Evaluation of Alternative Approaches for CSO Control

[sub-sections for CSO outfall groups as appropriate]

### 7. Conclusions Appendices

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## Development and evaluation of alternatives

Groupings of CSO outfalls/basins for control objectives and planning

By waterbody classification

By hydraulic connectivity, size, & proximity

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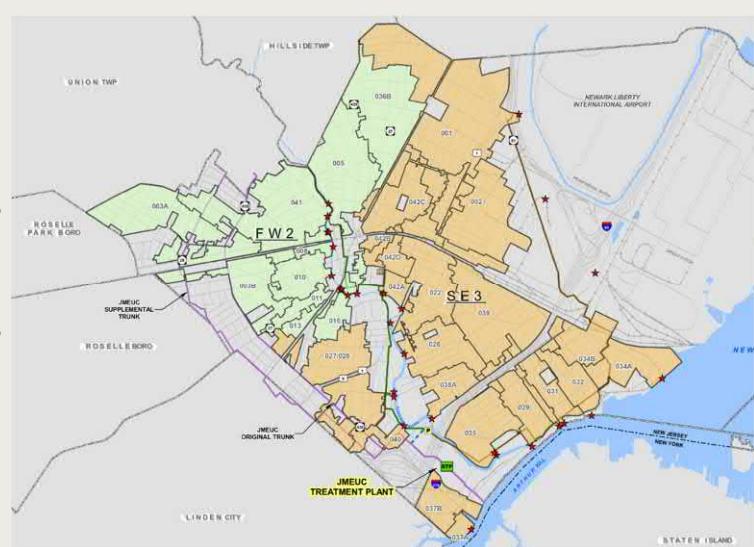
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## Development and evaluation of alternatives

CSO outfalls grouping

By waterbody classification

- FW2-NT Waters
  - Outfalls 003A, 005A, 008A, 010A, 012A, 013A, 014A, 016A, 036A, & 041A
- SE3 Waters
  - Outfalls 001A, 002A, 021A, 022A, 026A, 027A, 028A, 029A, 030A, 031A, 032A, 034A, 035A, 037A, 038A, 039A, 040A, 042A, & 043A



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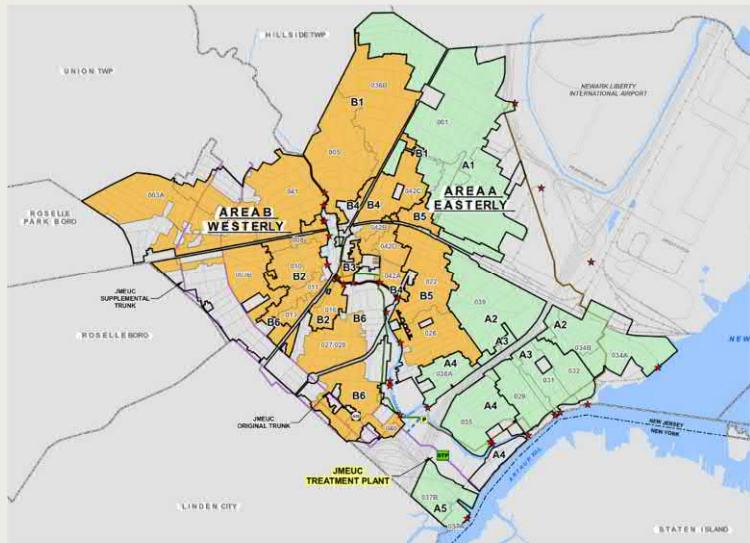
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## Development and evaluation of alternatives

CSO outfalls grouping

By hydraulic connectivity, size, & proximity

- Area A - Easterly Interceptor
  - A1 – 001A & 002A
  - A2 – 034A & 039A
  - A3 – 029A, 030A, 031A, 032A
  - A4 – 035A /043A & 038A
  - A5 – 037A
- Area B – Westerly Interceptor
  - B1 – 003A, 005A, 036A & 041A
  - B2 – 008A, 010A, 013A, & 016A
  - B3 – 012A & 014A
  - B4 – 042
  - B5 – 021A, 022A, & 026A
  - B6 – 027A, 028A, & 040A



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## Development and evaluation of alternatives

Initial discussion of CSO control objectives

### Presumption vs. Demonstration Approach

- Alternative methods for developing a water quality-based control program in the LTCP
  - Presumption approach (performance based)
  - Demonstration approach (water quality based)
  - Combination of both

### Presumption Approach

- Presumes that implementation of controls needed to meet defined performance criteria (e.g., controlling CSOs to no more than an average of four overflow events per year) will provide an adequate level of protection to meet the WQ-based objectives of the CWA.

### Demonstration Approach

- Requires municipality to demonstrate that:
  - The LTCP is adequate to meet WQ standards
  - Remaining CSO discharges will not preclude attainment of WQ standards
  - LTCP provides maximum pollutant reduction benefits *reasonably attainable*
- Water quality data and modeling to obtain sufficient information to identify the appropriate level of CSO control
- Post-construction compliance monitoring

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## Development and evaluation of alternatives

Initial discussion of CSO control objectives

### Presumption Approach: Performance Criteria

- Reduction of CSO frequency to an average of 4 overflows per year (with discretion to add 2 additional overflows)
- Elimination or capture for treatment of 85% of the volume of combined sewage in CSS during precipitation events on an "average annual basis."
- Elimination or capture for treatment of the mass of pollutants in CSS equal to 85% control by volume.
- Still requires post-construction compliance monitoring

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## Development and evaluation of alternatives

Initial discussion of CSO control objectives

### Coordination with NJ CSO Group

- September 6 meeting of NJ CSO Group with DEP
- Water quality modeling of harbor
  - Baseline CSO and plant effluent flows and concentrations provided to PVSC
  - Model runs for baseline and full CSO removal scenarios to set boundaries on CSO impacts (by October 31)
- Objectives and approach may vary by receiving water and CSO outfall groups

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## Development and evaluation of alternatives

### CSO control technology screening

Logical decision-making process: Screen different control technologies before detailed evaluations

#### Screening based on:

- Predicted effectiveness
  - Bacteria reduction
  - Volume reduction
  - Basement / street flooding control
- Implementation and operation factors
  - Land requirements
  - Suitable site locations
  - Maintenance intensity and reliability
- Cost and performance data

#### NJPDES CSO Permit list of alternatives

- Green Infrastructure
- Collection System Storage
- Sewage Treatment Plant (STP) Expansion & Storage
- Infiltration / Inflow Reduction in entire connected system
- Sewer Separation
- CSO Discharge Treatment
- CSO Related Bypass at STP (Blending)

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## Development and evaluation of alternatives

### CSO control technology screening

#### Collection System Technologies

- Combined Sewer Optimization
  - Additional Conveyance
  - Regulator Modifications
  - Outfall Consolidation/Relocation
  - Real Time Control
- Combined Sewer Separation
  - Roof Leader Disconnection
  - Sump Pump Disconnection
  - Combined Sewer Separation Operation and Maintenance
    - I/I Reduction
    - Advanced System Inspection & Maintenance
    - Combined Sewer Flushing
    - Catch Basin Cleaning

#### Storage Technologies

- Linear Storage
  - Pipeline
  - Tunnel
- Point Storage
  - Tank (Above or Below Ground)
  - Industrial Discharge Detention

#### Treatment Technologies

- Satellite / End-of-Pipe Facility
  - Vortex Separators
  - Screens and Trash Racks
  - Netting
  - Contaminant Booms
  - Baffles
  - Disinfection & Satellite Treatment
  - High Rate Physical/Chemical Treatment (High Rate Clarification Process - ActiFlo)
  - High Rate Physical (Fuzzy Filters)
- Treatment Plant
  - Additional Treatment Capacity
  - Wet Weather Blending
  - Industrial Pretreatment Program

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## Development and evaluation of alternatives

### CSO control technology screening



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## Development and evaluation of alternatives

### Increase conveyance and treatment

#### Initial investigation of increasing combined sewer system flow from Elizabeth to JMEUC plant

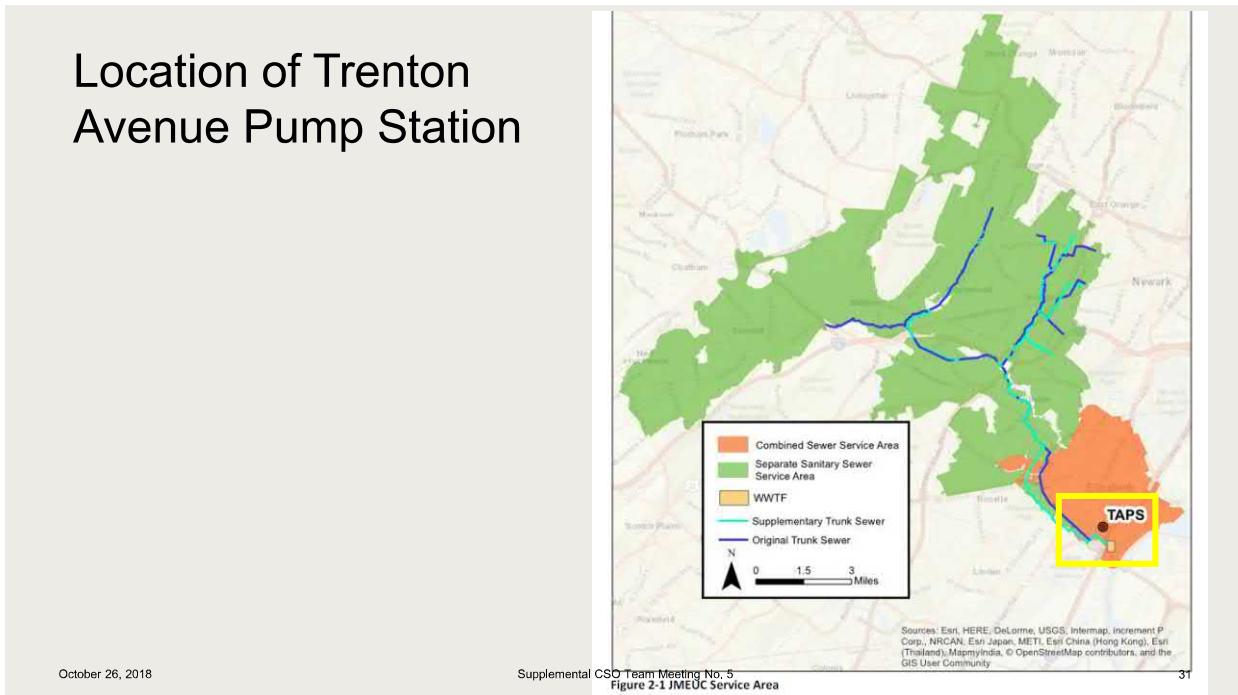
- TAPS pumping station location
- TAPS pumping rate
- Peak timing of TAPS flow versus sanitary sewer system flows from JMEUC service area
- Impacts on hydraulic grade line in trunk sewers

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## Location of Trenton Avenue Pump Station

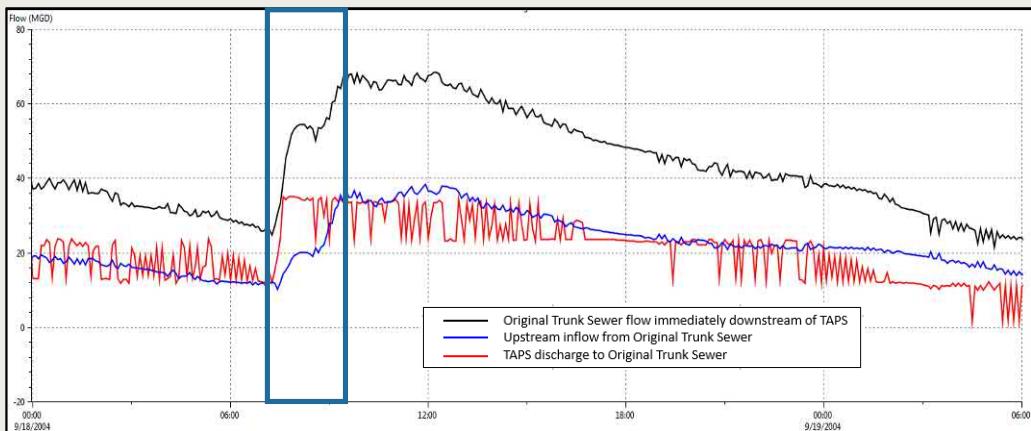


## Location of Trenton Avenue Pump Station

(from Figure 2-2 in JMEUC SCR; source: City of Elizabeth SCR; both June 2018)



## Peak flow timing for the Elizabeth combined sewer system and for the upstream sanitary sewer portions of the JMEUC trunk sewer system



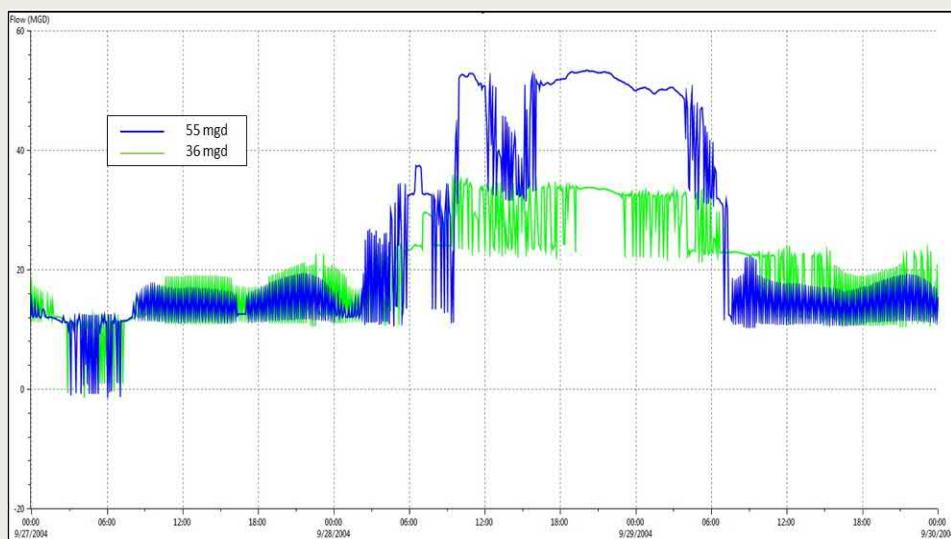
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## Modeled Flow from TAPS to JMEUC WWTF

- 36 mgd – current max rate per contractual limit
- 55 mgd – potential future max rate per physical limit of pumping facilities

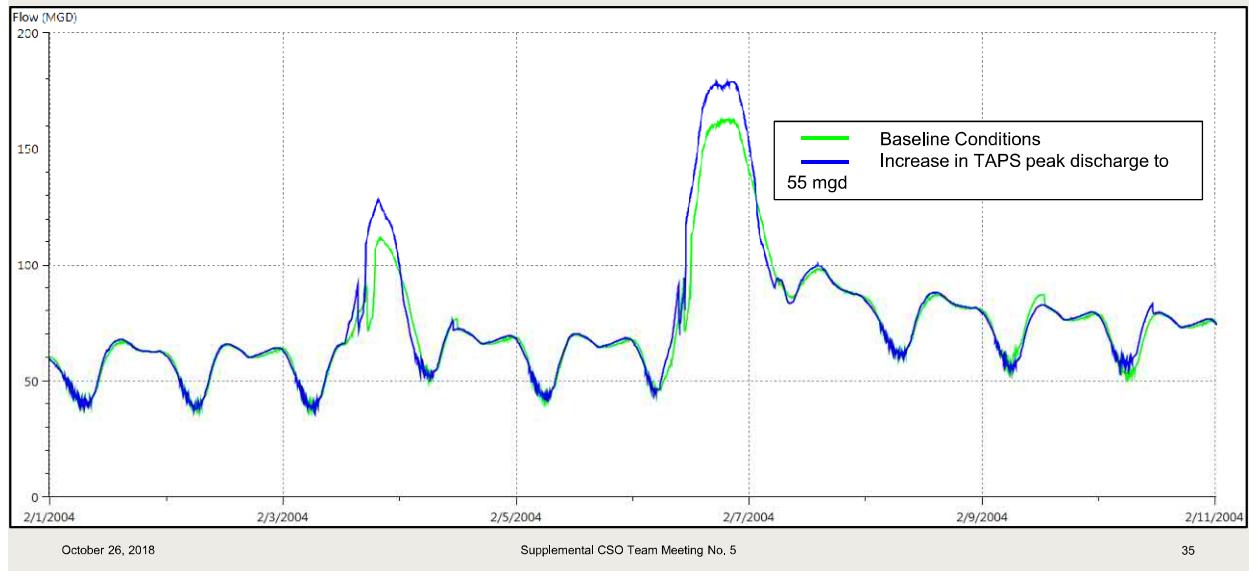


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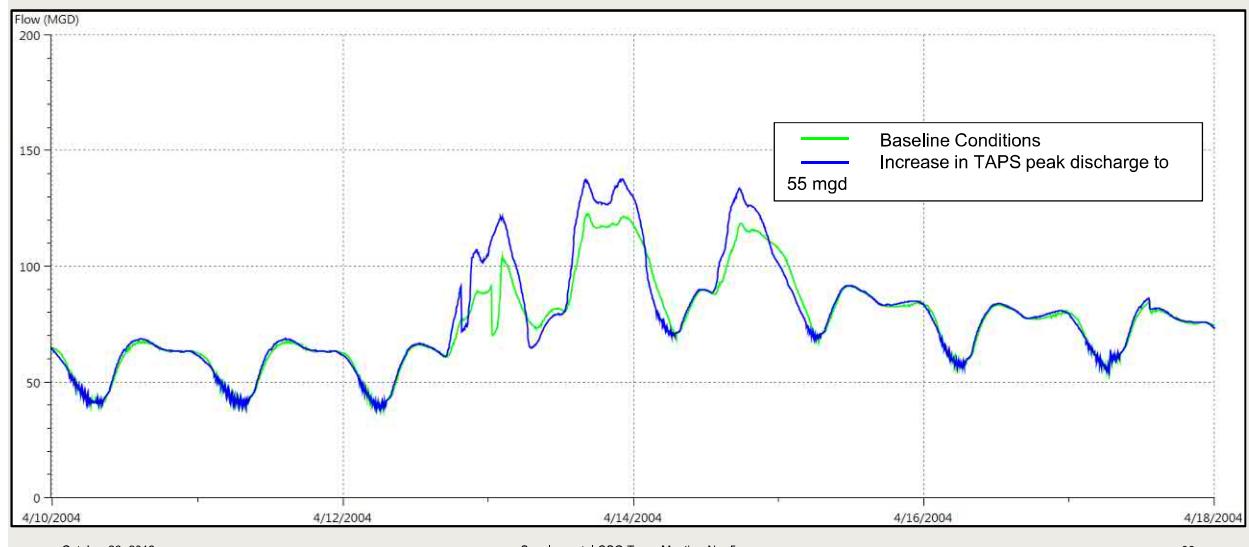
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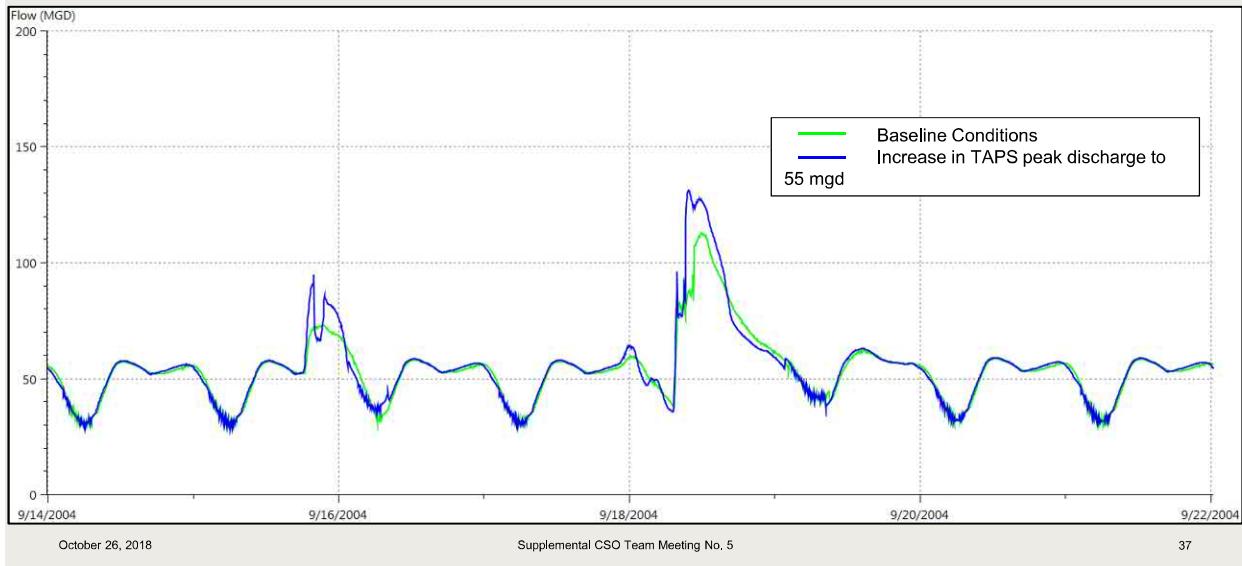
## Simulated flow at WWTF – 2/6/2004 Event



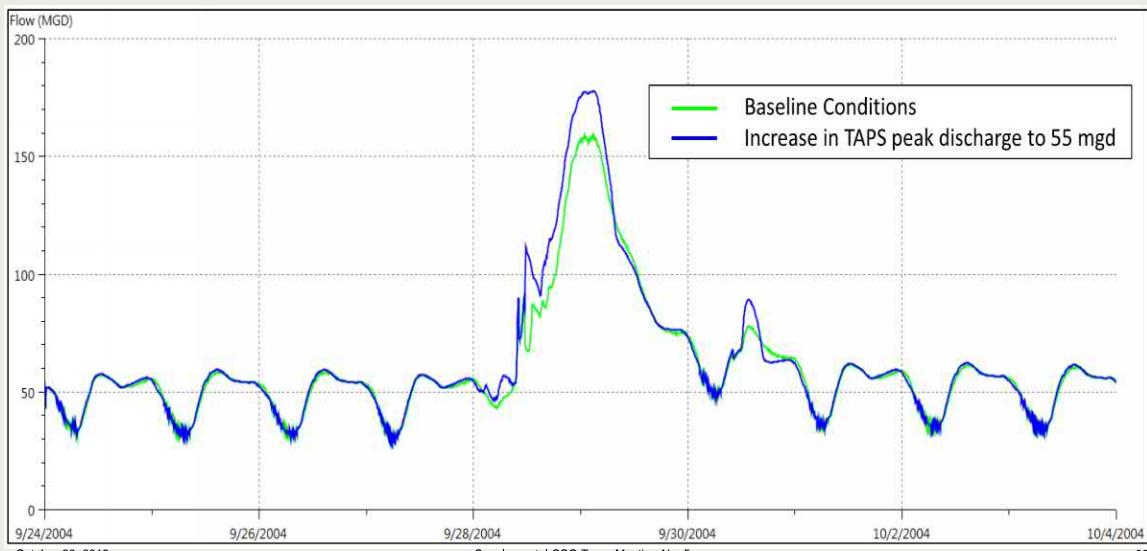
## Simulated flow at WWTF – 4/12/2004 Event



## Simulated flow at WWTF – 9/17/2004 Event



## Simulated flow at WWTF – 9/28/2004 Event



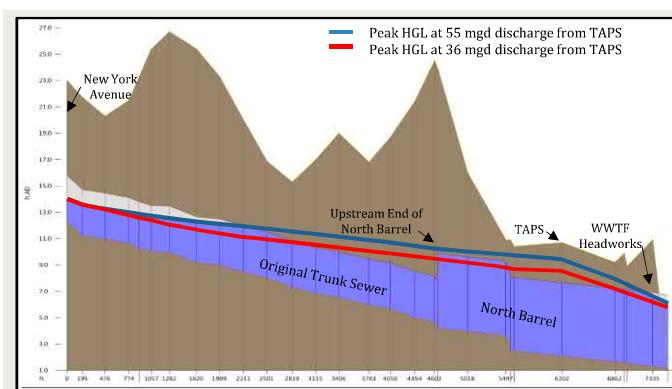
## Upstream extent of hydraulic grade line impacts of increased TAPS flow



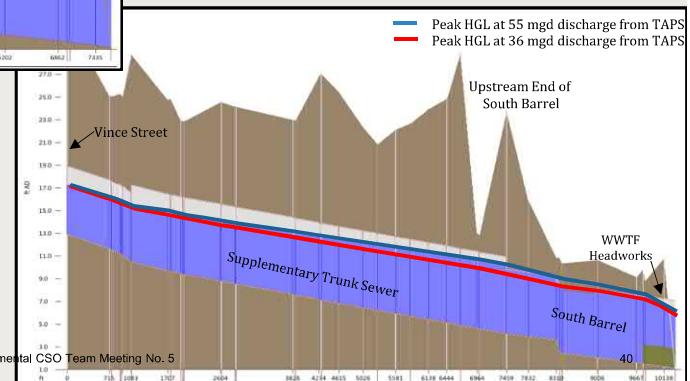
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Comparison of Peak HGL along the Trunk Sewers (September 28, 2004 Storm)



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## Preliminary findings on typical year CSO performance

Increasing Trenton Avenue PS maximum discharge to 55 Mgal/day, with existing collection and treatment system, predicted to result in:

- ↓ 17.6% reduction in annual total overflow volume, from 1065 to 878 Mgal.
- ↓ 12.5% reduction in the number of overflow events per year, from 56 to 49 Mgal.
- ↓ 10.1% reduction in the overflow volume for the 5th largest event, from approximately 56.7 to 51 Mgal.
- ↓ Much more pronounced impacts nearer to the pump station, with an estimated 71.4% reduction in total annual overflow volume at CSO Outfall 035A, from 81.3 to 23.2 Mgal.

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## Bayonne Wet Weather Treatment Demonstration Project: treatment technologies

### Project objectives

- Gather performance data & evaluate the effectiveness of CSO treatment technologies
  - Under field conditions
  - For solids removal & disinfection
  - At remote satellite locations
- Gain improved understanding of their potential use for satellite wet weather treatment, including CSOs
  - Reliability
  - Scalability
  - Anticipated capital and O&M costs



Source: NJDEP, [https://www.nj.gov/dep/dwq/pdf/WWFTDDP\\_Presentation.pptx](https://www.nj.gov/dep/dwq/pdf/WWFTDDP_Presentation.pptx)

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## Bayonne Wet Weather Treatment Demonstration Project

Six (6) pilot technologies tested

Function	Type	Technology
Solid removal	Vortex	Storm King
Solid removal	Plate settler unit	Terre Kleen
Enhanced solid removal	Compressed media filter	Flex Filter
Disinfection	Low pressure UV	Trojan
Disinfection	Medium pressure UV	Aquionics
Disinfection	Peracetic acid (PAA)	Injexx/Verdent

Selected based on:

- Suitability for satellite facilities
- Promising data on CSO performance
- Simple operation / low maintenance
- Small footprint
- Cost

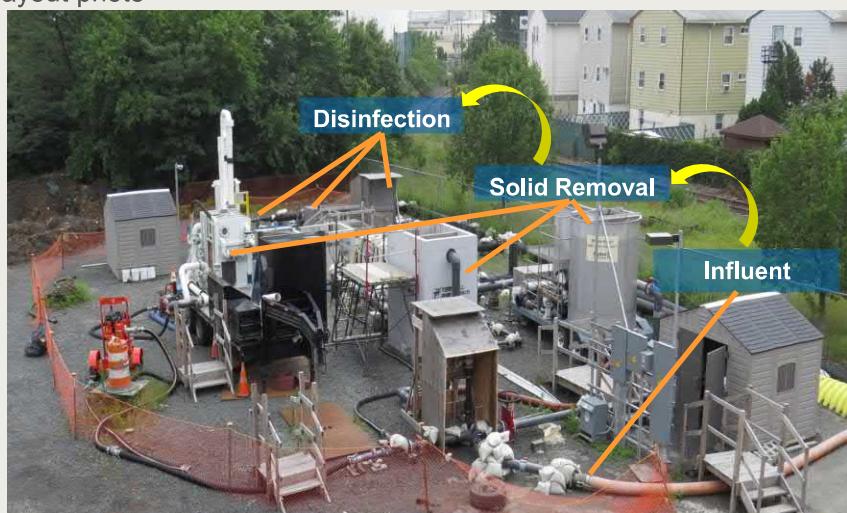
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## Bayonne Wet Weather Treatment Demonstration Project

Project site layout photo



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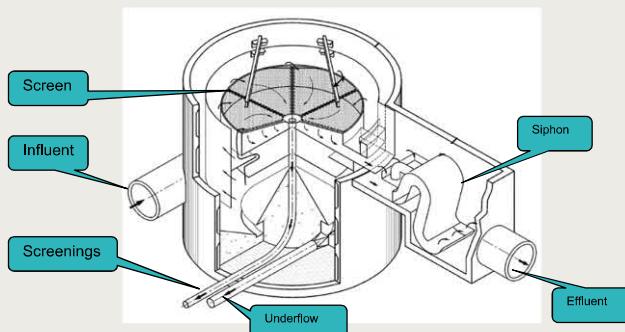
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## Bayonne Wet Weather Treatment Demonstration Project

High rate solids removal

### Storm King



Schematic



Typical full scale installation

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## Bayonne Wet Weather Treatment Demonstration Project

Enhanced high rate solids removal

### Flex Filter (WesTech WWETCO)

- High rate filtration system
- Uses synthetic compressible media
- Incoming flow applies hydrostatic force to the compression bladder causing tapered compression
- Densely compressed media at the bottom, expanded bed toward the surface
- Filter requires backwash: stop feed, which decompresses media; apply air scour and backwash water



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## Bayonne Wet Weather Treatment Demonstration Project

### General findings / observations

#### Course solids must be controlled!

- Course screening should precede any treatment scenarios.
- CSO Permit requires solids/floating removal equal to or greater than  $\frac{1}{2}$  inch; primary screening must meet this requirement.

#### Substantial prior volatile suspended solids (VSS) removal required for an effective disinfection process.

- Total suspended solids (TSS) have 2 components
  - Fixed suspended solids (FSS): primarily grit and sediment material
  - Volatile suspended solids (VSS): primarily organic material

VSS removal required for effective disinfection

Goal:  
pathogen reduction

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## Bayonne Wet Weather Treatment Demonstration Project

### Summary of results

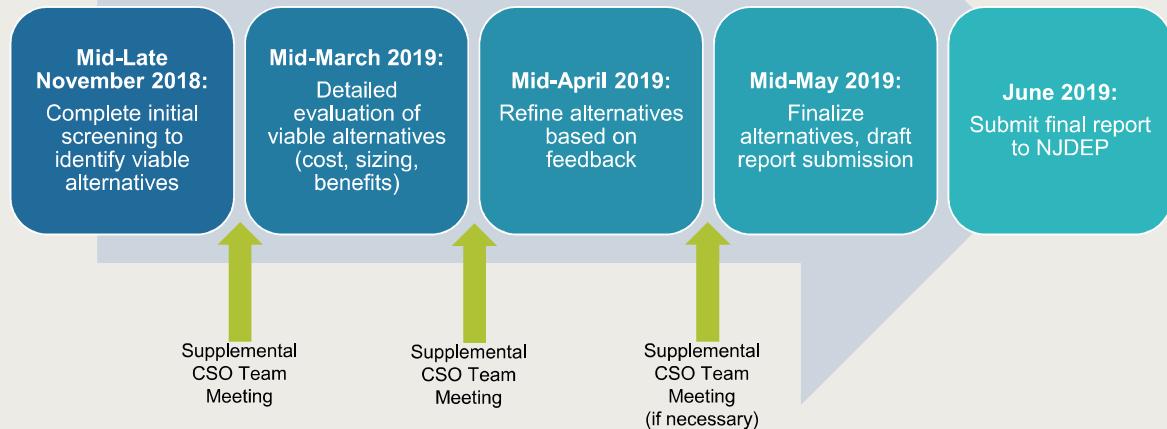
High-rate solids removal (Storm King & Terre Kleen)	Enhanced high-rate solids removal (Flex Filter)	UV Disinfection	Peracetic Acid (PAA) Chemical Disinfection
<ul style="list-style-type: none"><li>• Effective for grit removal (heavier solids)</li><li>• Unable to reduce solids loadings for UV disinfection</li><li>• Low volatile suspended solids (VSS) removal overall</li><li>• Low organic removal rates</li></ul>	<ul style="list-style-type: none"><li>• Filter was effective, but required shorter run time and frequent backwash.</li><li>• Average TSS (FSS + VSS) removal in most runs: close to 90%.</li><li>• Effective on its own for UV pretreatment.</li><li>• Effective for removal of other pollutants.</li></ul>	<ul style="list-style-type: none"><li>• UV transmittance (UVT) decreases as TSS, COD, &amp; CBOD increases</li><li>• Lower UVT requires higher UV output (more bulbs)</li><li>• Both low &amp; medium pressure units capable of achieving water quality objectives for pathogen reduction, but only if preceded by compressed media filter (Flex Filter)</li></ul>	<ul style="list-style-type: none"><li>• Effective disinfectant at comparable or lower dosages to chlorination.</li><li>• PAA contact time of 3 to 6 minutes were effective, compared to typical 30 minutes for chlorine.</li><li>• Less toxic than chlorine disinfection (no by products) and no dechlorination requirements.</li><li>• More corrosive and costly.</li></ul>

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## Next Steps – Timeline



## Next meeting lookahead

### Next Supplemental CSO Team meetings

Mid December 2018 – Early January 2019

March – April 2019

### Focusing on development and evaluation of alternatives report

- List of alternatives
- Screening for viable alternatives
- Sizing and costing of viable alternatives
- Modeling for CSO performance
- Draft report sections



# Questions?



# Thank you

City of Elizabeth and  
Joint Meeting of Essex & Union Counties (JMEUC)

**Supplemental CSO Team**

Meeting No. 5  
Long-Term Control Plan Permit Compliance