15. Appendix A – NJDEP DEAR Approval Letters

BCUA DEAR Approval Letter, February 12, 2020

Fort Lee DEAR Approval Letter, February 12, 2020

Hackensack DEAR Approval Letter, February 12, 2020

Ridgefield Park DEAR Approval Letter, February 12, 2020

Letter to NJDEP Requesting Defining the Hydraulically Connected System and Segments, April 24, 2020

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02B
Water Pollution Management Element
Bureau of Surface Water Permitting
P.O. Box 420 – 401 E State St
Trenton, NJ 08625-0420
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CATHERINE R. McCABE
Commissioner

February 12, 2019

Robert Laux, Executive Director
Bergen County Utilities Authority
P.O. Box 9 – 298 Mehrhof Road
Little Ferry, NJ 07643

Honorable Mark Sokolich
Borough of Fort Lee
309 Main Street
Fort Lee, NJ 07024

Susan Banzon, Project Manager
City of Hackensack
65 Central Avenue
Hackensack, NJ 07601

Hugo Poli, Commissioner of Department of Public Works
Ridgefield Park Village
234 Main Street
Ridgefield Park, NJ 07660

Re: Approval of Development and Evaluation of Alternatives Controls
Bergen County Utilities Authority (BCUA), NJPDES Permit No. NJ0020028
Borough of Fort Lee, NJPDES Permit No. NJ0034517
City of Hackensack, NJPDES Permit No. NJ0108766
Village of Ridgefield Park, NJPDES Permit No. NJ0109118

Dear Permittees:

Thank you for your submission dated November 27, 2019 which serves to update your July 1, 2019 submission entitled "Development and Evaluation of Alternatives Controls" as submitted to the New Jersey Department of Environmental Protection (the Department or NJDEP). This report and subsequent revision were submitted in a timely manner and were prepared in response to Part IV.D.3.v of the above referenced NJPDES permits. The report is part of the development of the Long-Term Control Plan (LTCP) submittal requirements where the next deliverable is due on June 1, 2020.

The "Development and Evaluation of Alternatives Controls" concerns the Bergen County Utilities Authority (BCUA) Little Ferry Sewage Treatment Plant (STP) with individual sections for the combined sewer municipalities within the BCUA sewer service area namely the City of Hackensack, Borough of Fort Lee, and the Village of Ridgefield Park. This subject letter serves to provide a response to this report where approval of this report serves to fulfill Part IV.D.3.b.v. Separate comment letters specific to Sections 13, 14 and 15 have been provided under separate cover.

The overall objective of the Development and Evaluation of Alternatives Report is to develop and evaluate a range of CSO control alternatives that meet the requirements of the Federal CSO Control Policy Section II.C.4, N.J.A.C. 7:14A-11, Appendix C, and the USEPA Combined Sewer Overflows Guidance for Long-Term Control Plan (EPA 832-B-95-002). Such evaluation shall include a range of CSO control alternatives for eliminating, reducing, or treating CSO discharge events. This subject report builds on other previously

submitted LTCP reports referenced in Part IV.D.3.b of the NJPDES permit, which includes an approved hydrologic, hydraulic and water quality model and other information in the July 1, 2018 "Sewer System Characterization Report" (approved by the Department on March 11, 2019); the July 1, 2018 "Supplemental CSO Team Public Participation Process Report" (approved by the Department on June 26, 2019); the June 27, 2018 "BCUA CSO Group Public Participation Process Report" (approved by the Department on June 26, 2019); the June 30, 2018 "NJCSO Group Compliance Monitoring Program Report" (approved by the Department on March 1, 2019); and the June 2018 "Identification of Sensitive Areas Report" (approved by the Department on April 8, 2019).

The Department provided technical comments on your "Development and Evaluation of Alternatives Controls" on October 3, 2019. In response to that letter, the Department received a revised report on November 25, 2019. Based on a review of the revised information, the Department has determined that all technical comments have been addressed but would like to comment on certain aspects of that submission and asks that additional detail be provided as part of the LTCP as due on June 1, 2020. Comments are as follows:

Comment 1

Comment 3 of the Department's October 3, 2019 letter concerns the topic of public participation. In the revised document BCUA acknowledged the requirement for public participation during the 'Selection and Implementation of Alternatives,' (SIAR); however the intent of Comment 3 in the October 3, 2019 letter is broader. The intent of Comment 3 is to have the comprehensive SIAR include a full description of the public participation activities, including feedback, that occurred for all 4 BCUA Group CSO permittees to update the previously submitted June 2018 Public Participation Process Reports. This will ensure that a full description of pubic participation throughout all three steps of the LTCP is included in the LTCP submission.

Comment 2

Comment 11 of the October 3, 2019 letter concerns coordination by the BCUA CSO group particularly in reference to current average and peak conveyance capacity of the interceptor as well as current wet weather conveyance capacity of the interceptor. Similarly, Comment 13 concerns the relationship to the affected CSO outfalls as a result of an STP expansion and/or bypass. To illustrate this point, Comment 13 is stated as follows:

> "There is discussion regarding STP expansion and bypass within the report in Sections 4.4 (Sewage Treatment Plant Expansion or Storage), 8.2.1 (Control Program 1 – Expansion of WPCF Capacity), and 8.2.2 (Control Program 2 – Wet Weather Blending). The report evaluates a potential expansion to the estimated wet weather treatment capacity from 120 MGD to between 149 and 235 MGD as well as the wet weather bypass of 90 or 180 MGD. However, it is unclear how these changes would affect the frequency or volume of combined sewer overflows. In the event that the BCUA WPCF is expanded with or without a CSO related bypass, please describe the resultant effect on CSO volumes and events for the combined sewer municipalities for all of the increases in STP flows referenced in this section."

BCUA's response to Comment 13 is as follows:

> "The BCUA has no CSO outfalls, and the flow from the municipal permittees is controlled by the regulators, so there is no impact on overflows due to plant expansion or bypass. The information regarding plant expansion and the estimated costs along with the interceptor capacity, has been provided to the municipal permittees. If during the Selection and Implementation of Alternatives, the

municipal permittees wish to consider sending additional flow to the BCUA WPCF, the impacts to overflow volumes will be evaluated in the overall model."

The Department acknowledges that BCUA has no CSO outfalls; however, the Development and Evaluation of Alternatives Report (DEAR) is intended to be a coordinated effort amongst the Borough of Fort Lee, the Village of Ridgefield Park, and the City of Hackensack. Plant expansion and bypass are two alternatives that are required to evaluated as part of the DEAR and the Department does not necessarily agree that plant expansion or bypass will have no effect on CSO overflow volumes and frequencies as stated in this comment. Please expand on the impacts of plant expansion and bypass in the LTCP.

In addition, the Table in the Executive Summary lists the Overpeck Valley Relief Sewer as having a conveyance capacity of 8 MGD, however Table 8-9 (Peak Transport Flow to the WPCF) lists the same capacity as 18 MGD. For the calculations to add up to the 210 MGD total, it appears that the correct value is 18 MGD. Please clarify in the LTCP.

Comment 3

BCUA serves three combined sewer municipalities namely the Borough of Fort Lee, the Village of Ridgefield Park and the City of Hackensack. Percent capture for each of the three municipalities is referenced within the Executive Summary of the Development and Evaluation of Alternatives Controls as well as within Attachment 13 (Borough of Fort Lee Development and Evaluation of Alternatives Report); Attachment 14 (City of Hackensack Combined Sewer System Development and Evaluation of Alternatives Report); and Attachment 15 (Village of Ridgefield Park Development and Evaluation of Alternatives Report). Specifically, these permittees contend that percent capture as part of the "2015 Baseline" is 84.7% for the Borough of Fort Lee (Executive Summary, page 6), 69.5% for the Village of Ridgefield Park (Executive Summary, page 13),. and 68% for the City of Hackensack (Table 7-2: Performance Results Summary).

While the Department is approving the Development and Evaluation of Alternatives Controls, the Department is not approving these percent capture values as it reserves the right to comment on the resultant calculations as part of the LTCP process. Note that similar comments have been made in each of the individual municipality reports. In addition, the Department reserves the right to require a breakdown of percent capture results by subcatchment in order to approve any percent capture calculation, as well as a clear definition of hydraulically connected system.

In sum, conditional on the above issue being further discussed within the LTCP, the Department has determined that the Development and Evaluation of Alternatives Controls is hereby approved and that this permit condition is now satisfied.

The Department looks forward to submission of the Selection and Implementation of the LTCP as due on June 1, 2020. Please let us know if you have any questions regarding submission of that report.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water Permitting

3

C: Marco Alebus, Bureau of Surface Water Permitting
Dayvonn Jones, Bureau of Surface Water Permitting
Nancy Kempel, CSO Team Leader, Bureau of NonPoint Pollution Control
Dwayne Kobesky, Bureau of Surface Water Permitting
Johnathan Lakhicharran, Bureau of Surface Water Permitting
Joe Mannick, Bureau of Surface Water Permitting

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CATHERINE R. McCABE
Commissioner

Via E-mail
February 12, 2020

Honorable Mark Sokolich
Borough of Fort Lee
309 Main Street
Fort Lee, NJ 07024

Re: Review of Development and Evaluation of Alternatives Report
Borough of Fort Lee, NJPDES Permit No. NJ0034517

Dear Mayor Sokolich:

Thank you for your most recent submission dated November 27, 2019 which serves to update your June 2019 submission entitled "Development and Evaluation of Alternatives Controls" as submitted to the New Jersey Department of Environmental Protection (the Department or NJDEP)). This report contains the "Development and Evaluation of Alternatives Report" for the Borough of Fort Lee. The Department also acknowledges the separate submission of responses to comments by the Borough of Fort Lee on November 26, 2019. This report and subsequent revision were submitted in a timely manner and were prepared in response to Part IV.D.3.v of the above referenced NJPDES permits. The report and subsequent revision were submitted in a timely manner and were prepared in response to Part IV.D.3.v of the above referenced NJPDES permit. This report is part of the development of the Long-Term Control Plan (LTCP) submittal requirements where the next deliverable is due on June 1, 2020.

The "Development and Evaluation of Alternatives Controls" concerns the Bergen County Utilities Authority (BCUA) Little Ferry Sewage Treatment Plant (STP) with individual sections for the combined sewer municipalities within the BCUA sewer service area namely the City of Hackensack, Borough of Fort Lee, and the Village of Ridgefield Park. This subject letter serves to provide a response to Section 13 entitled "Development and Evaluation of Alternatives Report" specific to the Borough of Fort Lee. The approval of the BCUA CSO Group report will be provided under separate cover to fulfill Part IV.D.3.b.v.

The overall objective of the Development and Evaluation of Alternatives Report is to develop and evaluate a range of CSO control alternatives that meet the requirements of the Federal CSO Control Policy Section II.C.4, N.J.A.C. 7:14A-11, Appendix C, and the USEPA Combined Sewer Overflows Guidance for Long-Term Control Plan (EPA 832-B-95-002). Such evaluation shall include a range of CSO control alternatives for eliminating, reducing, or treating CSO discharge events. This subject report builds on other previously submitted LTCP reports referenced in Part IV.D.3.b of the NJPDES permit, which includes the January 18, 2019 "Public Participation Program Report for the Borough of Fort Lee"; the June 27, 2018 "BCUA CSO Group Public Participation Process Report"; the June 29, 2018 "Sewer System Characterization Report for the Borough of Fort Lee, New Jersey"; and the June 30, 2018 "NJCSO Group Compliance Monitoring Program Report"; and the June 2018 "Identification of Sensitive Areas Report".

The Department provided technical comments on your "Development and Evaluation of Alternatives Report" on October 2, 2019. In response to that letter, the Department received a revised report on November 26, 2019. Based on a review of the revised information, the Department has determined that all technical comments have been addressed but would like to comment on certain aspects of that submission:

Comment 1

Percent capture is discussed in the Executive Summary as well as in Section 7.2.1 (Baseline) of the November 26, 2019 revised report. Regarding Section 7.2.1, the following is stated with respect to percent capture in response to Comment 8 of the Department's October 2, 2019 letter (additions shown with underline, deletions shown with strikethrough):

7.2.1 Baseline

A baseline analysis was performed to identify annually how many CSO discharge events occur, what volumes of CSO are discharged and what the percent capture of CSO is. 2004 was used as the design rainfall year. The results are shown in Table 7-1 and indicate that FL-001 and FL-002 accomplish 84.7% capture of CSO before any controls are selected.

Table 7-1. Baseline CSO Events and Volumes

Outfall	FL-001	FL-002
CSO Event Count	58	20
Volume (MG)	82.48	4.71
Total CSO Volume (MG)	87.19	
CSO Capture (%)	84.7	

In reference to percent capture in this section of the report and the following sections, the equation used to calculate CSO capture over a representative time frame is as follows:

$$\text{Percent capture} = 100 \times \frac{\text{Sum of volume delivered to acceptable treatment}}{\text{Sum of inflow volumes to the CSS [sanitary + runoff]}}$$

For the percent capture calculation, the wet weather period starts when the accumulated rainfall depth is greater than 0.1 inch and ends 12 hours after precipitation stops. The flow volume within this period is counted as wet weather flow.

~~There are several ways to compute CSO capture. The way that we computed it defines the wet weather period starting when the accumulated rainfall is greater than 0.1 inches and ends 12 hours after precipitation ends. The flow volume within this period is counted as wet weather. The annual wet weather flow volume is divided by the annual total flow volume to compute the percent capture.~~

This is the method being used by PVSC. This calculation approach is conservatively low and will produce lower estimates of capture than other methods. As an example using the method that New York City uses (using the total rain volume, not just the volume over 0.1 inches) would produce approximately 90% CSO capture. But regardless of the method used Fort Lee is near or above 85% capture which is in compliance with EPAs CSO Control Policy as long as ~~.~~ Fort Lee is granted its request to be segmented from the rest of BCUAs CSO communities because its CSOs discharge to the Hudson River while the other BCUA CSO communities discharge their overflows to the Hackensack River.

This section of the report further states:

> By this policy Fort Lee is almost in compliance with the 85% capture criteria. To attain the criteria and be in compliance with the policy Fort Lee will consider implementing some reasonable degree of additional CSO control. The following describes the levels of control that are being considered.

The Department does not have sufficient information at this time to render a determination on Fort Lee's contention that 84.7% percent capture is being attained. As a result, the Department reserves the right to comment on the issue of percent capture and resultant calculations as part of the LTCP process. In addition, the Department reserves the right to require a breakdown of percent capture results by subcatchment in order to approve any percent capture calculation, as well as a clear explanation of hydraulically connected system.

Comment 2

As noted in the above excerpt, the Department acknowledges that Fort Lee is requesting to be segmented from the rest of the BCUA CSO Group, which consists of three other permittees, where the percent capture calculation is considered for Fort Lee as a separate hydraulically connected system. The NJPDES permit defines the term 'hydraulically connected system' within the Notes and Definitions in Part IV as follows:

> "Hydraulically connected system" means the entire collection system that conveys flows to one Sewage Treatment Plant (STP). On a case-by-case basis, the permittee, in consultation with the Department, may segment a larger hydraulically connected system into a series of smaller inter-connected systems, based upon the specific nature of the sewer system layout, pump stations, gradients, locations of CSOs and other physical features which support such a sub area. A hydraulically connected system could include multiple municipalities, comprised of both combined and separate sewers.

While the Department acknowledges that CSO outfalls within the Borough of Fort Lee drain to a separate waterbody than the other CSO outfalls in the BCUA CSO Group, additional justification would need to be provided to demonstrate that the Borough of Fort Lee is a separate hydraulic system. For example, this could include a description as to the specific nature of the sewer system layout to support why this system should be considered "separate." This justification could be provided in advance of the LTCP as a separate submission.

Comment 3

In response to Comment 9 in the Department's October 2, 2019 letter, the following language was revised within Section 3.1 (Applicable Water Quality Standards) regarding ambient water quality with similar language in the Executive Summary:

> Figure 3-1 presents the data that was collected during the sampling program for the Hudson River at Fort Lee. This data will be submitted to NJDEP by PVSC for consideration. This location is a classified as a SE2 water body with a current fecal coliform standard of 770 cfu/100 mL as a geometric mean. Data are presented as open circles for surface data, filled gray circles for mid-depth data, and filled black circles for bottom data. Secchi depth does not fall into a specific depth category, but is plotted with filled black circles. Turbidity is shown on the same panel as Secchi depth and is presented with filled green circles. All samples collected in this program were in compliance with current fecal coliform standard of 770 CFU/100 mL. It is understood that this criteria might change in the future and this analysis may need to be repeated.

As noted in the Department's October 2, 2019 letter, it is premature and outside the scope of this report to draw any conclusions regarding compliance with water quality standards given that ambient water quality modeling results have not yet been submitted.

Comment 4

In the October 2, 2019 letter, the Department requested clarification of your intentions regarding solids removal in conjunction with PAA. The following supplemental information is included in Section 7.2.5 of your revised report:

7.2.5 Treatment – Disinfection with TSS Removal

Disinfection with TSS Removal of combined sewer overflows is another option in the Borough of Fort Lee. Disinfection by Peracetic Acid (PAA) serves as the basis in the evaluation. Pathogens represent the primary pollutant of concern for CSO discharges. Disinfection facilities are sized based on the maximum CSO discharge flow rate for each event to fully treat all but 4, 8, 12, and 20 CSO discharges per year. For the target of 4 CSO events per year, the 5th largest storm in the typical year will be captured and disinfected. For the storm events larger than the 5th event, CSO discharges will be partially treated, full treatment is achieved only during times that CSO discharges are less than the maximum discharge rate. Where full treatment is achieved, disinfection is assumed to remove 99.9% of pathogens (a "3-log kill."). This preliminary disinfection alternative assumes that PAA disinfection and TSS removal by a FlexFilter will be implemented at locations between the existing regulators and the existing outfalls. Table 7-5 presents the peak flow rates at each CSO control target and Table 7-6 summarizes the volume of partially treated overflows at each target.

TSS removal is included in the costs for this alternative but Fort Lee's CSO is almost equivalent to a primary treated wastewater. Primary treatment generally leaves 50 to 111 mg/L suspended solids in the effluent. Fort Lee CSO has 20 to 80 mg/L TSS (2007 Interim Monitoring Report). Disinfection will be tested with and without solids removal to see how TSS affects the chemical dosage and performance.

The objective of the CSO treatment should be based on the ultimate goal of reducing the pathogen loading such that when discharged into the receiving waters it will not result in the exceedance of water quality standards. In addition, CSO treatment should not be based solely on disinfection performance which is dependent of the influent wastewater concentration. Provided this alternative is selected, please ensure that documentation is provided to demonstrate that a 3 log kill can be attained and will not cause an exceedance or contribute to an existing exceedance of applicable water quality standards.

Comment 5

Cost information is provided in Section 5 (Costing), 7.5.3 (Identification of Preliminary Alternatives) and Appendix A (Detailed Total Capital, O&M, and Present Worth Costs) where revisions have been included in Section 7.5.3 based on an updated analysis. As noted in the Department's October 2, 2019 letter, the Department is not commenting on any cost analysis at this time and will defer its comments until the LTCP submission.

In sum, conditional on the above issues being further discussed within the LTCP, the Department has determined that all responses regarding Chapter 13 have been addressed.

The Department looks forward to submission of the Selection and Implementation of the LTCP as due on June 1, 2020. Please let us know if you have any questions regarding submission of that report.

Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water Permitting

5

C: Marzooq Alebus, Bureau of Surface Water Permitting
Dwayne Kobesky, Bureau of Surface Water Permitting
Joe Mannick, Bureau of Surface Water Permitting
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CATHERINE R. McCABE
Commissioner

February 12, 2020

Susan Banzon, Project Manager
City of Hackensack
65 Central Avenue
Hackensack, NJ 07601

Re: Review of Combined Sewer System Development and Evaluation of Alternatives Report
City of Hackensack, NJPDES Permit No. NJ0108766

Dear Ms. Banzon:

Thank you for your most recent submission dated November 27, 2019 which serves to update your July 1, 2019 submission entitled "Development and Evaluation of Alternatives Controls" as submitted to the New Jersey Department of Environmental Protection (the Department or NJDEP). This report contains the "Combined Sewer System Development and Evaluation of Alternatives Report" for the City of Hackensack. The Department also acknowledges the separate submission of responses to comments by the City of Hackensack on November 26, 2019. The report and subsequent revision were submitted in a timely manner and were prepared in response to Part IV.D.3.v of the above referenced NJPDES permit as part of the development of the Long-Term Control Plan (LTCP) submittal requirements where the next deliverable is due on June 1, 2020.

The "Development and Evaluation of Alternatives Controls" concerns the Bergen County Utilities Authority (BCUA) Little Ferry Sewage Treatment Plant (STP) with individual sections for the combined sewer municipalities within the BCUA sewer service area namely the City of Hackensack, Borough of Fort Lee, and the Village of Ridgefield Park. This subject letter serves to provide a response to Section 14 entitled "Combined Sewer System Development and Evaluation of Alternatives Report" specific to the City of Hackensack. The approval of the BCUA CSO Group report will be provided under separate cover to fulfill Part IV.D.3.b.v.

The overall objective of the Development and Evaluation of Alternatives Report is to develop and evaluate a range of CSO control alternatives that meet the requirements of the Federal CSO Control Policy Section II.C.4, N.J.A.C. 7:14A-11, Appendix C, and the USEPA Combined Sewer Overflows Guidance for Long-Term Control Plan (EPA 832-B-95-002). Such evaluation shall include a range of CSO control alternatives for eliminating, reducing, or treating CSO discharge events. This subject report builds on other previously submitted LTCP reports referenced in Part IV.D.3.b of the NJPDES permit, which includes the June 28, 2018 "System Characterization Report" (approved by the Department on March 19, 2019); the June 2018 "Public Participation Program Report" (approved by the Department on June 26, 2019); the June 27, 2018 "BCUA CSO Group Public Participation Process Report" (approved by the Department on June 26, 2019); the June 30, 2018 "NJCSO Group Compliance Monitoring Program Report" (approved by the Department on March 1, 2019); and the June 2018 "Identification of Sensitive Areas Report" (approved by the Department on April 1, 2019).

The Department provided technical comments on your "Development and Evaluation of Alternatives Report" on October 2, 2019. In response to that letter, the Department received a revised report on November 26, 2019. Based on a review of the revised information, the Department has determined that all technical comments have been addressed but would like to comment on certain aspects of that submission:

Comment 1

In your response to NJDEP Comment 3 it is stated that updates to the cost analysis have been included in your revised report to account for zero overflow events. Similarly, in your response to NJDEP Comment 13, it is stated that updates to the cost analysis have been included in your revised report to account for the inclusion of pretreatment technology at Anderson Street. As noted in the Department's October 2, 2019 letter, the Department is not commenting on any cost analysis at this time and will defer its comments until the LTCP submission.

Comment 2

On page 13 of the November 26, 2019 revised report the issue of percent capture is discussed including Table 7-2 (Performance Results Summary) which shows a 2015 Baseline Percent Capture of 68%. In addition, the following is stated with respect to percent capture (additions shown with underline where the equation is also an addition):

3.3 Range of CSO Goals Being Evaluated

The alternatives were evaluated for a system-wide total of 0, 4, 8, 12 and 20 overflows per year, as well as elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events on a hydraulically connected system-wide annual average basis for the 2004 typical year.

The number of overflows during the 2004 typical year are counted on a hydraulically connected system-wide annual average basis. The City and the Village of Ridgefield Park share the Hackensack River as a CSO receiving water body. Therefore, the number of overflows between the City and the Village of Ridgefield Park during the 2004 typical year are considered one event if the overflows occur during the same 24-hour period. The results within this Alternatives Report present the number of overflows for the City of Hackensack

Similarly, the elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events is on a hydraulically connected system-wide annual average basis. The system wide percent capture equation used to calculate the percent capture for the baseline (and all evaluated alternatives) is as follows:

$$Percent\ Capture = 100\ x \frac{Sum\ of\ volume\ delivered\ to\ accpetable\ treatment}{Sum\ of\ inflow\ volumes\ to\ CSS\ [sanitary + runoff]}$$

For the percent capture calculation, the wet weather volume was determined by evaluating flow during the wet weather period. The wet weather period starts when the accumulated rainfall depth is greater than 0.1 inch and ends 12 hours after precipitation stops. The flow volume within this wet weather period is counted as the wet weather flow.

The Department reserves the right to comment on the issue of percent capture and resultant calculations as part of the LTCP process. In addition, the Department reserves the right to require a breakdown of percent capture results by subcatchment in order to approve any percent capture calculation as well as a clear explanation of your hydraulically connected system.

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Comment 3

In response to NJDEP Comment 8, the City of Hackensack states the following:

> "The Borough of Fort Lee (Borough) is in process of creating a letter that states that the Borough is hydraulically disconnected from the City and Village of Ridgefield Park. The City agrees with the Borough's stance and will sign off on the letter. The City and Village of Ridgefield Park are to remain hydraulically connected."

While the Department acknowledges this information, as of the date of this letter the Department has not yet received sufficient justification to approve an alternate hydraulically connected system forthe Borough of Fort Lee. As stated within the NJPDES permit in Part IV – Notes and Definitions, a "hydraulically connected system" is defined as follows:

> "The entire collection system that conveys flows to one Sewage Treatment Plant (STP). On a case-by-case basis, the permittee, in consultation with the Department, may segment a larger hydraulically connected system into a series of smaller inter-connected systems, based upon the specific nature of the sewer system layout, pump stations, gradients, locations of CSOs and other physical features which support such a sub area. A hydraulically connected system could include multiple municipalities, comprised of both combined and separate sewers."

As noted above, the Department will need to evaluate any such justification where any interpretation of hydraulically connected system must be approved by the Department consistent with this definition. This information should be noted for the purposes of the LTCP as due on June 1, 2020.

In sum, conditional on the above issue being further discussed within the LTCP, the Department has determined that responses regarding the Combined Sewer System Development and Evaluation of Alternatives Report have been addressed.

The Department looks forward to submission of the Selection and Implementation of the LTCP as due on June 1, 2020. Please let us know if you have any questions regarding submission of that report.

Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water Permitting

C: Marco Alebus, Bureau of Surface Water Permitting
Dwayne Kobesky, Bureau of Surface Water Permitting
Nancy Kempel, CSO Team Leader, Bureau of NonPoint Pollution Control
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CATHERINE R. McCABE
Commissioner

February 12, 2020

Hugo Poli, Commissioner of Department of Public Works
Ridgefield Park Village
234 Main Street
Ridgefield Park, NJ 07660

Re: Review of Development and Evaluation of Alternatives
Village of Ridgefield Park, NJPDES Permit No. NJ0109118

Dear Mr. Poli:

Thank you for your submission dated November 27, 2019 which serves to update your July 1, 2019 submission entitled "Development and Evaluation of Alternatives Controls" as submitted to the New Jersey Department of Environmental Protection (the Department or NJDEP). This report contains the "Development and Evaluation of Alternatives" for the Village of Ridgefield Park. The Department also acknowledges the separate submission of responses to comments by the City of Hackensack on November 25, 2019. This report and subsequent revision were submitted in a timely manner and were prepared in response to Part IV.D.3.v of the above referenced NJPDES permits. The report is part of the development of the Long-Term Control Plan (LTCP) submittal requirements where the next deliverable is due on June 1, 2020.

The "Development and Evaluation of Alternatives Controls" concerns the Bergen County Utilities Authority (BCUA) Little Ferry Sewage Treatment Plant (STP) with individual sections for the combined sewer municipalities within the BCUA sewer service area namely the City of Hackensack, Borough of Fort Lee, and the Village of Ridgefield Park. This subject letter serves to provide a response to Section 15 entitled "Development and Evaluation of Alternatives" specific to the Village of Ridgefield Park. The approval of the BCUA CSO Group report will be provided under separate cover to fulfill Part IV.D.3.b.v.

The overall objective of the Development and Evaluation of Alternatives Report is to develop and evaluate a range of CSO control alternatives that meet the requirements of the Federal CSO Control Policy Section II.C.4, N.J.A.C. 7:14A-11, Appendix C, and the USEPA Combined Sewer Overflows Guidance for Long-Term Control Plan (EPA 832-B-95-002). Such evaluation shall include a range of CSO control alternatives for eliminating, reducing, or treating CSO discharge events. This subject report builds on other previously submitted LTCP reports referenced in Part IV.D.3.b of the NJPDES permit, which includes an approved hydrologic, hydraulic and water quality model and other information in the July 1, 2018 "Sewer System Characterization Report" (approved by the Department on March 11, 2019); the July 1, 2018 "Supplemental CSO Team Public Participation Process Report" (approved by the Department on June 26, 2019); the June 27, 2018 "BCUA CSO Group Public Participation Process Report" (approved by the Department on June 26, 2019); the June 30, 2018 "NJCSO Group Compliance Monitoring Program Report" (approved by the

Department on March 1, 2019); and the June 2018 "Identification of Sensitive Areas Report" (approved by the Department on April 8, 2019).

The Department provided technical comments on your "Development and Evaluation of Alternatives Report" on October 2, 2019. In response to that letter, the Department received a revised report on November 25, 2019. Based on a review of the revised information, the Department has determined that all technical comments have been fully addressed but would like to comment on certain aspects of that submission:

Comment 1

Comment 11 of the October 3, 2019 letter concerns coordination by the BCUA CSO group particularly in reference to current average and peak conveyance capacity of the interceptor as well as current wet weather conveyance capacity of the interceptor. Comment 15 of the October 3, 2019 letter also cites the need for a coordinated effort and describes that the report utilizes a singular approach through the implementation of one alternative as opposed to a mix of various alternatives. Comment 15 is stated as follows:

> "Section 7.4 includes a robust discussion of the six control program alternatives with individual subsections for each including description, analysis, institutional issues, implementability, public acceptance, performance summary and cost summary. In addition, a summary rating with weighted scores is provided as Table 7-31 (Summary Rating of Control Programs) on page 137 along with additional general discussion in Section 7.5.1 (Evaluation Factors). Summary information is also included in Tables 1-7 in the Executive Summary. However, these alternatives show a singular approach through the implementation of one alternative as opposed to a mix of various alternatives. In addition, please note the coordination between the three combined sewer municipalities and BCUA is essential in order to properly determine what would be needed to increase flow to the STP, as well as the STP expansion alternatives, including CSO-related bypass. This information must be clearly understood by all members of the BCUA CSO group in order for all of the CSO control alternatives to be accurately evaluated in terms of need and sizing of the other alternatives."

In response to NJDEP Comment 15 it is stated:

> "Acknowledged, coordination has been ongoing with the BCUA, and will continued throughout the Selection and Implementation of Alternatives Report."

The NJPDES permit requires that the LTCP be a coordinated effort amongst the Borough of Fort Lee, the Village of Ridgefield Park, and the City of Hackensack. Plant expansion and bypass are two alternatives that are required to assessed and the effects of these alternatives on CSO volumes and frequencies must be evaluated. In addition, the level of control, which is depicted in Table 8-4 (Summary of Percent Capture Achieved by Each Control Program) as a singular approach, should be expanded upon in the LTCP as a combination of CSO control program alternatives as referenced briefly in Section 8 (Summary). Please provide additional information in the LTCP.

Comment 2: On page 88 of the November 25, 2019 revised report the following is stated with respect to percent capture:

7.2.3.2 Wet Weather Capture Volume

The total subcatchment outflow time series scalar data which includes groundwater infiltration, RDII, base sanitary flow and runoff was exported. Each timestep was evaluated, if the time step was designated as wet, then the flow volume from that period was summed to create an annual wet weather flow volume entering the system. The total wet weather capture volume was 164.7 MG.

$$\%\ Capture = 1 - \left(\frac{Overflow\ Volume}{Total\ Wet\ Weather\ Capture\ Volume}\right)$$

$$1 - \left(\frac{50.3}{164.7}\right) = 69.5\%$$

To achieve 85% capture the overflow volume would need to be reduced from 50.3 MG to 24.7 MG.

Table 8-4 (Summary of Percent Capture Achieved by Each Control Program) also shows a 2015 Baseline Percent Capture of 69.5%.

The Department reserves the right to comment on the issue of percent capture and resultant calculations as part of the LTCP process. In addition, the Department reserves the right to require a breakdown of percent capture results by subcatchment in order to approve any percent capture calculation, as well as a clear definition of hydraulically connected system.

In sum, conditional on the above issue being further discussed within the LTCP, the Department has determined that responses regarding the Development and Evaluation of Alternatives have been addressed.

The Department looks forward to submission of the Selection and Implementation of the LTCP as due on June 1, 2020. Please let us know if you have any questions regarding submission of that report.

Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water Permitting

C: Nancy Kempel, CSO Team Leader, Bureau of NonPoint Pollution Control
Dayvonn Jones, Bureau of Surface Water Permitting
Dwayne Kobesky, Bureau of Surface Water Permitting
Johnathan Lakhicharran, Bureau of Surface Water Permitting
Joe Mannick, Bureau of Surface Water Permitting

3

Distribution List

Robert Laux, Executive Director
Bergen County Utilities Authority
P.O. Box 9 – 298 Mehrhof Road
Little Ferry, NJ 07643

Honorable Mark Sokolich
Borough of Fort Lee
309 Main Street
Fort Lee, NJ 07024

Hugo Poli
Commissioner of Department of Public Works
Ridgefield Park Village
234 Main Street
Ridgefield Park, NJ 07660

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BERGEN COUNTY UTILITIES AUTHORITY
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CATHERINE T. BENTZ
BRUCE BONAVENTURO
DANIEL GUMBLE

THOMAS S. KELLEY
PETER C. MASSA, JR.
DIANE TESTA
JON WARMS

Via Electronic Mail: Nancy.Kempel@dep.nj.gov **April 24, 2020**

Ms. Nancy Kempel
CSO Team Leader
Bureau of Non-Point Pollution Control - Division of Water Quality
PO Box 420
420 East State Street
Trenton, NJ 08625-0420

Subject: Bergen County Utilities Authority (BCUA) Hydraulically Connected System Definition.

Dear Ms. Kempel:

As discussed at the October 15, 2019 meeting between the NJDEP and the BCUA CSO Group, we are requesting NJDEP's acceptance of the definition of the BCUA Hydraulically Connected System and segmentation thereof as provided in this letter. This letter has been prepared cooperatively among the CSO communities of BCUA as indicated by the endorsements that follow the letter. The definition is based on Part IV Section B.1.c. of the NJPDES CSO permit which states:

> "Hydraulically connected system" means the entire collection system that conveys flows to one Sewage Treatment Plant (STP). On a case-by-case basis, the permittee, in consultation with the Department, may segment a larger hydraulically connected system into a series of smaller inter-connected systems, based upon the specific nature of the sewer system layout, pump stations, gradients, locations of CSOs and other physical features which support such a sub area. A hydraulically connected system could include multiple municipalities, comprised of both combined and separate sewers.

Accordingly, the hydraulically connected system would be defined as the BCUA interceptor sewers and the municipal sanitary and combined sewers that discharge to the interceptors and would also include the combined sewer outfalls, netting facilities and other structures on the outfalls downstream of the regulators. Within the overall hydraulically connected system the combined sewer systems are segmented into:

- Hackensack and Ridgefield Park systems which discharge CSO to the Hackensack River and Overpeck
- The Fort Lee system which discharges CSO to the Hudson River

Nancy Kempel, CSO Team Leader
Bureau of Non-Point Pollution Control - Division of Water Quality
April 24, 2020
Page **2** of **3**

Justification for the segmentation is consistent with the permit. As stated in the Fort Lee System Characterization Report, Fort Lee discharges its combined sewage through pump stations to the BCUA; however, it's Combined Sewer Overflow's (CSOs), which are the subject of the permit, discharge to the Hudson River through the Bluff Road and Palisade Terrace outfalls. The other two BCUA CSO communities discharge their CSO's to the Hackensack River and Overpeck Creek as shown in Figure 1. Because of the different receiving waters, the water quality impacts of the discharges are clearly independent from one and another which is the basis of the segmentation.

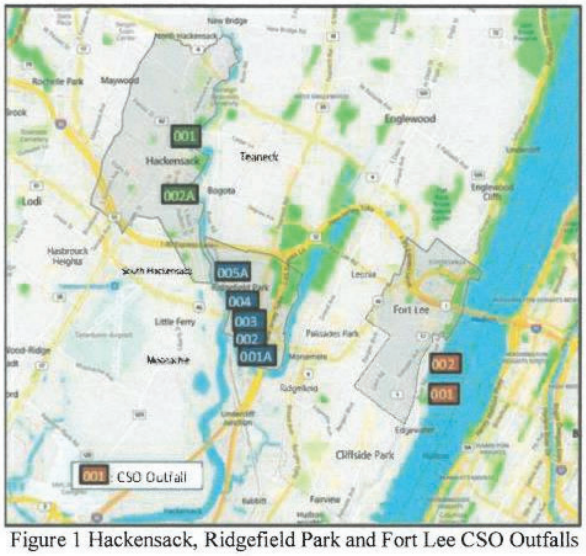


Figure 1 Hackensack, Ridgefield Park and Fort Lee CSO Outfalls

We intend to apply this definition, including the segmentation, when preparing the Selection and Implementation of Alternatives Report. Specifically, the effect will be to allow for the two segments to be evaluated independently for compliance under the Presumptive or Demonstration approaches. It is understood that the hydraulic performance of the overall hydraulically connected system will still need to be evaluated, and that the BCUA would still need to provide acceptance of any additional flow directed to the Little Ferry WWTP. We look forward to your written response providing the Department's acceptance of the BCUA hydraulically connected system as defined in this letter. Please contact us for any additional information you might require. In the interest of time we are moving forward with our Long Term Control Plan with the assumption that the segmentation request will be granted. If you have any questions, please do not hesitate to contact the BCUA CSO Group.

Very truly yours,

Robert Laux
Executive Director

Nancy Kempel, CSO Team Leader
Bureau of Non-Point Pollution Control - Division of Water Quality
April 24, 2020
Page **3** of **3**

ENDORSEMENT OF THE ABOVE DEFINITION OF THE BERGEN COUNTY UTILITIES AUTHORITY'S HYDRAULICALLY CONNECTED SYSTEM

Permittee: 4/24/20

Robert E. Laux — Date
Executive Director, Bergen County Utilities Authority
PO Box 9 – Mehrhof Rd
Little Ferry, NJ 07643
NJPDES #NJ0020028

Nancy Kempel, CSO Team Leader
Bureau of Non-Point Pollution Control - Division of Water Quality
April 24, 2020
Page 3 of 3

ENDORSEMENT OF THE ABOVE DEFINITION OF THE BERGEN COUNTY UTILITIES AUTHORITY'S HYDRAULICALLY CONNECTED SYSTEM

Permittee: 4/28/20

Date

Alfred Restaino
Borough Administrator, Fort Lee
309 Main Street
Fort Lee, NJ 07024
NJPDES #NJ0034517

Nancy Kempel, CSO Team Leader
Bureau of Non-Point Pollution Control - Division of Water Quality
April 24, 2020
Page **3** of **3**

ENDORSEMENT OF THE ABOVE DEFINITION OF THE BERGEN COUNTY UTILITIES AUTHORITY'S HYDRAULICALLY CONNECTED SYSTEM

Permittee: 4/28/2020

Susan Banzon — Date

Project Manager, City of Hackensack
65 Central Ave
Hackensack, NJ 07602
NJPDES #NJ0108766

Nancy Kempel, CSO Team Leader
Bureau of Non-Point Pollution Control - Division of Water Quality
April 24, 2020
Page 3 of 3

ENDORSEMENT OF THE ABOVE DEFINITION OF THE BERGEN COUNTY UTILITIES AUTHORITY'S HYDRAULICALLY CONNECTED SYSTEM

Permittee: Alan O'Grady 4/28/2020

Alan O'Grady
Superintendent, Ridgefield Park
234 Main Street
Ridgefield Park, NJ 07660
NJPDES #NJ1019118

Date

16. Appendix B – BCUA CSO Group Public Participation Meeting Minutes and Presentation (Since Public Participation Process Report)

Supplemental CSO Team Meeting #8, March 12, 2019

Supplemental CSO Team Meeting #9, May 15, 2019

Supplemental CSO Team Meeting #10, September 10, 2019

Supplemental CSO Team Meeting #11, January 28, 2020

Supplemental CSO Team Meeting #12, July 21, 2020

Bergen County Utilities Authority
Supplemental CSO Team
Meeting Number 8
Development and Evaluation of Alternatives Update
BCUA Administration Building, Public Meeting Room
March 12, 2019 10:00 – 11:30 am

Attendees – See attached sign in sheet

Minutes

1. Introductions
   - Safety Minute

2. Review of prior meeting
   - John presented recap, see attached presentation.

3. Status of submissions
   - PPP – NJDEP had asked Fort Lee for a separate submission rather than just the BCUA report, this was submitted and has not yet not received comments. BCUA, Hackensack and Ridgefield Park are waiting for comments/approval of their submissions.
   - Sensitive Areas – Being handled at the NJ CSO Group level for all municipalities. Primary contact information is the only outstanding item.
   - Characterization - BCUA and Ridgefield Park reports were resubmitted and have been approved. Hackensack was granted an extension on their resubmission, which is due next week. Fort Lee report will be resubmitted shortly.

4. Status of NJDEP Review

   - All July 1, 2018 reports that have been submitted, are posted on NJDEP site. Not sure if or when the final reports will be posted. The public has not made any requests for this information yet. This information should also be available through the towns.

5. Development and Evaluation of Alternatives Review
   - Evaluation of facilities required to convey additional flow to the BCUA WWTP, should be done at the municipal level. This evaluation is not explicitly listed in the seven required alternatives outline in the permit, but it is implied. DEP indicated if the LTCP calls for increasing conveyance to the WWTP, that BCUA should confirm acceptance of the flow prior to the LTCP submission.

   - DEP will not entertain the "No Action" alternative regardless of receiving water quality.

6. Status updates:

a. BCUA
    - Preliminary flow report is based on the 10 State Standard, this is still being reviewed. Data is based on all flow needing secondary treatment. Flow could increase to over 200MGD but that is an instantaneous flow not a daily flow.

b. Ridgefield Park
    - John presented – see attached slides

c. Fort Lee

    - Fort Lee is looking at primarily disinfection and green infrastructure. They do not have the space or lots to consider storage, plus rock is a consideration.

    - They have reduced overflows from the Lower Main area from 38 to 22 by directing flow to the BCUA interceptor rather than to the Palisades pump station. They would also like to send more flow to BCUA and will look at the interceptor capacity and develop cost for upgrading.

    - DEP was interested in what Disinfection method Fort Lee was entertaining. Considering PAA (dose will need to higher). DEP thinks this will be an issue with solids. Fort Lee has not considered use of the fuzzy filter or other solids removal technologies, as this will requires continuous onsite maintenance when in operation. Also, space is very limited and underlain by bedrock (Palisades). They would like to pilot the disinfection process. Most likely site would be a satellite at one of their two netting facilities.

    - They discussed the improvements made to Bluff Road and the impact on overflows.

d. Hackensack

    - They are still in the initial phases of alternatives evaluation. Currently looking at siting locations, primary consideration will be storage, upgrading facilities, and/or tunnels. BCUA's Hackensack Interceptor does not have much more capacity.

    - They will also recommend I/I studies and incorporate some green infrastructure.

    - Hackensack has no flow from other communities coming into the municipality.

7. Draft Report Outline

- Costing will be based on lifecycle cost. The method will need to be consistent with all groups.

8. SCSO Team future activities
    - John recommended the existing team recommend additional members to augment the team.

9. Open discussion of additional topics, if needed.

    - None

10. Upcoming Schedule / Next Steps

    - DEP inquired as to whether or not the groups wanted schedule extra meetings with the Department. They will make an effort to be available.

11. Next Meeting
    a. Next SCSO Team meeting May 14th?

MOTT MACDONALD

Development and Evaluation of Alternative Controls – Update

BCUA CSO Group Supplemental CSO Team Meeting #8

March 12, 2019

Safety Topic

Driver Safety

1. Winter is Not Over
   - Wet snow is more slippery
   - Start breaking sooner than later
   - Reduce car speed as appropriate
2. Roadway Safety is Full Time
   - Constantly scan your surroundings behind and ahead of you.
   - Anticipate that the other driver doesn't know what he is doing.
   - Keep a safe drive distance between vehicles (1 car length for each 10mph)
   - Make sure you car is well maintained
   - No Texting at any time
   - Avoid phone calls

BCUA CSO Group Supplemental CSO Team

Meeting No. 8 Agenda

Refresher – In meeting #7 we covered:
NJ CSO Group Receiving Water Model and Green Stormwater Infrastructure Modeling

BCUA CSO Group Supplemental CSO Team

Meeting No. 8 Agenda

- Submissions Status
- Status of NJDEP Review of Characterization and Public Participation Reports
- Status of Development and Evaluation of Alternatives
- Draft Report Outline
- Future Public Participation
- Upcoming Schedule

BCUA Supplemental CSO Team

DEP review status – July 1, 2018 submittals

- **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. DEP comment letter dated 3/01/19.
- **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. DEP **Approval** letter dated 3/01/19.
- **Public Participation Process Report**: comment letter dated 11/15/2018; revised report submitted1/07/19. Waiting for NJDEP comments or approval.
- **System Characterization Reports**: comment letter dated 12/17/2018, Revised Report submitted 2/15/19. NJDEP **Approval** letter dated 03/05/19

BCUA CSO Group Supplemental CSO Team

Public Participation Report NJDEP Review Comments

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02B
Water Pollution Management Element
Bureau of Surface Water Permitting
P.O. Box 420 – 401 E State St
Trenton, NJ 08625-0420
Phone: (609) 292-4860 / Fax: (609) 984-7938

CATHERINE R. McCABE
Commissioner

November 7, 2018

Dominic DiSalvo, Director of Engineering
Bergen County Utilities Authority
P.O. Box 9 – Foot of Mehrhof Road
Little Ferry, NJ 07643

Wayne Vriesema, Project Manager
City of Hackensack
65 Central Avenue
Hackensack, NJ 07602

Alan O'Grady, DPW Superintendent
Village of Ridgefield Park
24 Industrial Avenue
Ridgefield Park, NJ 07660

Edward Mignone, Assistant Borough Engineer
Fort Lee Borough
309 Main Street
Fort Lee Borough, NJ 07024

Re: Review of Public Participation Process Report Required by Part IV.D.3.b.iii
Bergen County Utilities Authority, NJPDES Permit No. NJ0020028
City of Hackensack, NJPDES Permit No. NJ0108766
Village of Ridgefield Park, NJPDES Permit No. NJ0109118
Fort Lee Borough, NJPDES Permit No. NJ0034517

Dear Permittees:

Thank you for your timely submission dated June 27, 2018 entitled "Public Participation Program Report." This report was submitted cooperatively by Bergen County Utilities Authority with the Borough of Fort Lee, the City of Hackensack and the Village of Ridgefield Park. Public participation should actively involve the affected/interested public through each of the three steps of the Long-Term Control Plan (LTCP) process. The required elements of the Public Participation Process Report and Supplemental CSO Team are defined at Part IV.G.2.b and Part IV.G.2.c of your NJPDES permit. The New Jersey Department of Environmental Protection (Department) has evaluated your submission against these permit requirements and requests that you provide a revised Public Participation Process Report by December 7, 2018 which addresses the topics described in the column titled "Actions" of the attached document.

Department staff are available to speak with you in further detail about our evaluation of your report and to discuss your revised Report submittal as due on December 7, 2018.

Thank you for your cooperation.

Sincerely,

Nancy L. Kempel

Nancy Kempel
Section Chief
Bureau of Nonpoint Pollution Control

C: Susan Rosenwinkel, Bureau of Surface Water Permitting
Joe Mannick, Bureau of Surface Water Permitting

BCUA Public Participation Report Evaluation

Does the Report include clear discussion of the following:	Summary of Findings	Action
Goals and desired outcomes for actively involving the affected public.	Section 4.2.b.i titled "Goals and Desired Outcomes for Involving the Public." The information listed in this section does not pertain to goals of educating, engaging and ways the affected public can provide feedback regarding the LTCP. While the topics listed in this section are important to seek public input on, these topics are not goals of a public participation process.	Create goals for the public participation process that include ways to effectively communicate and engage the affected public. Section 4.2 states that "We began by explaining in simple terms the history of the infrastructure…. Later the audiences will learn about the anticipated pollutant loads from CSO discharges, environmental impacts…" Clarify which audiences will receive this information, how, and when.
A description of outreach to hydraulically connected municipalities served by the same sewer treatment plant, including municipalities with separate sewer systems.	Neither BCUA's, Hackensack's, nor Ridgefield Park's reports discuss how the 47 municipalities in the BCUA sewer service prep will be engaged.	Additional outreach to separately sewered communities is needed. This could be done, for example, by updating existing brochures and making them accessible at county facilities (i.e. county library, etc.) and by presenting on the LTCP process, submittals, and key decision points during BCUA public meetings.
Identification of the affected public.	Section 4.1 of the report identifies ten groups of the affected public with no further breakdown of actual entities that fall within these general groups.	Identify specific entities that fit within these general categories of affected public. Identify which outreach and feedback activities are targeted to specific entities or general categories. For example, identify people who use and enjoy the downstream waters and/or recreational user groups, such as fishing, kayaking or boating clubs. Identify industrial users or organizations on behalf of these users. Evaluate the dominant languages of the affected public and if and how languages other than English should be built into engagement.
Information on the variety of outreach and engagement activities already completed. • description of outreach methods used, • why each outreach method was selected, and • outcome of the engagement activity (such as completed surveys, number of those in attendance, or summary of feedback from attendees).	BCUA provides outreach material for the BCUA group members to use and distribute. The report indicates that BCUA does not participate in the distribution of the material. BCUA does have a general CSO webpage.	Provide information on when and how any publications were distributed to the public and include a discussion of the effectiveness of the existing methods. Begin tracking metrics, such as the number of visitors to the CSO webpage and the frequency of updates to the webpage.
Information on planned outreach and engagement activities: • description of outreach methods to be used, • why each outreach method was selected, and • description of desired outcomes.	The report does not illustrate that a variety of methods are being employed. Section 4.3.3 identifies four potential means and methods that Mott MacDonald will undertake to support the BCUA CSO group however, there is no indication of which of these will be utilized by any of the four permittees. While the report makes several statements on the intention to get feedback from stakeholders on LTCP issues, the report does not sufficiently demonstrate that opportunities for feedback will be provided, the specific information feedback will be sought on, nor how affected public will be informed of the opportunity to provide feedback.	Provide a description of the variety of future/planned methods, why the method was selected, a description of the desired outcome, and which methods provide feedback opportunities to inform LTCP development. Provide details on approximately when feedback opportunities will occur, the mechanisms to notify public of feedback opportunities, and the topics feedback will be sought on.
How the public engagement activities provide opportunities for the public to be engaged throughout all three stages of the LTCP development process. • System Characterization • Development and Evaluation of Alternatives, and • Selection of Alternatives and Implementation of the LTCP	This is not discussed in the report.	Sufficiently demonstrate that engagement and feedback opportunities are planned and will be implemented during the development and evaluation of alternatives and the selection of alternatives and implementation.
How the feedback from the public will be considered in the decision-making process.	A general statement that feedback from the public will be evaluated during the process is included in the report. There is no discussion on how feedback from the public will be sought.	Provide a description of the methods that will be used to seek feedback from the public, what information the public will be provided with to comment on, and how segments of the affected public will be made aware of these feedback opportunities (e.g. surveys, public meetings, website/forms, email address).
Information on how the public and hydraulically connected communities will be provided with periodic updates on LTCP implementation.	This is not discussed in the report.	Describe how updates on the LTCP implementation will be provided to the public and Supplemental CSO Team.
How the public is provided an opportunity to review key draft submittals, such as the Characterization Report, the Public Participation Process Plan, the Consideration of Sensitive Areas, and the Development and Evaluation of Alternatives, and the Selection of Alternatives.	This is not discussed in the report.	Permittees may consider providing opportunities for the public to review key draft submittals. If BCUA considers this option, it is recommended that a general timeline is provided with target dates for distribution of draft reports, deadline for submission of comments, and how any changes to the reports before final submission will be shared back to the public. Consider how the BCUA/BCUA CSO Group will inform the public that this type of information is available for review.

Does the Public Participation Plan include a discussion of any of the following engagement methods?	Summary of Findings	Action
• Social Media Posts	This is not discussed in the report.	
• Emails	This is not discussed in the report.	
• Maintained & Routinely Updated Website	BCUA has a CSO webpage with general information about CSOs and LTCP development. The report mentions that minutes from the Supplemental CSO Team meetings are available on this website, however, this information was not found on the webpage at the time of review. Additionally, it is indicated that "website copy" will be provided to the members for use, but there is no discussion on whether or not this "website copy" is utilized.	Update the webpage with the information indicated in the report, such as Supplemental CSO Team meeting agendas, minutes, sign-in sheets and presentations. Provide information on future webpage content and where they will be made available for use on webpage. Begin tracking metrics, such as number of visitors to the various CSO webpages and the frequency of updates to the CSO webpages. Discuss how the Authority will be promoting the use of the website/informing the affected public that the website is a resource.
• News Articles	Section 4.3.2 mentions news articles that can be included in community newsletters, however, there is no allusion about whether or not the materials created by Mott MacDonald were used in the newsletters or when additional information will be available and if it will be included in future newsletters.	Provide information on when or if the information was used in the community newsletters. Provide information on future topics and when they will be made available for use in community newsletters.
• Mailers/Inserts	This is not discussed in the report.	
• Posters	This is not discussed in the report.	
• Attending and Presenting at Existing Community Group Meetings	This is not discussed in the report.	
• Hosting a booth at community/neighborhood fairs/events	The report mentions that BCUA provided flyers at the Ridgefield Park Earth Day celebration.	Consider attendance at other community events. Begin tracking metrics such as number of flyers distributed and number of visitors to the table.

BCUA CSO Group Supplemental CSO Team

Public Participation Report – Key Comments

Demonstrate engagement of hydraulically connected separately sewered communities.

- Begin tracking metrics, such as the number of visitors to tables at public events and number of brochures/flyers distributed at public events; number of emails received to CSO email account; number of visitors to CSO webpage; number of locations in the Village where CSO flyers/brochures are offered.
- Consider other methods of engagement such as staffing a table at local events to distribute materials.
- Add links to the webpage for information on the Supplemental CSO Team and copies of reports submitted to the Department in preparation of the LTCP.

BCUA CSO Group Supplemental CSO Team

Public Participation Report NJDEP Review Comments

Many of the Comments Went Beyond NJPDES Requirements, e.g.

- Tracking and Reporting on Visitors to Website
- Tracking Handouts and Where they are Placed
- Obtaining other Public Input on Plan
- Detailing How Public Will be Informed
  - On Progress of LTCP
  - Implementation

Issue – Some difficult to implement
Some part of next permit cycle.

RJJ9

BCUA CSO Group Supplemental CSO Team

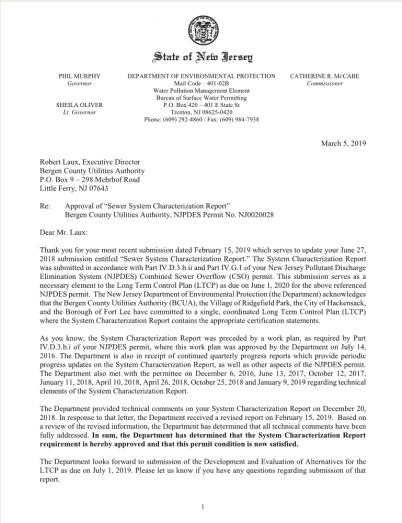
Public Participation Report – Key Comments

Permittees may consider providing opportunities for the Supplemental CSO Team to review key draft submittals.

- If BCUA/Ridgefield Park considers this option, it is recommended that a general timeline is provided with target dates for distribution of draft reports, deadline for submission of comments, and how any changes to the reports before final submission will be shared back to the team.
- Consider how BCUA/Ridgefield Park will inform the team that this type of information is available for review.
- There are some members of the team that may have left the position or are inactive. An effort should be made to bring additional members to the team as soon as possible.

BCUA CSO Group Supplemental CSO Team

Sewer System Characterization Report NJDEP Approval



State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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Phone: (609) 292-4860 / Fax: (609) 984-7958

CATHERINE R. McCABE
Commissioner

March 5, 2019

Robert Laux, Executive Director
Bergen County Utilities Authority
P.O. Box 9 – 298 Mehrhof Road
Little Ferry, NJ 07643

Re: Approval of "Sewer System Characterization Report"
Bergen County Utilities Authority, NJPDES Permit No. NJ0020028

Dear Mr. Laux:

Thank you for your most recent submission dated February 15, 2019 which serves to update your June 27, 2018 submission entitled "Sewer System Characterization Report." The System Characterization Report was submitted in accordance with Part IV.D.3.b.ii and Part IV.G.1 of your New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) permit. This submission serves as a necessary element to the Long Term Control Plan (LTCP) as due on June 1, 2020 for the above referenced NJPDES permit. The New Jersey Department of Environmental Protection (the Department) acknowledges that the Bergen County Utilities Authority (BCUA), the Village of Ridgefield Park, the City of Hackensack, and the Borough of Fort Lee have committed to a single, coordinated Long Term Control Plan (LTCP) where the System Characterization Report contains the appropriate certification statements.

As you know, the System Characterization Report was preceded by a work plan, as required by Part IV.D.3.b.i of your NJPDES permit, where this work plan was approved by the Department on July 14, 2016. The Department is also in receipt of continued quarterly progress reports which provide periodic progress updates on the System Characterization Report, as well as other aspects of the NJPDES permit. The Department also met with the permittee on December 6, 2016, June 13, 2017, October 12, 2017, January 11, 2018, April 10, 2018, April 26, 2018, October 25, 2018 and January 9, 2019 regarding technical elements of the System Characterization Report.

The Department provided technical comments on your System Characterization Report on December 20, 2018. In response to that letter, the Department received a revised report on February 15, 2019. Based on a review of the revised information, the Department has determined that all technical comments have been fully addressed. **In sum, the Department has determined that the System Characterization Report requirement is hereby approved and that this permit condition is now satisfied.**

The Department looks forward to submission of the Development and Evaluation of Alternatives for the LTCP as due on July 1, 2019. Please let us know if you have any questions regarding submission of that report.

1

BCUA CSO Group Supplemental CSO Team

What does the permit say about Development and Evaluation of Alternatives?

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

To be Evaluated by Municipalities

- Green Infrastructure
- Increased Storage Capacity
- Infiltration and Inflow Reduction
- Sewer Separation
- Satellite Treatment of CSO Discharge

To be Evaluated by BCUA

- Bypass of Secondary Treatment at STP
- Treatment Plant Expansion

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Facilities

- Transport
- Treatment

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Trunk Sewers Servicing Combined Sewer Municipalities:

Borough of Fort Lee

- Overpeck Trunk Sewer, and
- Overpeck Relief Sewer

City of Hackensack

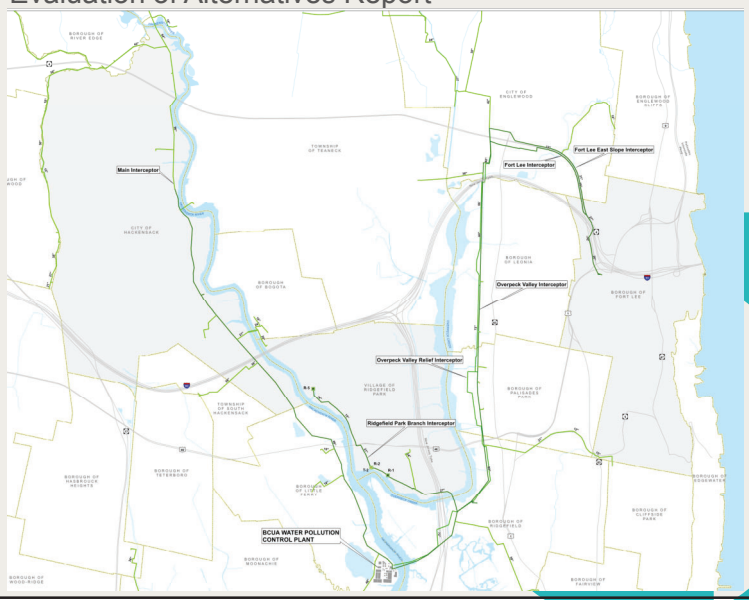
- Main Trunk Sewer

Village of Ridgefield Park

- Ridgefield Park Branch Intercepting Sewer
- Overpeck Trunk Sewer
- Overpeck Relief Sewer

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

InfoWorks ICM Model was Used to Estimate Sewer Flow Capacity near WPCF:

Trunk Sewer	Estimated Max Flow (mgd)*
Main Trunk Sewer	115
Overpeck Trunk & Relief Sewers	90
Total Max Peak Flow to WPCF	205

* Based on average wet well elevations

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Water Pollution Control Facility

Preliminary Information

Description	Max Flow (mgd)
NJPDES Permitted*	94
Average Daily Flow	75
Treatment Capacity (10 state standard)	105
Hydraulic Capacity	120
Max. Peak Flows	>200

* BCUA is currently undertaking a TMDL Study to potentially increase

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Arcadis is current evaluating:

- Hydraulic and Process Capacity of each Treatment Unit:
  - Influent Pumping Station
  - Grit Removal
  - Primary Settling Tanks
  - Secondary Aeration Tanks
  - Final Settling Tanks
  - Chlorination and Dechlorination
  - Outfall

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Arcadis will be evaluating:

- Bypassing of Secondary Treatment
  - Process Improvements
    - Needed to Meet NJPDES Permit Limits with Bypass
    - Construction and O&M Costs for Process Improvements Required
- Expanding STP Capacity
  - Treatment Improvements using
    - Ballasted Flocculation
    - Cost for Construction and O&M

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Village of Ridgefield Park

Preliminary Alternatives Screening

Ridgefield Park

Development and Evaluation of Alternatives Report - Siting

Objective: To identify potential sites for storage or end-of-pipe treatment.

Analysis using GIS (mapping) data, including:

- Aerial photography
- Land Use / Land Cover
- Property data (vacant land, land ownership, etc.)
- Open Space / Green Acres
- Soil Type
- Topography
- Contaminated Sites
- Brownfields

Ridgefield Park

Development and Evaluation of Alternatives Report - Siting

Objective: To identify potential sites for storage or end-of-pipe treatment.

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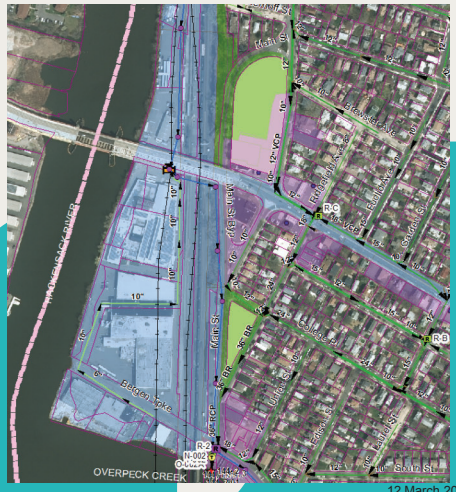

Ridgefield Park

Development and Evaluation of Alternatives Report - Siting

- Aerial Imagery and Land Use Classification
  - Structures vs. Paved vs. Vegetated
  - Open Space, Industrial, and Commercial vs. Residential and Transportation Corridors
  - Green Acres – NJDEP Approval – Propose GSI
- Parcel Data
  - Public vs. Private Ownership
- Soil Type
- Topography
  - Difference in elevation between site and outfall/regulator
  - Distance between site and outfall/regulator
- Known Contaminated Sites and Brownfields
  - Severity of contamination
  - Status of cleanup

Favorable	Unfavorable
Open paved or grass areas, vacant land	Buildings / Structures
Industrial, Commercial, Open Space	Green Acres, Residential, Transportation Corridors
Publicly owned	Privately owned
Small elevation change to outfall or regulator	Large elevation change to outfall or regulator
Close to outfall or regulator	Far from outfall and regulator
No soil or groundwater contamination	Known contaminated site or brownfield site

Ridgefield Park

Development and Evaluation of Alternatives Report - Siting

- Aerial Imagery and Land Use Classification
  - Structures vs. Paved vs. Vegetated
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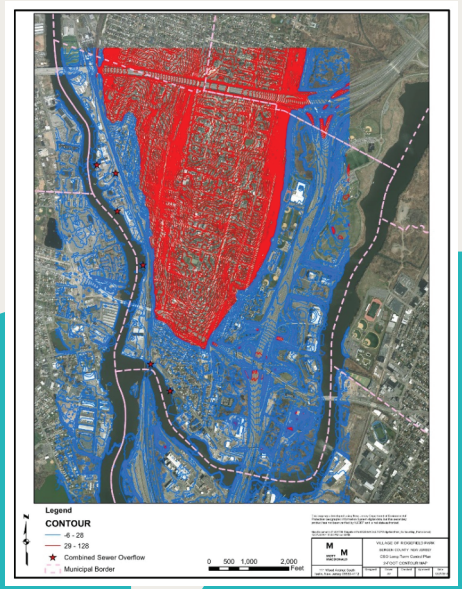


Ridgefield Park

Development and Evaluation of Alternatives Report – Example Site

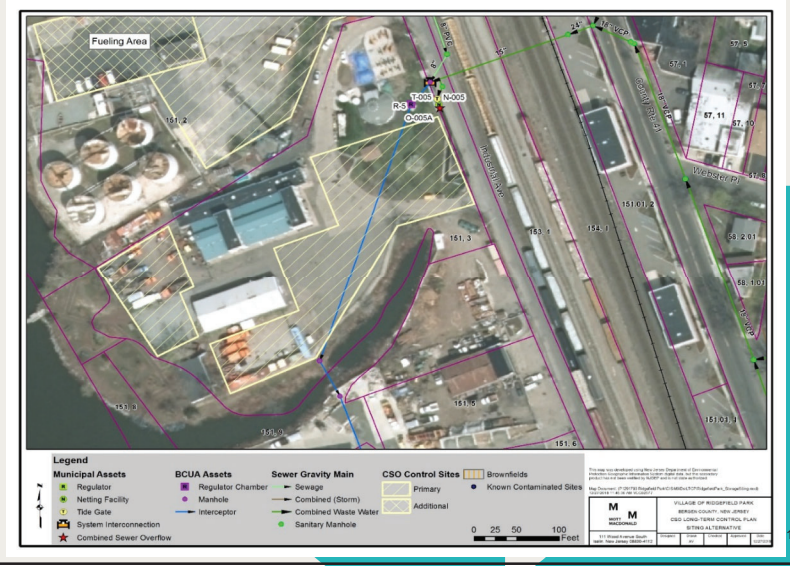
Area available: 0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations

BCUA Interceptor



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19

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

Green infrastructure (GI) = practices which reduce stormwater volume or flow rate by allowing the stormwater to infiltrate, to be treated by vegetation or by soils, or to be stored for reuse

- Desktop, planning-level study
- Estimate upper bound on impervious acres that could be feasibly managed by GI practices
- Following Chapter 2 "Locating and Assessing the Feasibility of Green Infrastructure" from NJDEP guidance document *Evaluating Green Infrastructure: A Combined Sewer Overflow Control Alternative for Long Term Control Plans*

Mott MacDonald | Presentation 26 12 March 2019

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

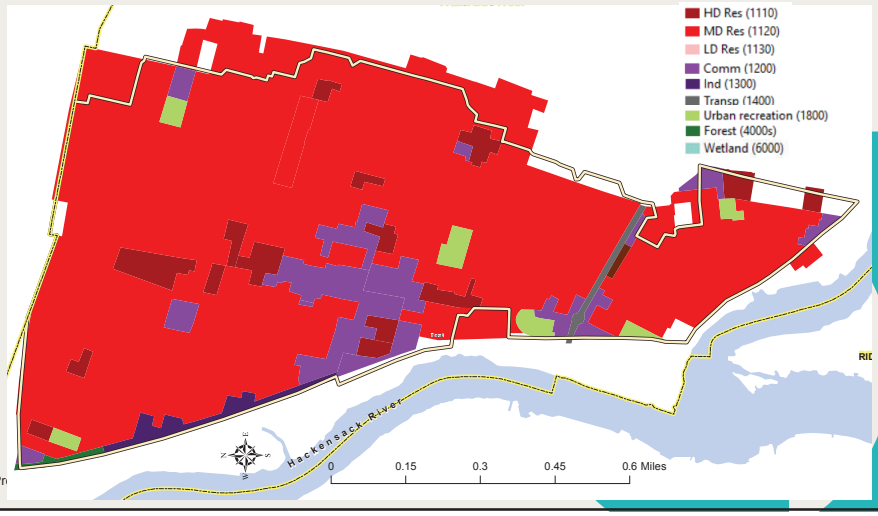
Analysis using GIS (mapping) data, including:

- Boundary of combined sewer area
- Aerial photography
- Land Use / Land Cover
- Tax parcels including area and ownership
- Building footprints
- Impervious area
- Streets
- Soil Type / Depth to Water (limited info on soil infiltration potential b/c urban land)
- Contaminated Sites

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Land Use / Land Cover



RJJ6

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Building footprints
- Impervious area

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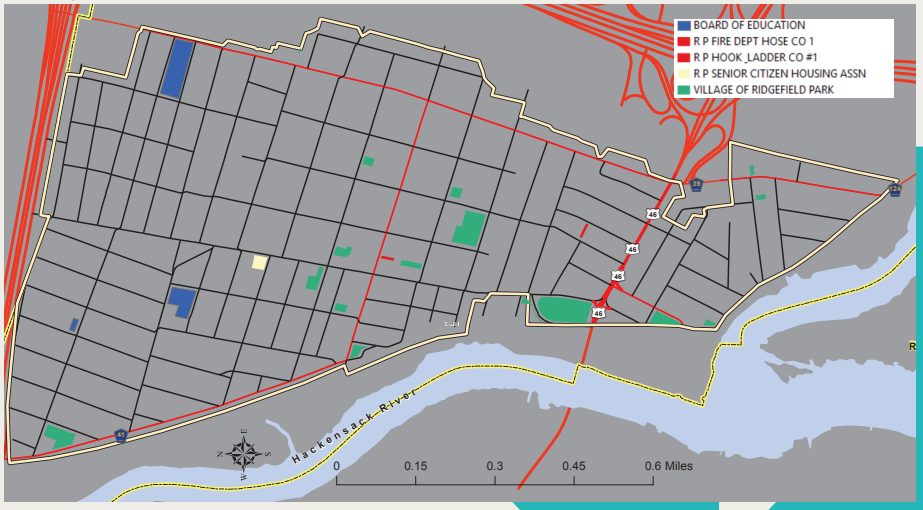
2019

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Property Ownership



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12 March 2019

Ridgefield Park

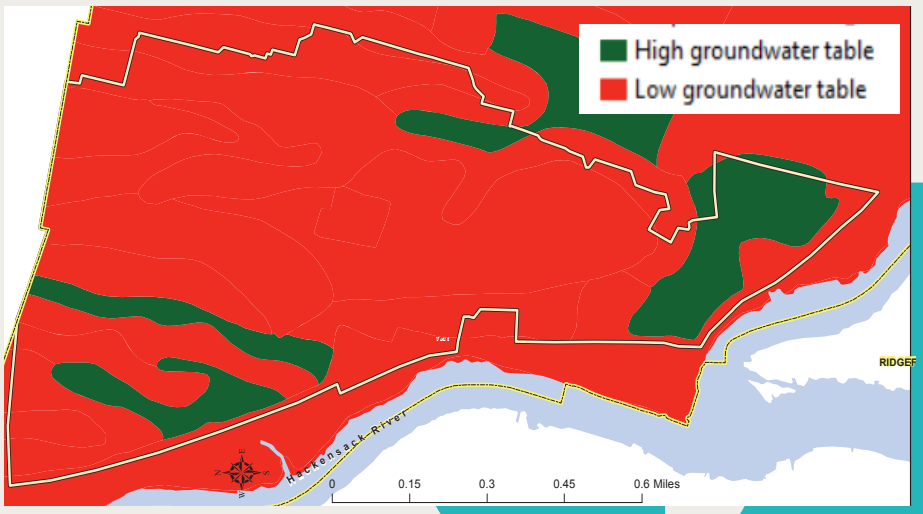
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Soil Type

Ridgefield Park

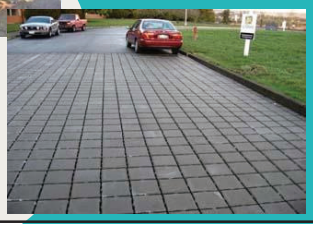
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Depth to Water



Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure



Strategies considered:

- Bioretention (raingardens, bioswales, etc.)
- Pervious pavement
- Dry wells

Potential locations considered:

- City right-of-way – curb strip
- City right-of-way – shoulder in non-parking locations
- City public and school properties
- Parking lanes
- Parking lots
- Roofs – dry wells

Ridgefield Park

Development and Evaluation of Alternatives Report – Inline Capacity

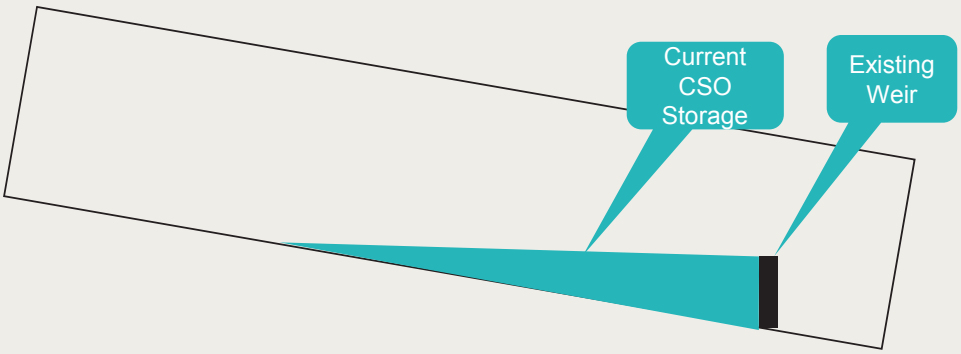
Maximize inline storage capacity

Works best with large flat pipes, which are not typical in Ridgefield Park

Ridgefield Park

Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity by raising overflow weir elevation



Ridgefield Park

Development and Evaluation of Alternatives Report – Inline Capacity

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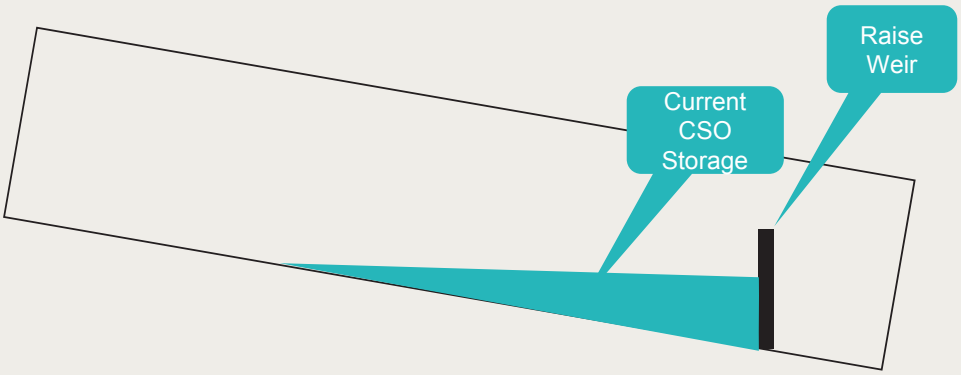
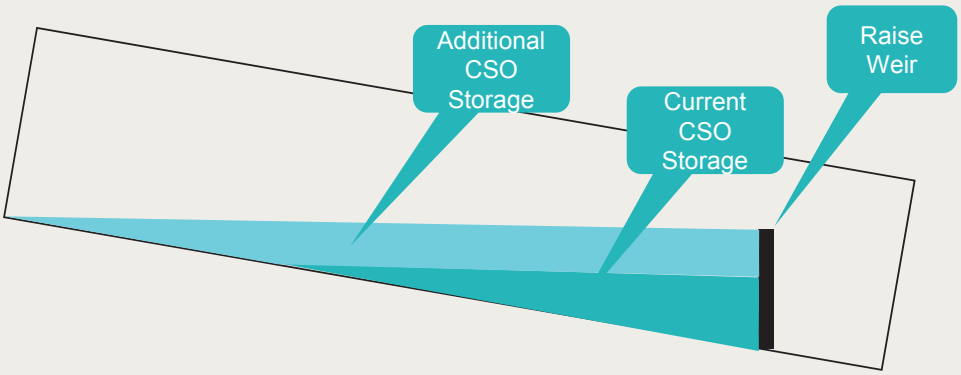


Ridgefield Park

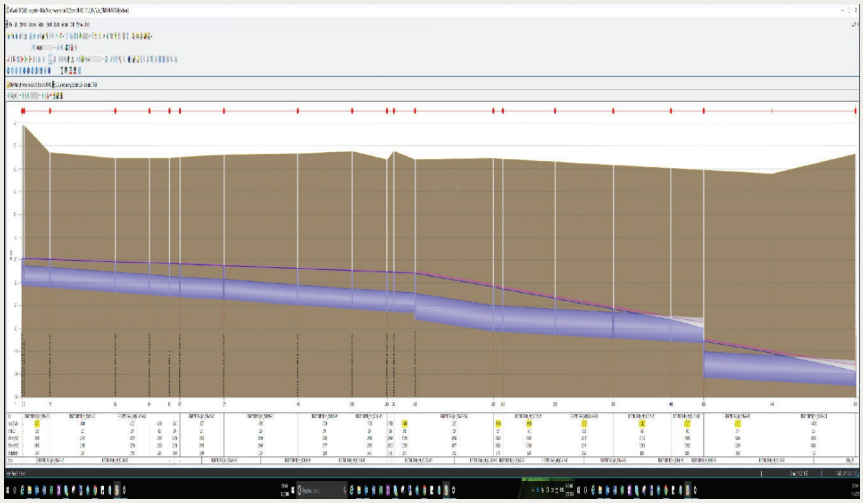
Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity by raising overflow weir elevation



Ridgefield Park

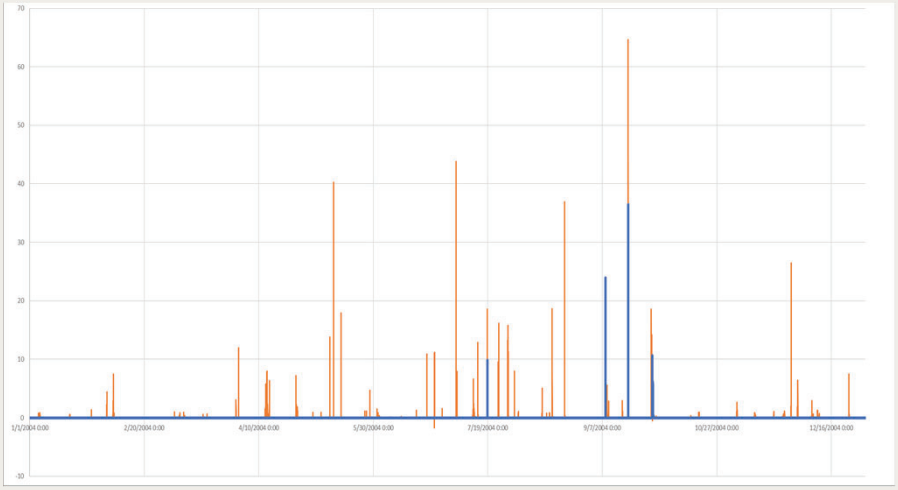
Development and Evaluation of Alternatives Report – Maximize Conveyance to WWTP



Ridgefield Park

NJ CSO Group Coordination

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Back to General Discussions

BCUA CSO Group Supplemental CSO Group

Development and Evaluation of Alternatives Report – DRAFT Outline

- Introduction
- General Information
- Water Quality Objectives
- Development of Alternatives
  - Development and Screening Levels
- Costing
- Available Land Analysis
- Alternatives Evaluation
- Summary
- References

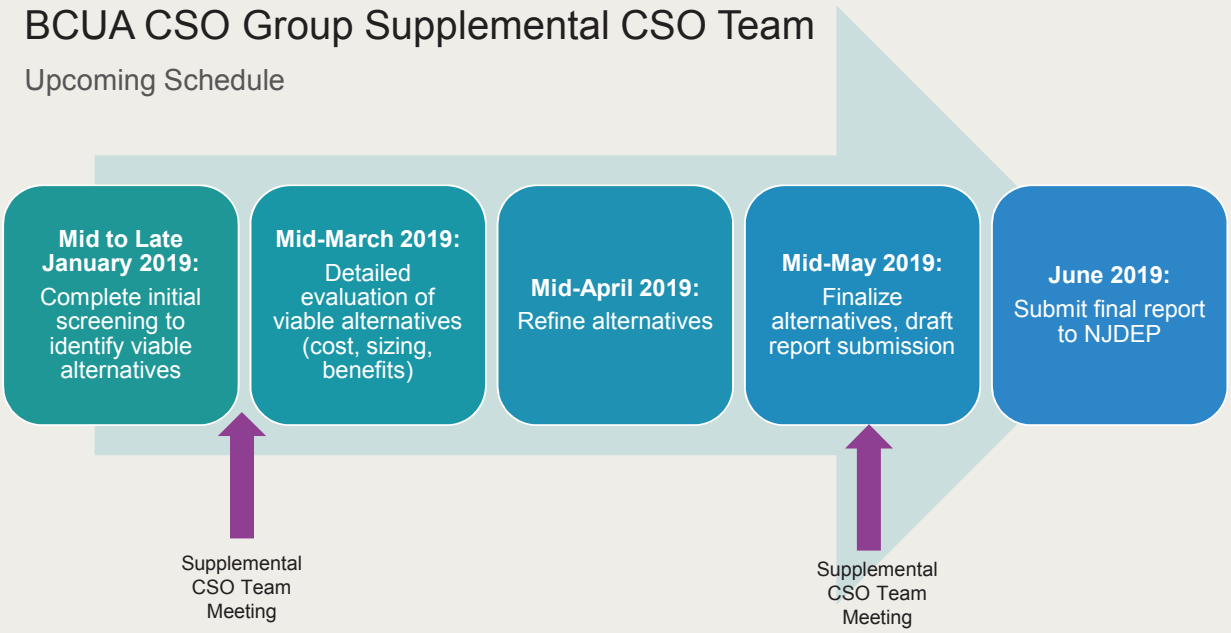
BCUA CSO Group Supplemental CSO Team

Future Public Participation Activities

- Looking for Supplemental CSO Team to liaise with public and other groups.
- New member(s)
- Input on additional outreach opportunities.

BCUA CSO Group Supplemental CSO Team

Upcoming Schedule



Upcoming Schedule

May 2019 – Anticipated Next Supplemental CSO Team Meeting

July 1, 2019 – Development and Evaluation of Alternatives Report Due to NJDEP

- Develop Comprehensive List of Alternatives
- Screen Alternatives
- Evaluate Alternatives
- Cost Estimates
- Coordinate with other Members of BCUA Group
- Produce and Submit Report

Final Questions?

Mott MacDonald | Presentation

Thank You?

Mott MacDonald | Presentation

Bergen County Utilities Authority
Supplemental CSO Team
Meeting Number 9
Development and Evaluation of Alternatives
BCUA Administration Building, Public Meeting Room
May 15, 2019 10:00 – 11:30 am

Attendees – See attached sign in sheet

Presentation slides attached

Minutes

1. Introductions
   - New participants from the general public were welcomed.

2. Safety Minute
   - Ladder safety - see attached presentation

3. Review of prior meeting
   - John presented recap, see attached presentation.
   - John indicated minutes from prior meetings are now posted on the BCUA website.
     - DEP asked what documentation is included on the BCUA website. John, indicated minutes, sign in sheets and presentations.

4. Status of submissions
   - Consideration of Sensitive Areas – Approved 4/18/2019
   - Baseline Compliance Monitor Report – Approved 3/1/2019
   - System Characterization Reports – BCUA, Fort Lett, Hackensack and Ridgefield Park all approved various dates.
   - PPP – NJDEP requested additional information on specific activities, responses are being drafted, due to NJDEP 5/23/2019

5. Public Participation Discussion
   - John expanded on certain aspects of the role of the SCSO Team
   - Reviewed the NJDEP letter
   - Requested suggestions for specific activities to present information on CSOs and the LTCP:
     - Earthfest at Overpeck – River Park Commission this Sunday, John indicated there were some online resources, and suggested brochures but that the timeframe was too short to formally participate.
     - Hold meetings in the evening to allow participation by those with daytime commitments.
     - Fort Lee street fair in June, date is being finalized.
     - Fort Lee intents to make a presentation once the costs are finalized.
     - Hold meetings near public transportation.

6. Development and Evaluation of Alternatives Review
   - NJDEP stated that if new ideas come out outside the alternative analysis, you will able to use them in implementing the LTCP.
   - BCUA – John presented, see attached presentation.
     - DEP will entertain modification to % removal requirements during wet weather for plants that seek permission to establish a bypass procedure.
     - DEP inquired on the highest flows seen at the plant BCUA has seen, John indicated the plant has seen flows greater than 200MGD.
     - It was asked what model was used, Mark DelBove indicated he thought BioWin.
     - NJDEP wanted to know if BCUA owns the property the additional facilities are shown on, John indicated they did, but it may be environmentally or otherwise constrained.
     - It was discussed that the potential plant wet weather capacity and interceptor capacity are similar so there is little opportunity for the municipalities to send additional wet weather flow to the plant without upgrading the interceptor and plant capacity.
   - Village of Ridgefield Park – John presented, see attached presentation.
   - Fort Lee – Gary presented, see attached presentation.
     - Still undecided between presumptive and demonstration.
     - Indicated the regulation did not define % capture, using rain event plus 12 hours to identify wet weather periods.
     - Green infrastructure expensive and did not result in much change in % capture.
     - Storage maintenance costs make it impractical.
     - Comment made, for green infrastructure, do you have the land to implement.
   - Hackensack – Frank presented, see attached presentation.
     - Hackensack River has different water quality than Hudson. Leaning towards the presumptive approach because of this.
     - Most likely separation of sewers will not occur due to expense.
     - Modeled green infrastructure. Green infrastructure movement for new development is occurring in city for redevelopment areas. It will be a long time component, but there still needs gray infrastructure alternative.
     - Infiltration and inflow (I/I) investigations revealed no “gushers” or “runners” present. There is little low hanging fruit is available to reduce I/I.
     - Primary consideration given to offline storage. Most likely two storage tanks.
     - Storage tank location options are the Costco Parking lot and the Anderson Street park area.
     - Posted surveys to website to get the publics opinion and to educate.
     - They have a website and email setup for public participation.
     - Hackensack Medical Center localized sewer separation. The railroad in area creates a berm that causes flooding. The city has

asked Arcadis to look at the flooding in that area, there could possibly be a sewer separation project in that area.

7. Upcoming Schedule / Next Steps
   - Development and Evaluation of Alternative Report due July 1, 2019
   - NJDEP will try to provide initial comments within 60-90 days.

8. Wrap up and open discussion of additional topics.
   - NJ Future
     - Requested an executive summary that could be distributed to the public. John indicated that an executive summary is already planned.
     - Asked if community benefits were being considered, John indicated that the reports are focused on the permit requirements to address CSO reduction. Incorporation of community benefits is a political decision to be made separately.
     - Social, economic and environmental (triple bottom line assessment) is being piloted in Camden.
     - Water conservation can get residents involved.
     - Make the conversations identifiable to the public.
   - Little Ferry resident
     - Little Ferry is a direct recipient of the CSO flows.
     - Disappointed in the level of public participation.
     - Discussed that Little Ferry has almost no waterfront access, and would like to see an emphasis on green space. John indicated that since the costs were being borne by the combined sewer communities it was unlikely they make adding green space in another municipality will be a part of their plans.
     - Suggested notifying local clubs and groups to get the word out. Rebuild by Design seems to be getting the word out.
   - Fort Lee resident
     - Requested stock photos not be use used in the fliers, since community members may think that they were taken locally and be misled. At a minimum identify the photo source. John indicated we will try to be more sensitive to those issues in the future.

9. Next Meeting
   - John will follow up with potential dates for late Summer if that does not work, then he will suggest some dates for early Fall.

Bergen County Utilities Authority
Supplemental CSO Team
Meeting Number 9
BCUA Administration Building, Public Meeting Room
May 15, 2019 10:00 am

Name	Organization	Email	initials
John Rolak	Mott MacDonald	John.rolak@mottmac.com	
John Dening	Mott MacDonald	John.dening@mottmac.com	JD
Donna Gregory	Mott MacDonald	Donna.gregory@mottmac.com	
Susan McVeigh	Health Officer, Hackensack	smcveigh@hackensack.org	
Francis Reiner	Senior Urban Designer, LLA-PP	francisr@dmrarchitects.com	
Mark Olson	Ridgefield Park Chairman, Green Team	Mark-olson@verizon.net	
Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com	
Bob Applebaum	Borough of Fort Lee	Bappelbaum@aol.com	
Jan Goldberg	Borough of Fort Lee	j-goldberg@fortleenj.org	
Captain Bill Sheehan	Hackensack Riverkeeper	captain@hackensackriverkeeper.org	
Michelle Langa	Hackensack Riverkeeper, attorney	legal@hackensackriverkeeper.org	
Alan O'Grady	Ridgefield Park	aog560@aol.com	
Del Bove, Mark	Arcadis	Mark.DelBove@arcadis.com	
Dominic DiSalvo	BCUA	ddisalvo@bcua.org	
Edward Mignone	Fort Lee	E-Mignone@fortleenj.org	
Gary Grey	HDR	Gary.Grey@hdrinc.com	
Robert Laux	BCUA	rlaux@BCUA.org	
Frank Belardo	Arcadis	frank.belardo@arcadis.com	FB

Name	Organization	Email	initials
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Ryan Westra	Hackensack	rwestra@hackensackdpw.org	
Ron Phillips	BCUA	rphillips@bcua.org	
Nancy Kempel	NJDEP	Nancy.kempel@dep.nj.gov	
Jennifer Feltis Cortese	NJDEP	Jennifer.feltis@dep.nj.gov	
Susan Rosenwinkel	NJDEP	Susan.rosenwinkel@dep.nj.gov	
Dwyane Kobesky	NJDEP	Dwyane.kobesky@dep.nj.gov	
Sal Pagano			
MIKE MCALOON	SUBURBAN CONSULTING	MMCALOON@SUBURBANCONSULTING.COM	MKM
GARY TERZANO	HACKENSACK	GARYTERZANO@GMAIL.COM	GT
Yingying Wu	HDR	yingying.wu@hdrinc.com	YW
JOE MANNICK	NJDEP	joe.mannick@dep.nj.gov	JM
Stephanie Farley	Mott Mac.		
Mo Kinberg	NJ Future	mkinberg@NJFuture.org	
Jennie Sobolewski	Lit The Fenny	sobolewskijenny@yahoo.com	
SHAZA RIZVI	NJDEP	SHAZA.I.RIZVI@DEP.NJ.GOV	SR
Rachael Pepe	NJ DEP	Rachael.Pepe@dep.nj.gov	RP

MOTT MACDONALD

Development and Evaluation of Alternative Controls

BCUA CSO Group Supplemental CSO Team Meeting #9

May 15, 2019

Safety Topic

Ladders

1

Pick the Right Ladder for the Job

- Type
- Length
- Material

2

Inspect the Ladder

- Corrosion
- Rot
- Clean

3

Set up the Ladder

- 4:1 Rule
- Level Ground
- 3' Above Roof

4

Use the Ladder

- Keep centered
- 3 Points of Contact
- Proper footwear
- Use a toolbelt

BCUA CSO Group Supplemental CSO Team

Meeting No. 9 Agenda

Refresher – In meeting #8 we covered:

- Submissions Status
- Status of NJDEP Review of Characterization and Public Participation Reports
- Status of Development and Evaluation of Alternatives
- Draft Report Outline
- Future Public Participation
- Upcoming Schedule

- Note minutes now posted on BCUA Website

BCUA CSO Group Supplemental CSO Team

Meeting No. 9 Agenda

BCUA CSO Group Supplemental CSO Team

Meeting No. 9 Agenda

- Submissions Status
- Public Participation Status
- Status of Development and Evaluation of Alternatives
  - BCUA
  - Village of Ridgefield Park
  - Fort Lee
  - Hackensack
- Upcoming Schedule

BCUA Supplemental CSO Team

DEP review status – July 1, 2018 submittals

- **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. DEP comment letter dated 3/01/19. Approved 4/8/19
- **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. DEP **Approval** letter dated 3/01/19.
- **Public Participation Process Report**: comment letter dated 11/15/2018; revised report submitted1/07/19. Received NJDEP Comments 4/23/19. Drafting response due 5/23/19.
- **System Characterization Reports**: comment letter dated 12/17/2018, Revised Report submitted 2/15/19. NJDEP **Approval** letter dated 03/05/19

BCUA CSO Group Supplemental CSO Team

Future Public Participation Activities

- Looking for Supplemental CSO Team to liaise with public and other groups.
- New member(s)

Public Participation Comment Letter

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02B
Water Pollution Management Element
Bureau of Surface Water Permitting
P.O. Box 420 – 401 E State St
Trenton, NJ 08625-0420
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CATHERINE R. McCABE
Commissioner

April 23, 2019

To: Distribution List

Re: Review of Revised Public Participation Process Report Required by Part IV.D.3.b.iii
Bergen County Utilities Authority, NJPDES Permit No. NJ0020028
Borough of Fort Lee, NJPDES Permit No. NJ0034517
City of Hackensack, NJPDES Permit No. NJ0108766
Village of Ridgefield Park, NJPDES Permit No. NJ0109118

Dear Permittees:

The New Jersey Department of Environmental Protection (the Department) is in receipt of the following public participation process reports:

- BCUA CSO Group, "Public Participation Program Report," June 27, 2018, revised January 4, 2019,
- City of Hackensack's "Public Participation Process Report," June 2018, revised January 2019,
- Village of Ridgefield Park's "Supplemental CSO Team Public Participation Report," July 1, 2018, revised January 7, 2019,
  Borough of Fort Lee's "Public Participation Program Report for the Borough of Fort Lee," January 18, 2019.

These reports were submitted in accordance with Part IV.D.3.b.iii of your New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) permit and serve as a necessary element to the Long Term Control Plan (LTCP) as due on June 1, 2020. The Department acknowledges that Bergen County Utilities Authority, the Borough of Fort Lee, the City of Hackensack and the Village of Ridgefield Park have committed to a single, coordinated LTCP where the Public Participation Process Report contains the appropriate certification statements. The Department also acknowledges that the Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park submitted Public Participation Process Reports intended to supplement the BCUA CSO Group report. On November 7, 2018 the Department issued comments on the initial June/July 2018 submittals. This letter serves to provide a determination on these submissions and to document the phone call on April 17, 2019 held between Department representatives and representatives for each of the above referenced CSO permittees. While Fort Lee is a participant in the BCUA CSO Group, note that comments on the January 18, 2019 submission entitled "Public Participation Program Report for the Borough of Fort Lee" will be made under separate cover.

As discussed in the April 17, 2019 phone call, the Department acknowledges that the revised submissions reflect the Department's recommendation to expand the composition of the regional supplemental team by stating the intention to invite additional non-governmental members of the community. The Department also acknowledges that in addition to the regional Supplemental CSO Team, Fort Lee and Ridgefield Park

Public Participation Comment Letter

Response Due May 23, 2019

Looking for Planned and Future Activities

Actively Engage Public

Through LTCP Submission June 1, 2020

Suggestions?

have formed local Supplemental CSO Teams. However, gaps exist in the permittee planned efforts to engage the affected public beyond those that sit on the Supplemental CSO Teams. As required by Part IV.G.2.b, of the permit, "implementation shall actively involve the affected public throughout each of the 3 Steps of the LTCP process." As such, active involvement, including feedback opportunities, must be provided by the permittee to the affected public beyond those who sit on the Supplemental CSO Team. Additionally, as this next year or so will be the time frame during which the permittee will be developing and selecting alternatives, this will be the most advantageous time to solicit and address input from the affected public on the alternatives.

During the call we discussed several ways to demonstrate active involvement with the affected public. Below is a bulleted list of some of the ideas the Department suggested on the call:

- Update the Homeowner's guide, and other pamphlets/flyers to add a brief mention of the CSO LTCP process underway and how to get more information;
- Partner with local community groups to incorporate CSO outreach into their efforts that they are already undertaken;
- Present at a local community group's existing meeting, such as but not limited to, homeowner's associations, boating/kayaking clubs, service-based groups, business associations (ex. chamber of commerce, downtown associations), neighborhood associations, Parent Teacher Organizations, and religious or cultural associations;
- Present at the environmental commission, planning board, and town council/committee meetings.

When hosting your own public meeting, please consider:

- Locations that are most convenient and familiar to residents, such as a local library, community building or school;
- Inviting the local groups that you have offered a presentation to and ask them to inform their members of the meeting;
- Advertising the meeting through multiple avenues, include social media, flyers in high visible locations, municipal email distribution lists, municipal meeting calendars and advertisement in local newspaper; and
- Partnering with a local group for the meeting, which will likely draw a larger attendance.

The above is not a comprehensive list of what could done to demonstrate active involvement and the Department encourages you to think about which approaches are most efficient and effective for your individual communities and the specific segments of the affected public you are seeking to engage. Additionally, as offered during the conference call, the Department is available to meet with you to further discuss specific approaches for public participation, including, sharing best practices from other public participation efforts; feedback on upcoming meeting agenda, format and presentations; suggesting methods to advertise feedback opportunities and upcoming meetings.

The Department requests that the previous submissions be supplemented with additional information **within 30 days of the date of this letter** to detail planned and/or future efforts to actively engage the affected public leading up to the submission of the Development and Evaluation of Alternatives Report and the Selection and Implementation of Alternatives Report. This supplement may be in the form of a letter or as revisions to the plan itself.

2

BCUA CSO Group Supplemental CSO Team

What does the permit say about Development and Evaluation of Alternatives?

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

To be Evaluated by Municipalities

- Green Infrastructure
- Increased Storage Capacity
- Infiltration and Inflow Reduction
- Sewer Separation
- Satellite Treatment of CSO Discharge

To be Evaluated by BCUA

- Bypass of Secondary Treatment at STP
- Treatment Plant Expansion

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Facilities

- Transport
- Treatment

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Trunk Sewers Servicing Combined Sewer Municipalities:

Borough of Fort Lee

- Overpeck Trunk Sewer, and
- Overpeck Relief Sewer

City of Hackensack

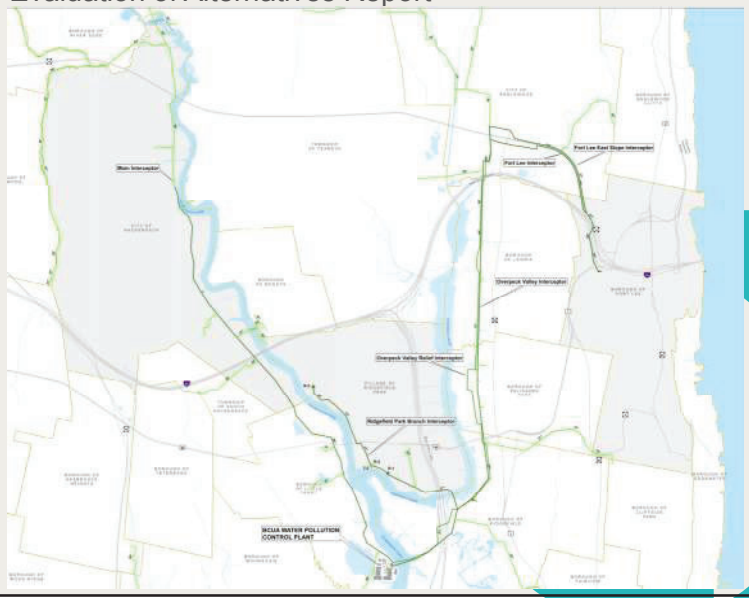
- Main Trunk Sewer

Village of Ridgefield Park

- Ridgefield Park Branch Intercepting Sewer
- Overpeck Trunk Sewer
- Overpeck Relief Sewer

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

InfoWorks ICM Model was Used to Estimate Sewer Flow Capacity near WPCF:

Trunk Sewer	Estimated Max Flow (mgd)*
Main Trunk Sewer	115
Overpeck Trunk & Relief Sewers	95
Total Max Peak Flow to WPCF	210

* Based on average wet well elevations and no system surcharge.

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Arcadis evaluation:

- Hydraulic and Process Capacity of each Treatment Unit:
  - Influent Pumping Station
  - Grit Removal
  - Primary Settling Tanks
  - Secondary Aeration Tanks
  - Final Settling Tanks
  - Chlorination and Dechlorination
  - Outfall

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Arcadis Evaluated:

- Existing Plant Capacity
- Bypassing of Secondary Treatment
  - Process Improvements
    - Needed to Meet NJPDES Permit Limits with Bypass
    - Construction and O&M Costs for Process Improvements Required
- Expanding STP Capacity
  - Treatment Improvements using
    - Ballasted Flocculation
    - Cost for Construction and O&M

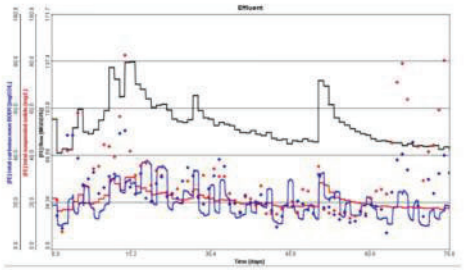


Figure 3. LF WPCF Model Wet Weather Output Comparison

Table 5. Wet Weather Statistical Analysis, mg/L

	Plant Data	Model
TSS		
- Average	25	21
- Min	7	16
- Max	51	31
- Std Deviation	10.1	3
- 30-day max	31	23
- 7-day max	36	28
cBOD		
- Average	34	20
- Min	8	10
- Max	117	38
- Std Deviation	22.5	7
- 30-day max	38	24
- 7-day max	64	31

WWTP Calibration

Calibrated to 2015 Data

- TSS
- cBOD

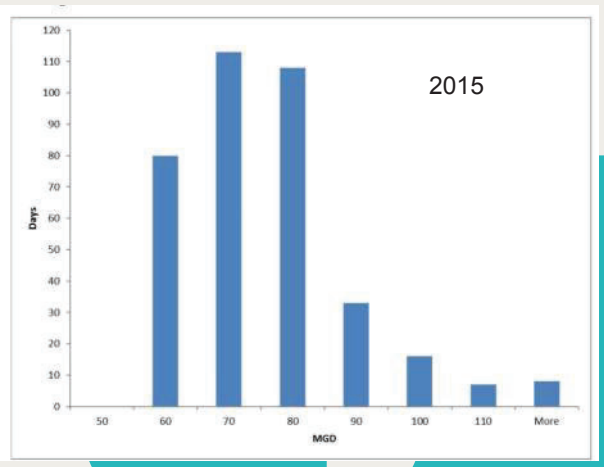
BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Water Pollution Control Facility Preliminary Information

Description	Max Flow (mgd)
NJPDES Permitted*	94
Average Daily Flow	75
Treatment Capacity (10 state standard)	105
Existing Hydraulic Capacity	220
Max. Peak Flows	>200

* BCUA is currently undertaking a TMDL Study to potentially increase



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

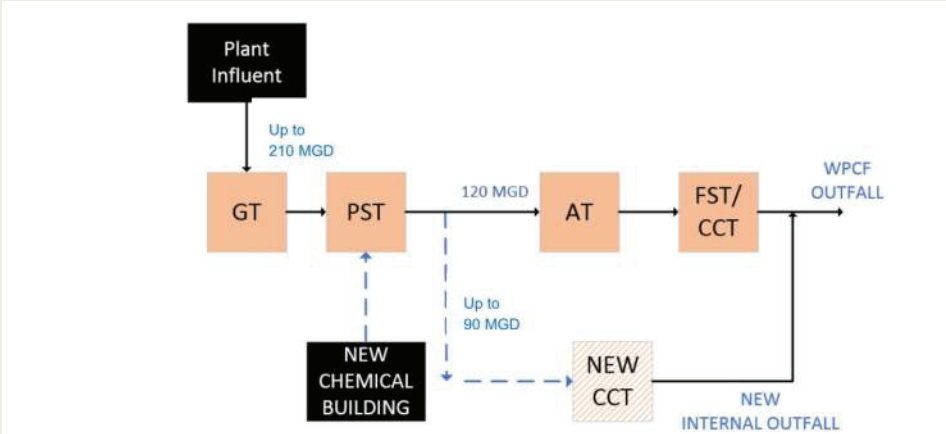


Figure 6. CEPT Alternative Block Flow Diagram

Chemically Enhanced High Rate Treatment

Chemically Enhanced High Rate Treatment

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

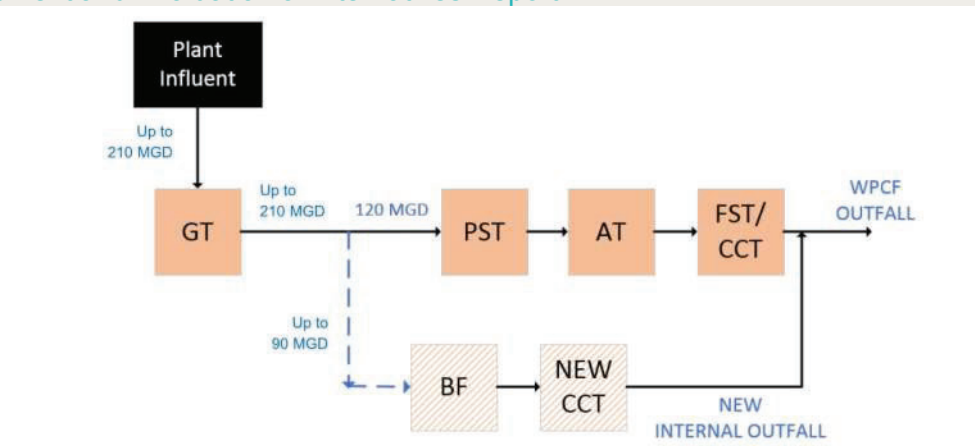


Figure 7. Ballasted Flocculation Alternative Block Flow Diagram

Ballasted Flocculation

Ballasted Flocculation

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Alternative	Construction Cost	Operation Costs	20-Year Present Worth
Chemically Enhanced High Rate Treatment	$32M-$127M ($64M)	$0.8M	$44M-$139M ($76M)
Ballasted Flocculation	$55M-$220M ($110M)	$1.2M	$73M-$238M ($128M)

Class 5 Cost Estimate (+100% -50%)

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Village of Ridgefield Park

Preliminary Alternatives

Ridgefield Park

Development and Evaluation of Alternatives Report – Screening Process

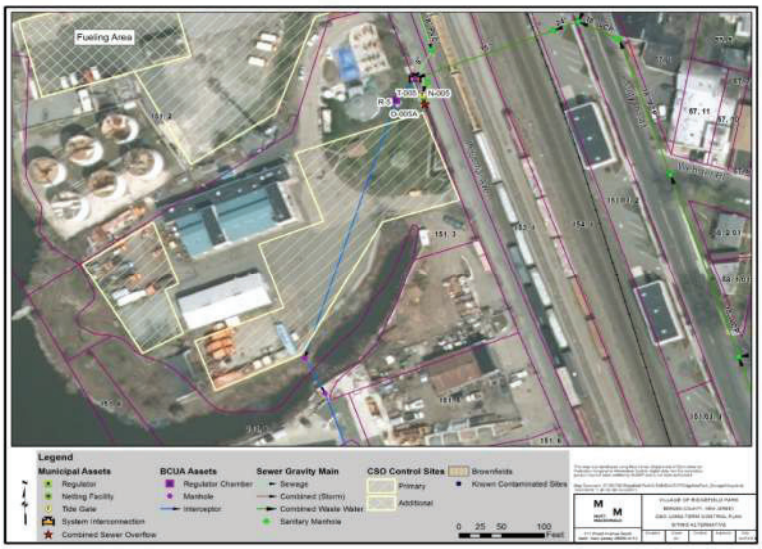
Area available: 0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations

BCUA Interceptor



Ridgefield Park

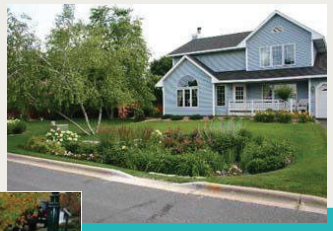
Development and Evaluation of Alternatives Report – Screening Process

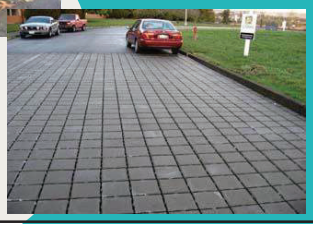
Strategies considered:

- Bioretention (raingardens, bioswales, etc.)
- Pervious pavement
- Dry wells

Potential locations considered:

- City right-of-way – curb strip
- City right-of-way – shoulder in non-parking locations
- City public and school properties
- Parking lanes
- Parking lots
- Roofs – dry wells



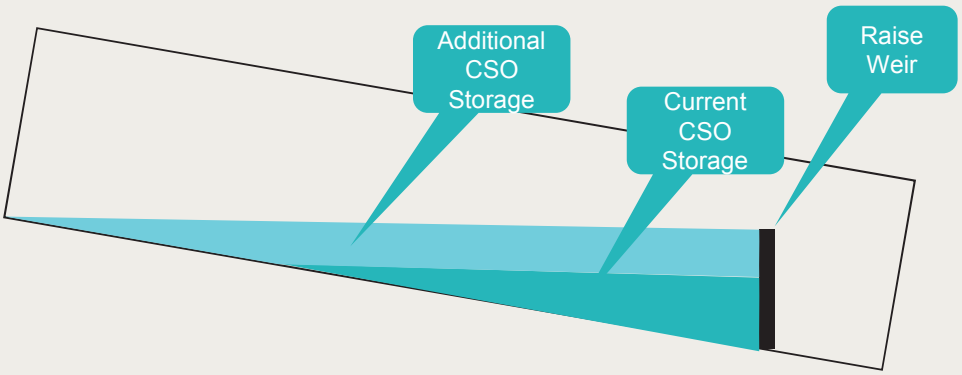


Ridgefield Park

Development and Evaluation of Alternatives Report – Screening

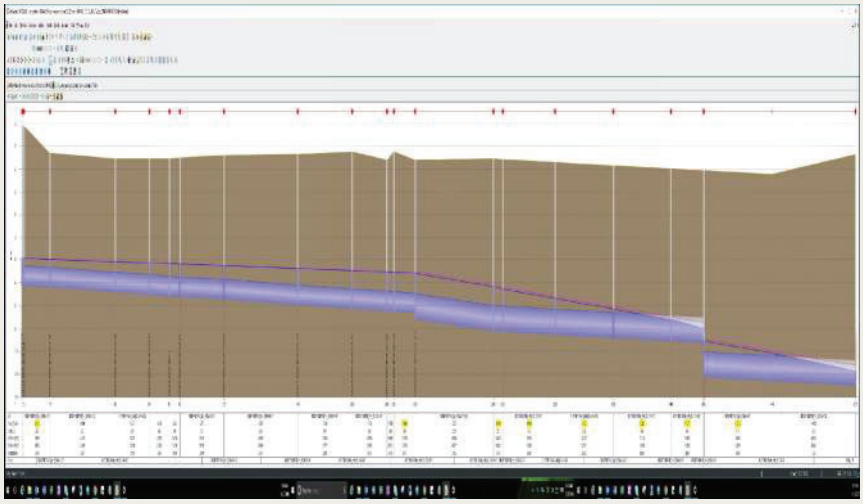
Maximize inline storage capacity

Works best with large flat pipes, which are not typical in Ridgefield Park



Ridgefield Park

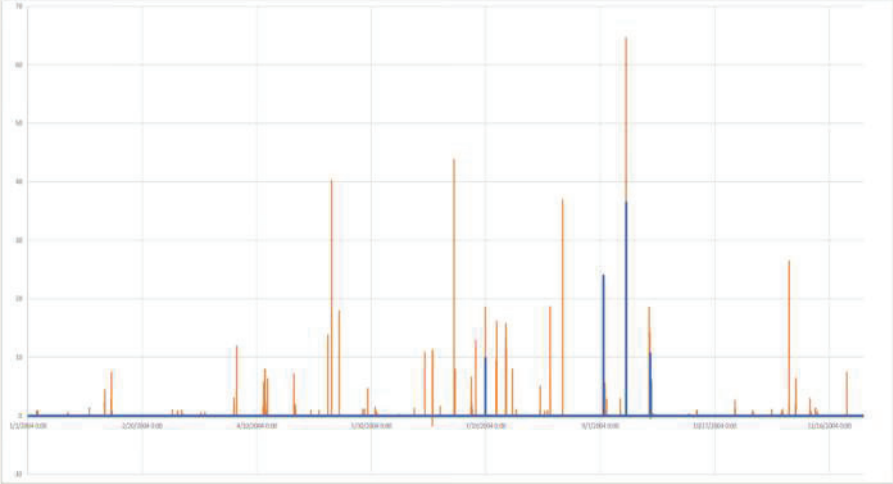
Development and Evaluation of Alternatives Report – Screening Process



Ridgefield Park

NJ CSO Group Coordination

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture



Ridgefield Park

NJ CSO Group Coordination – Agreed with BCUA Modeled Output

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture

	Rank	Event	Total CSO (MG)	Start	End
Top 4 Storm Events by Overflow	1	49	262.0	9/28/2004 5:30	9/30/2004 13:45
	2	46	154.4	9/8/2004 3:30	9/9/2004 22:00
	3	48	129.4	9/18/2004 7:15	9/18/2004 15:15
	4	36	115.0	7/18/2004 16:30	7/19/2004 2:00
Top 8 Storm Events by Overflow	5	56	106.9	11/28/2004 3:30	11/29/2004 0:15
	6	35	101.0	7/12/2004 9:15	7/14/2004 23:30
	7	32	98.1	6/25/2004 17:00	6/26/2004 6:15
	8	37	94.4	7/23/2004 10:30	7/24/2004 4:15
Top 12 Storm Events by Overflow	9	6	89.9	2/6/2004 8:00	2/6/2004 23:45
	10	23	87.6	5/12/2004 15:30	5/12/2004 21:45
	11	38	78.9	7/27/2004 16:15	7/28/2004 8:45
	12	15	78.5	4/12/2004 18:15	4/14/2004 21:00
Top 20 Storm Events by Overflow	13	44	59.7	8/21/2004 13:30	8/21/2004 18:30
	14	17	59.5	4/26/2004 1:30	4/27/2004 6:00
	15	34	57.7	7/5/2004 3:00	7/5/2004 16:45
	16	43	57.2	8/14/2004 22:30	8/16/2004 12:30
	17	52	44.4	11/4/2004 14:15	11/5/2004 17:30
	18	57	44.3	12/1/2004 4:30	12/1/2004 15:15
	19	24	38.7	5/15/2004 21:30	5/16/2004 9:00
	20	22	38.6	5/10/2004 23:45	5/11/2004 5:45

Ridgefield Park

Existing Conditions

Outfall No.	Outfall Name	Annual Total			Maximum
		No. Overflow Events	Overflow Volume (Mgal)	Duration (hours)	Peak Flow (mgd)
001A	Bergen Turnpike	44	12.99	273.15	20.86
002A	Main Street and Bergen Turnpike	37	2.10	125.30	7.89
003A	Christie Street	59	15.49	310.99	31.87
004A	Mount Vernon Street	72	23.41	652.37	49.36
005A	Industrial Avenue	37	4.32	75.92	7.84
006A	Hackensack Avenue	35	0.75	205.94	3.74
System-wide Total		**not appl.**	**59.05**	**not appl.**	**not appl.**
System-wide Maximum		**72**	**23.41**	**652.37**	**49.36**

Ridgefield Park

Future Baseline Conditions - 2050

- Required by Permit

Year	Population
1970	13,990
1980	12,738
1990	12,522
2000 (US Census)	12,873
2010 (US Census)	12,729
2017 (US Census 7-Year Estimate)	13,154

Ridgefield Park

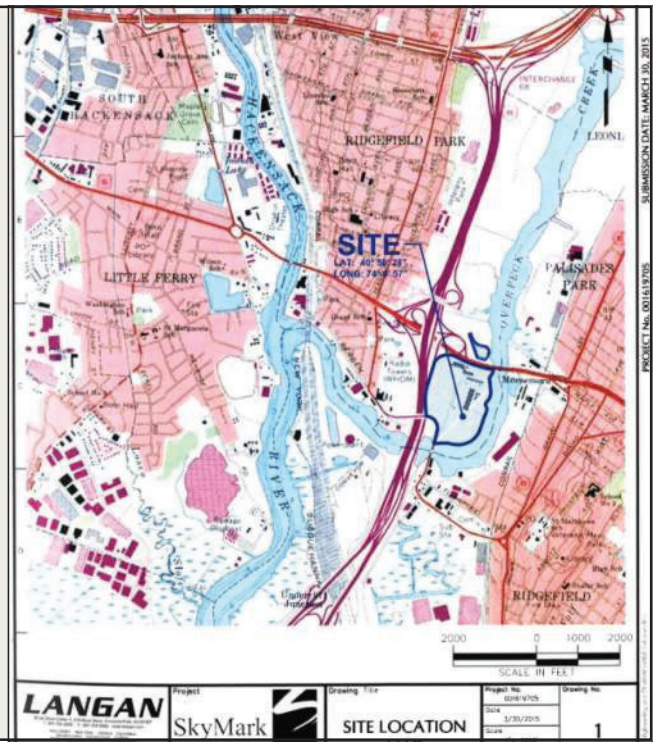
Future Baseline Conditions

Data Source	Projected Population to 2050 - Conservative (people)	Projected Population to 2050 – All Sources (People)
NJTPA	17,960	17,960
US Census Projection		15,910
NJ Department of Labor	15,720	15,720
Sky Mark Development Analysis	16,470	16,470
BCUA Projections		14,620
Average	16,720	16,100

Ridgefield Park

Future Baseline Conditions

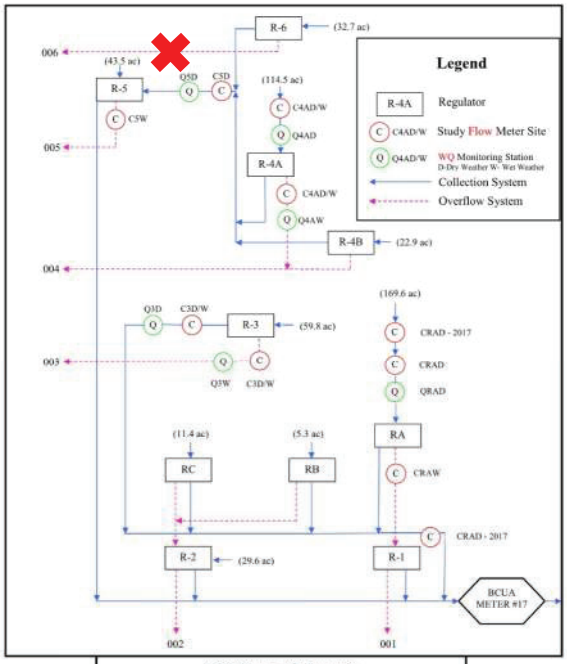
- Future growth associated with Skymark and outside of combined area.



Ridgefield Park

Control Programs

- Eliminate Regulator 006

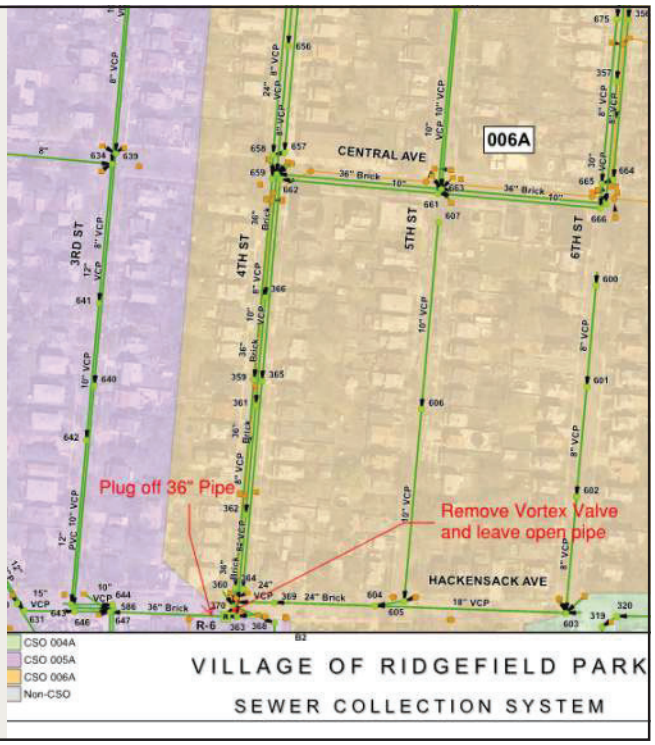


CSO System Schematic
Village of Ridgefield Park
CSO Characterization Study

Ridgefield Park

Control Programs

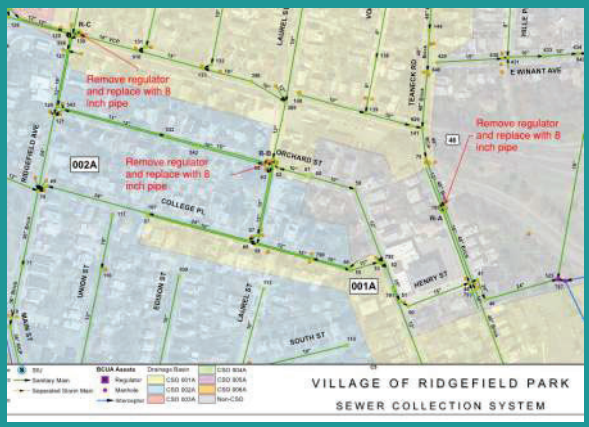
- Eliminate Regulator 006



Ridgefield Park

Control Programs

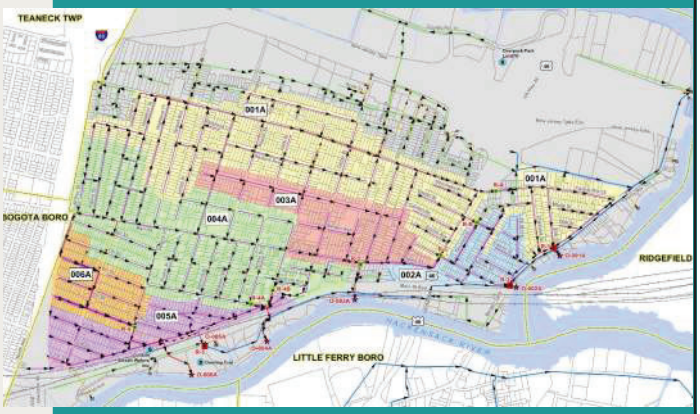
- Eliminate Regulator 006
- Eliminate Internal Regulators



Ridgefield Park

Control Programs

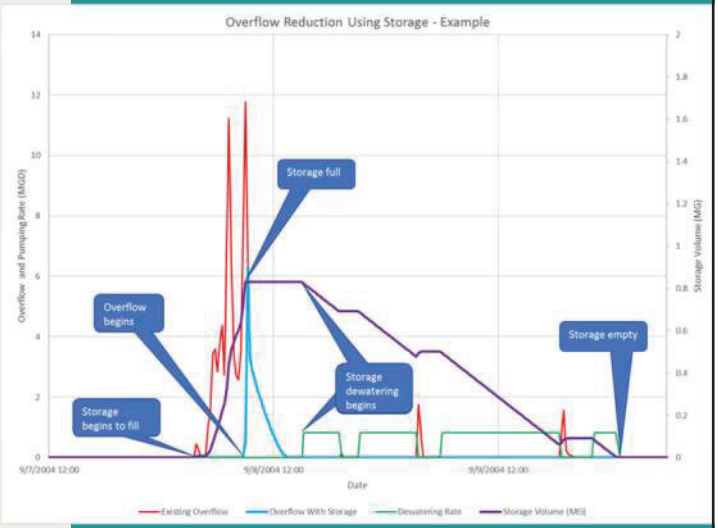
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation



Ridgefield Park

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage



Ridgefield Park

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage

Ridgefield Park

Control Programs

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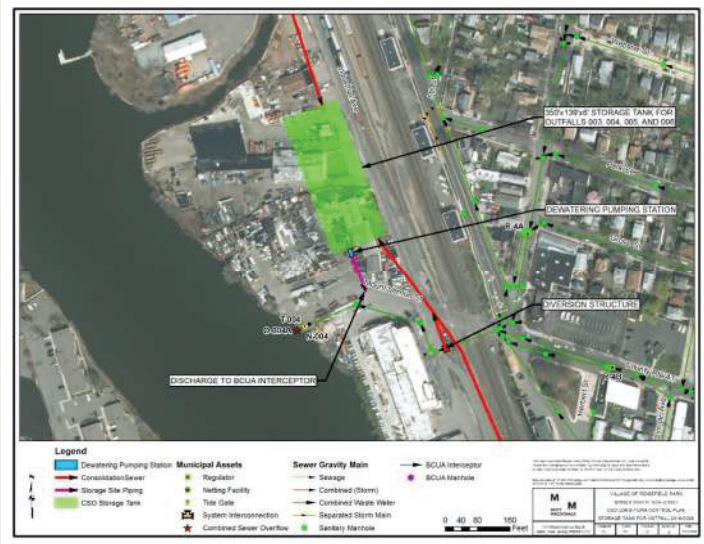
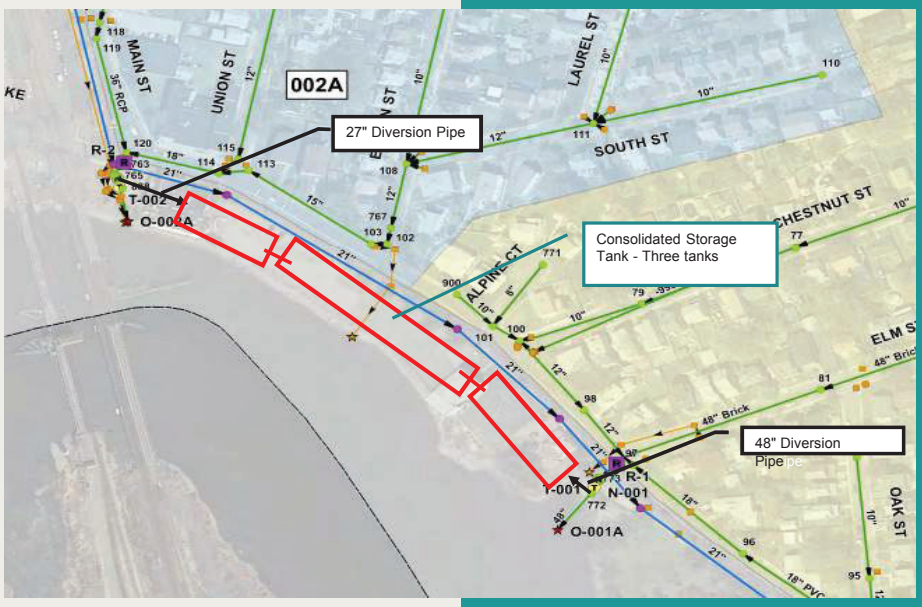


Ridgefield Park



Ridgefield Park

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel

Ridgefield Park

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
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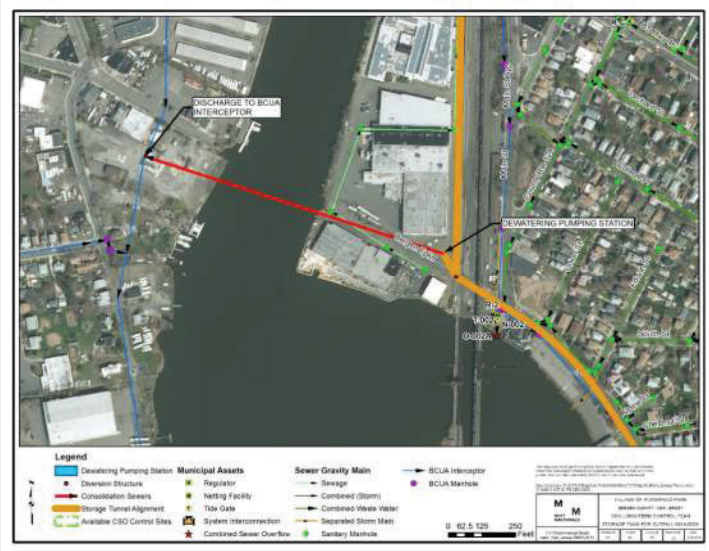
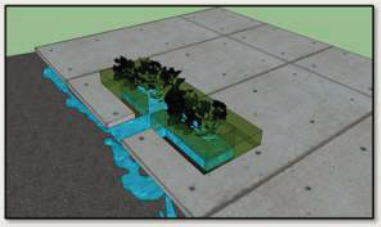
- Tunnel

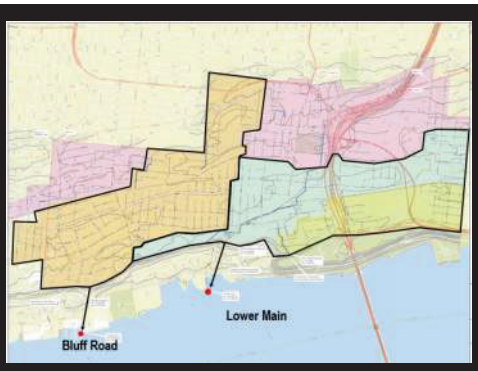


Ridgefield Park

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel
- Green Infrastructure





Borough of Fort Lee CSO Team Meeting Long Term Control Plan

May 15, 2019

HDR

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AGENDA

- Introductions
- Long Term Control Plans
- Fort Lee's CSOs
- Modeling
- CSO Controls
- Preliminary Costs
- Remaining CSO Permit Requirements

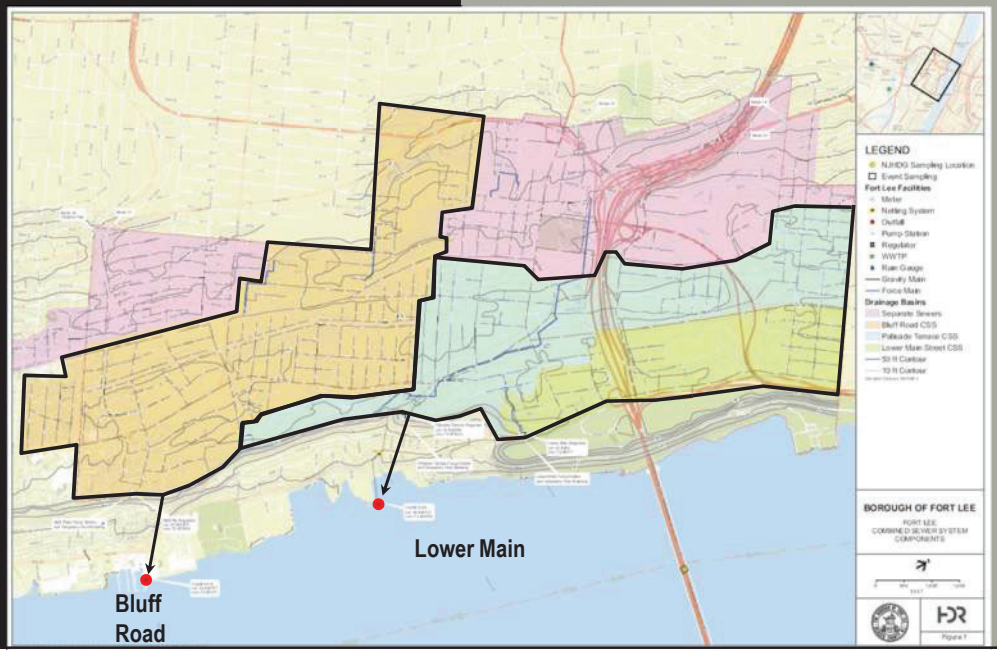
INTRODUCTIONS

- Ed Mignone – Borough Engineer Fort Lee
- Bob Applebaum – Member Supplemental CSO Team
- Jan Goldberg – Member Supplemental CSO Team
- Sal Pagano – Member Supplemental CSO Team
- Yingying Wu – HDR Engineering Inc.
- Gary Grey – HDR Engineering Inc.

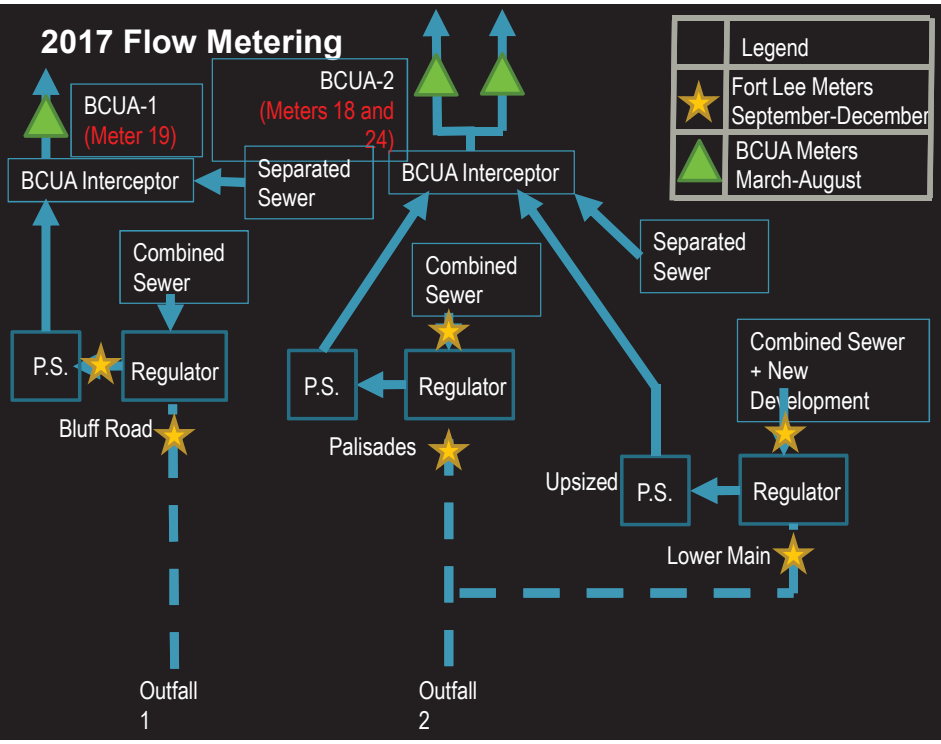
Long Term Control Plan

- Step 1 – System Characterization
  - CSOs
  - Existing controls and performance
  - Landside model
- Step 2 – Evaluation of Alternatives
  - Identify target parameters
  - Select alternatives and control level
  - Cost estimates
- Step 3 – Implementation Schedule
  - Consider median family income and costs of other water quality improvements

FORT LEE's CSOs



2017 Flow Metering



Outfall Summary – 2004 Rainfall

Before Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	1	0.01
Febuary	2	4.58	2	0.79
March	5	1.24	5	0.60
April	5	6.91	7	1.01
May	10	7.14	3	0.69
June	6	3.96	1	0.60
July	7	17.10	8	2.88
August	6	5.93	3	0.45
September	6	19.42	4	3.77
October	1	0.28	2	0.58
November	5	6.03	2	0.33
December	4	3.71	0	0.00
Total	60	77.20	38	11.73

After Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	0	0.00
Febuary	2	4.58	2	0.11
March	5	1.24	0	0.00
April	5	6.91	4	0.01
May	10	7.14	3	0.24
June	6	3.96	1	0.30
July	7	17.10	5	0.94
August	6	5.93	2	0.14
September	6	19.42	3	2.09
October	1	0.28	0	0.00
November	5	6.03	2	0.35
December	4	3.71	0	0.00
Total	60	77.20	22	4.19

CSO CONTROL OBJECTIVES

Presumptive Approach

- 85% Capture
- 4 Overflows per year
- 8 Overflows per year
- 12 Overflows per year
- 20 Overflows per year

Demonstration Approach

- Demonstrate that the selected control program, though not meeting Presumptive Approach criteria, will meet water quality based requirements

CSO CONTROLS

CONTROLS

Source Controls:

Green infrastructure, ***I&I Reduction***, Sewer separation, BMPs, ***Nine Minimum Controls***

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, regulator modification

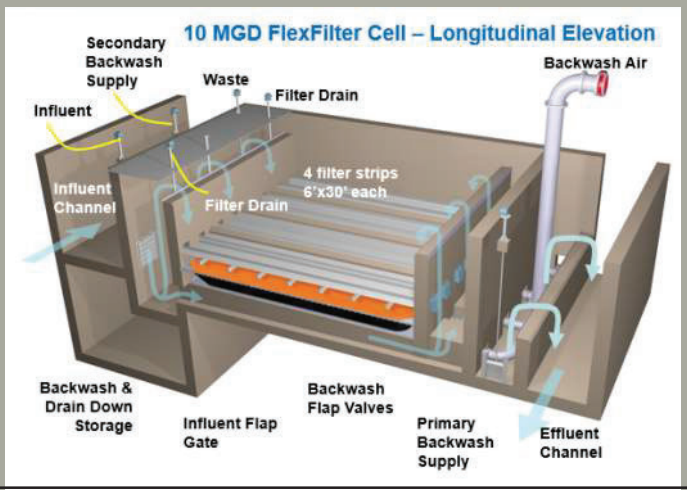
Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, ***high rate filtration/clarification***, chlor/dechlor disinfection, ***PAA disinfection***, UV disinfection, WWTP plant expansion

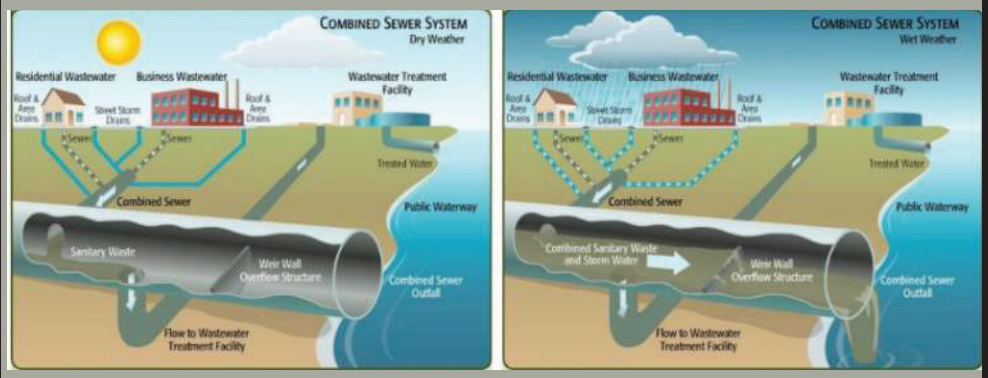
Flex Filter



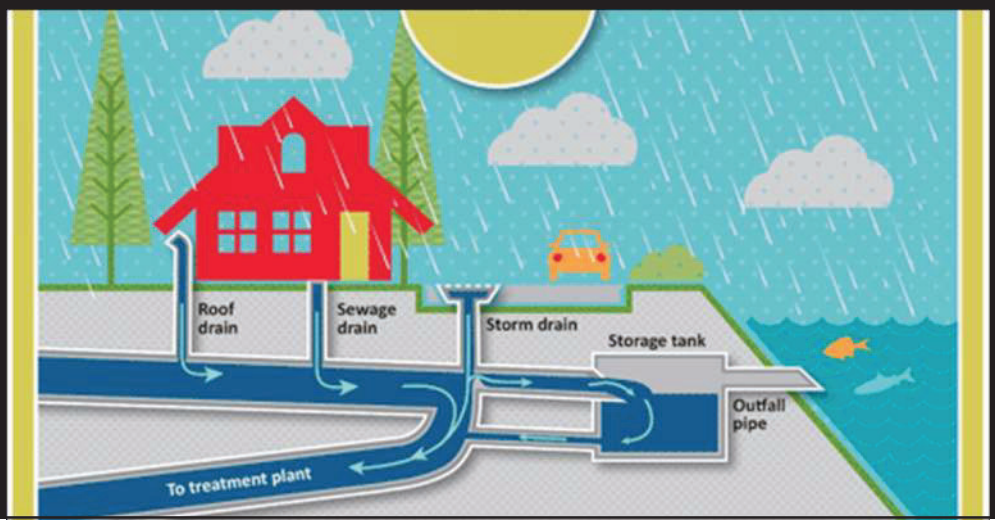
PAA Disinfection

- Peracetic Acid (PAA)
  - Acetic Acid and Hydrogen Peroxide solution
- Common Elements
  - 275 gallon totes or 55 gallon drums
  - Feed pumps
  - Mixers / diffusers
  - Instrumentation (flow, TSS)
  - Sampling equipment
  - Pressure relief
  - Temperature monitoring

In-Line Storage

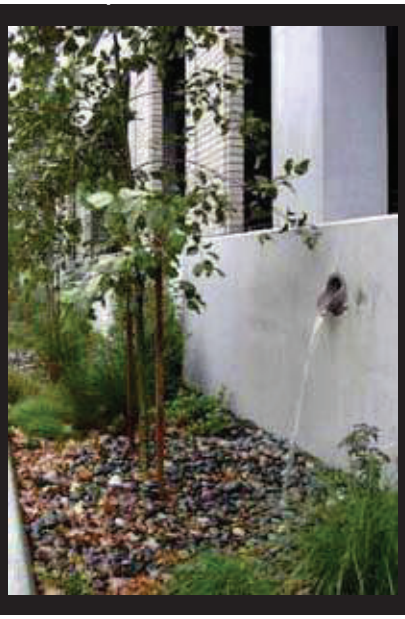


Off-Line Storage



Green Infrastructure Options

Downspout Disconnection

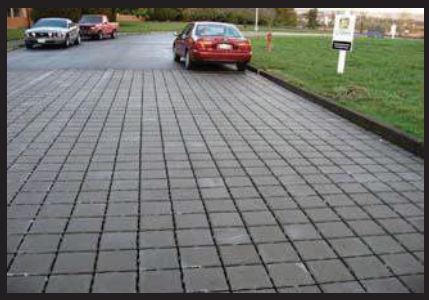


Rain Gardens

Planter Boxes

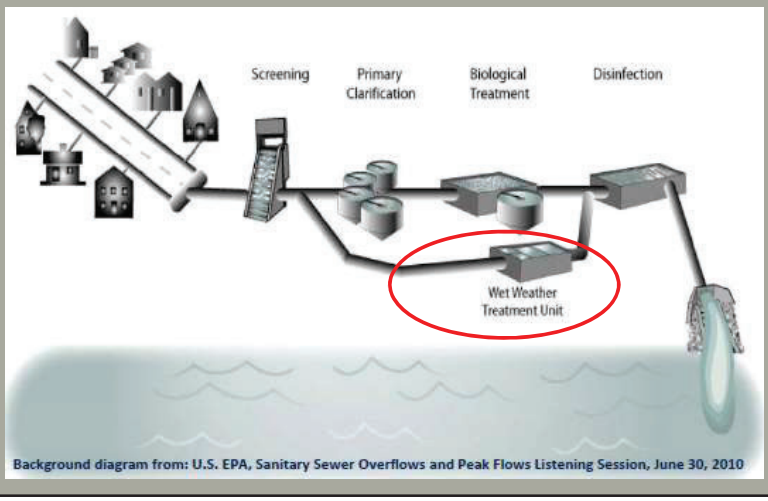
Bioswales

Permeable Pavements



Green Streets and Alleys

Auxiliary Treatment at a WWTP (Blending)



Background diagram from: U.S. EPA, Sanitary Sewer Overflows and Peak Flows Listening Session, June 30, 2010

Preliminary Results

CSO Volumes and Frequencies at Each CSO Control Level

	Baseline			0 CSO			4 CSOs			8 CSOs			12 CSOs			20 CSOs		
Outfall	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	90.8%	0	0	100.0%	8.6	4	99.0%	11.1	8	98.8%	20.0	12	97.8%	34.0	20	96.2%
FL-002	4.7	20		0	0	100.0%	1.0	3	98.0%	1.8	6	96.4%	2.9	11	94.3%	4.7	20	90.8%

Storage Tank Size (MG)					
Outfall	0 CSO events	4 CSO events	8 CSO events	12 CSO events	20 CSO events
FL-001	12.5 [1]	4.6	4.1	3.1	2.0
FL-002	1.2	0.4	0.3	0.1	0.0
Total	13.7 [1]	5.0	4.3	3.2	2.0

(2 MG = 150' x 150' x 12')

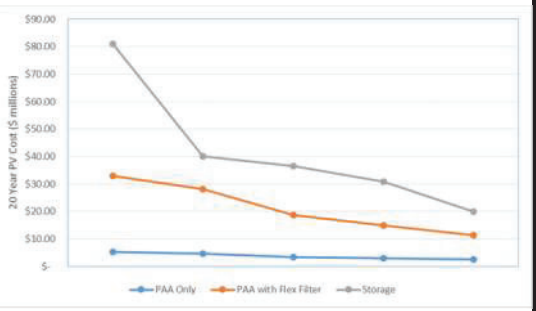
[1] Cannot dewater within 3 days for zero CSO events at FL-001

GI Alternatives									
Outfall	Baseline			5% GI-Bluff Road			10% GI-Bluff Road		
	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	90.8%	79.8	57	91.1%	77.0	58	91.4%
					Additional Percent Capture	0.3%		Additional Percent Capture	0.6%

Preliminary Costs – Gray Infrastructure

Sewer Separation Costs - $400 to $450 million ($478,650/acre)

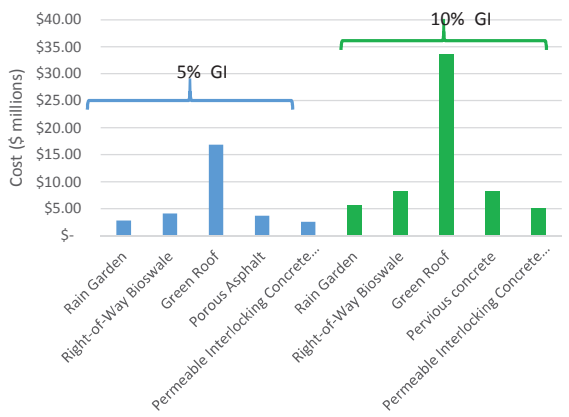
	PAA Only	PAA w/ FlexFilter	Tanks
0 CSOs per year			
Capital Cost ($M)	$ 1.35	$ 28.95	$ 50.64
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80	$ 30.29
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97	$ 80.94
4 CSOs per year			
Capital Cost ($M)	$ 1.27	$ 24.67	$ 22.60
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51	$ 17.48
Total 20 yr PV Cost ($M)	$ 4.67	$ 28.18	$ 40.07
8 CSOs per year			
Capital Cost ($M)	$ 1.07	$ 16.16	$ 20.11
20 yr PV O&M Cost ($M)	$ 2.38	$ 2.45	$ 16.34
Total 20 yr PV Cost ($M)	$ 3.45	$ 18.61	$ 36.45
12 CSOs per year			
Capital Cost ($M)	$ 1.00	$ 12.97	$ 16.31
20 yr PV O&M Cost ($M)	$ 1.99	$ 2.05	$ 14.61
Total 20 yr PV Cost ($M)	$ 2.99	$ 15.01	$ 30.91
20 CSOs per year			
Capital Cost ($M)	$ 0.85	$ 9.75	$ 11.25
20 yr PV O&M Cost ($M)	$ 1.60	$ 1.64	$ 8.72
Total 20 yr PV Cost ($M)	$ 2.44	$ 11.39	$ 19.97



Preliminary Costs – Green Infrastructure

	Green Infrastructure Type	Min Capital Cost ($M)	Max Capital Cost ($M)	20 Year PV O&M Cost ($M)	Min Total 20 year PV Cost ($M)	Max Total 20 year PV Cost ($M)
5% GI (~6.5 Acres)	Rain Garden	$ 0.63	$ 2.00	$ 0.80	$ 1.43	**$ 2.80**
	Right-of-Way Bioswale	$ 0.99	$ 3.29	$ 0.80	$ 1.79	$ 4.09
	Green Roof	$ 3.15	$ 16.03	$ 0.80	$ 3.95	$ 16.83
	Porous Asphalt	$ 1.71	$ 3.58	$ 0.13	$ 1.83	$ 3.71
	Permeable Interlocking Concrete Pavers (PICP)	$ 0.85	$ 2.43	$ 0.13	$ 0.98	**$ 2.56**
10% GI (~13 Acres)	Rain Garden	$ 1.26	$ 4.01	$ 1.60	$ 2.86	**$ 5.61**
	Right-of-Way Bioswale	$ 1.97	$ 6.57	$ 1.60	$ 3.57	$ 8.17
	Green Roof	$ 6.31	$ 32.06	$ 1.60	$ 7.91	$ 33.66
	Pervious concrete	$ 4.01	$ 8.02	$ 0.25	$ 4.26	$ 8.27
	Permeable Interlocking Concrete Pavers (PICP)	$ 1.71	$ 4.86	$ 0.25	$ 1.96	**$ 5.11**

Preliminary Costs – Green Infrastructure



Remaining 2015 CSO Permit Requirements

- ✓CSO signs have been posted near outfalls
- ✓CSO notification system is online (http://NJCSO.hdrgateway.com)
- ✓CSO monthly Discharge Monitoring Reports (DMRs)
- ✓Work plans/QAPPs submitted to NJDEP
  - Baseline Compliance Monitoring Plan
  - System Characterization and Landside Monitoring QAPP
- ✓Monthly CSO Permittee meetings at BCUA
- ✓Evaluation of previous landside model
- ✓Water Quality monitoring
- ✓Complete flow monitoring
- ✓Update landside model
- Conduct alternatives analysis July 1, 2019
- Submit the LTCP June 1, 2020

Questions
Comments
Discussion

Gary Grey
HDR Inc.

Yingying Wu
HDR Inc.

City of Hackensack

COMBINED SEWER SYSTEM
LONG TERM CONTROL
PLAN

DEVELOPMENT AND EVALUATION
OF ALTERNATIVES STATUS

MAY 15, 2019

ARCADIS Design & Consultancy for natural and built assets

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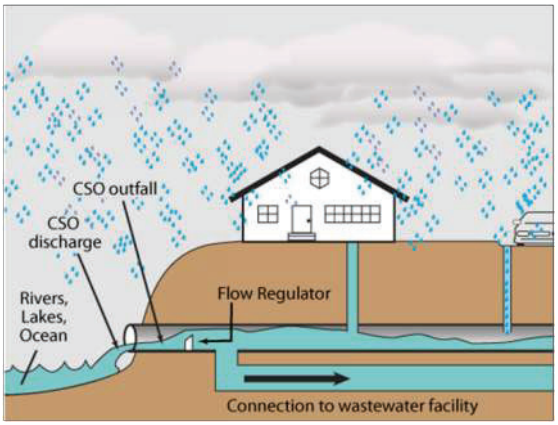
Agenda

- Overview of Hackensack's Combined Sewer System
- Overview of the NJDEP permit requirements
- Development and Evaluation of Alternatives Status
- Coordination and Public Participation goals
- Summary

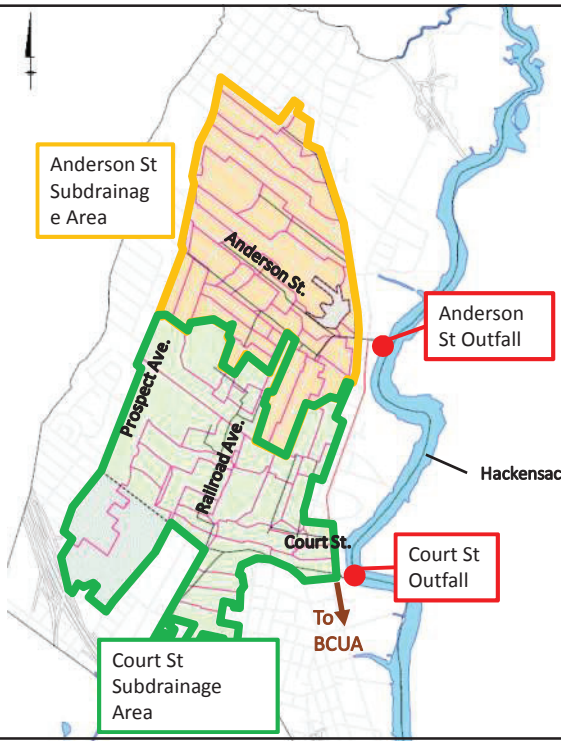
Overview of Hackensack Combir Sewer System

- What is a Combined Sewer Overflow (CSO)?



Overview of Hackensack Combin Sewer System

Court Street Outfall



Overview of Hackensack Combined Sewer System

- ~31 miles of combined sewers
- ~50% of Hackensack's population served by combined sewer system
- NJDEP New Jersey Pollution Discharge Elimination System (NJPDES) Permit No. NJ0108766

Overview of Hackensack Combir Sewer System

- Screening facilities

Court Street Screening Facility

Bar screens

NJDEP Permit Requirements

- Long Term Control Plan (LTCP) goals:
  - Reduce combined sewer overflows to obtain water quality compliance
    - Using "presumptive" or "demonstration" approach
  - Utilize important public feedback throughout the process
- Sewer System Characterization Report
  - Submitted July 1, 2018; approved March 19, 2019
- Public Participation Process Report
  - Submitted July 1, 2018; approval is pending
- Development and Evaluation of Alternatives Report – due July 1, 2019
  - The NJDEP Permit requires City of Hackensack to evaluate:
    - Sewer Separation
    - End of pipe treatment
    - Green infrastructure
    - Infiltration/inflow control
    - Storage – tanks or tunnel

Development and Evaluation of Alternatives

Sewer separation – two separate sanitary and stormwater systems

- Positives – improves water quality, reduces or eliminates untreated sanitary discharge, reduces flooding in basements and streets
- Negatives – high cost, extensive construction, internal plumbing work

Alternative prescreening – no further consideration recommended City wide due to extensive construction costs

- Estimated cost $750M
  - Cost Source: Updated 2007 Cost
- New storm sewers in the CSS

e Analysis Report

Development and Evaluation of Alternatives

End of pipe treatment – screening and discharge disinfection

- Positives – smaller footprint, chlorine widely used in wastewater treatment
- Negatives – limited use in the US for CSOs, potentially produce toxic byproducts
- City of Hackensack currently has screening facilities at both outfalls

Alternative prescreening – still under consideration

- Potential lower costs for disinfection alone
  - Unsure if disinfection alone will satisfy water quality requirements

Development and Evaluation of Alternatives

Green infrastructure (GI) – stores, absorbs, and uses storm water runoff

- Positives – lower capital cost, can assist in reducing flooding, streetscape
- Negatives – higher maintenance cost, site specific, low impact on CSOs

Green Roof

Bioswale

Rain Garden

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Development and Evaluation of Alternatives

LID Control Editor

Bioretention Basin Default Configurations

Surface		Soil Layer		Storage Layer		Underdrain	
Beam Height (in)	9	Thickness (in)	21	Thickness (in)	15	Drain Coef. (in/hr)	1.5
Vegetation volume (fraction)	0.05	Porosity (Vol. Fraction)	0.26	Void Ratio	0.7	Drain Exponent	0.5
Surface roughness (Manning's n)	0.25	Field Capacity (Vol. Fraction)	0.09	Seepage Rate (in/hr)	0.01	Drain Offset (in)	4.5
Surface Slope (percent)	1	Wilting Point (Vol. Fraction)	0.035	Clogging factor	0		
		Conductivity (in/hr)	2.1				
		Conductivity slope	8				
		Suction Head	3.5				

10% Area Controlled	14.9 MG	Δ2%

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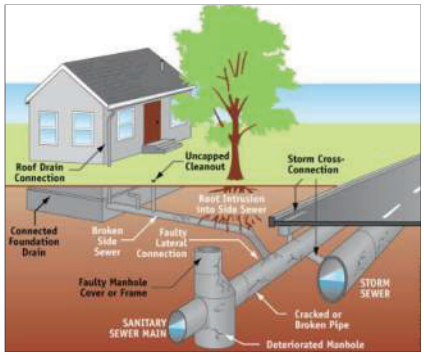
Development and Evaluation of Alternatives

Infiltration/Inflow (I/I) Control

- Positives – improves water quality, reduces combined sewer volume
- Negatives – high cost, possible disruption in services, extensive construction



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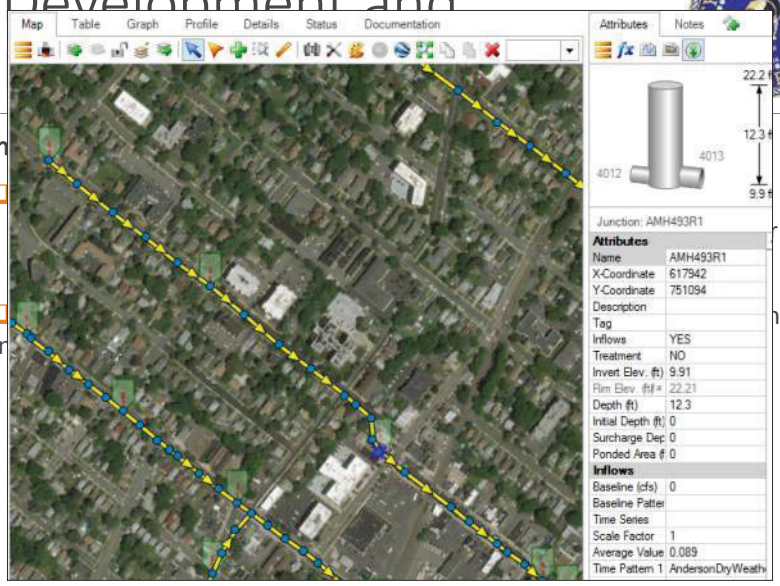
Development and



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Development and Evaluation of Alternatives

Storage alternatives– temporarily store combined sewer flow and pump back slowly to the treatment plant after rain event

- In-line storage – not feasible because there is no additional capacity to store combined flow in the current sewer system
- Off-line storage – storage tanks near the outfalls or a tunnel
  - Positives – eliminates or reduces overflow discharges, reduces sewer backups, improves the efficiency of existing treatment capacity
  - Negatives – lack of real estate, high cost

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Develop Evaluati ves

Storage Prescreenin son to Court

- Large conduit wit WM model with pump back control

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Tun with Diar	
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Tun with Diar	
Tun with Diameter	

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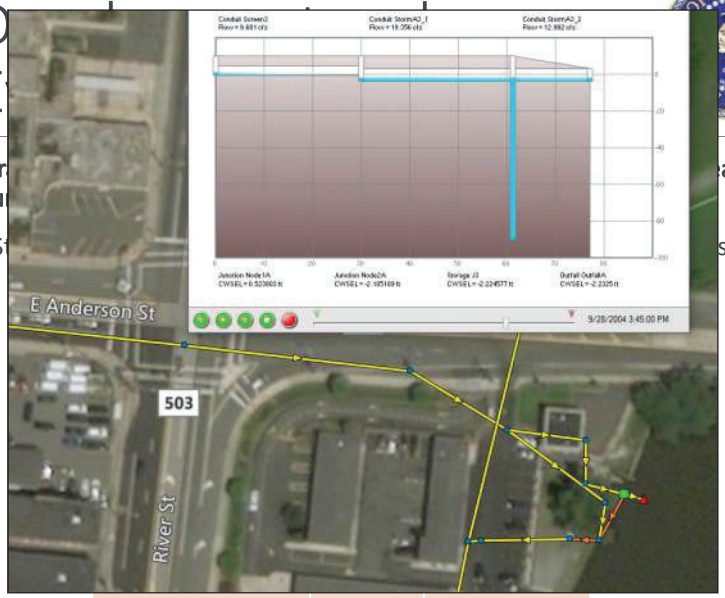

2 Tanks: 3.13 MG Volume with 73-foot Diameter	20	89%

Public Participation Goals

- Educate residents and businesses about the combined sewer system
- Inform residents/businesses about future projects and costs
- Incorporate public feedback into the selection of alternatives
- How?
  - Surveys – posted to the City's website
  - Public meetings – hopeful to present at the City's June 11th Council Meeting
  - Invite interested residents to join Public Participation Team
- Meet NJDEP Permit requirements

Summary

- Development and Evaluation of Alternatives
  - Model alternatives
  - Evaluate estimated costs for alternatives
  - Complete report by July 1, 2019
    - BCUA to receive draft on June 1, 2019
- Coordination and Public Participation
  - Add a member of the public to the Supplemental CSO team
  - Conduct outreach efforts to receive public feedback

ARCADIS Design & Consultancy for natural and built assets

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Questions?

- Website: www.hackensack.org/cso
- Email: csoteam@hackensackdpw.org

ARCADIS Design & Consultancy for natural and built assets

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2018 CSO Summary

Month	Rainfall (in)	001A Anderson	002A Court	Combined
Jan-18	2.91	3	2	3
Feb-18	6.11	7	7	8
Mar-18	4.78	2	2	2
Apr-18	5.48	5	5	5
May-18	3.16	7	10	10
Jun-18	3.67	6	6	6
Jul-18	6.85	9	9	10
Aug-18	6.32	11	10	11
Sep-18	6.73	5	6	6
Oct-18	3.24	5	5	5
Nov-18	6.05	9	8	9
Dec-18	4.50	4	4	4
Average	**4.98**	**6**	**6**	**7**
Total	**59.80**	**73**	**74**	**79**

*Number of overflows estimated using PCSWMM model of the City of Hackensack's combined sewer system

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Back to General Discussions

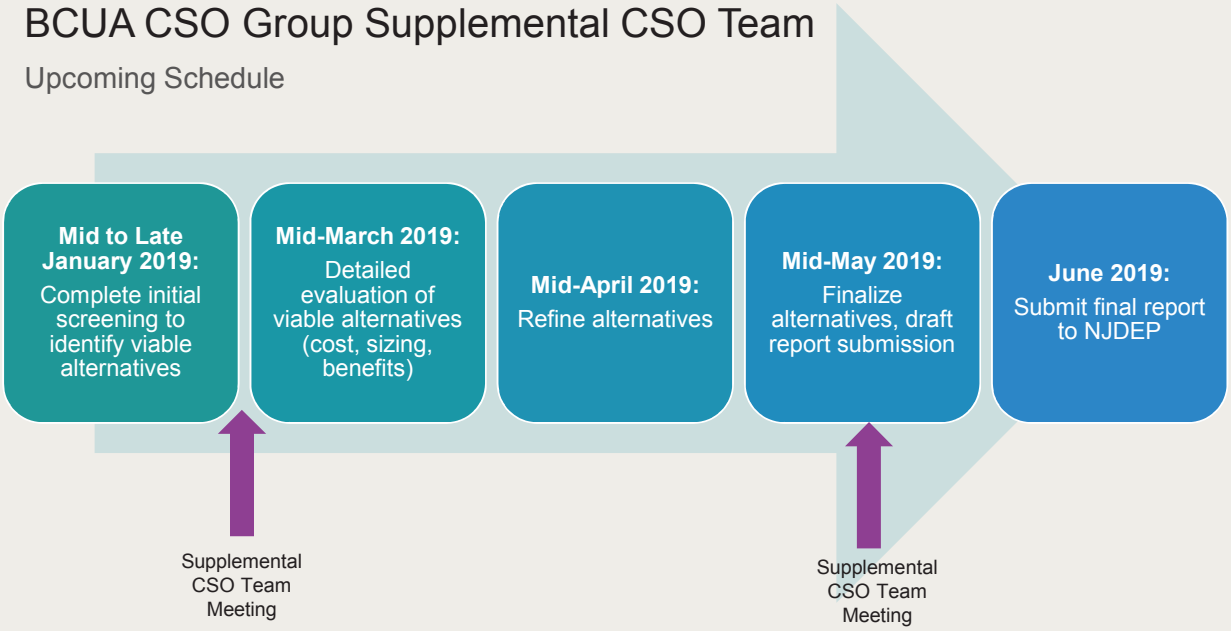
BCUA CSO Group Supplemental CSO Group

Development and Evaluation of Alternatives Report – DRAFT Outline

- Introduction
- General Information
- Public Participation Update
- Water Quality Objectives
- Development of Alternatives
  - Development and Screening Levels
- Costing
- Available Land Analysis
- Alternatives Evaluation
- Summary
- References

BCUA CSO Group Supplemental CSO Team

Upcoming Schedule



Upcoming Schedule

July 1, 2019 – Development and Evaluation of Alternatives Report Due to NJDEP

- Develop Comprehensive List of Alternatives
- Screen Alternatives
- Evaluate Alternatives
- Cost Estimates
- Coordinate with other Members of BCUA Group
- Produce and Submit Report

Next Meeting Date?

Final Questions?

Thank You?

Bergen County Utilities Authority
Supplemental CSO Team
Meeting Number 10
Development and Evaluation of Alternatives
BCUA Administration Building, Public Meeting Room
September 10, 2019 10:00 – 11:30 pm

Attendees – See attached sign in sheet

Presentation slides attached

Minutes

1. Introductions

2. Safety Minute
   - John presented on Food Safety, see attached presentation.

3. Review of prior meeting
   - John presented recap, see attached presentation.
   - John reminded everyone minutes from prior meetings are posted on the BCUA website.

4. Status of submissions
   - John presented on the status of submissions, see attached presentation.

5. Development and Evaluation of Alternatives Review
   - BCUA – John presented, see attached presentation.
     - It was discussed if "The American Dream" mall construction had already been accounted for in flows that are expected at the BCUA in the coming years and Dominick stated that the mall had been accounted for and approved.
   - Hackensack – Frank presented, see attached presentation.
   - Fort Lee – Gary presented, see attached presentation.
   - Village of Ridgefield Park – John presented, see attached presentation.

6. Public Participation Discussion
   - Planning board meetings were suggested to encourage public participation.
   - The meetings should be through the County to reach a broader group of people who interact with the water. The municipalities will be hosting their own meetings.
   - First meeting needs to leave an impression on the public to motivate public participation in future meetings.
   - DEP should attend town meetings for the public to be able to ask them direct questions.
   - It is important to notify the public of how much each alternative will cost and how this will impact their taxes or sewer bill.

- It was recommended the public meeting not be held until the plan was well formulated to that the public has something substantial to comment on and so they do not lose interest over the course of several meetings.

7. Upcoming Schedule / Next Steps
   - Selection and Implementation of Alternatives Report due June 1, 2020.
   - NJDEP comments are expected late September.
   - Towns meet with their mayors and elected officials to present alternatives.
   - Approval of Municipalities and BCUA by March 2020.
   - Each Municipality will do their own FCA with consistent methodology.

8. Wrap up and open discussion of additional topics.
   - DEP Discussion
     - The question of what happens if one town doesn't submit an acceptable plan, but the others do. How will this affect the other towns? Dominic clarified that these are individual permits for each town, and they shouldn't affect each other but it would be better to ask the DEP directly.
     - Green infrastructure is being strongly encouraged, but it is expensive and requires extensive of maintenance.
     - It was suggested DEP be asked how the costs of MS4s should be included in the financial analysis.
     - Stormwater utilities were suggested as a way to pay for LTCP.
   - Alternatives Final Decision
     - Prior to making a final decision on the alternatives each town should meet with their mayor and elected officials. However, this should only happen when the unknown variables are eliminated. Shouldn't happen too early or too late.
     - What do municipalities need to authorize the Selection of Alternatives report?
     - Meet with the DEP again before officially submitting final decision.
     - Report is due June 1, 2020 but when should everyone be finished? John indicated that this is a topic for the next BCUA Group permitees meeting, the overall anticipated schedule is in the presentation.

9. Next Meeting
   - John will follow up with potential dates for late November or early December but given that it is holiday season the date may need to be rescheduled.

Bergen County Utilities Authority
Supplemental CSO Team
Meeting Number 10
BCUA Administration Building, Public Meeting Room
September 10, 2019 10:00 am

Name	Organization	Email	initials
John Rolak	Mott MacDonald	John.rolak@mottmac.com	
John Dening	Mott MacDonald	John.dening@mottmac.com	
Donna Gregory	Mott MacDonald	Donna.gregory@mottmac.com	
Susan McVeigh	Health Officer, Hackensack	smcveigh@hackensack.org	
Francis Reiner	Senior Urban Designer, LLA-PP	francisr@dmrarchitects.com	
Mark Olson	Ridgefield Park Chairman, Green Team	Mark-olson@verizon.net	
Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com	
Bob Applebaum	Borough of Fort Lee	Bappelbaum@aol.com	
Jan Goldberg	Borough of Fort Lee	j-goldberg@fortleenj.org	
Captain Bill Sheehan	Hackensack Riverkeeper	captain@hackensackriverkeeper.org	
Michelle Langa	Hackensack Riverkeeper, attorney	legal@hackensackriverkeeper.org	
Alan O'Grady	Ridgefield Park	aog560@aol.com	
Del Bove, Mark	Arcadis	Mark.DelBove@arcadis.com	
Dominic DiSalvo	BCUA	ddisalvo@bcua.org	
~~Edward Mignone~~	~~Fort Lee~~	~~E-Mignone@fortleenj.org~~	
Gary Grey	HDR	Gary.Grey@hdrinc.com	
Robert Laux	BCUA	rlaux@BCUA.org	
Frank Belardo	Arcadis	frank.belardo@arcadis.com	

Name	Organization	Email	initials
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Ryan Westra	Hackensack	rwestra@hackensackdpw.org	
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Susan Rosenwinkel	NJDEP	Susan.rosenwinkel@dep.nj.gov	
Dwyane Kobesky	NJDEP	Dwyane.kobesky@dep.nj.gov	
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Mike McAloon	Suburban Consulting	mmcaloon@suburbanconsulting.com	MKM
Ed Monroe	Ridgefield PK		EM
Yingying Wu	HDR	yingying.wu@hdrinc.com.	yw
Diego Rodriguez	Mott MacDonald	Diego.Rodriguez@MottMac.com	DGR

MOTT MACDONALD

Development and Evaluation of Alternative Controls

BCUA CSO Group Supplemental CSO Team Meeting #10

September 10, 2019

Safety Topic

September is Food Safety Month

Stats

In the U.S.

76,000,000 cases a year

325,000 hospitalized

5,000 deaths

1

Chill

Within 2 hours

40ºF of colder

Thaw in Fridge

2

Clean

Wash hands 20 sec

Cutting boards

Countertops

3

Cook

Check temperature

Stir

Boil – soups, sauces and gravies

4

Separate

Meat

Cutting boards

Shopping Carts

Prevent dripping

http://safetytoolboxtopics.com/

BCUA CSO Group Supplemental CSO Team

Meeting No. 10 Agenda

Refresher – In meeting #9 we covered:

- Submissions Status
- Public Participation Status
- Status of Development and Evaluation of Alternatives
  - BCUA
  - Hackensack
  - Fort Lee
  - Village of Ridgefield Park
- Upcoming Schedule

- Reminder minutes now posted on BCUA Website

BCUA CSO Group Supplemental CSO Team

Meeting No. 10 Agenda

BCUA CSO Group Supplemental CSO Team

Meeting No. 10 Agenda

- Development and Evaluation of Alternatives
  - BCUA
  - Village of Ridgefield Park
  - Fort Lee
  - Hackensack
- Selection and Implementation of Alternatives
- Public Outreach Opportunities
- Upcoming Schedule

BCUA Supplemental CSO Team

DEP review status – July 1, 2018 submittals

- **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. DEP comment letter dated 3/01/19. **Approved 4/8/19**
- **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. DEP **Approval** letter dated 3/01/19.
- **Public Participation Process Report:** comment letter dated 11/15/2018; revised report submitted1/07/19. **Approved June 26, 2019.**
- **System Characterization Reports**: comment letter dated 12/17/2018, Revised Report submitted 2/15/19. NJDEP **Approval** letter dated 03/05/19

BCUA Supplemental CSO Team

DEP review status – July 1, 2019 submittals

- **Development and Evaluation of Alternatives Report:**
  - **All members submitted on time**
  - **Comments from NJDEP anticipated by end of September**

BCUA CSO Group Supplemental CSO Team

What does the permit say about Development and Evaluation of Alternatives?

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

To be Evaluated by Municipalities

- Green Infrastructure
- Increased Storage Capacity
- Infiltration and Inflow Reduction
- Sewer Separation
- Satellite Treatment of CSO Discharge

To be Evaluated by BCUA

- Increased Storage Capacity
- Bypass of Secondary Treatment at STP
- Treatment Plant Expansion

MOTT MACDONALD

BCUA Update Development and Evaluation of Alternative Controls

BCUA CSO Group Supplemental CSO Team
Meeting #10

September 10, 2019

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Future Conditions

Data Source	Conservative Projected Population 2050 (people)	Average Projected Population 2050 (people)
NJTPA	650,660	650,660
US Census Projection	659,880	659,880
NJ Department of Labor	745,480	
BCUA WMP Extended Projections	676,430	676,430
Average	**683,110**	**662,320**

New Wastewater Source	Projected Flow Increases to Little Ferry WPCF (MGD)
2050 Population Growth (114,240 people@65 gpcpd)	7.1
Edgewater WPCF	4.0
American Dream Complex	0.9
Total	**12.0**

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Significant Indirect Users

No Significant Impact

CSO Basin 006, Ridgefield Park	Overflow statistics for typical year, 2015 Baseline
Number of overflows	12
Annual volume (MG)	0.5
Annual duration (hrs.)	39
Average flow rate (MGD)	0.31

CSO Basin 002A Court Street Hackensack	Overflow statistics for typical year, 2015 Baseline
Number of overflows	76
Annual volume (MG)	151.5
Annual duration (hrs.)	456 (76 overflow days, assumed 6 hrs. per day)
Average flow rate (MGD)	7.97

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Development and Evaluation of Alternatives Report

BCUA Facilities

- Transport
- Treatment

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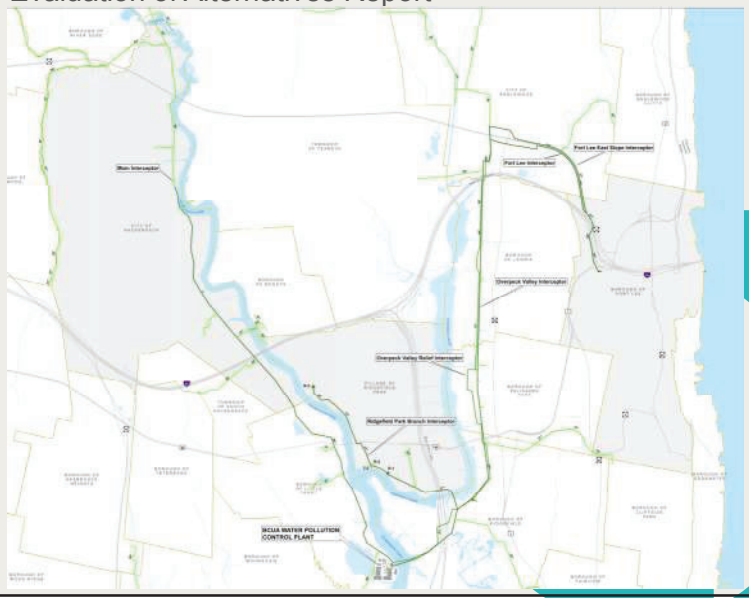
Development and Evaluation of Alternatives Report



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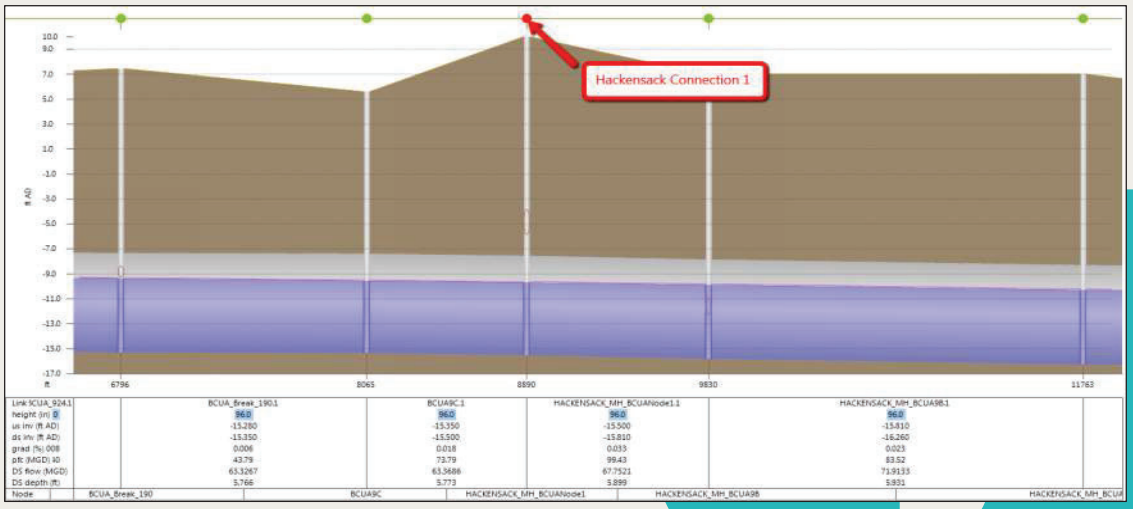
Development and Evaluation of Alternatives Report – Typical Year Capacity



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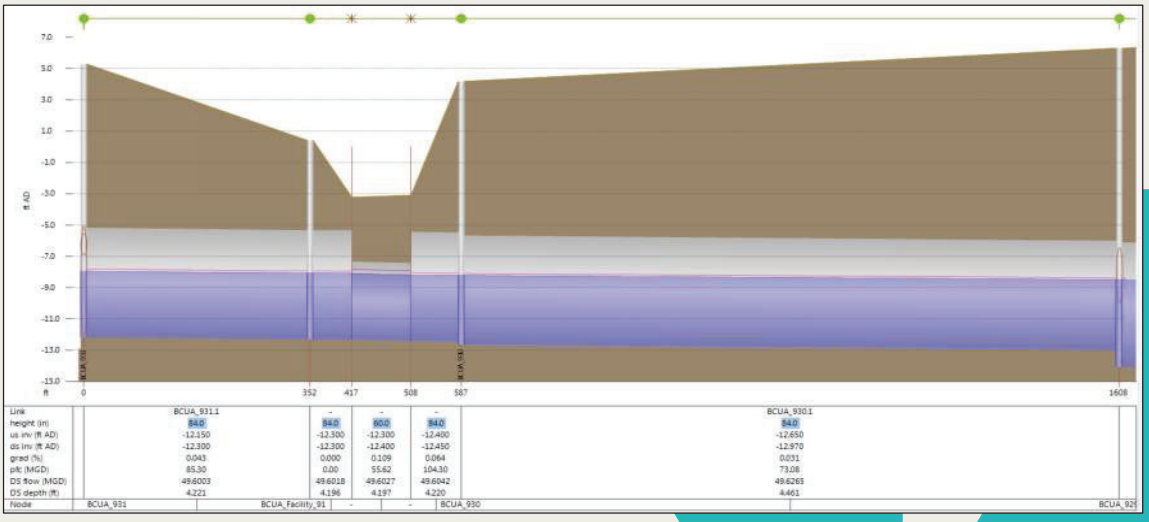
Development and Evaluation of Alternatives Report – Typical Year Capacity



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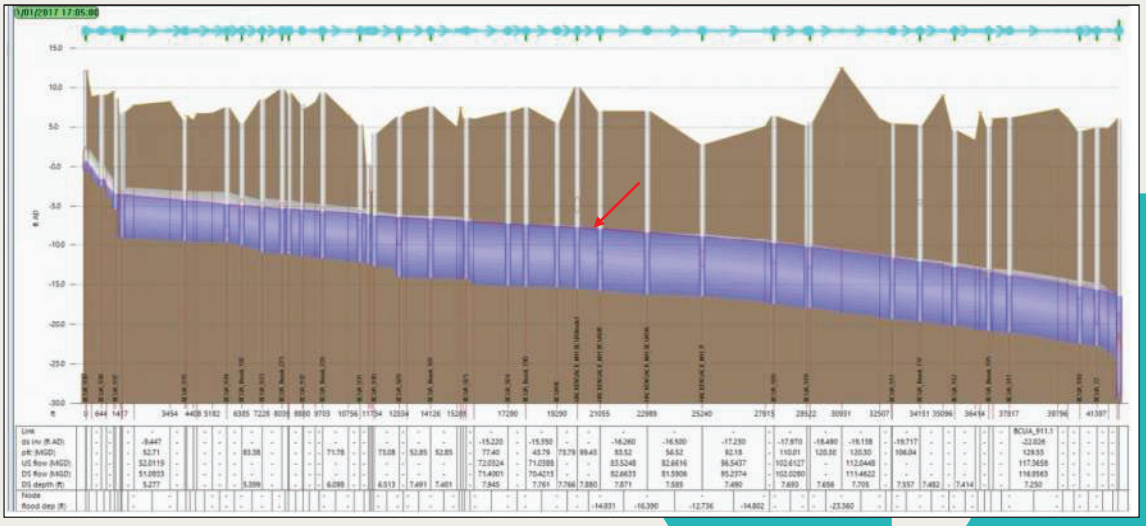
Development and Evaluation of Alternatives Report – Design Storm



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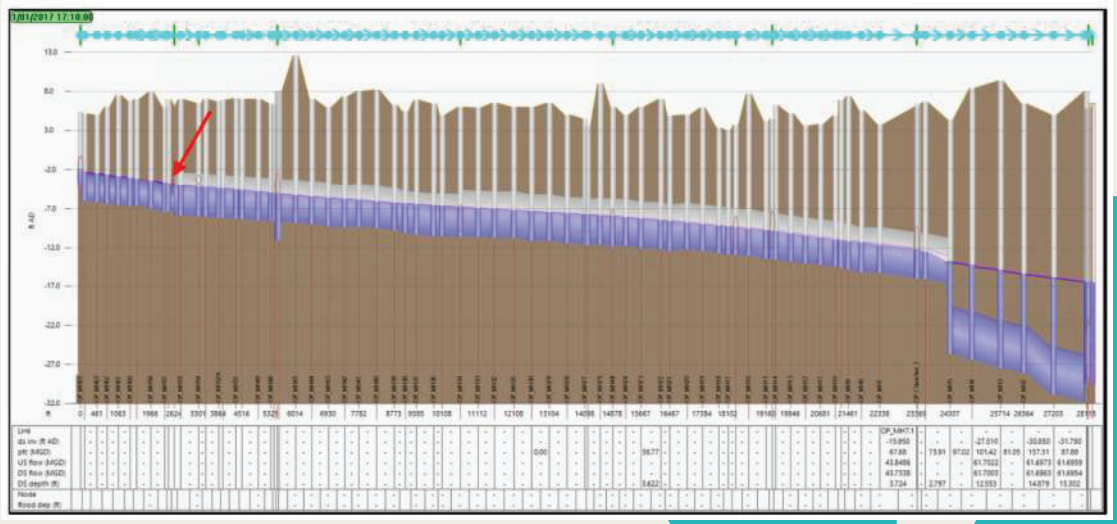
Development and Evaluation of Alternatives Report – Low Connections



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Development and Evaluation of Alternatives Report

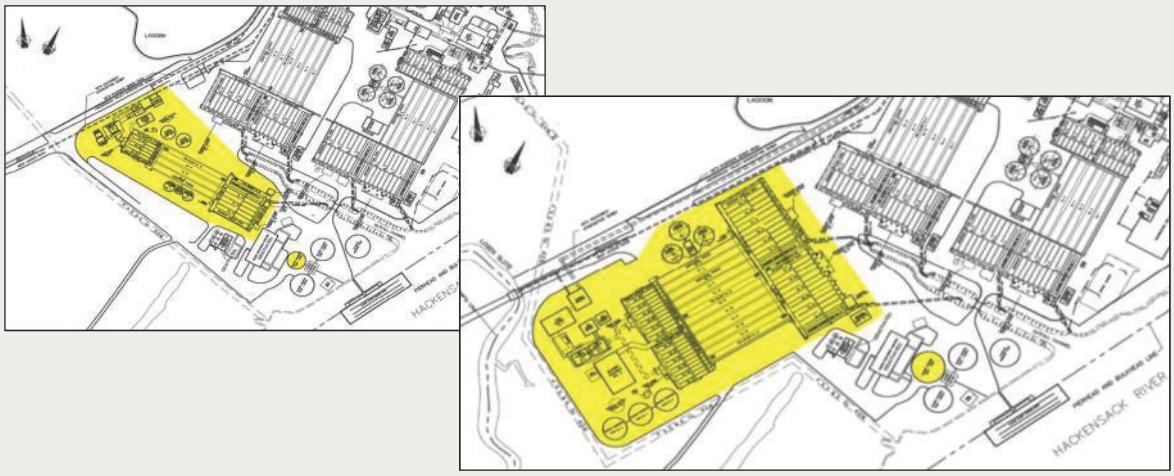
InfoWorks ICM Model was Used to Estimate Sewer Flow Capacity near WPCF:

Trunk Sewer	Estimated Max Flow (mgd)*
Main Trunk Sewer	130
Overpeck Trunk & Relief Sewers	80
Total Max Peak Flow to WPCF	210

* Based on average wet well elevations and no system surcharge.

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report



Control Program 1: Expand Plant Capacity

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Plant Capacity Expansion	Total Plant Wet Weather Capacity	Capital Costs	O&M Costs	O&M Present Worth (20-year)	Total Present Worth (20-year)
29 MGD	149 MGD	$192,000,000	$7,400,000	$113,000,000	$305,000,000
58 MGD	178 MGD	$286,000,000	$11,000,000	$167,000,000	$453,000,000
86 MGD	206 MGD	$373,000,000	$14,400,000	$219,000,000	$592,000,000
115 MGD	235 MGD	$462,000,000	$17,800,000	$271,000,000	$733,000,000

Control Program 1: Expand Plant Capacity

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

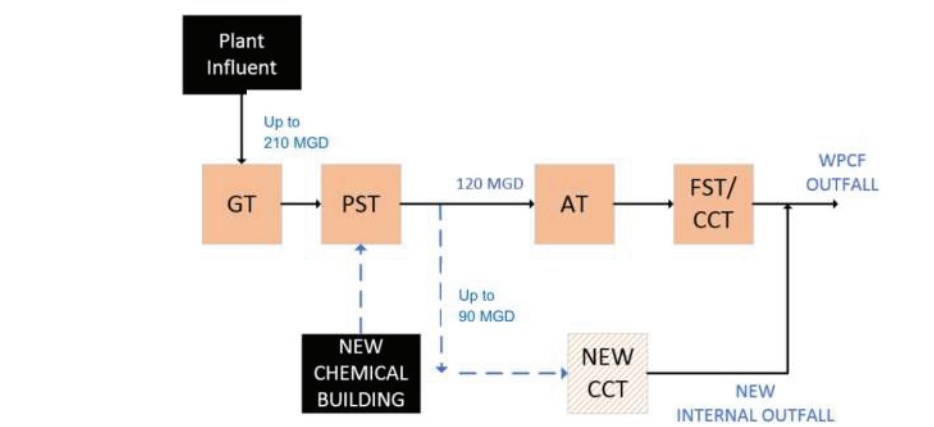


Figure 6. CEPT Alternative Block Flow Diagram

Control Program 2: Wet Weather Blending

Chemically Enhanced High Rate Treatment

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Blended Flow and Technology	Total Wet Weather Treatment Capacity	Capital Costs	O&M Costs	O&M Present Worth (20-year)	Total Present Worth (20-year)
90 MGD CEPT	210 MGD	$64,500,000	$850,000	$12,900,000	$77,700,000
90 MGD BF	210 MGD	$111,500,000	$1,220,000	$18,600,000	$129,800,000
180 MGD CEPT	300 MGD	$90,200,000	$850,000	$12,900,000	$103,300,000
180 MGD BF	300 MGD	$161,100,000	$1,220,000	$18,600,000	$179,300,000

Control Program 2: Wet Weather Blending

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

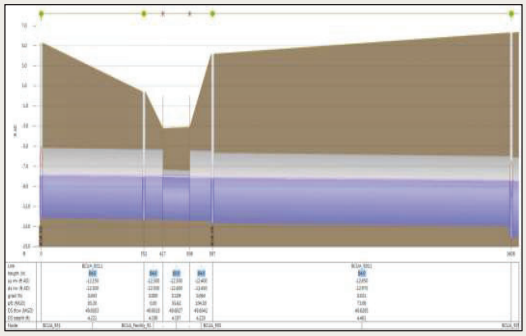
Treatment Rate [5-min] (MGD)	Required Storage Volume (MG)
120	40
140	7.9
160	0.5
180	0

Tank Size	Capital Costs	O&M Costs	O&M Present Worth (20-year)	Total Present Worth (20-year)
40 MG	$217,000,000	$3,800,000	$58,000,000	$269,000,000
7.9 MG	$56,000,000	$1,200,000	$18,000,000	$72,000,000
0.5 MG	$9,000,000	$430,000	$6,500,000	$15,500,000

Control Program 3: Regional Storage

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report



Interceptor	Storage volume at max depth (MG)	Storage volume at max depth +2 ft (MG)
Hackensack Trunk Sewer	2.8	0.2
Overpeck Trunk Sewer	2.5	0.7
Overpeck Relief Sewer	1.8	0.4
Total	6.1	1.3

Control Program 4: Inline Storage

City of Hackensack

COMBINED SEWER SYSTEM LONG TERM CONTROL PLAN

DEVELOPMENT AND EVALUATION OF ALTERNATIVES SUMMARY RESULTS

SEPTEMBER 10, 2019

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Agenda

- Overview of Hackensack's Combined Sewer System (CSS)
- Overview of the Combined Sewer System Long Term Control Plan (LTCP) Goals
- Combined Sewer Overflow (CSO) Control Alternatives
- Public Participation
- Next Steps

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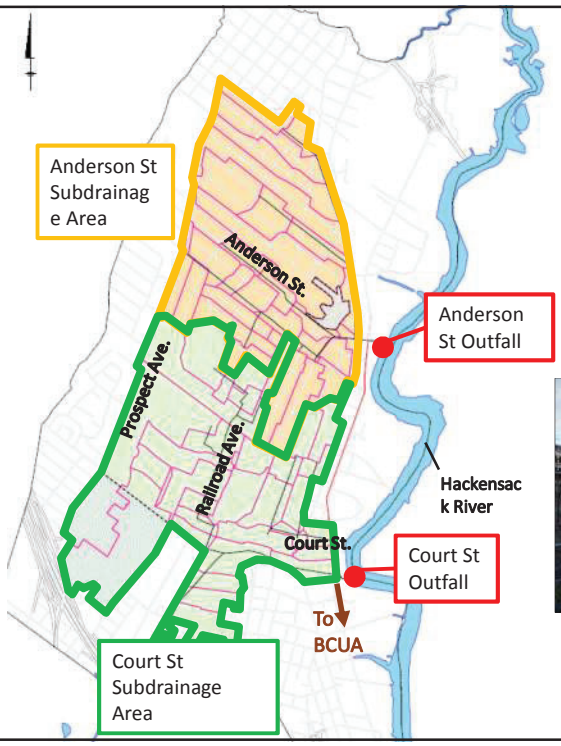

Overview of Hackensack Combined Sewer System

- ~31 miles of combined sewers
- ~50% of Hackensack's population served by combined sewer system
- Screening facilities

Long Term Control Plan (LTCP) Goals

- Reduce CSO to obtain water quality compliance with public input
- Two approaches:
  - **Presumption Approach:** 85% Capture of CSO discharge or reduce number of CSOs to 4-6 per year
  - **Demonstration Approach:** Demonstrate water quality compliance

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CSO Control Alternatives

- Green Infrastructure
  - Bioswales/Raingardens
  - Permeable Pavement
- Sewer Separation
- Infiltration/Inflow Control
- Treatment of CSO discharge
- Storage
  - Tank(s)
  - Tunnel
  - In-line

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Development and Evaluation of Alternatives

Green infrastructure (GI) – stores, absorbs, and uses storm water runoff

- Positives – lower capital cost, can assist in reducing flooding, streetscape
- Negatives – higher maintenance cost, site specific, low impact on CSOs

Bioswale

Rain Garden

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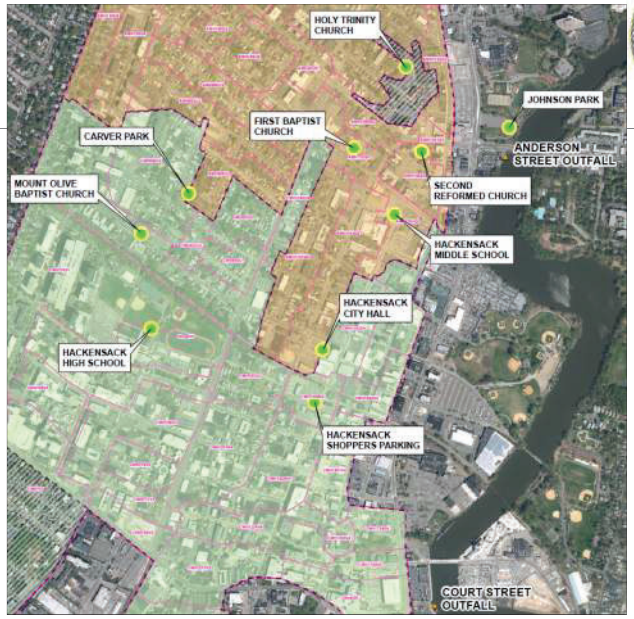
Possible GI Location Map



Development and Evaluation of Alternatives

Green infrastructure (GI) Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Estimated Cost ($M)	Key Constraints
Baseline conditions for 2004	68%	56	N/A	-	-
GI - 5% Impervious Area	70%	51	13.0%	$32M	Does not reach performance & water quality goals, number of overflows not reduced.
GI - 10% Impervious Area	70%	51	14.8%	$43M	Does not reach performance & water quality goals, number of overflows not reduced.

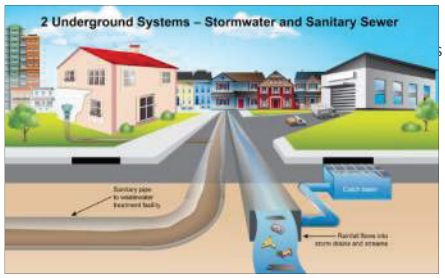
Development and Evaluation of Alternatives

Sewer separation – two separate sanitary and stormwater systems

- Positives – improves water quality, reduces or eliminates untreated sanitary discharge, reduces flooding in basements and streets
- Negatives – high cost, extensive construction, internal plumbing work

Alternative prescreening – City wide cost

- Estimated cost $560M
  - Cost Source: Updated 2007 Cost
- Includes new storm sewers in the CSS



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Development and Evaluation of Alternatives

End of pipe treatment – pretreatment and discharge disinfection

- Positives – smaller footprint, chlorine widely used in wastewater treatment
- Negatives – disinfection relies on the TSS concentration, limited use in the US for CSOs, potentially produce toxic byproducts
- City of Hackensack currently has screening facilities at both outfalls

Alternative prescreening – still under consideration

- Potential lower cost for disinfection alone
  - Unsure if disinfection alone will satisfy water quality requirements

Name of Alternative	Estimated Cost ($M)	Key Constraints
Disinfection	$16M	Uncertain if this alternative satisfies water quality goals, number of overflows not reduced, no pretreatment.
Pretreatment & Disinfection	$50M	Extent of pretreatment is unknown, uncertain if this alternative satisfies water quality goals, number of overflows not reduced.

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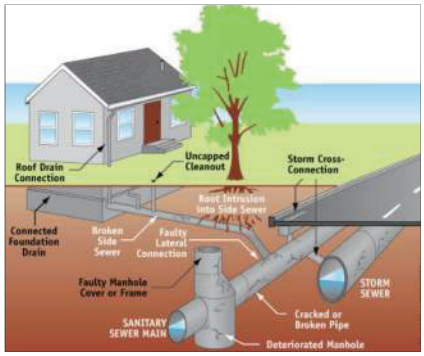
Development and Evaluation of Alternatives

Infiltration/Inflow (I/I) Control

- Positives – improves water quality, reduces combined sewer volume
- Negatives – high cost, possible disruption in services, extensive construction



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Development and Evaluation of Alternatives

Infiltration/Inflow (I/I) Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows per Year	Reduction of Overflow Volume from Baseline (%)	Estimated Cost ($M)	Key Constraints
Baseline conditions for 2004	68%	56	N/A	-	-
Removal of Inflow and Infiltration (I&I)*	68%	56	0.1%	$11M	Does not reach performance and water quality goals, number of overflows not reduced.

*Removal of I/I based on 2015 Combined Sewer System Condition Assessment completed by Arcadis

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Development and Evaluation of Alternatives

Storage alternatives– temporarily store combined sewer flow and pump back slowly to the treatment plant after rain event

- In-line storage – not feasible because there is no additional capacity to store combined flow in the current sewer system
- Off-line storage – underground storage tanks near the outfalls or a tunnel
  - Positives – eliminates or reduces overflow discharges, reduces sewer backups, improves the efficiency of existing treatment capacity
  - Negatives – lack of real estate, high cost

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Storage Tunnel from Anderson to Court

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Development and Evaluation of Alternatives

Storage Tunnel from Anderson to Court Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Estimated Cost ($M)	Key Constraints
Baseline conditions for 2004	68%	56	N/A	-	-
Tunnel Storage - 18ft Diameter	96%	4	89.6%	$97M	Constructability of a deep tunnel has risks, high cost.
Tunnel Storage - 17ft Diameter	95%	8	87.2%	$94M	Constructability of a deep tunnel has risks, high cost.
Tunnel Storage - 14ft Diameter	93%	12	79.7%	$85M	Constructability of a deep tunnel has risks, high cost.
Tunnel Storage - 10.5ft Diameter	86%	20	60.9%	$74M	Constructability of a deep tunnel has risks, high cost.

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Storage Prescreening Alternative – 2 Underground Storage Tanks (100-foot deep) near Court and Anderson Outfalls

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Development and Evaluation of Alternatives

Storage Prescreening Alternative – 2 Underground Storage Tanks (100-foot deep) near Court and Anderson Outfalls Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Estimated Cost ($M)	Key Constraints
Baseline condltions for 2004	68%	56	N/A	-	-
Two tanks, 115ft dia.	98%	4	93.0%	$140M	Siting issues for tank locations, high cost.
Two tanks, 105ft dia.	96%	8	89.7%	$123M	Siting issues for tank locations, high cost.
Two tanks, 87ft dia.	94%	12	81.6%	$98M	Siting issues for tank locations, high cost.
Two tanks, 73ft dia.	89%	20	66.9%	$79M	Siting issues for tank locations, high cost.
Two tanks, 60ft dia., (85% Capture)	85%	25	52.7%	$66M	Siting issues for tank locations, high cost.

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Dearborn, Michigan: http://www.we-technologies.com/wastewater-projects.php

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Public Participation

- Educate residents and businesses about the combined sewer system
- Inform residents/businesses about future projects and costs
- Incorporate public feedback into the selection of alternatives
- How?
  - Surveys – posted to the City's website
  - Public meetings – presented to Council, Public and Committee of the Whole (COW) on June 11, 2019. Will schedule additional presentations.
  - Invite interested residents to join Public Participation Team

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Next Steps

- Next Steps
  - Continue and expand public participation efforts and schedule additional meetings
  - 2019-2020 selection of LTCP program alternatives for CSO control
- Questions?
  - Website: www.hackensack.org/cso
  - Email: csoteam@hackensackdpw.org

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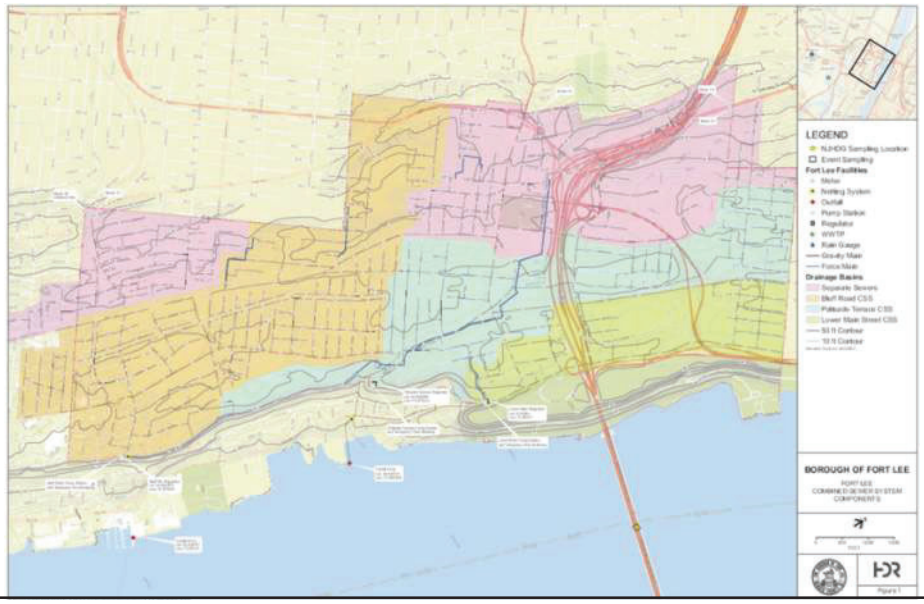
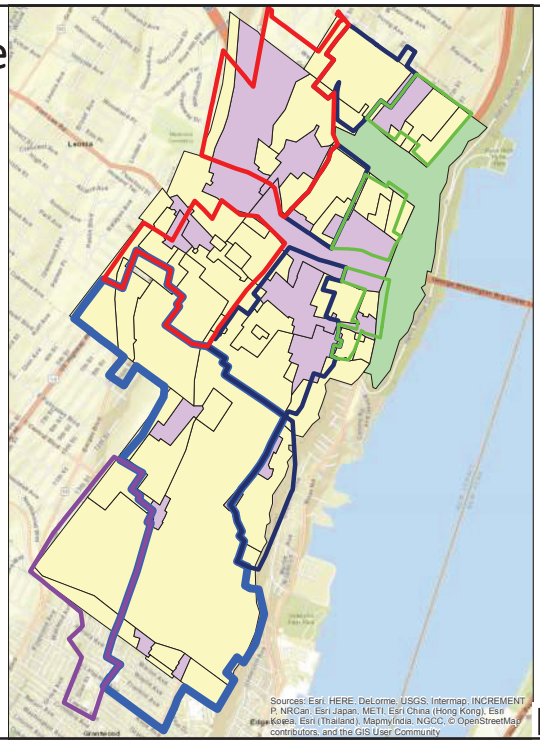
Fort Lee - NJPDES Permit No. NJ0034517
Development of Alternatives



2007 Land Use Type and Drainage Area

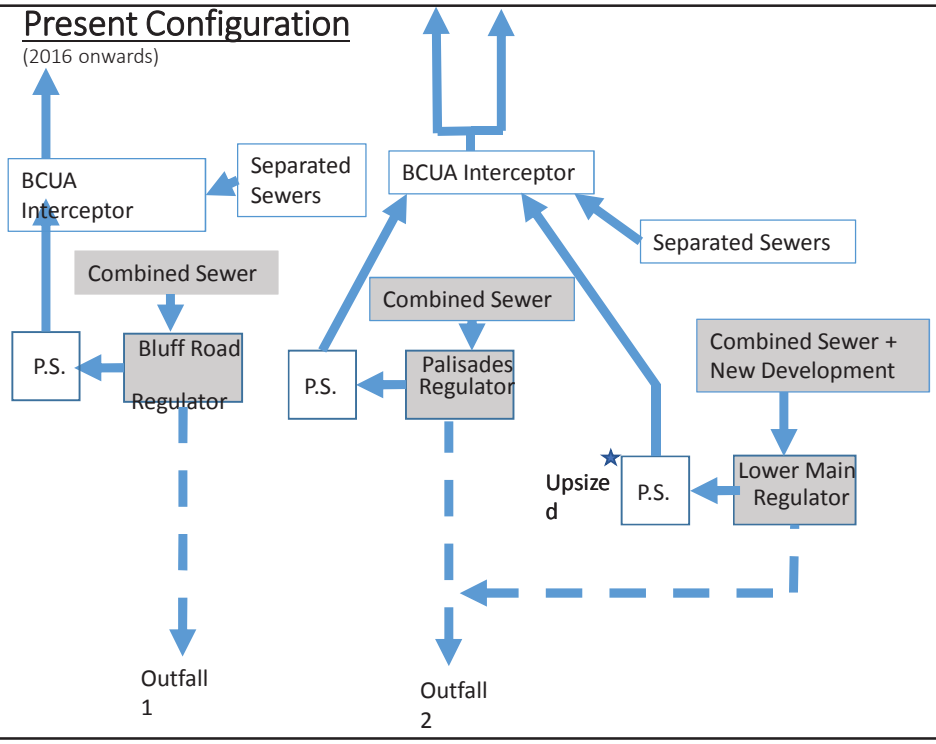


Model Improvements Since 2007 Hudson Lights (~16 acres)
Lower Main Drainage Area

2012

2019

Present Configuration
(2016 onwards)

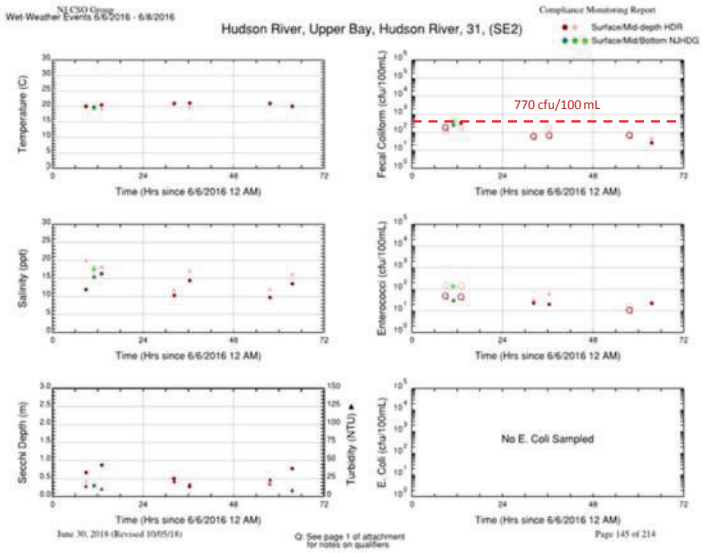


Projected Overflows for 2004 Typical Year

Condition	Outfall 001 (Bluff Road)		Outfall 002 (Palisade Terrace)	
	Overflows	Volume	Overflows	Volume
2004 before redirection of Lower Main	60	77.20	38	11.73
2004 after redirection of Lower Main	60	77.20	22	4.17

CSO capture after redirection of flow is 84.7%

Water Quality Sampling Results



No water quality impairment. The Hudson River meets current SE2 Criteria

Fort Lee Almost Meets the CSO Policy

"A program that meets any of the criteria listed below would be presumed to provide an adequate level of control ……. provided the permitting authority determines that such presumption is reasonable ……."

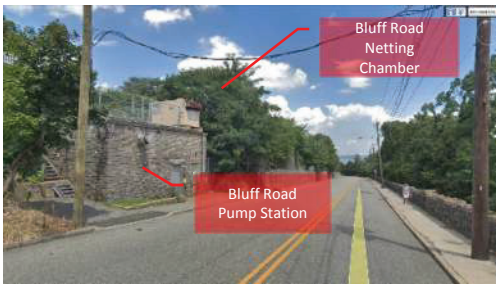
i. No more than an average of four overflow events per year...

ii. The elimination or the capture for treatment of no less than **85% by volume of the combined sewage collected** in the CSS during precipitation events on a system-wide annual average basis...

iii. The elimination or removal of no less than the **mass of pollutants, identified as causing water quality impairment**..., for the volumes that would be eliminated or captured for treatment under paragraph ii... " (Section II.C.4.a.)

Bluff Road

Bluff Road netting facility is on the boarder of Ft Lee and Edgewater on the Palisades. Access is from Claremont Road on Manatauck Avenue.



Gray Infrastructure - Storage Tank Control

Table 7-3. Storage Tank Size (MG) at Each Level of Control

CSO Event Target/yr	FL-001	FL-002
0	12.5	1.2
4	4.6	0.4
8	4.1	0.3
12	3.1	0.1
20	2.0	0.0

Table 7-4. Overflow Volumes and Events with Storage Tank Alternative

CSO Event Target/yr	CSO Volume (MG)				CSO Events			
	FL-001	FL-002	Total	Reduction	FL-001	FL-002	Total	Reduction
Baseline	82.5	4.7	87.2		58	20	60	
0	0.0	0.0	0.0	100%	0	0	0	100%
4	8.6	1.0	9.6	89%	4	3	4	93%
8	11.1	1.8	13.0	85%	8	6	8	87%
12	20.0	2.9	23.0	74%	12	11	12	80%
20	34.0	4.7	38.7	56%	20	20	20	67%

Gray Infrastructure - Treatment Control

(Solids Removal and Disinfection)

Table 7-5. CSO Peak Flow Rates (MGD) at Each Level of Control

CSO Event Target/yr	FL-001	FL-002
0	100.8	9.8
4	85.3	7.8
8	55.4	3.3
12	42.6	3.2
20	32.3	1.0

Table 7-6. Partially Treated CSO Volumes (MG) at Each Control Target

CSO Event Target/yr	FL-001	FL-002	Total	Volume Reduction
Baseline	82.5	4.7	87.2	
0	0.0	0.0	0.0	100%
4	3.6	0.3	3.9	96%
8	11.3	2.1	13.4	85%
12	15.8	2.1	18.0	79%
20	20.2	4.0	24.2	72%

Cost of Gray Infrastructure Controls

Table 7-7. Total Capital Cost, Total 20-yr O&M Cost, Raw and PTPC as 20-yr Present Value

	PAA Only	PAA w/ FlexFilter	Tanks
0 CSOs per year			
Raw Capital Cost ($M)	$ 1.35	$ 28.95	$ 50.64
20 yr PV O&M Cost ($M)	$ 3.90	$ 5.75	$ 30.29
Total 20 yr PV Cost ($M)	$ 5.25	$ 34.71	$ 80.94
Probable Total 20 yr PV Cost ($M)	$ 7.27	$ 78.14	$ 156.90
4 CSOs per year			
Capital Cost ($M)	$ 1.27	$ 24.67	$ 22.60
20 yr PV O&M Cost ($M)	$ 3.40	$ 5.01	$ 17.48
Total 20 yr PV Cost ($M)	$ 4.67	$ 29.68	$ 40.07
Probable Total 20 yr PV Cost ($M)	$ 6.58	$ 66.68	$ 73.97
8 CSOs per year			
Capital Cost ($M)	$ 1.07	$ 16.16	$ 20.11
20 yr PV O&M Cost ($M)	$ 2.38	$ 3.48	$ 16.34
Total 20 yr PV Cost ($M)	$ 3.45	$ 19.63	$ 36.45
Probable Total 20 yr PV Cost ($M)	$ 5.05	$ 43.87	$ 66.61
12 CSOs per year			
Capital Cost ($M)	$ 1.00	$ 12.97	$ 16.31
20 yr PV O&M Cost ($M)	$ 1.99	$ 2.89	$ 14.61
Total 20 yr PV Cost ($M)	$ 2.99	$ 15.85	$ 30.91
Probable Total 20 yr PV Cost ($M)	$ 4.50	$ 35.30	$ 55.37
20 CSOs per year			
Capital Cost ($M)	$ 0.85	$ 9.75	$ 11.25
20 yr PV O&M Cost ($M)	$ 1.60	$ 2.29	$ 8.72
Total 20 yr PV Cost ($M)	$ 2.44	$ 12.04	$ 19.97
Probable Total 20 yr PV Cost ($M)	$ 3.72	$ 26.66	$ 36.85

There is a significant cost associated with providing solids removal for disinfection. Disinfection will be piloted with and without solids removal.

Green Infrastructure Controls - 5% and 10% of Impervious Area

Table 7-2. Overflow Volumes and Frequencies with GI Alternative

	GI Alternative							
	Baseline		5% GI-Bluff Road			10% GI-Bluff Road		
Outfall	CSO Volume	CSO Events	CSO Volume	CSO Events	Volume Reduction	CSO Volume (MG)	CSO Events	Volume Reduction
FL-001	82.5	58	79.8	57	3%	77.0	58	7%

Cost of Green Infrastructure Controls

Table 7-8. Cost Summary for Green Infrastructure to Control 5% and 10% of Impervious Cover

	Green Infrastructure Type	Capital Cost Min PTPC ($M)	Capital Cost Max PTPC ($M)	20-Yr O&M Cost as PV ($M)	Min PTPC 20-Yr Life Cycle Cost as PV ($M)	Max PTPC 20-Yr Life Cycle Cost as PV ($M)
5% GI (~6.5 Acres)	Rain Garden	$ 1.58	$ 5.01	$ 0.80	$ 2.38	$ 5.81
	Right-of-Way Bioswale	$ 2.46	$ 8.21	$ 0.80	$ 3.26	$ 9.01
	Green Roof	$ 7.88	$ 40.08	$ 0.80	$ 8.68	$ 40.88
	Porous Asphalt	$ 4.27	$ 8.95	$ 0.13	$ 4.40	$ 9.08
	Pervious concrete	$ 5.01	$ 10.02	$ 0.13	$ 5.13	$ 10.14
	Permeable Interlocking Concrete Pavers	$ 2.14	$ 6.08	$ 0.13	$ 2.26	$ 6.20
10% GI (~13 Acres)	Rain Garden	$ 3.15	$ 10.02	$ 1.60	$ 4.75	$ 11.62
	Right-of-Way Bioswale	$ 4.93	$ 16.43	$ 1.60	$ 6.53	$ 18.03
	Green Roof	$ 15.77	$ 80.16	$ 1.60	$ 17.37	$ 81.76
	Porous Asphalt	$ 8.54	$ 17.90	$ 0.25	$ 8.79	$ 18.15
	Pervious concrete	$ 10.02	$ 20.04	$ 0.25	$ 10.27	$ 20.29
	Permeable Interlocking Concrete Pavers	$ 4.27	$ 12.16	$ 0.25	$ 4.52	$ 12.41

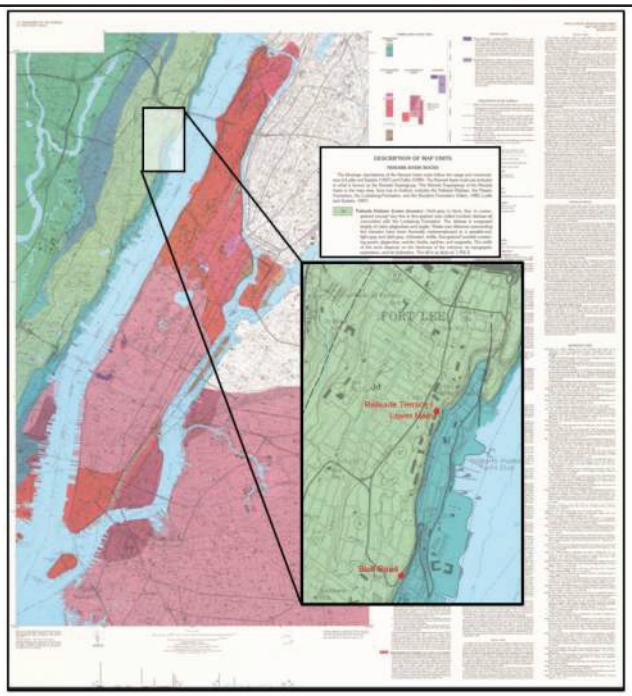
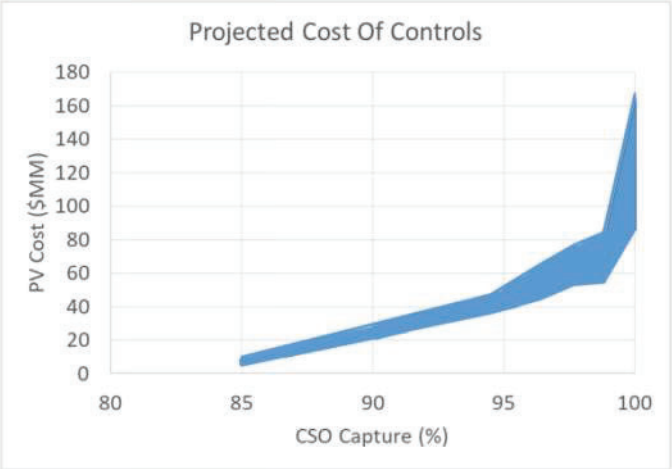


Figure 6-3. Bedrock Map of New York and Parts of Kings and Queens Counties, New York and Bergen and Hudson Counties, New Jersey

Ft Lee is underlain by Palisade bedrock which will impede recharge.

Cost Range of CSO Controls



Questions to be answered:

- Is 84.7% CSO control enough considering we are currently meeting SE2 water quality criteria?
- How will water quality criteria change?
- Can GI get us to 85+% CSO control at a reasonable cost?
- If we have to do more than 85% CSO control should we pilot test disinfection with and without solids removal?
- If we want to use tanks where can we site them and how much more will sewage disposal cost?

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Outfall Summary – 1988 Typical Year

NJPDES	Month	Number of CSO Events	Average CSO Duration (Hours)	Average CSO Volume (MG)	Total CSO Volume (MG)
FL-001	1	5	8.42	0.85	4.26
FL-001	2	5	8.03	1.31	6.54
FL-001	3	3	8.58	1.37	4.11
FL-001	4	4	3.65	0.75	3.00
FL-001	5	7	7.62	1.38	9.66
FL-001	6	3	4.08	0.83	2.50
FL-001	7	10	4.90	1.51	15.08
FL-001	8	4	2.65	1.11	4.44
FL-001	9	2	7.63	3.29	6.58
FL-001	10	3	7.83	2.34	7.02
FL-001	11	6	12.30	2.21	13.25
FL-001	12	4	3.11	0.31	1.22
Total		**56**			**77.76**

NJPDES	Month	Number of CSO Events	Average CSO Duration (Hours)	Average CSO Volume (MG)	Total CSO Volume (MG)
FL-002	1	4	11.50	0.08	0.32
FL-002	2	4	7.86	0.18	0.73
FL-002	3	2	16.80	0.19	0.38
FL-002	4	2	7.58	0.11	0.23
FL-002	5	6	12.00	0.23	1.38
FL-002	6	3	3.23	0.04	0.13
FL-002	7	6	19.10	0.37	2.22
FL-002	8	1	31.30	0.56	0.56
FL-002	9	2	11.00	0.51	1.01
FL-002	10	3	11.10	0.30	0.89
FL-002	11	6	13.20	0.29	1.72
FL-002	12	1	0.75	0.00	0.00
Total		**40**			**9.57**

Condition	Outfall 001 (Bluff Road)		Outfall 002 (Palisade Terrace)	
	Overflows	Volume	Overflows	Volume
2004 before redirection of Lower Main	60	77.20	38	11.73
2004 after redirection of Lower Main	60	77.20	22	4.17

Outfall Summary – Typical Year 2004

Outfall	001 Bluff Road		002 Lower Main/Palisade	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	0	0.00
Febuary	2	4.58	2	0.11
March	5	1.24	0	0.00
April	5	6.91	4	0.01
May	10	7.14	3	0.24
June	6	3.96	1	0.30
July	7	17.10	5	0.94
August	6	5.93	2	0.14
September	6	19.42	3	2.09
October	1	0.28	0	0.00
November	5	6.03	2	0.35
December	4	3.71	0	0.00
Total	**60**	**77.20**	**22**	**4.19**

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Village of Ridgefield Park

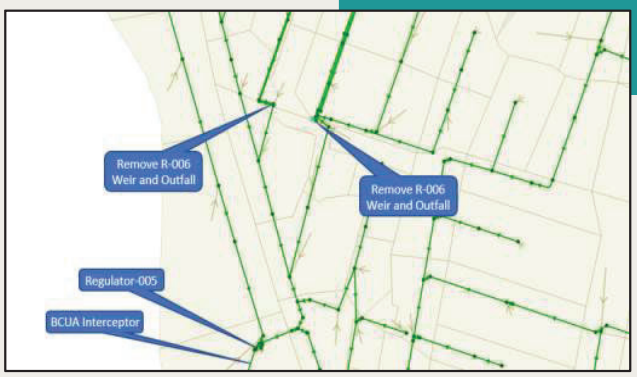
Alternatives Analysis

Alternatives Evaluation

Control Program 1 - Elimination of Outfall 006A

Small overflow volume at 006A

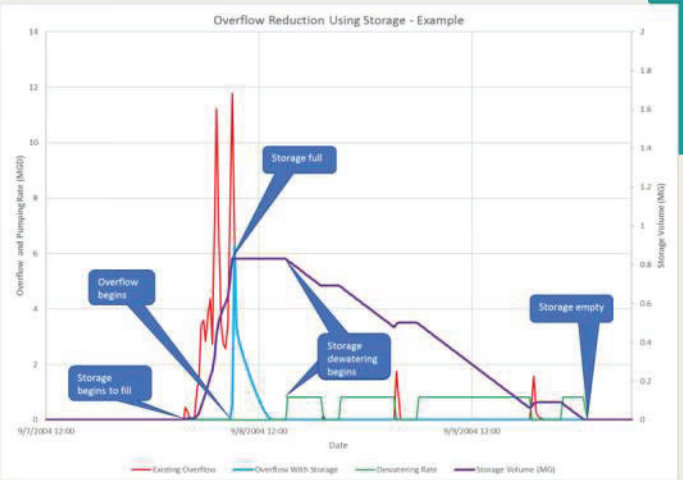
- Feasible to combine 005A and 006A to reduce burden on other alternatives
- Model shows additional upgrades required to the system if 006A is eliminated
- No water quality benefit to elimination, but extra costs



Alternatives Evaluation

Storage – Tanks and Tunnels

Temporary storage tunnels and tanks reduce and delay overflows



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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

Consists of:

- Diversion structures with fine screens;
- Consolidation piping
- An offline below grade tank equipped with a flushing system and odor control;
- Tank overflow to an outfall;
- Dewatering pumping station; and
- Discharge connection back to the interceptor.

- 2 Consolidated Tanks for 001A & 002A and 003A-006A
- Consolidation - pros and cons to individual outfall storage
- Largest Project issues come with large-scale construction in an urban area

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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

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Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one, central tunnel

- Results in only one outfall near current 002A
- Consists of:
  - Consolidation piping from Outfall 006A
  - Diversion piping from each outfall
  - Control Gates
  - Drop shafts along Industrial Avenue and at intersection of 2nd Avenue, and Bergen Turnpike.
  - Deaeration chambers
  - A dewatering pumping station
  - Grit and screening facilities
  - Force main connection back to the BCUA Main Trunk Sewer.
  - A tunnel overflow with tide gate
- Issues are typical with large-scale urban construction, though tunnels introduce further complications
  - Mining and construction across the entire route as well complexity in tunnel management

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Alternatives Evaluation

Control Program 3 – Consolidated Tunnel Storage Contd.

Consolidated Tunnel Map

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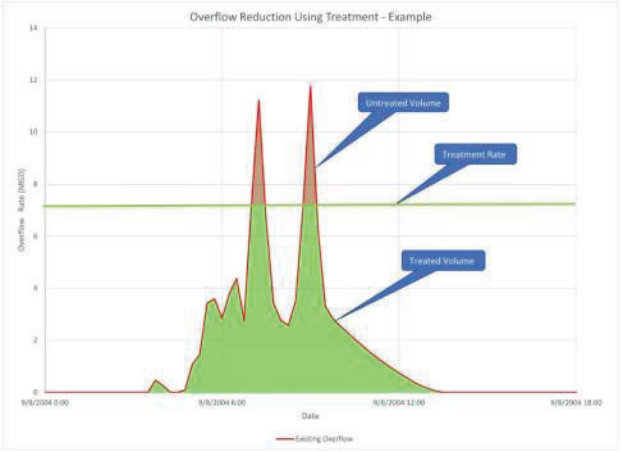
Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

Similar to EOP storage, but overflow is not returned to interceptor

- Treatment capacity governed by flow, not volume like the storage tanks
- Treatment process:
  - Fine Screening for floatable and course particles
  - Pump Station
  - High-rate primary treatment (i.e. ActiFlo)
  - Disinfection by peracedic acid
- Similar pros and cons to consolidation as storage
- Issues are general for large-scale urban construction



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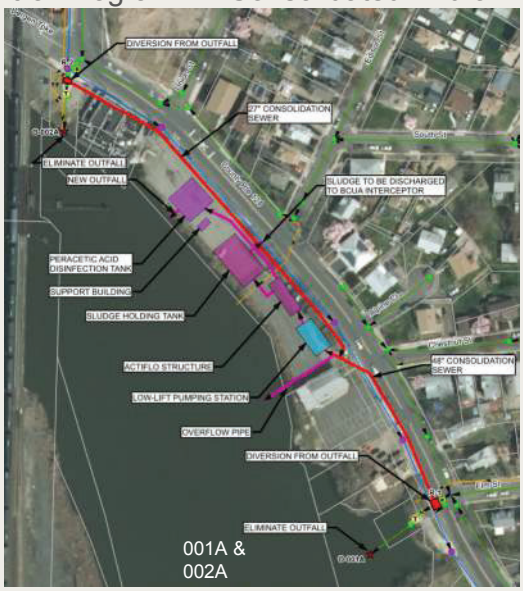
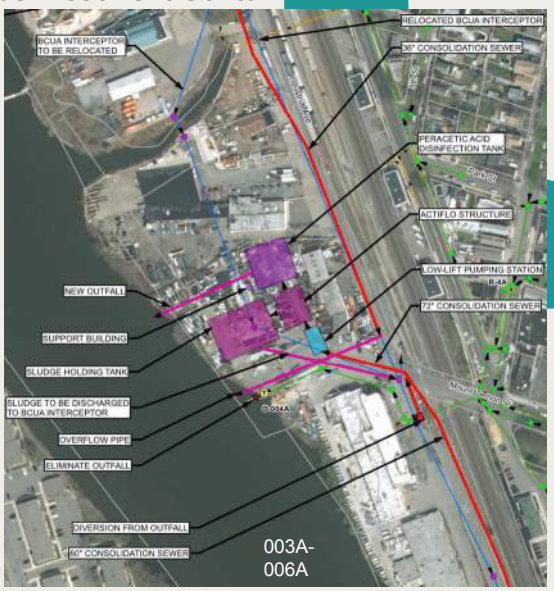
Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.





Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

- Pros:
  - Work in public right-of-way; no new land needed
  - Opportunity for current system renewal and reconstruction
  - Elimination of outfalls
- Cons:
  - Highly disruptive to roads and traffic
  - Need to redirect every sanitary service connection on the street
  - Need for stormwater controls and treatment in the future
- Issues are general for large-scale construction in urban areas
- Pollutant loads (excepting some pathogens) to receiving water will increase 40%

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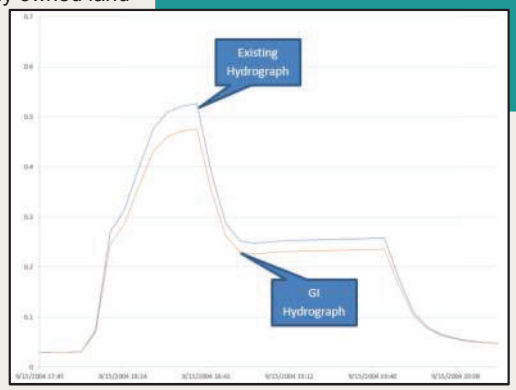
Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

- Bioswales selected as representative GI
  - Anticipated GI would consist largely of bioswales and permeable pavement
- Site suitability was a major issue
  - Land-use, impervious cover, hydrologic soil group (HSG), and publicly owned land
- Maximum of 4% of total impervious area directed to GI
- Minimal institutional/implementation issues



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Performance

CSO Reduction

Table 8-1: Summary of CSO Volumes for Typical Year

Control Program	2015 Baseline (MG)	Level of Control - Overflows during Typical Year (MG)				
		0	4	8	12	20
1. Eliminate CSO-006A	50.3	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	50.3	0.0	5.7	5.8	9.7	21.5
3. Tunnel	50.3	0.0	4.7	4.7	7.9	11.4
4. Consoldiated End of Pipe Treatment	50.3	0.0	0.2	0.2	0.2	3.0
5. Sewer Separation	50.3	0.0	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	50.3	49.9	49.4	48.9	48.3	

Table 8-3: Summary of Frequency of Overflows for Typical Year

Control Program	2015 Baseline	Level of Control - Overflows during Typical Year				
		0	4	8	12	20
1. Eliminate CSO-006A	53	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	53	0	4	4	10	20
3. Tunnel	53	0	4	4	7	10
4. Consoldiated End of Pipe Treatment	53	0	1	1	2	10
5. Sewer Separation	53	0	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	53	53	53	53	53	

Table 8-4: Summary of Percent Capture Achieved by Each Control Program

Control Program	2015 Baseline	Level of Control - Overflows during Typical Year				
		0	4	8	12	20
1. Eliminate CSO-006A	69.5%	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	69.5%	100.0%	96.5%	96.5%	94.1%	86.9%
3. Tunnel	69.5%	100.0%	97.2%	97.2%	95.2%	93.1%
4. Consoldiated End of Pipe Treatment	69.5%	100.0%	99.9%	99.9%	99.9%	98.2%
5. Sewer Separation	69.5%	100.0%	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	69.5%	69.7%	70.0%	70.3%	70.7%	

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Costing

Cost Estimating Procedures

Order of Magnitude estimate (Class 5)

- Capital Costs
  - Design = 10% of Construction Costs
  - Construction Management = 10% of Construction Costs
  - Administrative/Legal = 5% of Construction Costs
- O&M
  - Only routine costs – no large-scale overhauls or replacements due to 20 yr planning period
- NPW
  - n=20 years i=2.75%
  - PW from O&M costs used the following:
    - $(P|A, i\%, n) = ((1+i)^n-1)/((i(1+i)^n)$

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Costing

NPW Calculations

Control Program	Cost per Gallon Volume CSO Reduction ($/gal)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$1.7	$1.2	$1.2	$1.1	$1.2
3) Tunnel	$2.4	$2.2	$2.2	$2.2	$2.2
4) Treatment (Consolidated)	$1.7	$1.5	$1.5	$1.5	$1.3
5) Sewer Separation	$3.8	NA	NA	NA	NA
	Volume Reduction for Impervious Area Managed (MG)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$9.1	$7.2	$6.3	$5.8	

Control Program	NPW Summary - Overflows per Year ($M)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$84	$54	$52	$47	$34
3) Tunnel	$118	$99	$99	$92	$86
4) Treatment (Consolidated)	$87	$77	$77	$77	$60
5) Sewer Separation	$193	NA	NA	NA	NA
	NPW Summary - % of Impervious Area Managed ($M)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$2.7	$6	$9	$12	

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Alternatives Rating

Rating Procedure

Control Programs rated 1 (worst) to 5 (best) on several categories and a weighted average found

- Cost
  - Normalized by $/gallon
  - Based on 4 overflows per year and 5% GI
  - 25% weight
- CSO Reduction
  - Overall reduction of CSO volume in Typical Year
  - 15% weight
- Institutional Issues
  - Ranked according to possibility of permitting delaying project six (6) months or more
  - 15% weight
- Implementability
  - Ranked according to project being delayed by other factors for six (6) or more months
  - 15% weight
- Public acceptance
  - Ranked according to how we think the public would welcome and support the plan
  - 15% weight

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Alternatives Rating

Ranking – **NO SELECTION MADE AT THIS PHASE!**

Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

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BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Back to General Discussions

BCUA CSO Group Supplemental CSO Group

Selection and Implementation of Alternatives

Due June 1, 2020

- Must be approvable
- Implementation Schedule
  - Annual Milestones
  - Sensitive area Prioritization
  - Construction
  - Financing
- Financial Capability
- Compliance Monitoring Program

BCUA CSO Group Supplemental CSO Group

Public Participation

Suggestions for additional members to invite.

Public Meeting

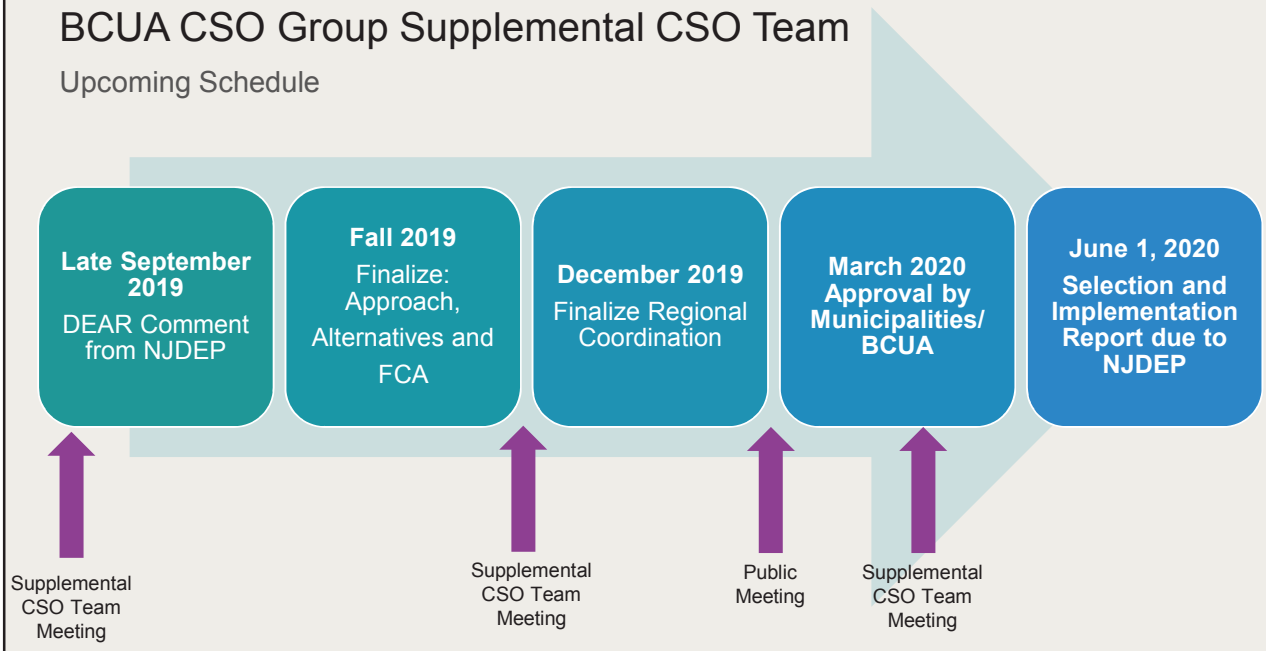
- Location
- Time
- Project phase

Webpage Article

- Suggestions for Topic/Focus

BCUA CSO Group Supplemental CSO Team

Upcoming Schedule



Final Questions?

Thank You?

Bergen County Utilities Authority (BCUA)
Supplemental Combined Sewer Overflow (CSO) Team
Meeting Number 11
Selection and Implementation of Alternatives
Fort Lee Municipal Building
January 28, 2020 10:00am – 12:00pm

Attendees – See attached sign-in sheet

Presentation slides attached

Minutes

1. Introductions
    - Attendees introduced themselves. Mr. Dening (Mott MacDonald) and Ms. Rosenwinkel (NJDEP) encouraged attendees to ask questions and provide input at any time during the presentation. Mr. Dening presented the meeting agenda.

2. Safety minute
    - Mr. Dening presented on jump starting a car in cold weather, see attached presentation.

3. Review of prior meeting
    - Mr. Dening indicated that there would be no extensions to the LTCP submissions to NJDEP and the report would be submitted on or before June 1, 2020.
    - Mr. Dening indicated that minutes from previous meetings are available on the BCUA website, in the "Water Pollution Control" pulldown menu under "CSO Long-Term Control Plan" (https://www.bcua.org), and all previously submitted reports are available on the NJDEP website (https://nj.gov/dep/dwq/cso.htm) under "Long Term Control Plan Submittal" on the right side of the page.

4. Presentations from each permittee

    BCUA:
    - See attached presentation. Mr. Dening indicated that BCUA does not have any outfalls however it receives flow from connection communities. It is working together with the CSO communities to examine opportunities to increase flow to the plant, particularly dewatering flows, while ensuring there is no detrimental impact to interceptor or treatment plant capacity.
    - He noted that the alternative to blend flow receiving primary treatment and disinfection with flow receiving secondary treatment to meet the permit requirements seems to be getting more traction recently.
    - A resident asked what MGD means. Mr. Dening indicated that it means "million gallons per day". Again Mr. Dening encouraged questions to be asked at any time.

Ridgefield Park:

- Mr. Dening presented that Ridgefield Park will likely be selecting the level of control as 85% capture, meaning that 85% of the CSO volume would get treated at the plant or receives equivalent treatment. He noted that the permit and EPA policy require an evaluation of the costs and benefits of providing higher levels of treatment.
- He presented the range of costs for the various alternatives, noting that cost per gallon is also presented to compare the alternatives on equal footing. He also presented the additional rating criteria that were used to evaluate the alternatives.
- He indicated that storage tanks received the highest rating, followed by tunnel and satellite treatment. Storage tanks were also the lowest cost and least complex, as such this alternative would be recommended for further refinement.
- It will be recommended to the Village that end of pipe treatment and storage tunnels be eliminated due to cost and complexity, and sewer separation (though it would address CSOs completely) would be very costly and disruptive to the community as well as the potential for future stormwater treatment requirements.
- Mr. Dening noted that while green infrastructure would not be able to achieve the water quality objectives on its own, it has value to the community for green space and public education, as such it may be an add-on solution that would be retained for further analysis, primarily for public education. He noted that siting locations would be limited to the public right of way, as green infrastructure on private property could be problematic to include in the LTCP.
- Ms. Rosenwinkel asked what is currently on the 001A/002A site. Mr. Dening indicated that it is a primarily vacant site with a portion occupied by an abandoned VFW post which is owned by the Town. Ms. Rosenwinkel asked if the tanks would be subsurface or above ground. Mr. Dening indicated that the tanks would be subsurface so they could fill by gravity and could potentially be used for open space above the tanks.

Fort Lee:

- Mr. Grey (HDR) provided a review of the progress to-date, and indicate that the goal would be to achieve 85% capture, though the EPA and NJDEP may require more.
- He then provided an overview of the collection system infrastructure, and the % capture results from the model, including revised results following a model update. He noted that the outfalls discharged to the Hudson River, while the outfalls of the other permittees discharge to the Hackensack River, as such the fecal coliform measurement already meets the water quality standards. He indicated that Fort Lee would be focusing on the presumptive approach.
- He presented the range of CSO control alternatives, noting that the topography of Fort Lee including the cliffs and underlying bedrock present a challenge for the installation of storage tanks and green infrastructure. He indicated that the depth of soil over the bedrock would need to be further investigated to determine the feasibility of green infrastructure.
- Mr. Grey indicated that Fort Lee would be moving forward with regulator modifications (already done for the Lower Main Pump Station), high rate treatment at the outfalls, and green infrastructure if feasible. Green infrastructure would likely be permeable pavement and bioswales. It would only cap the peak rates, but the flow would eventually end up in the sewer system for treatment, resulting in less overflow

volume. He noted that underflow from a Flexfilter may be able to be sent to BCUA for treatment. He also noted that PAA disinfection was selected over chlorination because it does not have a residual following treatment that must be removed, and it also has a much lower contact time requirement. It also has a longer shelf life, which is important for CSO applications as it would only be in use periodically.

- Mr. Grey presented that range of present worth costs, noting the green infrastructure operations and maintenance costs would be updated to include costs of sampling, depending on frequency and parameters to be sampled.
- An attendee asked whether green infrastructure would be located in the public right-of-way. Mr. Grey confirmed that they are only looking at right-of-way and not private property.
- Mr. Grey indicated that the baseline % capture is 84.7%, and green infrastructure would achieve the remaining 0.3% for total 85% capture, while grey infrastructure would achieve 90.1% capture.
- Ms. Rosenwinkel asked what the size of the flex filter might be. Mr. Grey indicated that for a 10 MGD filter, it would be approximately the same area as the netting chamber, which would reduce overflows to about 20 per year. If a larger flex filter is required, this would require blasting rock out of the Palisades.

Hackensack:

- Mr. Belardo (Arcadis) presented that Hackensack has two outfalls and outlined the contributing subdrainage areas, and the outer portions of the town are mostly separated sewer. He indicated that each outfall has its own screening facility to prevent solids and floatables from entering the river.
- He indicated that based on the preliminary water quality findings from the NJ CSO Group, Hackensack would be selecting the presumptive approach with an 85% capture control level. He indicated that the current capture is about 68%.
- He presented the range of alternatives and their estimated costs. Sewer separation was found to be very costly, and satellite treatment and green infrastructure were both costly and would not achieve 85% capture. As such, storage was selected, particularly tank storage which was able to achieve 85% capture, and performed well in terms of the ranking criteria and cost. Green infrastructure would be retained as a supplement, using permeable pavement and bioswales. Two storage tanks were recommended, one at each outfall with an estimated 60 feet diameter and 100 feet depth below ground surface.
- Mr. Belardo presented an additional alternative, describing a stormwater study which had been recently completed. This study is currently a concept design and the City of Hackensack has not yet determined if it will move forward. This recommended a large storm sewer running down Railroad Avenue to Atlantic Street, with a pump near the Hackensack River. This sewer could contribute to a future sewer separation of the area and would be sized for the 25-year storm, but the initial primary purpose of this sewer is to address overland stormwater flow. The team is considering incorporating this project into the LTCP, although it would be more costly than just tanks, not only would it increase CSO % capture and reduce the number of overflow events, it would also address localized flooding.
- Mr. Belardo presented the cost curve for the various alternatives relative to overflow volume, noting that the stormwater project has not been added to the curve yet. He

noted that Hackensack is currently working the financial capability assessment to determine what the city can afford.

- Ms. Rosenwinkel asked how long this would take to implement. Mr. Belardo indicated that this is not known yet. He indicated that the % capture calculation only includes capture of the storm flow from the drainage area, and does not include future sewer separation.
- Mr. Grey asked if the storm sewer would be in the railroad right-of-way. Mr. Belardo indicated that it would be in the public right-of-way. Except for the location where the storm sewer would perpendicularly cross underneath the railroad.
- Ms. Rosenwinkel asked if the stormwater project would result in a new outfall. Mr. Belardo indicated that it would be a stormwater outfall with a stormwater-only pump station.

5. Water quality modelling
    - Mr. Dening presented preliminary water quality findings, noting that the analysis had extended from Cape May to the end of Long Island.
    - He explained what pathogens are, what affects their concentration, and how they are measured in the model. He indicated that the model had been calibrated based on about 36 sampling locations to identify the sources of pollutants. The concentrations were calculated on a 30-day geometric mean, which is similar, but not the same as a rolling average. He indicated that the model found that the Upper Hackensack River is not meeting the water quality requirements all the time.
    - An attendee asked what year the analysis was for. Mr. Dening indicated that the simulation was based on the "typical year" which uses 2004 representative data.
    - Mr. Dening presented figures indicating that CSOs represent a relatively small proportion of the pollutants, and if CSOs were the only pollutants, the Hackensack River would be below the threshold 90-95% of the time and the Hudson River would be below the threshold 100% of the time as it currently is.

6. Public participation discussion
    - Mr. Dening asked whether any attendees had any questions, concerns or feedback.
    - A representative of the Hackensack planning board asked whether the CSO alternatives account for redevelopment and additional population growth. Mr. Del Bove (Arcadis) responded that new developments are typically required to install a separate sewer as well as provide on-site storage so that they do not contribute additional flow to the combined system. A resident from Fort Lee asked whether this was the same in Fort Lee. Mr. Grey indicated that the projections include proposed projects and increased population, however there are reduced flows because of water conservation.
    - The resident from Fort Lee indicated that she had received a text message about this meeting, and asked if there were other ways to let people know about this project, as it is very important. Mr. Grey indicated that it had been advertised on the website, and would not be feasible to send a text to everyone in the community. The resident asked how to better inform residents. Mr. Grey indicated that the members of the Supplemental CSO Team were formally invited to be regularly involvement, however any members of the public are welcome to attend these meetings. The resident

indicated that it would be helpful to have information about facility locations, types of facilities and costs.

- Ms. Rosenwinkel indicated that it might be helpful to have the reports condensed to key points. She also indicated that storage seems to be a popular solution across the country, and asked attendees if they had any thoughts about that. Mr. Grey indicated that storage would be very difficult to implement because of the Palisades.
- An attendee asked whether the team would be making the final decision following the submission of the reports to NJDEP, or whether the decision would be made before then. Mr. Dening indicate that BCUA is coordinating the decision to ensure that the selected alternative do not adversely impact treatment capacity, and the decisions would need to be made by June.
- A resident asked what the estimated cost to the property owner would be. Mr. Dening indicated that this would be discussed, in the next portion of the presentation, as part of the financial capability assessment.
- Another resident indicated that he had received a text message from the town. He suggested that an informational video could be produced (such as Fort Lee on-demand). Mr. Dening responded that he is not sure if the team would have the resources to do this, but could look into existing information videos publicly available. The resident requested that building awareness should be included in the schedule. The first resident indicated that she would be interested in just the facts, including numbers, problems and solutions. The second resident indicated that a white paper would be useful with layman's terms. Mr. Dening indicate the complete reports are linked on the NJDEP website and prior meeting minutes are posted on the BCUA website. Ms. Rosenwinkel indicated that the NJDEP's responses are also posted with the reports. She indicated that earlier meetings were mainly about background information and building the model, however, now is when things would get interesting and now would be a great time for the community to get involved. Ms. Langa (Hackensack Riverkeeper) indicated that the average person does not have time to read the reports and suggested a one-page informational flyer listed the problems and top solutions for each community, which could be mailed or circulated digitally. Mr. Dening also noted that there is a one-page newsletter prepared for Ridgefield Park, as well as the executive summaries of the reports which are meant to be able to be read as a stand-alone document. Ms. Langa indicated that Riverkeeper would be willing to circulate this information if it is shared with them.

7. Financial capability assessment
    - Mr. Dening presented the process for calculating the percentage of median household income. He indicated that EPA allows flexibility in this calculation, and most permittees have employed a dynamic model to account for changes over time. He indicated that wastewater costs are anticipated to grow faster than income.
    - He outlined the factors that would be considered in paying for these projects, noting that the costs have been projected until 2070, and would result in an annual increase in the sewer bill. Mr. Grey clarified that the % median household income (MHI) burden is based on wastewater and stormwater costs and does not include water.
    - The second resident asked whether the model accounts for the infusion of any external aid such as federal funding to help pay for these projects. Mr. Dening

indicated that the communities must plan for what is affordable to them. Additional funding should only be considered if you are confident you can obtain it, otherwise you may create a plan you cannot afford if the funding falls through.

- The first resident asked what control alternative the graph with the sharp cost increase represents. Mr. Dening indicated that it is based on a household burden of 2% MHI, but that actual costs would be dependent upon which project are selected and the timeline that they are implemented.

8. Next meeting
    - Mr. Dening indicated that there would be one more meeting before the June 1 report submission.
    - The second resident asked whether there is a parallel process in other communities. Mr. Dening indicated that there are 21 other municipal permittees in the state completing the same process, as well as in CSO communities across the country. Ms. Rosenwinkel there are 25 permittees total including wastewater treatment plant. She also added that permittees in New Jersey have been making their submissions on time, developing some innovative solutions, and focusing on low hanging fruit, as compared to places like Washington D.C. where they went straight to a costly tunnel solution. She indicated that any changes would need to be resolved in court, so it is good to present a range of alternatives.
    - Mr. Dening thanked everyone for coming and concluded the meeting just prior to 12:00PM.

Bergen County Utilities Authority
Supplemental CSO Team
Meeting Number 11
Fort Lee Municipal Building Room 201
January 28, 2020 10:00 am

Name	Organization	Email	initials
~~John Rolak~~	~~Mott MacDonald~~	~~John.rolak@mottmac.com~~	
John Dening	Mott MacDonald	John.dening@mottmac.com	JD
~~Donna Gregory~~	~~Mott MacDonald~~	~~Donna.gregory@mottmac.com~~	
~~Susan McVeigh~~	~~Health Officer, Hackensack~~	~~smcveigh@hackensack.org~~	
~~Francis Reiner~~	~~Senior Urban Designer, LLA-PP~~	~~francisr@dmrarchitects.com~~	
Mark Olson	Ridgefield Park Chairman, Green Team	Mark-olson@verizon.net	
~~Stephen Quinn~~	~~Ridgefield Park Environmental Commission~~	~~stephencquinn@aol.com~~	
Bob Applebaum	Borough of Fort Lee	Bappelbaum@aol.com	
Jan Goldberg	~~Borough of Fort Lee~~	~~j-goldberg@fortleenj.org~~	X Retiring
Captain Bill ~~Sheehan~~	~~Hackensack Riverkeeper~~	~~captain@hackensackriverkeeper.org~~	
Michelle Langa	Hackensack Riverkeeper, attorney	legal@hackensackriverkeeper.org	
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Jennifer Feltis Cortese	~~NJDEP~~	~~Jennifer.feltis@dep.nj.gov~~	
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~~Dwyane Kobesky~~	~~NJDEP~~	~~Dwyane.kobesky@dep.nj.gov~~	
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Harvey Sohmer	FORT LEE	h-sohmer@fortleenj.org	
Yingying Wu	HDR	yingying.wu@hdrinc.com	YW
Sam Gronner	PRIVATE CITIZEN, FORT LEE	yo_sam2077@yahoo.com	

Preliminary Selection and Implementation of Alternatives

BCUA CSO Group Supplemental CSO Team
Meeting #11

Fort Lee Municipal Building

January 28, 2020

1

BCUA CSO Group Supplemental CSO Team

Meeting No. 11 Agenda

- Introductions
- Safety Minute
- Meeting No. 10 Refresher
- Refinement of CSO Alternatives
  - Permittee Presentations
- Water Quality Modeling
- CSO Community Input
- Financial Capabilities Assessment
- Selection of Alternatives DRAFT Report outline
- Schedule
- Open Discussion

2

Safety Topic

Jumpstarting a Car

1

Don't let cars touch.

Wear Safety Glasses.

2

Read the Manual.

3

Unless manual says otherwise connect cables: Red to dead and back to black.

4

Start booster car first. Run for a few minutes then start dead car.

5

Remove cables in reverse order.

http://safetytoolboxtopics.com/

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BCUA CSO Group Supplemental CSO Team

Meeting No. 10 Refresher

- Development and Evaluation of Alternatives
  - BCUA
  - Village of Ridgefield Park
  - Fort Lee
  - Hackensack
- Selection and Implementation of Alternatives
- Public Outreach Opportunities
- Upcoming Schedule

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BCUA CSO Group Supplemental CSO Team

Meeting No. 10 Minutes Posted

5

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BERGEN COUNTY UTILITIES AUTHORITY

BCUA Update
Support of Alternatives

BCUA CSO Group Supplemental CSO Team
Meeting #11

January 28, 2020

6

BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- BCUA is not implementing alternatives
  - Providing support for municipalities
- Evaluated:
  - Plant Design Capacity – 120 MGD wet weather.
  - Interceptor Capacity – 210 MGD
  - Increased full treatment to add 29-115 MGD capacity - $310M to $730M
  - High rate primary treatment with secondary treatment bypass.
    - Increase plant treatment rate to 210 MGD for $77M-130M
    - Increase plant treatment rate to 300 MGD for $103M-179M
      - Would require interceptor expansion
  - Inline storage in interceptors – Limited volume available (approx. 1.3 MG)
  - On site storage volume – up to 40 MG $270 M

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BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- BCUA is carefully examining opportunities to increase flow to the plan. They are finalizing updates to their capacity assurance program and will be coordinating the needs of the CSO communities with that update.
- Acceptance of dewatering flows, provided no impact to plant.

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The Village of Ridgefield Park

Ridgefield Park Update Support of Alternatives

BCUA CSO Group Supplemental CSO Team Meeting #11

January 28, 2020

9

DRAFT - Preliminary Alternatives Selection

Level of Control

Recommend 85% Capture - Presumptive

- Most be calculated in conjunction with other permittees.
- Meets requirements of National CSO Policy.
- Evaluate effectiveness of increased level of control (knee of the curve).

10

Rating – From Development and Evaluation of Alternatives Report

Costs – **NO SELECTION MADE AT DEAR PHASE!**

Control Program	Cost per Gallon Volume CSO Reduction ($/gal)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$1.7	$1.2	$1.2	$1.1	$1.2
3) Tunnel	$2.4	$2.2	$2.2	$2.2	$2.2
4) Treatment (Consolidated)	$1.7	$1.5	$1.5	$1.5	$1.3
5) Sewer Separation	$3.8	NA	NA	NA	NA
	Volume Reduction for Impervious Area Managed (MG)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$9.1	$7.2	$6.3	$5.8	

Control Program	NPW Summary - Overflows per Year ($M)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$84	$54	$52	$47	$34
3) Tunnel	$118	$99	$99	$92	$86
4) Treatment (Consolidated)	$87	$77	$77	$77	$60
5) Sewer Separation	$193	NA	NA	NA	NA
	NPW Summary - % of Impervious Area Managed ($M)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$2.7	$6	$9	$12	

Alternatives Rating

Rating Procedure

Control Programs rated 1 (worst) to 5 (best) on several categories and a weighted average found

- Cost
  - Normalized by $/gallon
  - Based on 4 overflows per year and 5% GI
  - 25% weight
- CSO Reduction
  - Overall reduction of CSO volume in Typical Year
  - 15% weight
- Institutional Issues
  - Ranked according to possibility of permitting delaying project six (6) months or more
  - 15% weight
- Implementability
  - Ranked according to project being delayed by other factors for six (6) or more months
  - 15% weight
- Public acceptance
  - Ranked according to how we think the public would welcome and support the plan
  - 15% weight

Rating – From Development and Evaluation of Alternatives Report

Ranking – **NO SELECTION MADE AT DEAR PHASE!**

Requested SCSO Team input on rankings

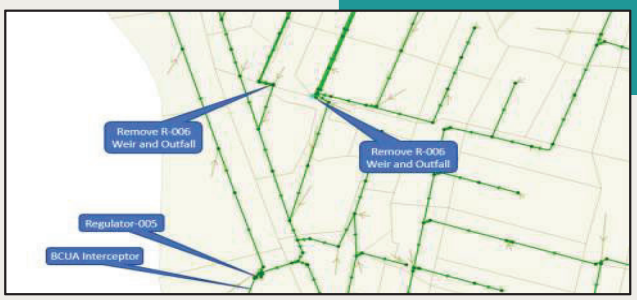
Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

DRAFT - Preliminary Alternatives Selection

Control Program 1 - Elimination of Outfall 006A

Small overflow volume at 006A

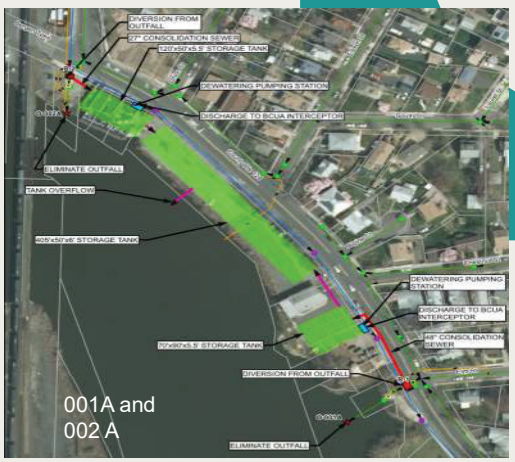
- Feasible to combine 005A and 006A to reduce burden on other alternatives
- Model shows additional upgrades required to the system if 006A is eliminated
- No water quality benefit to elimination, but extra costs



RECOMMEND - RETAIN TO REDUCE CONSOLIDATION COSTS

DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage



RECOMMEND – RETAIN, BEST RATING AND LESS COMPLEX

15

15

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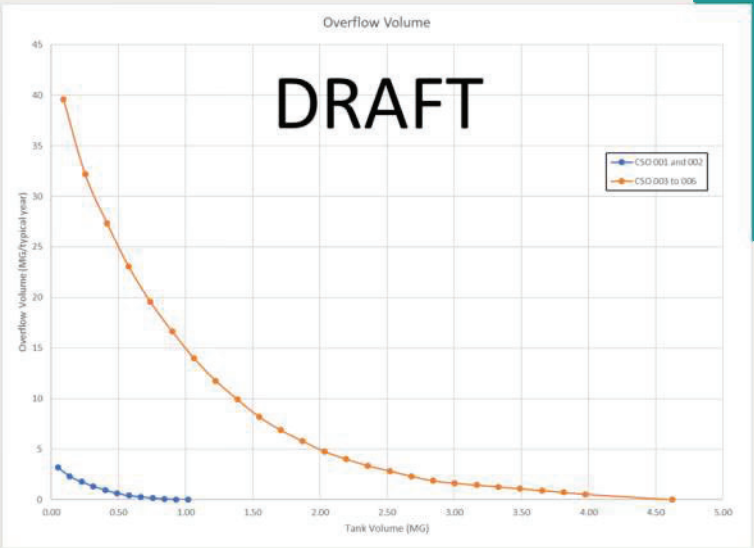
Control Program 2 - Consolidated Tank Storage



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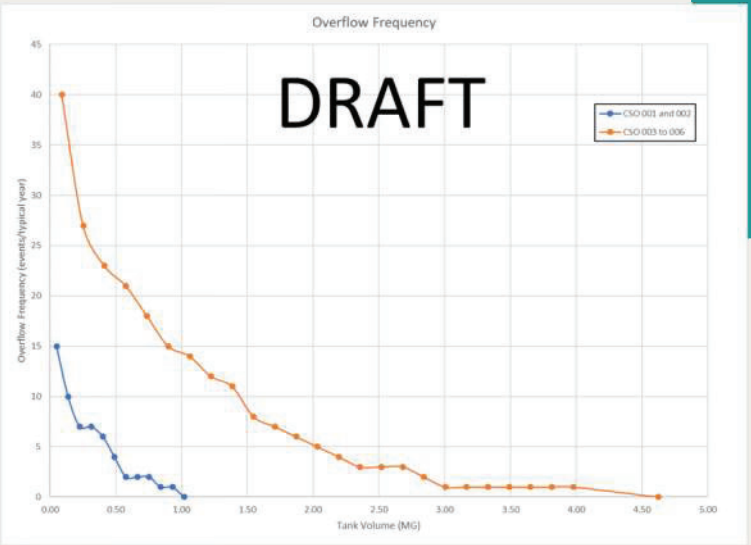
DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage



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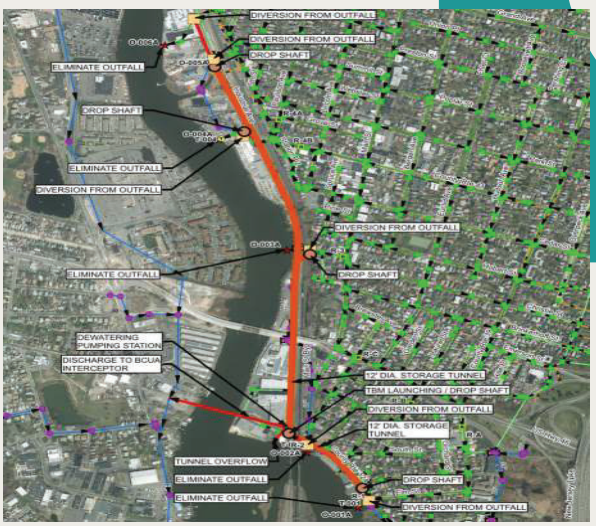
DRAFT - Preliminary Alternatives Selection

Control Program 3 –
Consolidated Tunnel Storage



RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

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DRAFT - Preliminary Alternatives Selection

Control Program 4 - Consolidated End of Pipe Treatment

RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

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DRAFT - Preliminary Alternatives Selection

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

- Pros:
  - Work in public right-of-way; no new land needed
  - Opportunity for current system renewal and reconstruction
  - Elimination of outfalls
- Cons:
  - Highly disruptive to roads and traffic
  - Need to redirect every sanitary service connection on the street
  - Need for stormwater controls and treatment in the future
- Issues are general for large-scale construction in urban areas
- Pollutant loads (excepting some pathogens) to receiving water will increase 40%

RECOMMEND - ELIMINATE DUE TO COST AND DISRUPTION
FUTURE WATER QUALITY CONCERNS

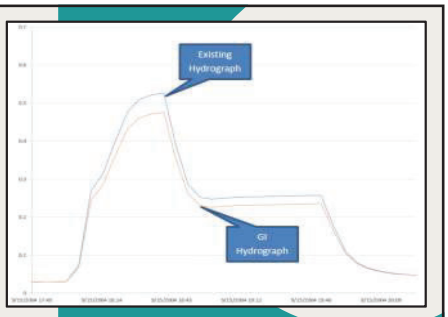
20

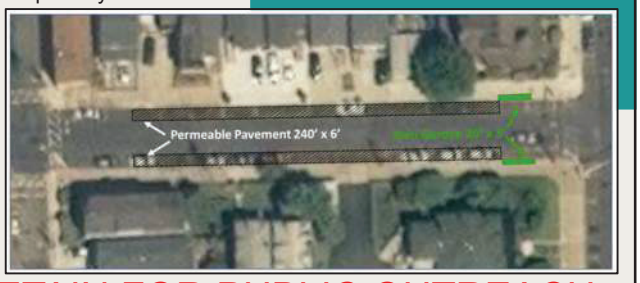
DRAFT - Preliminary Alternatives Selection

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

- Bioswales selected as representative GI
  - Anticipated GI would consist largely of bioswales and permeable pavement
- Site suitability was a major issue
  - Land-use, impervious cover, hydrologic soil group (HSG), and publicly owned land
- Maximum of 4% of total impervious area directed to GI
- Minimal institutional/implementation issues





RECOMMEND - POTENTIALLY RETAIN FOR PUBLIC OUTREACH AND EDUCATION

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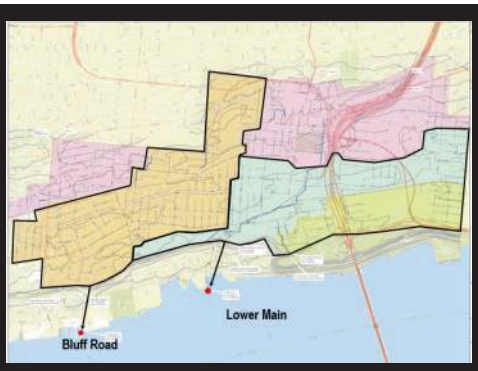

Borough of Fort Lee
CSO Team Meeting
Long Term Control Plan

December 10, 2019

HDR

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The Remaining 2015 CSO Permit Requirements

- ✓ CSO signs have been posted near outfalls
- ✓ CSO notification system is online (http://NJCSO.hdrgateway.com)
- ✓ CSO monthly Discharge Monitoring Reports (DMRs)
- ✓ Work plans/QAPPs submitted to NJDEP
  - Baseline Compliance Monitoring Plan
  - System Characterization and Landside Monitoring QAPP
- ✓ Monthly CSO Permittee meetings at BCUA
- ✓ Evaluation of previous landside model
- ✓ Water Quality monitoring
- ✓ Complete flow monitoring
- ✓ Update landside model
- ✓ Conduct alternatives analysis July 1, 2019
- Submit the LTCP June 1, 2020

GOAL – 85% Capture with water quality improvement but NJDEP and USEPA can require more.

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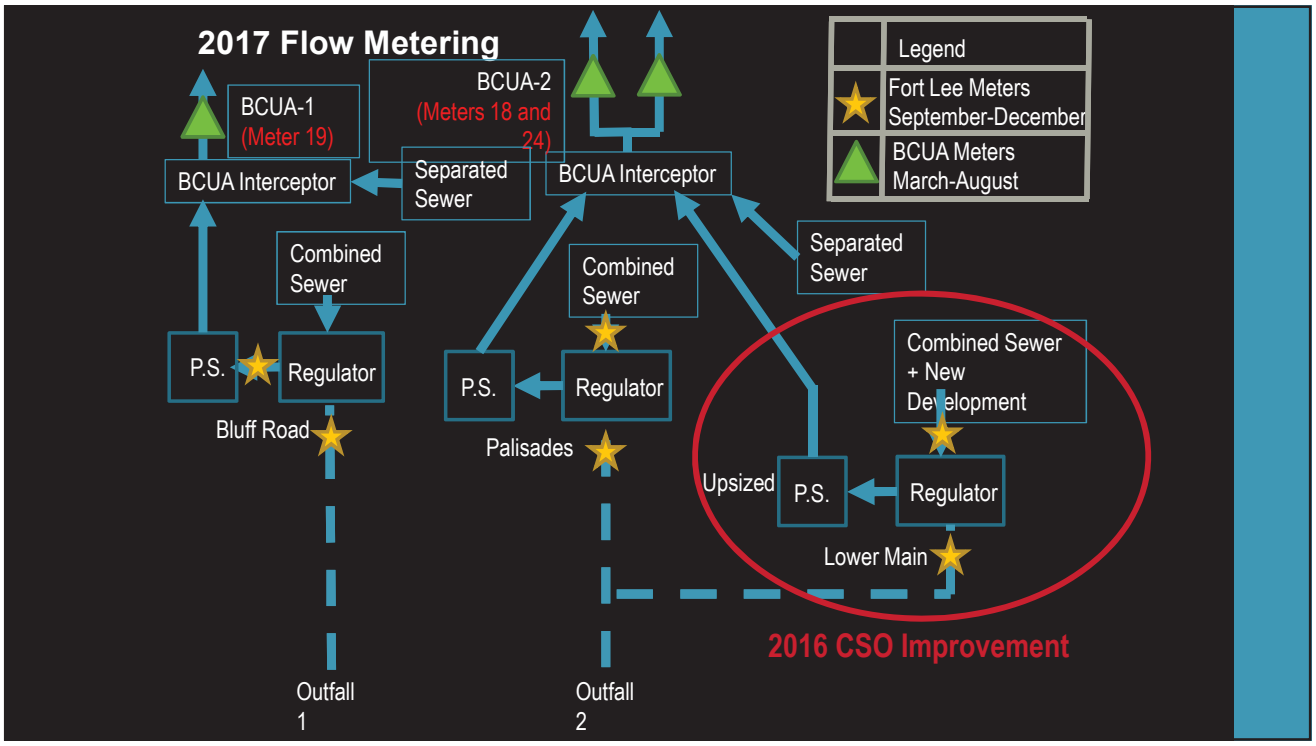

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Outfall Summary – 2004 Rainfall

Before Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	1	0.01
Febuary	2	4.58	2	0.79
March	5	1.24	5	0.60
April	5	6.91	7	1.01
May	10	7.14	3	0.69
June	6	3.96	1	0.60
July	7	17.10	8	2.88
August	6	5.93	3	0.45
September	6	19.42	4	3.77
October	1	0.28	2	0.58
November	5	6.03	2	0.33
December	4	3.71	0	0.00
Total	60	77.20	38	11.73

After Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	0	0.00
Febuary	2	4.58	2	0.11
March	5	1.24	0	0.00
April	5	6.91	4	0.01
May	10	7.14	3	0.24
June	6	3.96	1	0.30
July	7	17.10	5	0.94
August	6	5.93	2	0.14
September	6	19.42	3	2.09
October	1	0.28	0	0.00
November	5	6.03	2	0.35
December	4	3.71	0	0.00
Total	60	77.20	22	4.19

84.7% Capture

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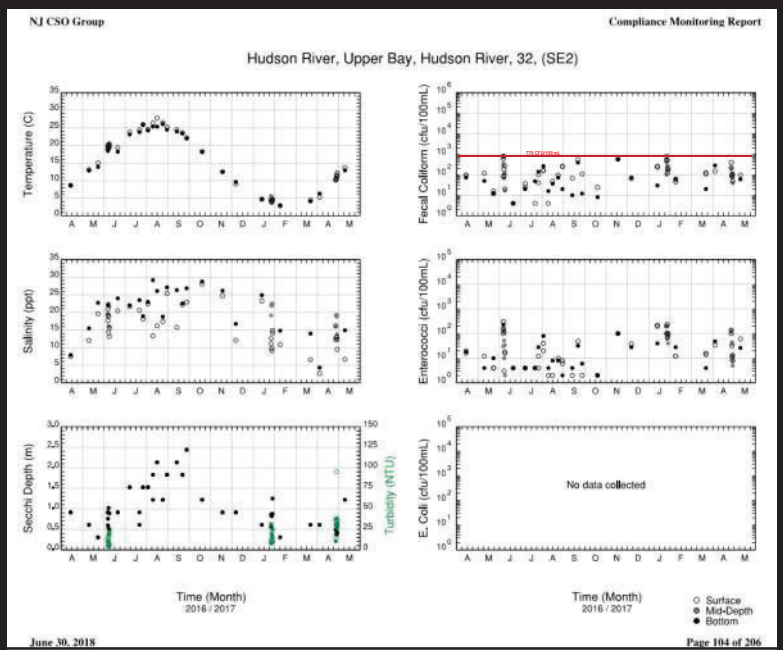
Hudson River Water Quality at GW Bridge



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CSO CONTROL OBJECTIVES

Presumptive Approach

- 4 Overflows per year
- 8 Overflows per year
- 12 Overflows per year
- 20 Overflows per year
- 85% Capture

Demonstration Approach

- Demonstrate that the selected control program, though not meeting Presumptive Approach criteria, will meet water quality based requirements

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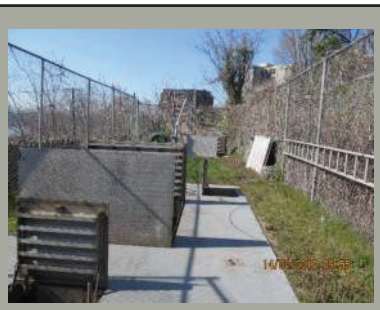
CSO CONTROLS

Bluff Road will require improvements to control flooding



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CONTROLS

Source Controls:

Green infrastructure, *I&I Reduction*, Sewer separation, BMPs, **Nine Minimum Controls**

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, **regulator modification**

Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, **high rate filtration/clarification**, chlor/dechlor disinfection, **PAA disinfection (with or without filtration)**, UV disinfection, WWTP plant expansion

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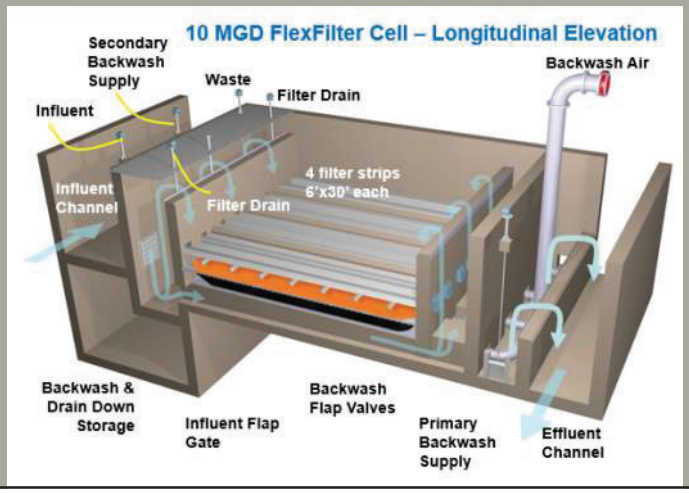
Flex Filter



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PAA Disinfection

- Peracetic Acid (PAA)
  - Acetic Acid and Hydrogen Peroxide solution
- Common Elements
  - 275 gallon totes or 55 gallon drums
  - Feed pumps
  - Mixers / diffusers
  - Instrumentation (flow, TSS)
  - Sampling equipment
  - Pressure relief
  - Temperature monitoring

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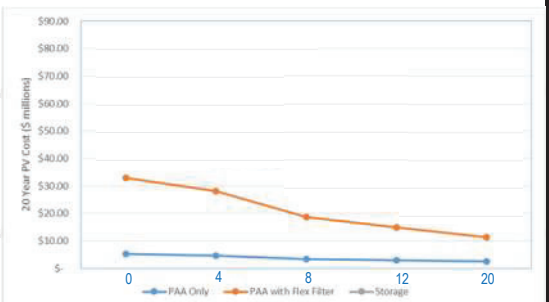
Preliminary Costs – Gray Infrastructure

Sewer Separation Costs - $400 to $450 million ($478,650/acre)

	PAA Only	PAA w/ FlexFilter
0 CSOs per year		
Capital Cost ($M)	$ 1.35	$ 28.95
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97
4 CSOs per year		
Capital Cost ($M)	$ 1.27	$ 24.67
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51
Total 20 yr PV Cost ($M)	$ 4.67	$ 28.18
8 CSOs per year		
Capital Cost ($M)	$ 1.07	$ 16.16
20 yr PV O&M Cost ($M)	$ 2.38	$ 2.45
Total 20 yr PV Cost ($M)	$ 3.45	$ 18.61
12 CSOs per year		
Capital Cost ($M)	$ 1.00	$ 12.97
20 yr PV O&M Cost ($M)	$ 1.99	$ 2.05
Total 20 yr PV Cost ($M)	$ 2.99	$ 15.01
20 CSOs per year		
Capital Cost ($M)	$ 0.85	$ 9.75
20 yr PV O&M Cost ($M)	$ 1.60	$ 1.64
Total 20 yr PV Cost ($M)	$ 2.44	$ 11.39



O&M costs are being upgraded to include sampling of the discharge. One sample for fecal coliform will be collected for each event at each outfall.

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Green Infrastructure

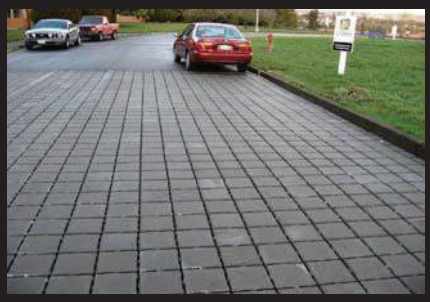
Rain Gardens

Bioswales

33

Green Infrastructure

Permeable Pavements



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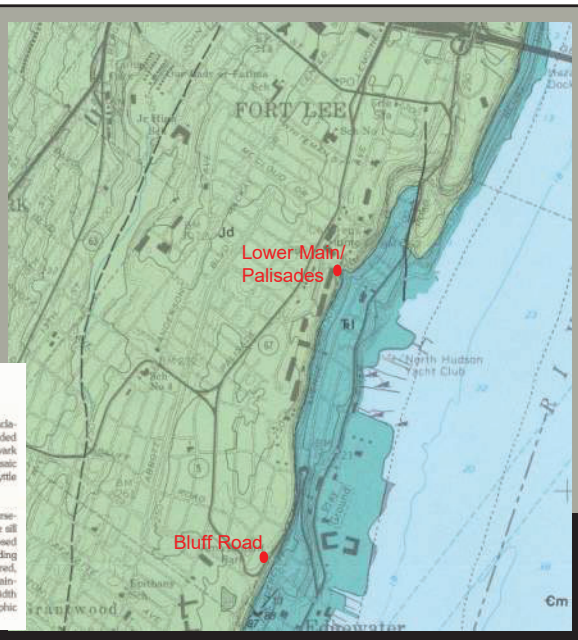
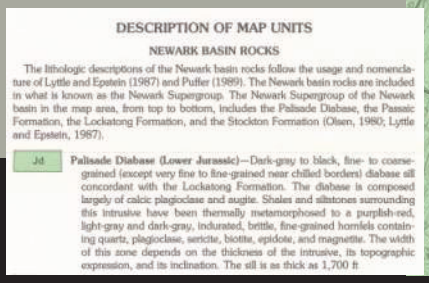
Bedrock constrains green infrastructure in Fort Lee





DESCRIPTION OF MAP UNITS

NEWARK BASIN ROCKS

The lithologic descriptions of the Newark basin rocks follow the usage and nomenclature of Lyttle and Epstein (1987) and Puffer (1989). The Newark basin rocks are included in what is known as the Newark Supergroup. The Newark Supergroup of the Newark basin in the map area, from top to bottom, includes the Palisade Diabase, the Passaic Formation, the Lockatong Formation, and the Stockton Formation (Olsen, 1980; Lyttle and Epstein, 1987).

Jd — **Palisade Diabase (Lower Jurassic)**—Dark-gray to black, fine- to coarse-grained (except very fine to fine-grained near chilled borders) diabase sill concordant with the Lockatong Formation. The diabase is composed largely of calcic plagioclase and augite. Shales and siltstones surrounding this intrusive have been thermally metamorphosed to a purplish-red, light-gray and dark-gray, indurated, brittle, fine-grained hornfels containing quartz, plagioclase, sericite, biotite, epidote, and magnetite. The width of this zone depends on the thickness of the intrusive, its topographic expression, and its inclination. The sill is as thick as 1,700 ft

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Preliminary Costs – Green Infrastructure

We are currently identifying specific candidate sites for Green Infrastructure

	Green Infrastructure Type	Min Capital Cost ($M)	Max Capital Cost ($M)	20 Year PV O&M Cost ($M)	Min Total 20 year PV Cost ($M)	Max Total 20 year PV Cost ($M)
5% GI (~6.5 Acres)	Rain Garden	$ 0.63	$ 2.00	$ 0.80	$ 1.43	**$ 2.80**
	Right-of-Way Bioswale	$ 0.99	$ 3.29	$ 0.80	$ 1.79	$ 4.09
	Green Roof	$ 3.15	$ 16.03	$ 0.80	$ 3.95	$ 16.83
	Porous Asphalt	$ 1.71	$ 3.58	$ 0.13	$ 1.83	$ 3.71
	Permeable Interlocking Concrete Pavers (PICP)	$ 0.85	$ 2.43	$ 0.13	$ 0.98	**$ 2.56**
10% GI (~13 Acres)	Rain Garden	$ 1.26	$ 4.01	$ 1.60	$ 2.86	**$ 5.61**
	Right-of-Way Bioswale	$ 1.97	$ 6.57	$ 1.60	$ 3.57	$ 8.17
	Green Roof	$ 6.31	$ 32.06	$ 1.60	$ 7.91	$ 33.66
	Pervious concrete	$ 4.01	$ 8.02	$ 0.25	$ 4.26	$ 8.27
	Permeable Interlocking Concrete Pavers (PICP)	$ 1.71	$ 4.86	$ 0.25	$ 1.96	**$ 5.11**

+0.3% Capture

+0.6% Capture

O&M costs are being upgraded to include sampling of the discharge. One sample for fecal coliform will be collected for each event at each outfall.

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Preliminary Results

CSO Volumes and Frequencies at Each CSO Control Level

	Baseline			0 CSO			4 CSOs			8 CSOs			12 CSOs			20 CSOs		
Outfall	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	84.7%	0	0	100.0%	8.6	4	92.9%	11.1	8	92.7%	20.0	12	91.7%	34.0	20	90.1%
FL-002	4.7	20		0	0	100.0%	1.0	3	91.9%	1.8	6	90.3%	2.9	11	88.2%	4.7	20	84.7%

GI Alternatives									
Outfall	Baseline			5% GI-Bluff Road			10% GI-Bluff Road		
	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	84.7	79.8	57	85%	77.0	58	85.3%
					Additional Percent Capture	**0.3%**		Additional Percent Capture	**0.6%**

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Preliminary Costs –

Alternative	Capture	Present Worth Cost
Baseline	84.7%	$0
Gray – 20 OF per Year	90.1%	$2.44 to 11.4 M
Green – Rain Garden, Bioswale or Porous Pavement	85%	$2.6 to 4.1 M

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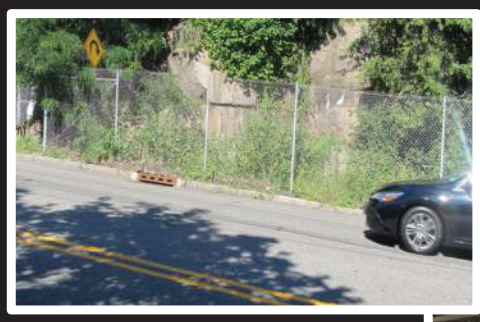
Repair of the Netting Facility



Good Day

Bad Day
(twice in 2019)

Traffic Hazard on Route 5

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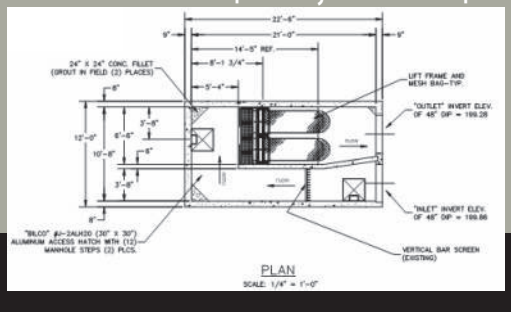
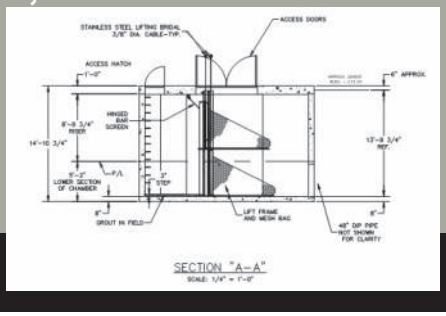
Planned Improvements for Bluff Road Netting Facility

- Replace 2 net system with 4 net system
- Add a knee wall to the netting chamber
- Repair erosion damage
- Cost ~$300,000 to $500,000





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Questions
Comments
Discussion

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City of Hackensack

COMBINED SEWER SYSTEM
LONG TERM CONTROL PLAN

PROGRESS UPDATE

SUPPLEMENTAL CSO TEAM MEETING

JANUARY 28, 2020

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Agenda

- Overview of Hackensack's Combined Sewer System (CSS)
- Development and Evaluation of Alternatives (DEAR) Review
- Additional Alternative: Court Street Stormwater Study
- Selection and Implementation of Alternative (SIAR)
  - Approach Selection: "Presumption" or "Demonstration"?
  - "Knee-of-the-curve" Analysis
  - Next Steps

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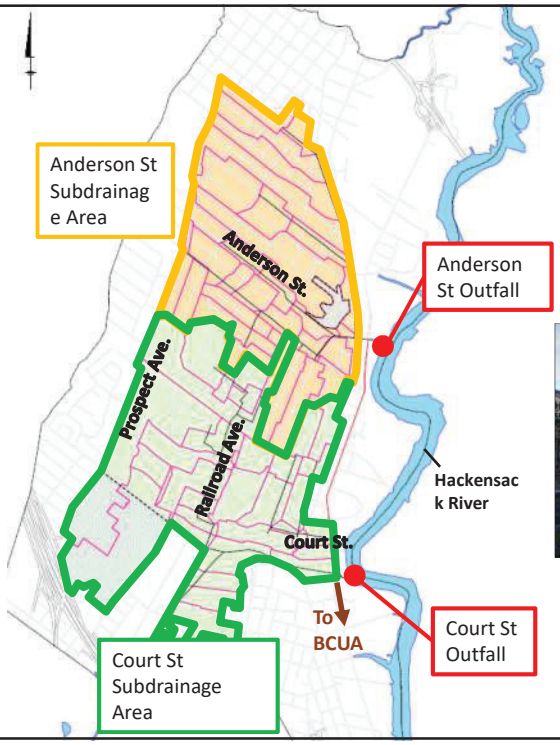

Overview of Hackensack Combined Sewer System

- ~31 miles of combined sewers
- ~50% of Hackensack's population served by combined sewer system
- Screening facilities

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Development and Evaluation of Alternatives (DEAR) Review

- CSO Control Objectives

Presumption Approach

- 85% Capture or
- 4 Overflows per year

Demonstration Approach

Demonstrate that the selected control program, though not meeting Presumption Approach criteria, will meet water quality-based requirements

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Development and Evaluation of Alternatives (DEAR) Review

Alternative	Percent Capture	Total Estimated Costs
Baseline Conditions for 2004	68%	-
Full City-wide Sewer Separation	100%	$560M
Pretreatment and Disinfection	-	$50M
GI - 10% Impervious Area	70%	$43M
Removal of I&I	68%	$11M
Tunnel Storage - 85%	86%	$74M
Satellite Storage Tanks - 85%	85%	$66M
Regional Storage Tank - 85%	85%	$63M

- Storage alternatives also evaluated for 0, 4, 8, 12 and 20 overflows scenarios

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Possible GI Location Map

Bioswale

Rain Garden

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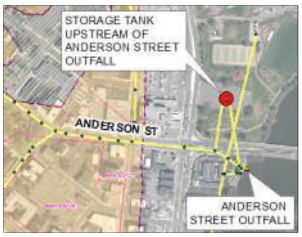
Storage Alternative: 2 Underground Storage Tanks



Alternative	Percent Capture	No. of Overflows	Reduction of Overflow Volume	Estimated Cost ($M)
Baseline conditions for 2004	68%	56	N/A	-
Two tanks, 60ft dia., (85% Capture)	85%	25	52.7%	$66M

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Dearborn, Michigan: http://www.we-technologies.com/wastewater-projects.php

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Additional Alternative: Court Street Stormwater Study

- The City of Hackensack performed a stormwater study in part of the Court Street Subdrainage Area
  - Goal: Determine a viable alternative to assist with flood mitigation in flood-prone areas west of Railroad Avenue

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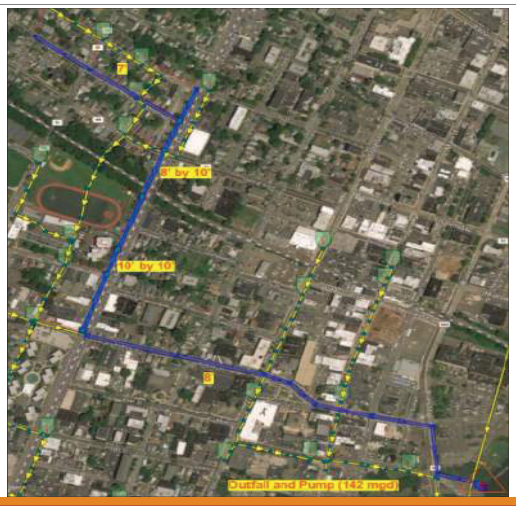
Additional Alternative: Court Street Stormwater Study

- 25-year design storm, 2050 tidal influence
- Stormwater interceptor with in-line storage along Railroad Avenue
- Pump station near the Hackensack River



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Additional Alternative: Court Street Stormwater Study

- How can this project assist with the City's LTCP?
  - Reduce number of CSOs from the Court Street outfall
  - Increase the CSO percent capture
  - Additional benefit: mitigate an often-occurring flooding issues within the City. This benefit would not occur with the storage tank alternative at Court Street.

CSO LTCP Alternatives		
Court Subdrainage Area (Outfall 001A)		
	% CSO Capture	Estimated Costs
Baseline (existing)	72.0%	-
Stormwater Project	88.3%	$66,000,000
Storage Tank (LTCP)	85.0%	$33,000,000
System-wide (Outfalls 001A and 002A)		
	% CSO Capture	Estimated Costs
Baseline (existing)	68.5%	-
Stormwater Project at Court Street & Storage Tank at Anderson Street (LTCP)	86.2%	$99,000,000

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Selection and Implementation of Alternatives

- Selection of approach: "Presumption" or "Demonstration"?

  Pending NJDEP approval of the Water Quality Modeling. Water quality results in the Hackensack River will determine the approach needed for the City's LTCP. **Initial results indicate that the presumption approach may be the appropriate approach to take.**

- Goal: Increase system-wide percent capture from 68% to a minimum of 85%

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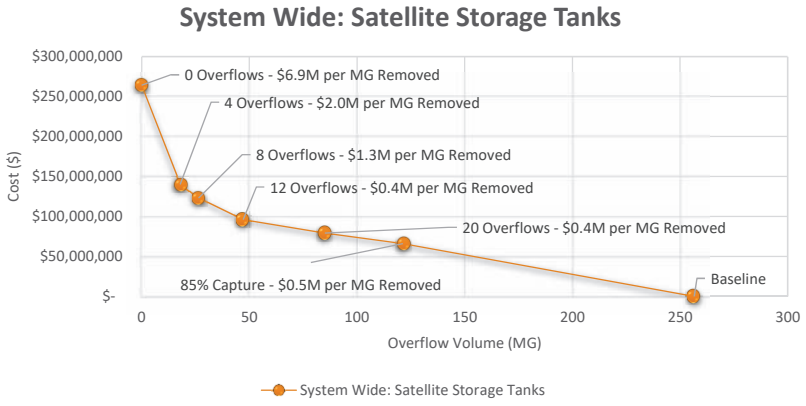
Selection and Implementation of Alternatives

- "Knee-of-the-curve" Analysis – Satellite Storage Tanks



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Selection and Implementation of Alternatives

- Next Steps
  - Final Selection of the LTCP
  - Implementation Schedule
  - Financial Capability Analysis (FCA – Affordability Study)
  - Submit SIAR Report to NJDEP by June 1, 2020
- Questions?
  - Website: www.hackensack.org/cso
  - Email: csoteam@hackensackdpw.org

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Development and Evaluation of Alternatives Report

Water Quality Modeling

Mott MacDonald | Presentation 56 28 January 2020

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Models

- Hydrodynamic Model (ECOMSED)
  - Water Elevation
  - Currents
  - Temperature
  - Salinity
- WQ Model (RCA)
  - Salinity
  - Tracer
  - E. coli
  - Fecal coliform
  - Enterococci
- Both models are run on the same grid (segmentation)
  - 10 vertical layers

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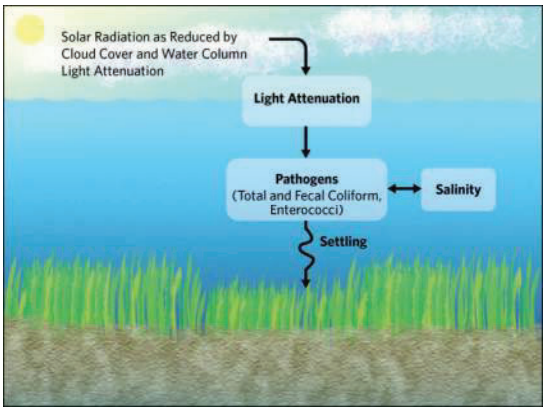
Pathogen Model

Factors that affect bacteria

- Natural die-off
- Temperature
- Solar radiation
- Salinity
- Settling



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Required Hydrodynamic Model Inputs

- Physical Dimensions
  - Shoreline
  - Bathymetry
- Boundary Conditions
  - Tides
  - Temperature
  - Salinity
- Freshwater Sources
  - Rivers
  - CSOs
  - Storm Sewers
  - Direct Drainage
  - WWTPs
- Meteorology

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Landside Pathogen Concentration Stations

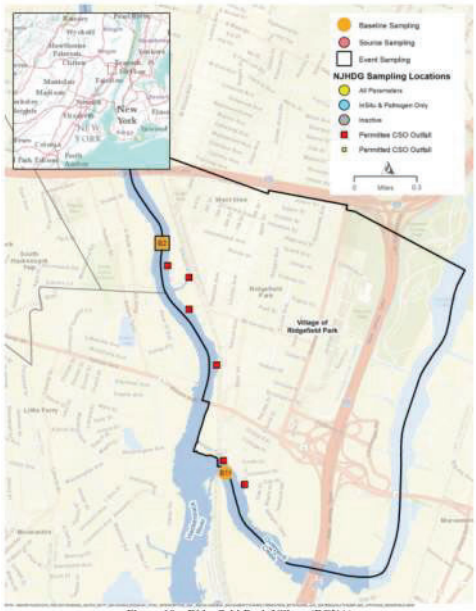

Figure 10 – Ridgefield Park Village (BCUA)

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Landside Pathogen Concentration Stations

Figure 11 – Borough of Fort Lee (BCUA)

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WQM Component Analysis

- WQ Component Analysis:
  - E. coli
  - Fecal
  - Enterococci
- Components:
  - NJ CSO
  - NJ SW/Runoff
  - NJ STP
  - NJ/NY/CT Rivers
  - Hudson River
  - Dry-weather
  - NYC CSO+SW
  - NY/CT STP

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Healthy Neighborhoods

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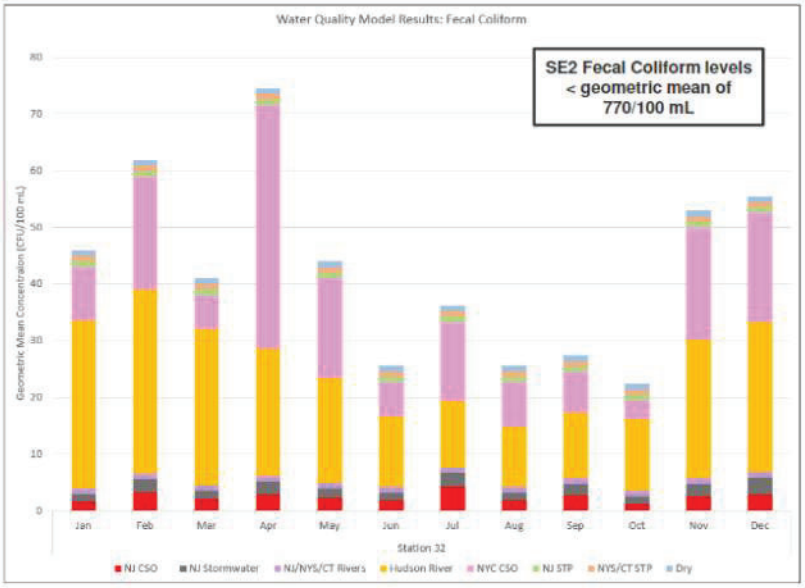
WQM Component Analysis – Fecal Coliform-Hudson River



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Healthy Neighborhoods

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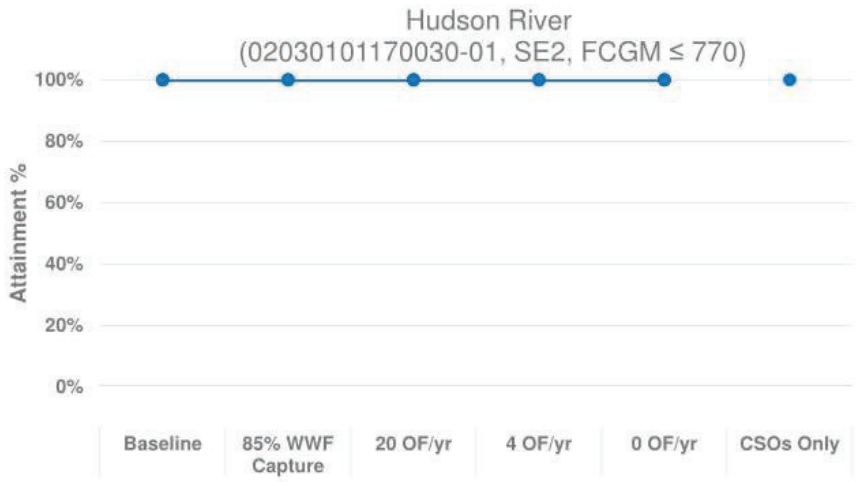
WQM Attainment



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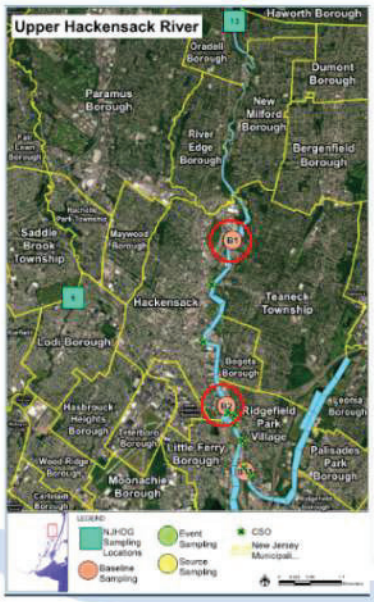
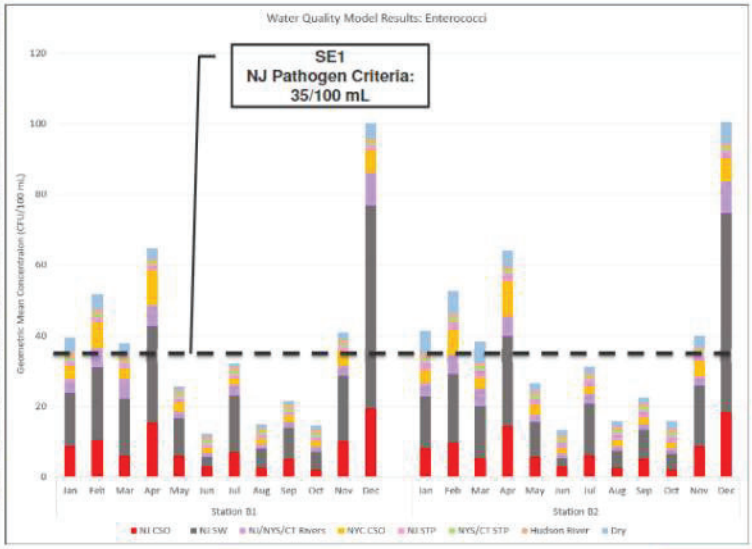
WQM Component Analysis – Upper Hackensack River -Enterococci





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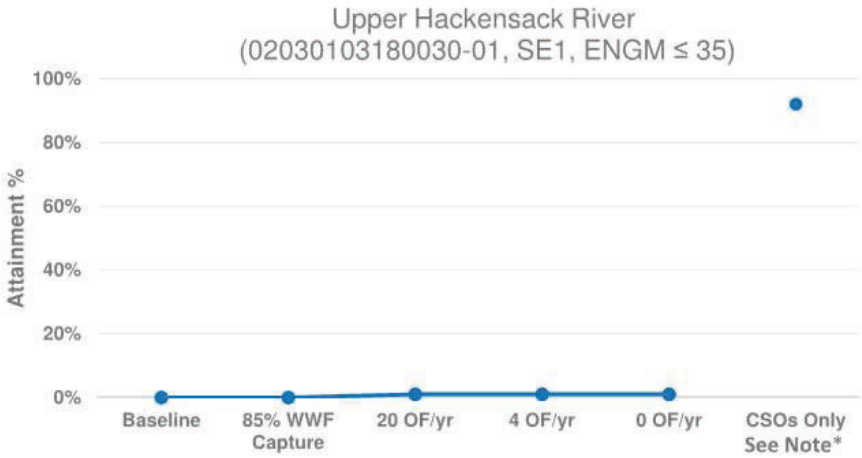
WQM Attainment



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Healthy Neighborhoods

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BCUA CSO Group Supplemental CSO Team

Public Outreach Opportunities

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Public Outreach Opportunities

- Input on the selection process?
  - Are your interested being considered?
  - Comments on locations of facilities?
  - Comments on types of facilities?
  - Comments on costs?

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Public Participation

- Future opportunities
  - Next SCSO Team Working Meeting?
  - Planned public meeting – tentatively May 2020
    - Venues
    - Time
    - Advertising
    - Invitees
  - Other activities

Webpage Article

- Suggestions for Topic/Focus

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Financial Capability Assessment

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Financial Capabilities Assessment

Goal is to determine impact on residential population and to allow the LTCP extent and schedule to incorporate those impacts.

- EPA Methodology
  - Snapshot based on current conditions.
  - Allows for flexibility and additional factors to be considered.
  - Very limited view of affordability.
- "Dynamic" Model
  - Accounts for inflation
  - Accounts for expected project schedule.

COST PER HOUSEHOLD
Worksheet 1

		Line Number
Current WWT Costs		
• Annual Operations and Maintenance Expenses (Excluding Depreciation)	_____	100
• Annual Debt Service (Principal and Interest)	_____	101
Subtotal (Line 100 + Line 101)	_____	102
Projected WWT and CSO Costs (Current Dollars)		
• Estimated Annual Operations and Maintenance Expenses (Excluding Depreciation)	_____	103
• Annual Debt Service (Principal and Interest)	_____	104
Subtotal (Line 103 + Line 104)	_____	105
Total Current and Projected WWT and CSO Costs (Line 102 + Line 105)	_____	106
Residential Share of Total WWT and CSO Costs	_____	107
Total number of Households in Service Area	_____	108
Cost Per Household (Line 107 ÷ Line 108)	_____	109

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Financial Capabilities Assessment - EPA Indicators

How much CSO Control can the Municipality afford?

- Primarily based on EPA Guidance
  - 2% of Median Household Income (MHI)
- Implications of affordability:
  - Implementation schedule
    - Prioritize projects with highest cost effectiveness
  - Level of control
  - Required annual rate increases

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Financial Capabilities Assessment - EPA Indicators

Residential Indicator	Current system costs (combined, sanitary, and stormwater)	
	Percent residential share = Typ. 75-85%	
	Cost per residential household – should be less than 2% of MHI	
Financial Indicator	Debt Indicators	Bond Ratings
		Overall Net Debt as % of Full Market Property Value
	Socioeconomic Indicators	Unemployment Rate
		Median Household Income
	Financial Management Indicators	Property Tax Revenues as % of Full Market Property Value
		Property Tax Revenue Collection Rate

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Financial Capabilities Assessment - EPA Indicators

FINANCIAL CAPABILITY MATRIX
Table 3

Permittee Financial Capability Indicators Score (Socioeconomic, Debt and Financial Indicators)	Residential Indicator (Cost Per Household as a % of MHI)		
	Low (Below 1.0 %)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0 %)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

FINANCIAL CAPABILITY GENERAL SCHEDULING BOUNDARIES
Table 4

Financial Capability Matrix Category	Implementation Period
Low Burden	Normal Engineering/Construction
Medium Burden	Up to 10 years
High Burden	Up to 15 Years*
	*(Schedule up to 20 years based on negotiation with EPA and state NPDES authorities)

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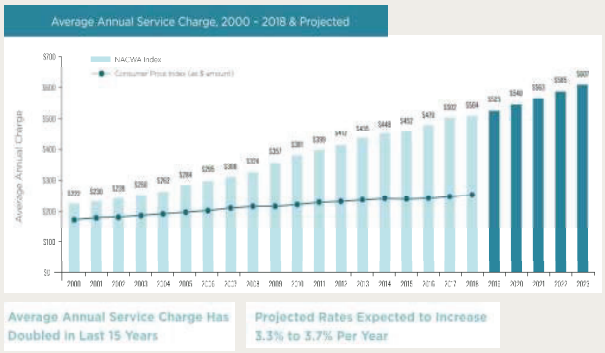
Financial Capabilities Assessment - Additional Items to Consider

- Sewer utility costs likely to rise faster than income growth over next 20-30 years
- Consider future non-CSO costs and obligations
- Income and Cost Considerations
  - Burden by income distribution brackets
  - Poverty rates
  - Unemployment and labor force participation rates
- Financial Strength Considerations
  - Debt ratio and debt per capita
  - Number of customers and composition
  - Legislative revenue limitations



Source: NACWA, 2018 Cost of Clean Water Index, https://www.nacwa.org/docs/default-source/news-publications/pub-5-index-1-web-final.pdf

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Financial Capabilities Assessment

So what is this all about?

- It's like buying a house or car.
  - What are my current expenses?
  - How much money do I make now and in the future?
  - When will I buy it?
  - How expensive is it?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?

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Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a LTCP
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?

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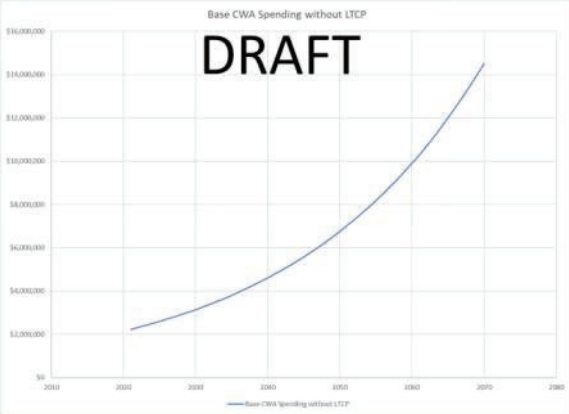
Financial Capabilities Assessment



So what is this all about?

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  - What is the interest rate?
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  - What is my mortgage term?

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Financial Capabilities Assessment

So what is this all about?

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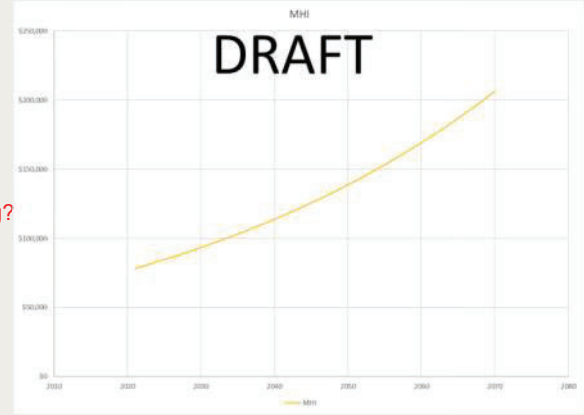

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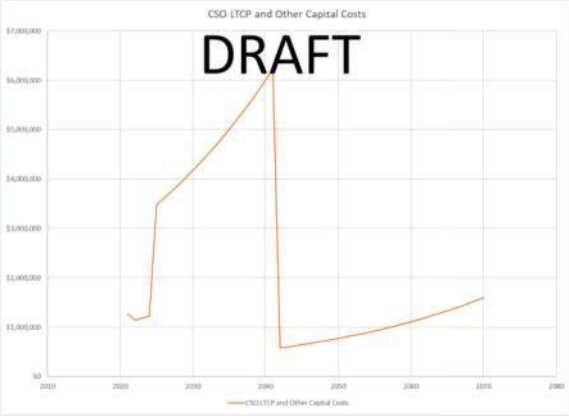
Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?



Mott MacDonald | Presentation 80 28 January 2020

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BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
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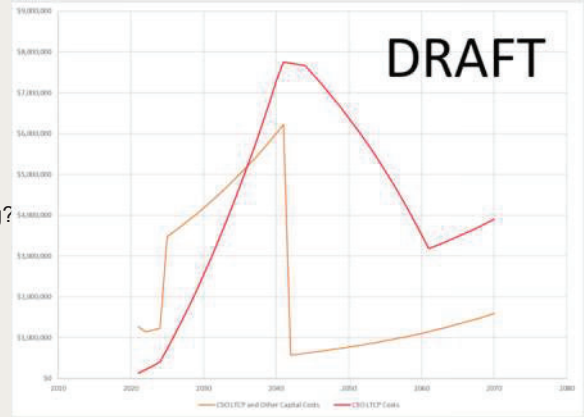
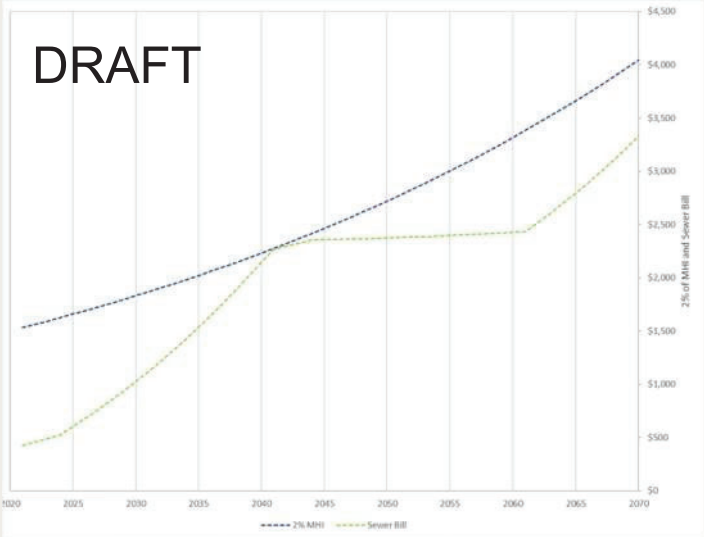


BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

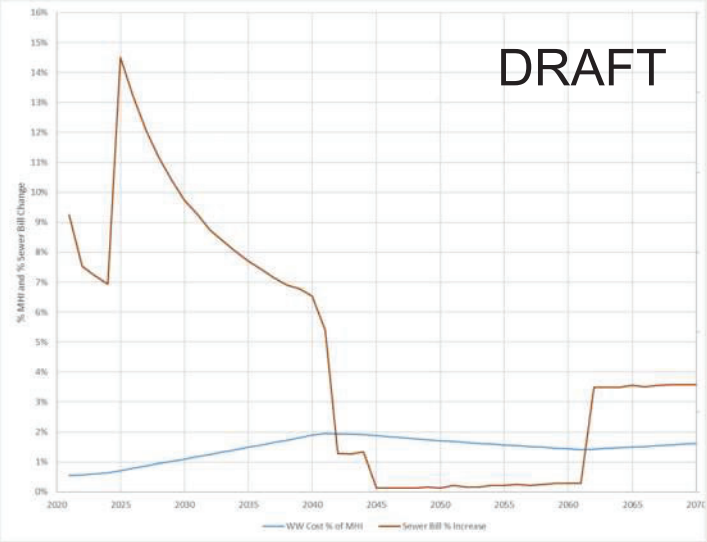
What is the impact to me?



BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

What is the impact to me?



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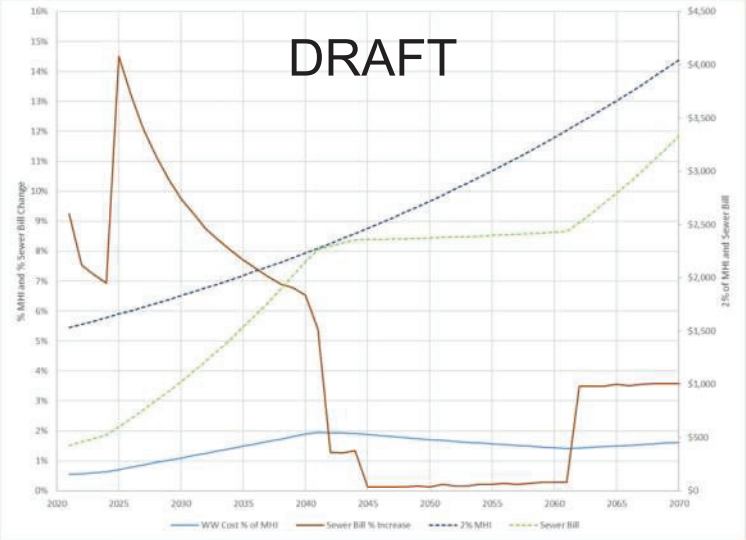
BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

What is the impact to me?



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BCUA CSO Group Supplemental CSO Team

Selection and Implementation of Alternatives Report

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BCUA CSO Group Supplemental CSO Group

Selection and Implementation of Alternatives Report - Requirements

Due June 1, 2020

- Must be approvable
- Implementation Schedule
  - Annual Milestones
  - Sensitive area Prioritization
  - Construction
  - Financing
- Financial Capability
- Compliance Monitoring Program

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BCUA CSO Group Supplemental CSO Group

Selection and Implementation of Alternatives Report Outline

- Certifications
- Executive Summary
- Introduction
- System Characterization and Modeling
- Control Plan Approach and Strategy
- Development of Alternatives
- Selection of LTCP

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BCUA CSO Group Supplemental CSO Group

Selection and Implementation of Alternatives Report Outline (Cont'd)

- Financial Capabilities
- Financing Plan
- Implementation Schedule
- Operational Plan
- Compliance Monitoring – Potentially Regional
- Public Participation

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BCUA CSO Group Supplemental CSO Team

Schedule

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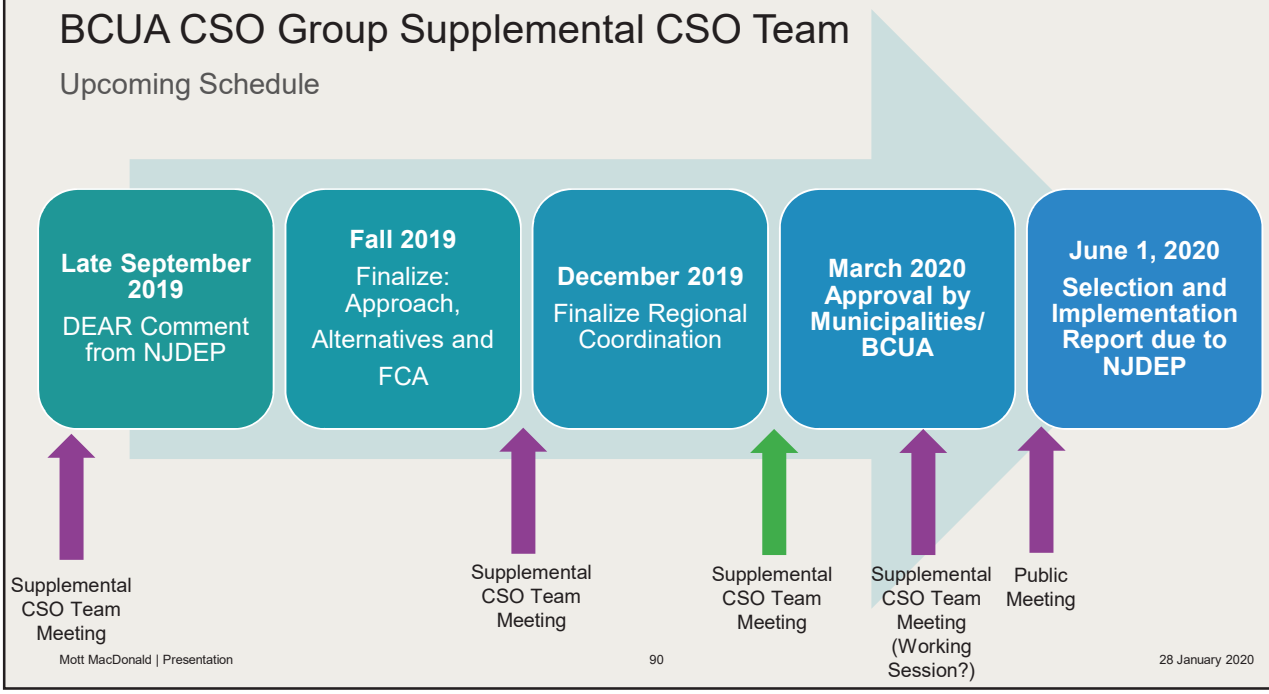
BCUA CSO Group Supplemental CSO Team

Upcoming Schedule



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Final Questions?

91

Thank You?

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Bergen County Utilities Authority

Supplemental CSO Team Meeting #12

Selection and Implementation of Alternatives

July 21, 2020, 10:00 am - 12:00 pm

via Microsoft Teams

Meeting Minutes (DRAFT)

Attendees:

- John Dening, Sabina Martyn – Mott MacDonald for BCUA and Ridgefield Park
- Lewis Goldshore – Special Environmental Counsel for Ridgefield Park
- Bob Appelbaum – Fort Lee
- Gary Grey, Yingying Wu – HDR for Fort Lee
- Ryan Westra, Susan Banzon, Michael McAloon – Hackensack
- Frank Belardo – Arcadis for Hackensack
- Susan Rosenwinkel, Marzooq Alebus, Nancy Kempel, Stephen Seeberger, Dwayne Kobesky – NJDEP
- Michele Langa – Hackensack Riverkeeper
- Sam Gronner – Resident of Fort Lee
- Sal Pagano – Resident of Fort Lee

Presentation slides attached.

Minutes:

1. Introductions
   - JD welcomed everyone to the meeting and presented the meeting agenda.

2. Safety Minute
   - JD presented on driving safety, see attached presentation.

3. Selection of CSO Control Alternatives - Permittee Presentations
   - See attached presentations.
   - JD presented the status of BCUA's LTCP efforts, indicating that their focus would be on evaluating conveying and treating additional flow. This would be done through regulator modifications, interceptor improvements and eventually increasing treatment capacity at the plant.
     - SR asked how the baseline year relates to the typical year. JD explained that the same rainfall does not occur in any two given years, so an analysis was done to identify a "typical year" for rain conditions, identifying 2004 as the

typical year, to provide a common point of comparison. 2004 had about 48" of rain which is slightly more than average. The "baseline year" refers to a point in time used as a reference point for the LTCP improvements. 2015 was used as the baseline year, because it represents the start of the current LTCP. SR asked if the baseline model is run using 2004 typical year rainfall with 2015 infrastructure. JD confirmed that this is the case.

- JD presented on Ridgefield Park indicating that a storage tank has been tentatively selected as the preferred CSO control alternative. (See attached presentation slides)
- GG presented on Fort Lee indicating that the main CSO LTCP projects proposed are flow meters, green infrastructure pilot program, and sewer separation. (See attached presentation slides)
- FB presented on Hackensack indicating that the main CSO LTCP projects proposed are the green infrastructure program, Court Street subdrainage area stormwater project, localized sewer separation, and Anderson Street storage tank. (See attached presentation slides)

4. CSO Community Input
    - JD provided an opportunity for the group to provide input on the proposed CSO control projects. NK indicated that the information presented was helpful for NJDEP but she has no questions at this time.
    - SR asked the group: noting that the LTCP will be submitted to NJDEP on or before October 1st following which the new permit will be issued, how would the group like to see public involvement moving forward? She asked if there is a need for public to be involved once the plan is established. ML responded that the focus should be on making sure that the outline of the plan is being followed and that there is oversight. ML indicated that she is not sure how public would be involved, but it would be helpful to share updates or progress reports to demonstrate that everything is going according to plan and schedule.
    - BA indicated that he assumes that annual updates would be presented to the public on a website or by email, with information such as what the project is, what is the objective of the program, how many years will projects take for implementation, and what was accomplished during the past year, so that the public can keep in touch with progress.
    - SG suggested that, like COVID-19 communications, the Mayor or council should summarize and provide a long-term picture of the proposed work so that when the plan is approved by the council it doesn't take the residents by surprise in terms of impacts to their bill. He suggested that a YouTube video could be done to provide this information. GG noted that in Fort Lee the council meetings are televised, and are available to view online.
    - SG asked, when the town approves new multi-family projects, is there a mandate that a separate sewer system must be constructed to convey effluent. GG indicated that recent development had been separating sewers. NK noted for GG that the N.J.A.C 7:8 stormwater management rules were updated this year and will not be effective

until March 2021, however the update requires green infrastructure to be evaluated in any major development project.

- MA noted that the water quality model referenced throughout the presentation has not been received or approved by the NJDEP, so it should be noted as such (e.g. "draft") in presentations and reports.

5. Discussion of Public Meeting
    - BA asked why the public meeting would be combined for the three municipalities, rather than one meeting for each town. JD indicated that it is meant to be a regional approach, due to the shared impacts of water quality on these communities, for example actions taken by Hackensack would impact water quality in Ridgefield Park located right across the river. JD indicated that the regional approach provides a bigger picture and greater context. SG responded that people's interests are typically focused on local impacts, as such meetings should be local rather than county-wide. He noted that he found the Twitter and text message notifications provided by Fort Lee useful. GG responded that if the group could physically meet, the common regional aspects could be discussed, and then the group could split out to discuss each town's projects, however he was not sure how this could be done online. He suggested an approach like PVSC, who posted boards online, however this platform does not allow interaction. JD suggested that Zoom has the capability to do breakout rooms, so local items could be addressed that way.
    - BA suggested that in the same way some places are producing weekly YouTube video for COVID-19, a similar approach could be taken to provide CSO LTCP information. He noted that posting on YouTube would provide the public with the opportunity to post questions. He suggested giving a week for questions to be posted, then posting responses to these questions. Although this would not be in real-time, it would give people who are not otherwise available to attend a meeting at a particular time the opportunity to view the information and provide feedback.
    - FB agreed, suggesting that in order to make it more interactive, municipalities could post the presentation to their Facebook page and respond to feedback that way.
    - BA suggested that there could be one YouTube presentation for the BCUA region, with each town also posting their own local presentation.
    - ML also agreed with GG's suggestion of a joint meeting with breakout groups. She noted that it would also be helpful to record the meetings and make them available to the public to view and comment on for a period of time afterwards. BA indicated that this would allow people to not be restricted by time and would allow them to provide feedback later.
    - SG suggested a live audio conference call and sharing visuals beforehand, with some moderating of conversations during the call to address any questions on the previously shared materials.
    - ML also suggested including the public meeting ideas for what the average person can do: alerting people to illicit connections, impervious pavement on properties, rain

barrels, etc. She noted that people would be more invested in the process when they feel there is something they can do about it.

- JD thanked everyone for their input on the next public meeting. He asked if the public would be most interested in local impacts, including schedule, cost, and location of projects. SG responded that the presentation should be simplified for the general public and not be so technical and in the weeds, focusing on how the projects would impact individual residents and taxpayers in the town. JD asked whether the history and explanation of what is a CSO should be included. SG responded that yes, everything should be explained so it is understandable, without acronyms, including how the sewer system works, its impact on the environment, etc.

6. Next Steps
    - MA asked JD for a copy of the presentation. JD indicated that slides and minutes would be prepared and distributed for comment, following which they would be posted on the BCUA website.
    - JD asked whether NJDEP would like to remain in the call to address any more detailed questions, or whether a separate meeting should be organized. JD indicated that the project team will be meeting on Thursday at 10am, and NK and SR indicated that they would be available to attend and as their questions. JD would forward the meeting invitation to SR, NK, MA, SS and Dwyane Kobesky.

Preliminary Selection and Implementation of Alternatives

BCUA CSO Group Supplemental CSO Team Meeting #12

Virtual Meeting

July 21, 2020

1

BCUA CSO Group Supplemental CSO Team

Meeting No. 12 Agenda

- Introductions
- Safety Minute
- Tentative Selection of CSO Control Alternatives
  - Permittee Presentations
- CSO Community Input
- Discussion of Public Meeting
- Next Steps
- Open Discussion

2

Safety Topic

Remembering How to Drive

Practice:

1 **Turning radius**

2 **Signal before turning**

3 **Putting on seatbelt**

4 **Parallel parking**

5 **Which side your gas tank is on**

3

Long term control plan submission and NJDEP review status

Step 1.

- System Characterization Report – NJDEP Approval on 1/17/2019
- Baseline Compliance Monitoring Program Report – NJDEP Approval on 3/1/2019
- Consideration of Sensitive Areas Report – NJDEP Approval on 4/8/2019
- Public Participation Process Report – NJDEP Approval on 2/7/2019

Step 2.

- Development and Evaluation of Alternatives – Due on 7/1/2019

Step 3.

- Selection and Implementation of Alternatives
- Final LTCP – Due October 1st

(Extension from June 1 to October 1 due to COVID-19)

4

MOTT MACDONALD

BERGEN COUNTY UTILITIES AUTHORITY

BCUA Update
Support of Alternatives

BCUA CSO Group Supplemental CSO Team Meeting #12

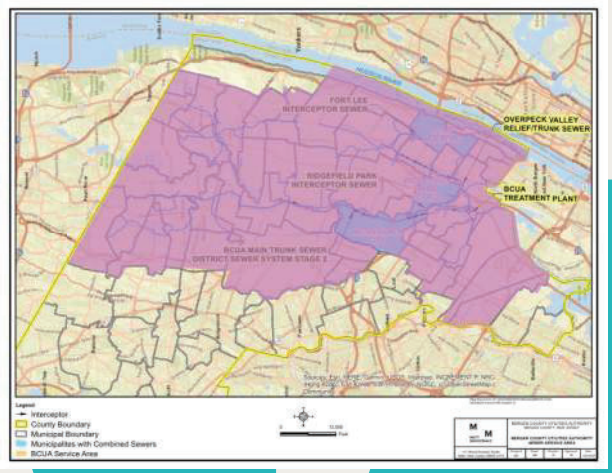
July 21, 2020

5

BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- Level of Control
  - Coordinating with municipalities to develop based on:
    - Hydraulically Connected System



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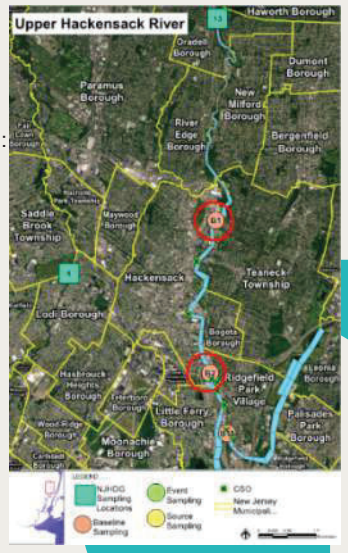
BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

Level of Control

- Coordinating with municipalities to develop based on:
  - Hydraulically Connected System
  - Segmentation of System
    - Hudson River
      - Fort Lee
    - Hackensack River Basin
      - Hackensack
      - Ridgefield Park



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BCUA Systemwide 2015 Baseline Performance

459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

309
Million gallons per year Total combined sewer overflow volume to Hackensack River Basin

56
Overflows during the Typical Year to the Hackensack River Basin

71.7%
Wet Weather Capture in the Hydraulically Connected System.

1,620
Million Gallons (MG) of Wet Weather Inflow

150
Million gallons per year Total combined sewer overflow volume to Hudson River

58
Overflows during the Typical Year to the Hudson River

74.5%
Wet Weather Capture to the Hudson River

70%
Wet Weather Capture in Hackensack River Basin

8

BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- BCUA is not implementing alternatives
  - Providing support for municipalities
- Convey and Treat or Store Additional Flow
  - Considered under DEAR
  - Consider broader elements.
  - Revised WWTP Permit
    - Stricter effluent limits

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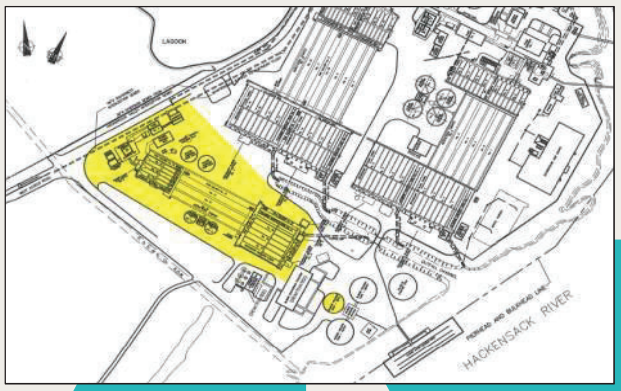
BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- BCUA is not implementing alternatives
  - Providing support for municipalities
- Evaluated:
  - Based on prior plant permit.
  - Plant Design Capacity – 120 MGD wet weather.
  - Interceptor Capacity – 210 MGD
  - Increased full treatment to add 29-115 MGD capacity
    - $310M to $730M



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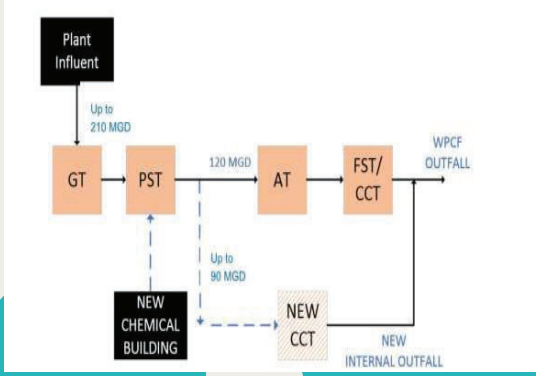
BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- BCUA is not implementing alternatives
  - Providing support for municipalities
- Evaluated:
  - Plant Design Capacity – 120 MGD wet weather.
  - Interceptor Capacity – 210 MGD
  - Increased full treatment to add 29-115 MGD capacity
    - $310M to $730M
  - High rate primary treatment with secondary treatment bypass.
    - Increase plant treatment rate to 210 MGD for $77M-130M
    - Increase plant treatment rate to 300 MGD for $103M-179M



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BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

- BCUA is not implementing alternatives
  - Providing support for municipalities
- Evaluated:
  - Plant Design Capacity – 120 MGD wet weather.
  - Interceptor Capacity – 210 MGD
  - Increased full treatment to add 29-115 MGD capacity
    - $310M to $730M
  - High rate primary treatment with secondary treatment bypass.
    - Increase plant treatment rate to 210 MGD for $77M-130M
    - Increase plant treatment rate to 300 MGD for $103M-179M
  - Inline storage in interceptors – Limited volume available (approx. 1.3 MG)
  - On site storage volume – up to 40 MG $270 M

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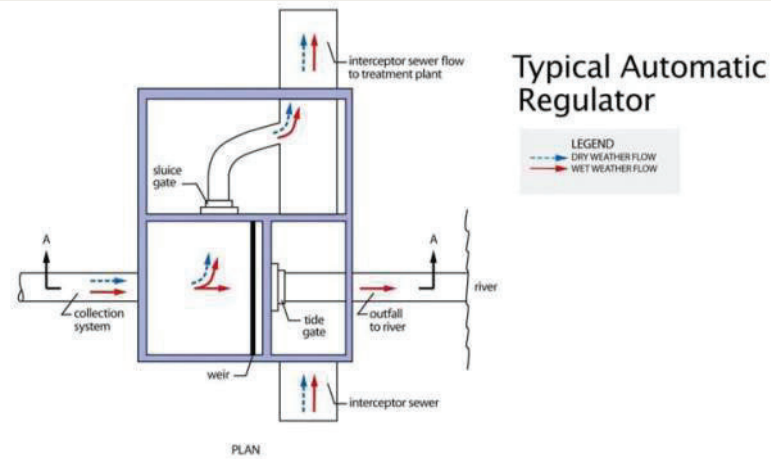
BCUA CSO Group Supplemental CSO Team

Additional Analysis

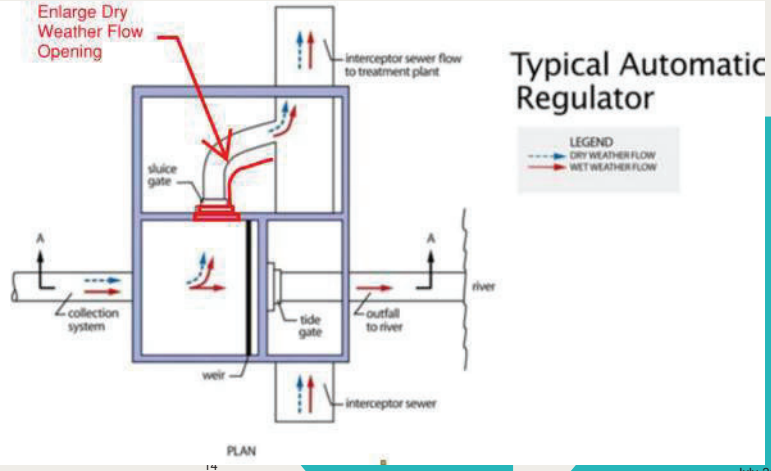
- Convey and Treat Additional Flow
  - Phase 1 modify regulators
  - Increase Ft. Lee pumping capacity



BCUA CSO Group Supplemental CSO Team

Additional Analysis

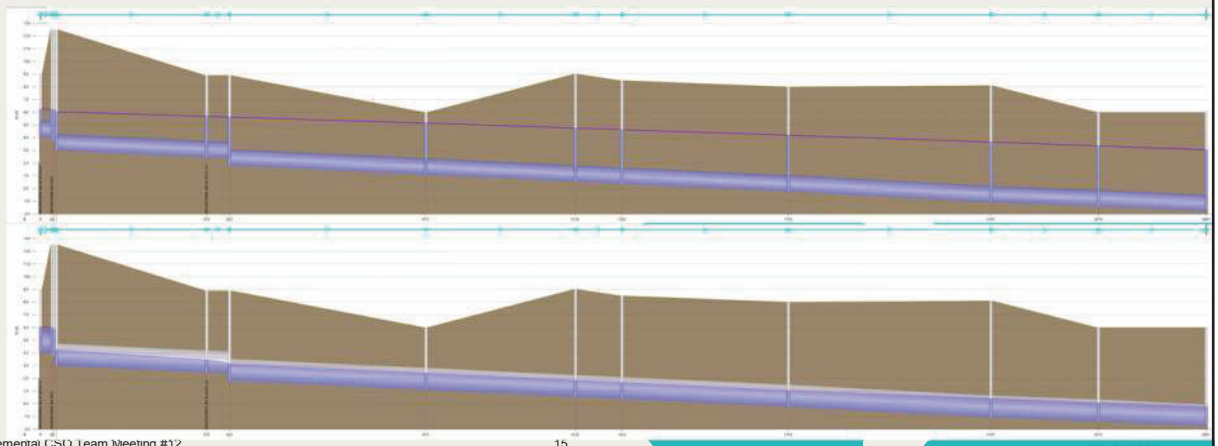
- Convey and Treat Additional Flow
  - Phase 1 modify regulators
    - Increase by 25%
    - Increase by 50%



BCUA CSO Group Supplemental CSO Team

Additional Analysis

- Convey and Treat Additional Flow
  - Phase 2 modify interceptors



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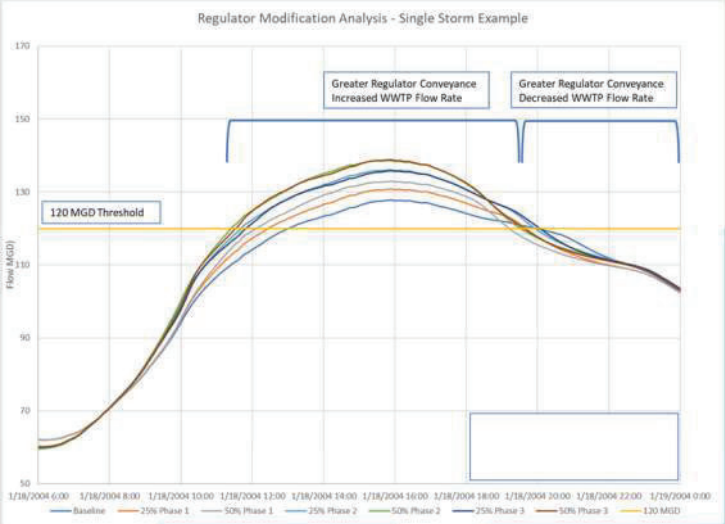
BCUA CSO Group Supplemental CSO Team

Additional Analysis

- Convey and Treat Additional Flow
  - Phase 2 Impact at Plant



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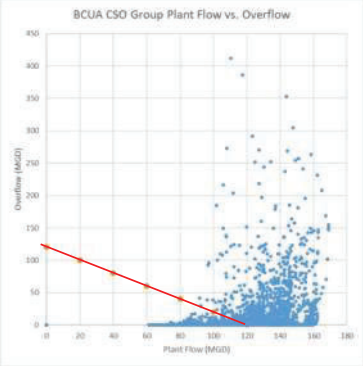
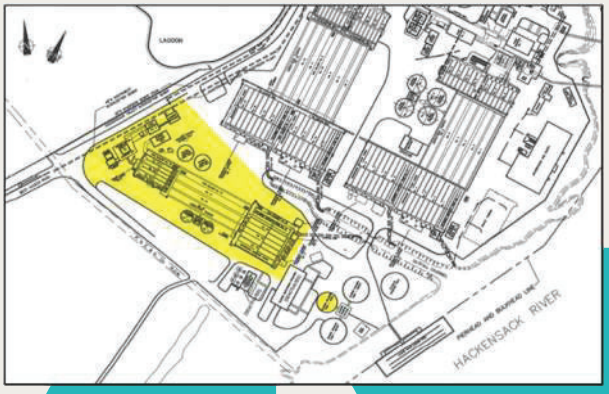
BCUA CSO Group Supplemental CSO Team

Additional Analysis

- Convey and Treat Additional Flow
  - Phase 3 modify plant capacity
  - Based on current permit
  - Developing Costs – More expensive than Municipal Costs





MOTT MACDONALD

The Village of Ridgefield Park Settled in 1685

Ridgefield Park Update Tentatively Selected LTCP

BCUA CSO Group Supplemental CSO Team Meeting #12

July 21, 2020

Ridgefield Park – Tentative LTCP

Outline

- Overview
- Alternatives
- Selection Process
- Tentative Selection of CSO Control Alternatives
- Schedule
- Costs
- Post Construction Compliance Monitoring
- Adaptive Management

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Ridgefield Park 2015 Baseline Performance

2004
NJDEP approved Typical Hydrologic Year

48.4”
Total rainfall depth in 2004 Typical Year

53
MG Typical Year Overflow Volume

216
MG Wet Weather Inflow

73
Storm events in 2004 Typical Year with greater than 0.1” of rainfall

459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

55
Typical Year Overflow Frequency

75.5%
Wet Weather Capture

20

Alternatives Evaluation

Control Programs Evaluated

21

Rating of Ridgefield Park Alternatives

From Development and Evaluation of Alternatives Report

Requested SCSO Team input on rankings

Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

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Control Approach Selection

Presumption Approach Targeting 85 Percent Capture

- Alternatives evaluation included evaluation of range of control levels (0, 4, 8, 12, and 20 overflows per year and 85% capture), in typical year conditions
- Calculate in conjunction with other permittees.
- Meets requirements of National CSO Policy.
- Evaluate effectiveness of increased level of control (knee of the curve).

Water Quality Modeling

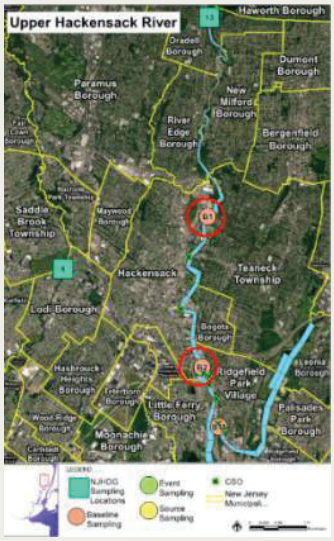
- Receiving water is the Hackensack River
- A complex water quality model was developed with regional communities (NJ CSO Group) to determine water quality of receiving waters, based on typical year.
- Hackensack River in the vicinity of BCUA is an SE1 water:
  - Entero criterion of 35 cfu/100mL geometric mean is exceeded → water quality criteria is not attained:
    - under dry weather flow conditions; and
    - when CSOs are eliminated.

Table 6-2. AU Attainment in SE1 Waterbodies under Baseline and 100% Control Conditions

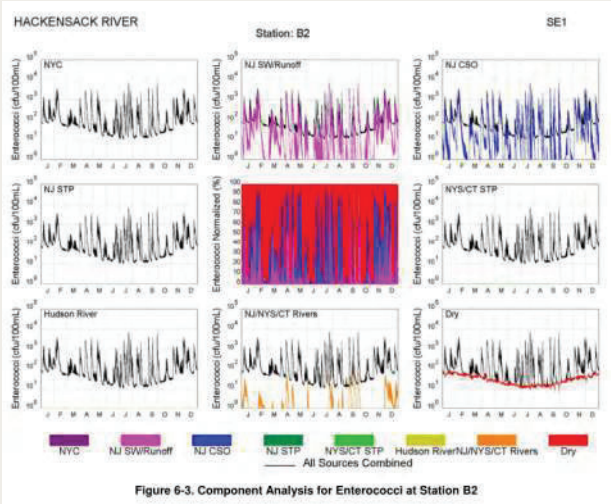
Assessment Unit Name	Assessment Unit Number	Baseline % Attainment	100% Control % Attainment
Hackensack R (Oradell to Old Tappan gage)	02030103170060-01	100.0	100.0
Hackensack R (Fort Lee Road to Oradell gage)	02030103180030-01	0.0	0.0

Source: Calibration and Validation of Pathogen Water Quality Model" Report (Draft, produced by NJ CSO Group / PVSC in April 2020)

Water Quality Modeling



Stormwater has almost equal contribution to CSOs, significant dry weather sources:



Source: Calibration and Validation of Pathogen Water Quality Model" Report (Draft, produced by NJ CSO Group / PVSC in April 2020)

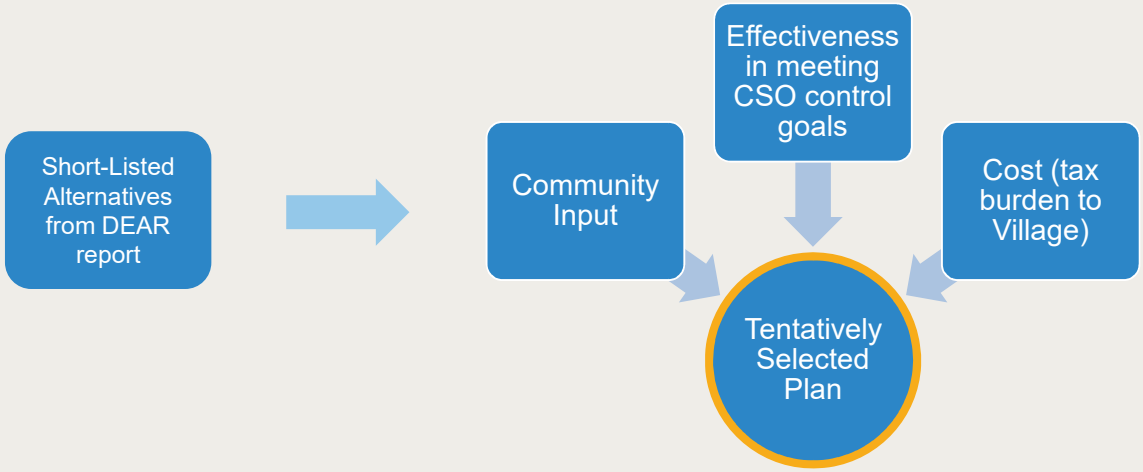
Control Approach Selection

Presumption Approach Targeting 85 Percent Capture

Presumption Approach (performance based)	**Demonstration Approach** (water quality based)
• No less than 85 percent capture of annual overflow volume; • No less than the equivalent mass of the pollutants causing water quality impairment; or • No more than 4 overflows in the typical year	• Use receiving water model to identify control level needed to meet WQ-based requirements
SELECTED as best balance between permit compliance, water quality benefit and allocation of municipal funds.	**NOT SELECTED:** WQ modelling not very insightful in demonstrating WQ improvements in receiving waters.

Tentatively Selected Plan

Presumption Approach Targeting 85 Percent Capture



Summary of Community Input

From previous Supplemental CSO Team meetings

1. Cost is a priority for residents (both maintenance and capital)
2. Odor mitigation should be employed
3. Green infrastructure can be used as educational tool to supplement other CSO control alternatives due to cost and limited impact on CSO volumes.
4. Concern about the potential impact of future regulations, including for stormwater quality in sewer separation.
5. Belowground CSO storage tanks can be integrated into future open space projects along waterfront.

Short-Listed Alternatives

Presumption Approach Targeting 85 Percent Capture

- Control Program 2 - Consolidated Tank Storage
  - Best rating, least complex
- Control Program 4 - Consolidated End of Pipe Treatment
  - 2nd Best rating, higher cost, complexity, and community impact

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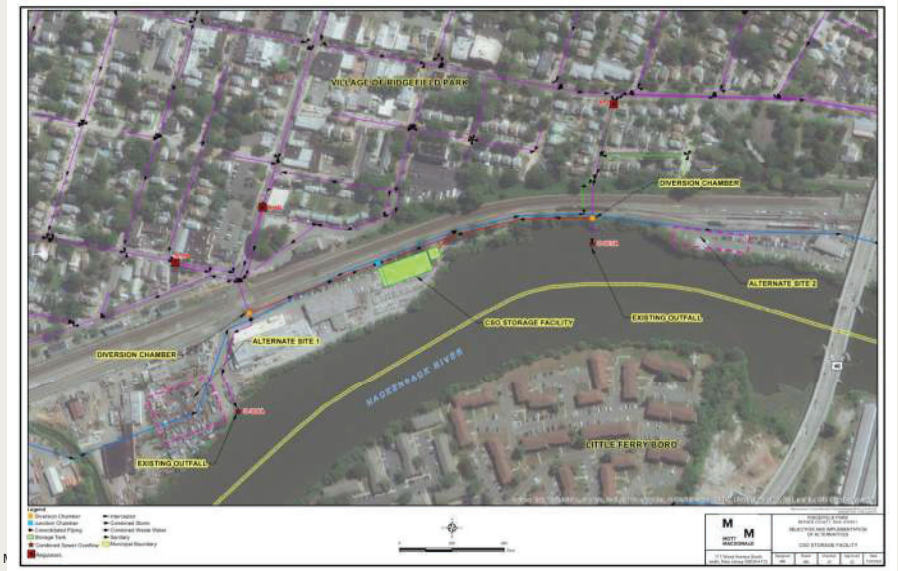
Tentatively Selected Plan – Subject to Change

Presumption Approach Targeting 85 Percent Capture



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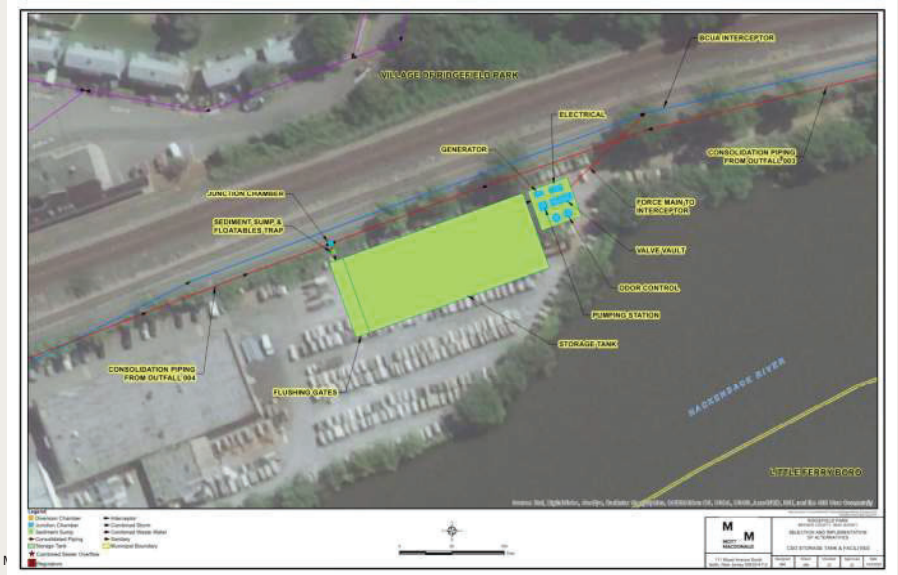
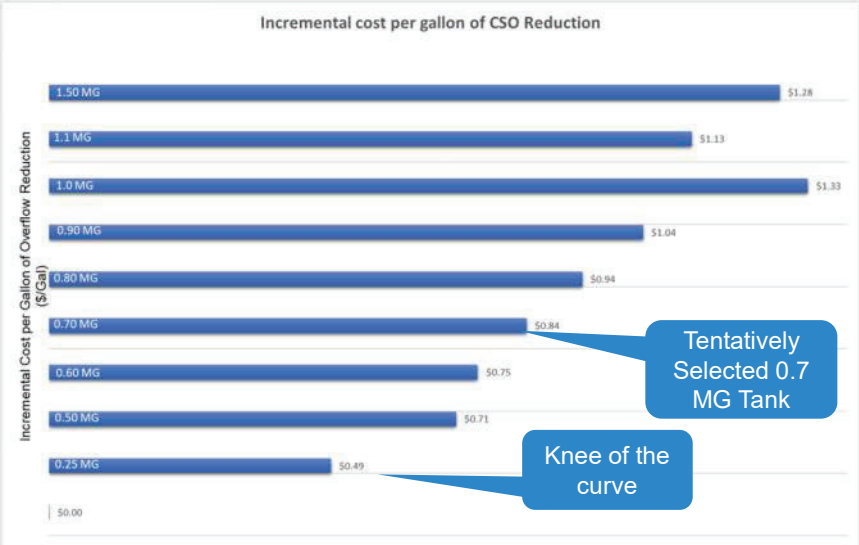
Tentatively Selected Plan – Subject to Change

Presumption Approach Targeting 85 Percent Capture



Tentatively Selected Plan

Knee of the curve



Implementation Schedule (DRAFT)

Year 1: Feasibility Study

Years 2-3: Acquire Property

Years 4-7: Design – Permitting – Funding

Years 7-12: Construction

Years 12-14
- Monitoring
- Recalibration
- Performance Verification
- O&M

Years 15+
- O&M

NJDEP Quarterly Status Meeting 33 June 25, 2020

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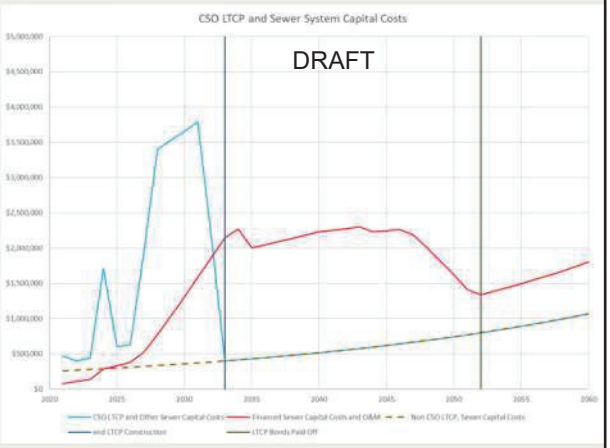
Cost Considerations

- Heavy tax burden, need to control costs.
- Village has many financial constraints, which makes even the recommended affordability consideration of 2% of MHI highly burdensome.
- COVID-19 pandemic may impact affordability and implementation schedule for CSO LTCP projects
  - Potentially reduced household incomes and sewer utility revenues.
  - Affordability analysis done for LTCP may no longer be accurate.



Supplemental CSO Team Meeting #12 34 July 21 2020

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Ridgefield Park Tentative LTCP Performance

2004
NJDEP approved Typical Hydrologic Year

48.4”
Total rainfall depth in 2004 Typical Year

31
MG Typical Year Overflow Volume

216
MG Wet Weather Inflow

73
Storm events in 2004 Typical Year with greater than 0.1” of rainfall

459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

26
Typical Year Overflow Frequency

85.6%
Wet Weather Capture

35

Post-Construction Compliance Monitoring

1. Receiving water quality conditions

- Will be monitored and modeled by NJ CSO Group in coordination with sampling program from NJ Harbor Dischargers Group routine sampling program.

2. CSO facilities performance

- Will be monitored and modeled by VRP to characterize performance based on Typical Year modeling of system with CSO facilities in place
- Data will be used to recalibrate/verify the collection system model to determine compliance with the NJPDES permit
- Compliance based on Typical Year conditions, as compared to the baseline model.

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Adaptive Management

- **Adaptive management** to be included in LTCP
  - COVID-19 Impacts
  - Re-assess affordability throughout implementation schedule, based on emergent economic conditions beyond permittees' control
  - Include provisions to re-evaluate, revise and/or reschedule CSO controls as appropriate to reflect new technologies, new conditions and potential new funding sources

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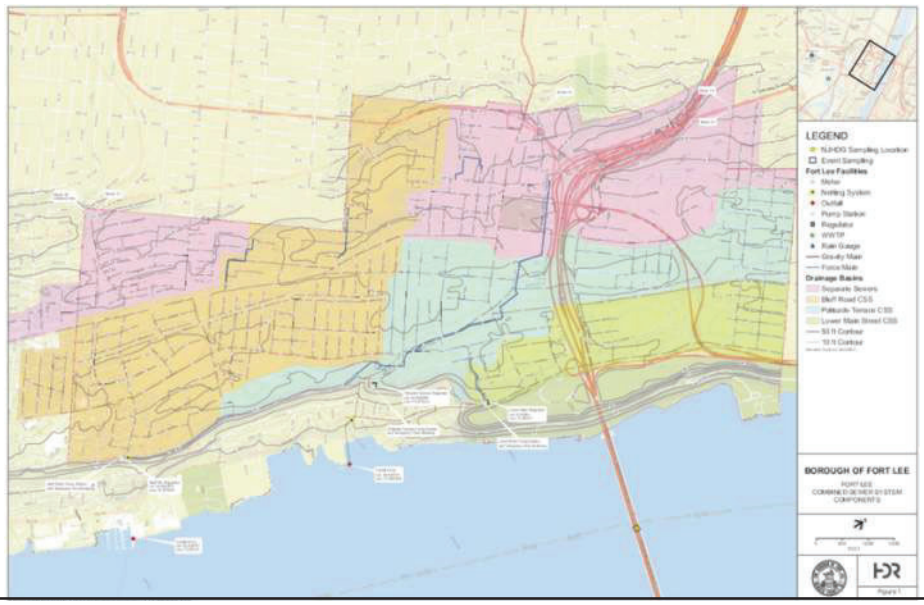
Fort Lee - NJPDES Permit No. NJ0034517
SCSO Meeting – July 21, 2020
Preliminary LTCP

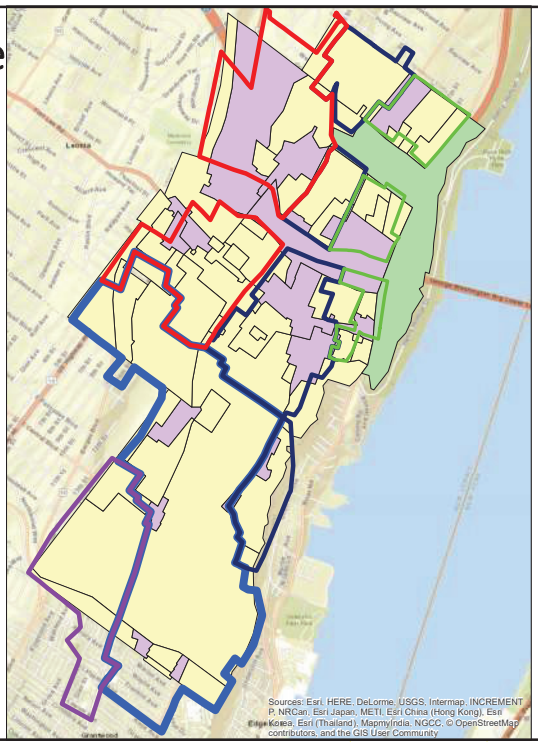


38

2007 Land Use Type and Drainage Area

Regulator
- BCUA-1
- BCUA-2
- Bluff Rd
- Lower Main
- Palisades

Land Use
- Residential
- Commercial
- Park



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CSO Permit Requirements

"A program that meets <u>any of the criteria listed below</u> would be presumed to provide an adequate level of control ……. <u>provided the permitting authority determines that such presumption is reasonable</u> ……."

i. No more than an average of four overflow events per year...

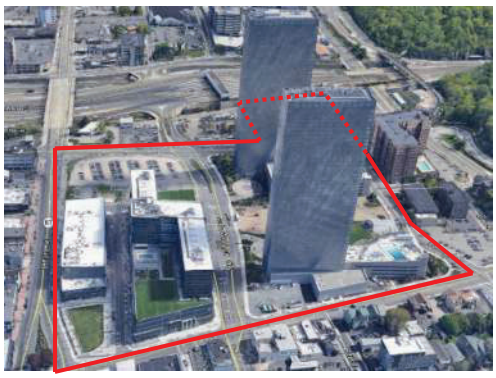
ii. <u>The elimination or the capture for treatment of no less than **85% by volume of the combined sewage collected** in the CSS during precipitation events on a system-wide annual average basis...</u>

iii. <u>The elimination or removal of no less than the **mass of pollutants, identified as causing water quality impairment**..., for the volumes that would be eliminated or captured for treatment under paragraph ii... " (Section II.C.4.a.)</u>

40

Model Improvements Since 2007
The Towers and Hudson Lights (~16 acres)
Lower Main Drainage Area

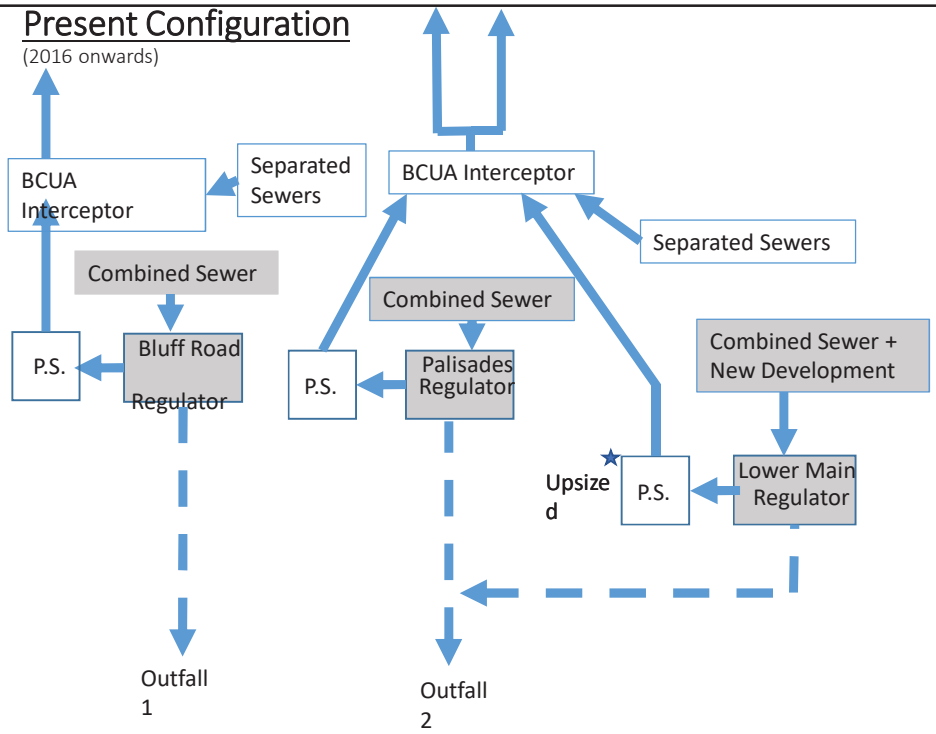
2012



2019

41

Present Configuration
(2016 onwards)



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Projected Overflows for 2004 Typical Year

Condition	Outfall 001 (Bluff Road)		Outfall 002 (Palisade Terrace)		
	Overflows	Volume	Overflows	Volume	CSO Capture
2015 InfoWorks ICM (Baseline)	58	124.5	35	25	**74.5%**
2017 InfoWorks ICM (The Towers Separated)	58	124.5	25	18.8	**76.3%**
2045 InfoWorks ICM (The Towers and Hudson Lights separated)	59	132	17	11	**79.1%**

Long Term Control Plan Goal – **85% Capture**

Break the LTCP to ~4 Phases

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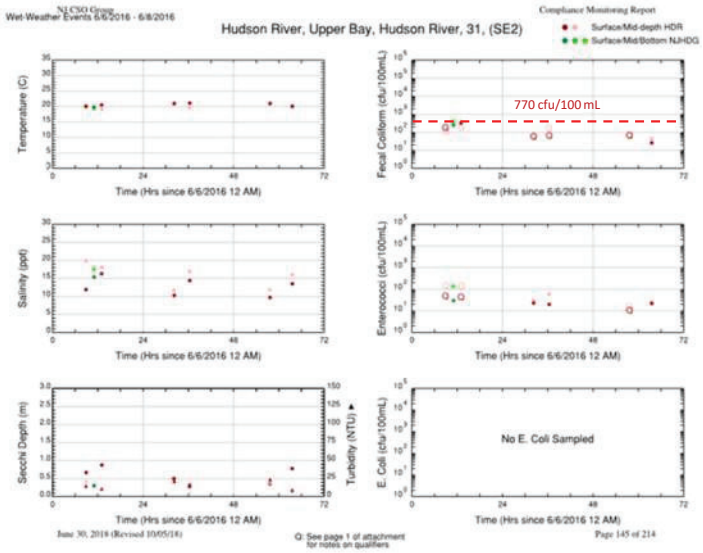
Water Quality Sampling Results



No water quality impairment. The Hudson River meets current SE2 Criteria.

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CSO Controls

Source Controls:

Green infrastructure, I&I Reduction, **Sewer separation**, BMPs, **Nine Minimum Controls**

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, regulator modification

Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, high rate filtration/clarification, chlor/dechlor disinfection, PAA disinfection (with or without filtration), UV disinfection, WWTP plant expansion

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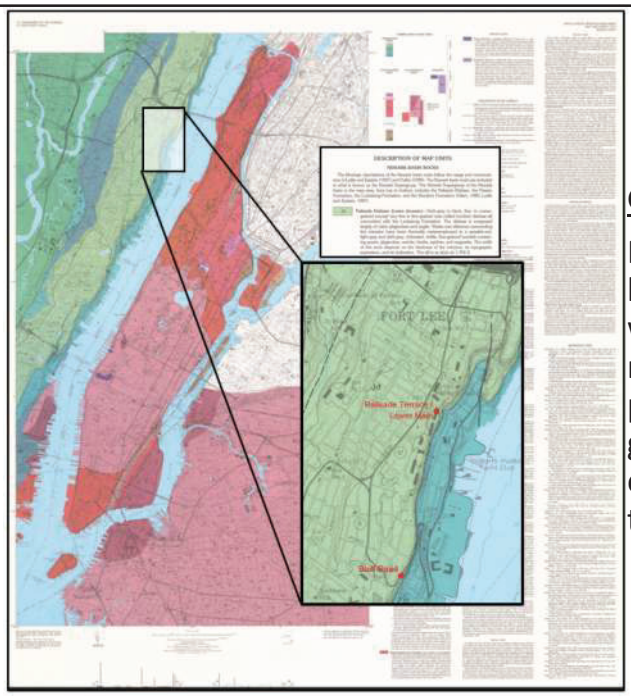

Figure 6-3. Bedrock Map of New York and Parts of Kings and Queens Counties, New York and Bergen and Hudson Counties, New Jersey

Green Infrastructure

Ft Lee is underlain by Palisade bedrock which will impede recharge and potentially limit green infrastructure effectiveness. Pilot test this alternative.

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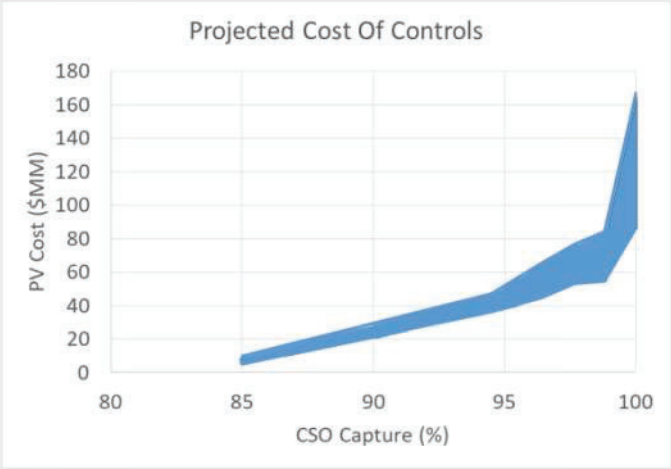
Cost Range of CSO Controls



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Preliminary LTCP to get to 85% Control

- Install Flow Meters on Bluff Road and Palisade Outfalls ($70 to $80K per year)

- Construct two pilot scale green infrastructure CSO alternatives (pervious pavers and bioswale) to see how effective they are ($250K)

- Sewer separation in four phases for 46 acres at $300,000 per acre ($13.8 M)

(The LTCP is yet to be adopted by the elected body)

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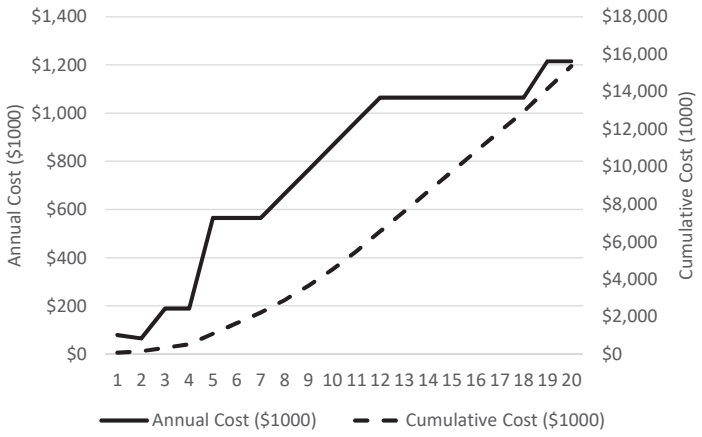
Preliminary LTCP Costs Schedule



(The LTCP is yet to be adopted by the elected body)

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Gary Grey
HDR Inc.
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Yingying Wu
HDR Inc.
yingying.wu@hdrinc.com

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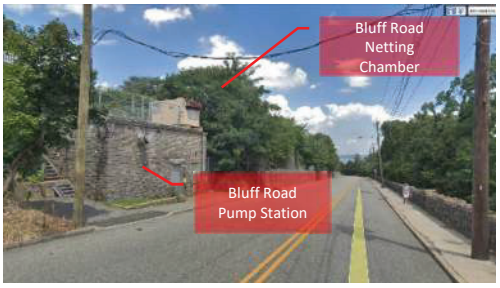
Bluff Road

Bluff Road netting facility is on the boarder of Ft Lee and Edgewater on the Palisades. Access is from Claremont Road on Manatauck Avenue.



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ARCADIS Design & Consultancy for natural and built assets

CITY OF HACKENSACK

Combined Sewer System LTCP

Selected Plan Update

Supplemental CSO Team Meeting, July 21, 2020

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Agenda

- Overview of Hackensack's Combined Sewer System (CSS)
- Development and Evaluation of Alternatives (DEAR) Review
- Selection and Implementation of Alternatives (SIAR) Update
  - Selection of Approach – "Presumption" or "Demonstration"
  - SIAR Selected CSO Control Plan
    - Projects
    - Implementation Schedule / Phased Approach
    - Updated Cost Estimate
- Next Steps

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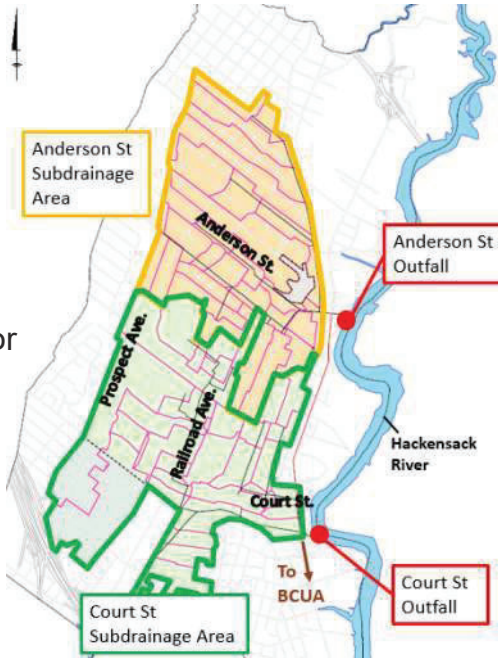
CSS Overview

- Approximately 31 miles of combined sewers
- Approximately 50% of Hackensack's population is served by the CSS
- Screening facilities installed for both outfalls



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DEAR Control Alternatives Review

- Development and Evaluation of Alternatives Report (DEAR)
  - Submitted to NJDEP on June 30, 2019
  - Approved by NJDEP on February 12, 2020

Alternative	Percent Capture	Total Estimated Costs
Baseline Conditions for 2004	68%	-
Full City-wide Sewer Separation	100%	$560M
Pretreatment and Disinfection	-	$50M
GI - 10% Impervious Area	70%	$43M
Removal of I&I	68%	$11M
Tunnel Storage - 85%	86%	$74M
Satellite Storage Tanks - 85%	85%	$66M
Regional Storage Tank - 85%	85%	$63M

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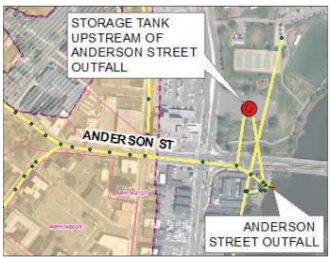
DEAR Control Alternatives Review

- Storage Tank Alternative



Dearborn, Michigan: http://www.we-technologies.com/wastewater-projects.php

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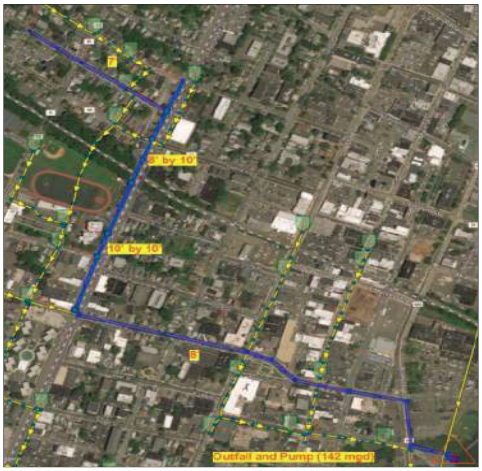
Sewer Separation Control Alternative

- **Supplemental Alternative - Court Street Subdrainage Area Stormwater Project:**
  - Mitigates flooding issues and increases CSO capture
  - Stormwater interceptor with in-line storage along Railroad Avenue
  - Pump Station near the Hackensack River



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SIAR CSO Approach Selection

- Selection of approach: “Presumption” or “Demonstration”?
- Due to water quality compliance issues in the Hackensack River, the “presumption” approach is selected.
- **Goal:** Increase system-wide percent CSO capture in Hackensack from 68.5% (baseline) to a minimum of 85%

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SIAR Selected CSO Control Plan

- **Selected CSO Long-Term Control Plan Projects:**
  - Green Infrastructure Program
  - Court Street Subdrainage Area Stormwater Project
  - Additional Localized Sewer Separation Projects
  - Anderson Street Storage Tank

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SIAR Selected CSO Control Plan

- **Green Infrastructure (GI) Program:**
  - A certain amount of funds, including grant funding, per year of the LTCP (to be determined) will be allocated towards a green infrastructure program
  - Create an ordinance to require more GI for developers to install
  - The green infrastructure program will serve as a functional and educational program for the public:
    - Provides localized benefits of stormwater management and aids in flooding mitigation
    - Provides awareness of the impact of CSOs and impervious coverage on the environment
    - Potential GI sites and technologies will be evaluated, designed and installed during the LTCP

Permeable Pavement

Bioswale

Rain Garden

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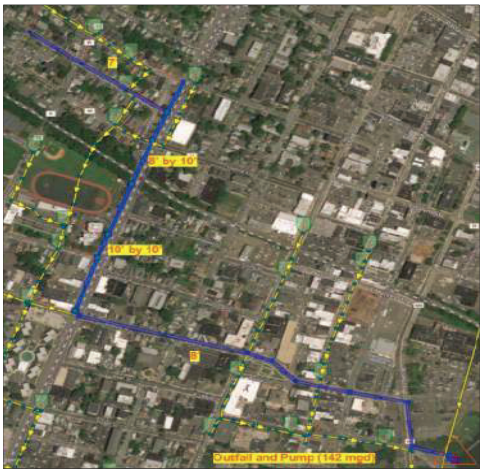
SIAR Selected CSO Control Plan

- **Court Street Subdrainage Area Stormwater Project:**
  - Stormwater mitigation project located in the Court Street Subdrainage Area
  - Project objectives based on Court Street Stormwater Study completed by Arcadis
  - Dual benefit project: flood mitigation and CSO reduction

Court Subdrainage Area (Outfall 002A)	
	% CSO Capture
Baseline (existing)	72.0%
Stormwater Project	88.3%



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SIAR Selected CSO Control Plan

- **Localized Sewer Separation Projects:**
  - The City currently has two sewer separation projects in construction on Main Street
  - These projects will contribute to localized sewer separation projects noted in the City's LTCP
  - Approximately 22 acres* of contributing runoff area reduced from the CSS, primarily in Court Street area
  - The City will undertake additional localized sewer separation projects and construct adequately sized stormwater outfalls during the LTCP
    - Additional sewer separation project locations to be developed after submission of SIAR Report

*Does not account for all roof runoff that may still connect to combined sewer system after construction

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Design and figures courtesy of Suburban Consulting Engineers, Inc.

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SIAR Selected CSO Control Plan

- **Localized Sewer Separation Projects:**

Design courtesy of Suburban Consulting Engineers, Inc.

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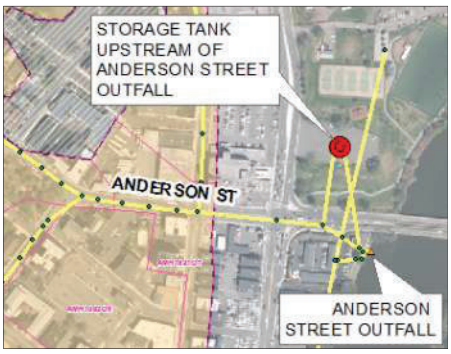
SIAR Selected CSO Control Plan

- **Anderson Street Storage Tank:**
  - Storage tank in the Anderson Street subdrainage area to reach the minimum 85% capture system-wide goal is still anticipated
  - Storage Tank size:
    - Approximately 2.5 MG
    - Approximately 100 feet deep by 65 feet in diameter
  - Storage Tank will be primarily underground and potentially underneath the parking lot near Johnson Park
  - Stored CSO will be pumped back to BCUA when the BCUA interceptor has adequate capacity to receive the flow



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SIAR Selected CSO Control Plan

- **Summary Model Results:**
  - Court Street Subdrainage Area Stormwater Project
  - Localized Sewer Separation Projects (x2 ongoing Main Street projects thus far)
  - Anderson Street Storage Tank

Area	Overflow Volume (MG)	Captured Volume (MG)	% Capture
Baseline Conditions Total CSS	256.6	558.1	68.5%
Anderson Street Area (Outfall 001A)	40.1	204.8	83.6%
Court Street Area (Outfall 002A)	37.5	353.6	90.4%
Total Hackensack CSS	77.7	558.4	87.8%

  - Conservatively above the 85% capture goal

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SIAR Selected CSO Control Plan

- **Implementation Schedule / Phased Approach**
  - 30-year implementation to reach system-wide 85% capture goal
  - Phased implementation approach DRAFT:

Year	0-5	6-10	11-15	16-20	21-25	26-30
Main Street Sewer Separation Projects (ongoing)	Ongoing					
Court Street Stormwater Project	Start			Completion		
Additional Localized Sewer Separation Projects	Start			Evaluate		
Anderson Street Storage Tank					Re-evaluate	
Green Infrastructure Program	Start					Completion

  - The size and necessity of a storage tank at Anderson Street will be re-evaluated after construction of additional localized sewer separation projects. A flow monitoring program and model recalibration process would be required to determine the system-wide percent capture prior to final design of a storage tank.

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SIAR Selected CSO Control Plan

- **Revised Opinion of Probable Cost**
  - Updated the capital costs based on 30-year schedule to reach 85% capture goal
  - Utilized PVSC cost reference guide from 2020 for consistency amongst CSO communities

Selected Plan	Capital Cost ($M)
Main Street Sewer Separation Projects (ongoing)	$5.8
Court Street Stormwater Project	$61
Additional Localized Sewer Separation Projects	TBD
Anderson Street Storage Tank	$42
Green Infrastructure Program ($100K/year - TBD)	$3
Total (without additional sewer separation projects)	$111.8

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Next Steps

- Refine cost estimates
- Finalize the Financial Capabilities Analysis (FCA)
- Finalize Implementation Schedule
- Host a public meeting for the residents of Hackensack
  - Date to be determined
  - Virtual or In-person meeting to be determined
- Finalize SIAR Report – submit to NJDEP by October 1, 2020

- Questions?
  - Website: www.Hackensack.org/cso
  - Email: csoteam@hackensackdpw.org

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Preliminary Selection and Implementation of Alternatives

BCUA CSO Group Supplemental CSO Team Meeting #12

Virtual Meeting

July 21, 2020

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BCUA CSO Group Supplemental CSO Group

Community Input

- Input on tentatively selected alternatives?
  - Are your interests being considered?
  - Comments on:
    - Locations of facilities?
    - Types of facilities?
    - Cost?
- Preferences for implementation?
  - Concerns about construction disturbance?
  - Implementation sequence and schedule

Supplemental CSO Team Meeting #12 70 July 21 2020

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Open Public Meeting

Tentatively Scheduled for Tuesday August 18th

Format / Venue

- Will likely be held remotely due to COVID-19
  - Microsoft Teams
  - Zoom
  - Youtube / Facebook Live

Advertising

- Newspaper
- Social Media
- Community Groups
- Community Text Message
- Other?

Content

- Background on CSO LTCP process
- Alternatives considered
- Tentatively selected CSO control program
  - Schedule
  - Cost
  - Location
- Opportunities to provide input

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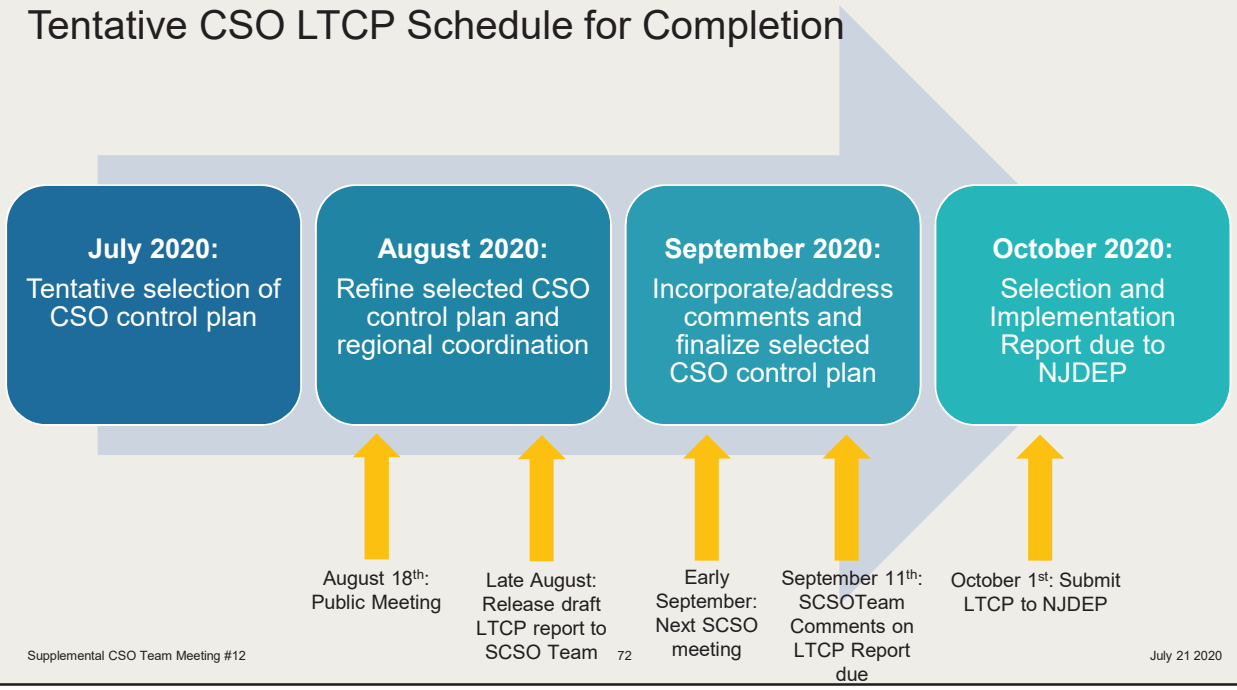
Tentative CSO LTCP Schedule for Completion



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Questions?

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Thank You!

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17. Appendix C – Fort Lee Public Participation Meeting Minutes and Presentation (Since Public Participation Process Report)

Public Meetings Since the Public Participation Report (January 18, 2019)

May 15, 2019	Local CSO Team Meeting
December 10, 2019	Local CSO Team Meeting
January 28, 2020	Supplemental CSO Team Meeting
August 13, 2020	Mayor and Council Meeting

Local CSO Team Meeting – May 15, 2019

Attending:

Ed Mignone – Borough Engineer Fort Lee

Bob Applebaum – Member Supplemental CSO Team

Jan Goldberg – Member Supplemental CSO Team

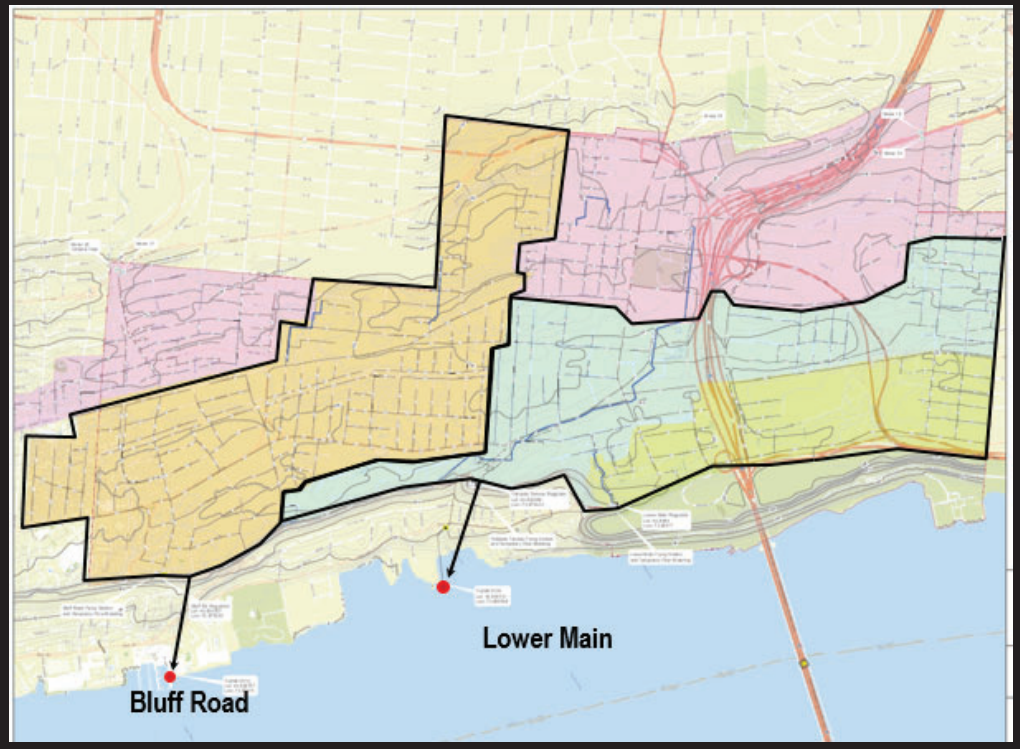
Sal Pagano – Member Supplemental CSO Team

Yingying Wu – HDR Engineering Inc.

Gary Grey – HDR Engineering Inc.

Purpose:

To speak to the Local Team about what constitutes a Long Term Control Plan, Fort Lee's CSOs, hydraulic modeling to estimate CSOs, gray and green controls a,d initial cost estimates for control.



Borough of Fort Lee CSO Team Meeting Long Term Control Plan

May 15, 2019

HDR

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AGENDA

- Introductions
- Long Term Control Plans
- Fort Lee's CSOs
- Modeling
- CSO Controls
- Preliminary Costs
- Remaining CSO Permit Requirements

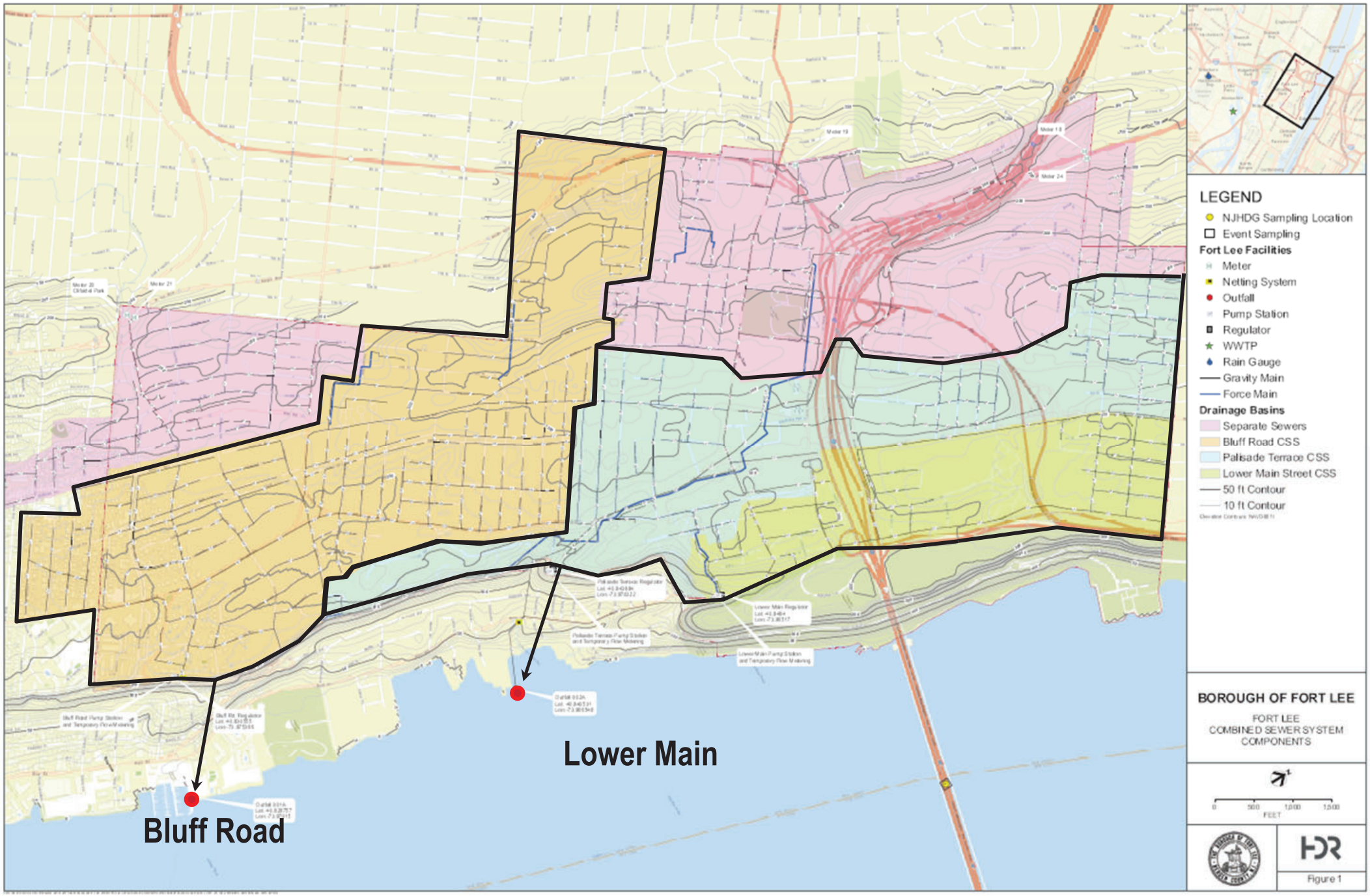
INTRODUCTIONS

- Ed Mignone – Borough Engineer Fort Lee
- Bob Applebaum – Member Supplemental CSO Team
- Jan Goldberg – Member Supplemental CSO Team
- Sal Pagano – Member Supplemental CSO Team
- Yingying Wu – HDR Engineering Inc.
- Gary Grey – HDR Engineering Inc.

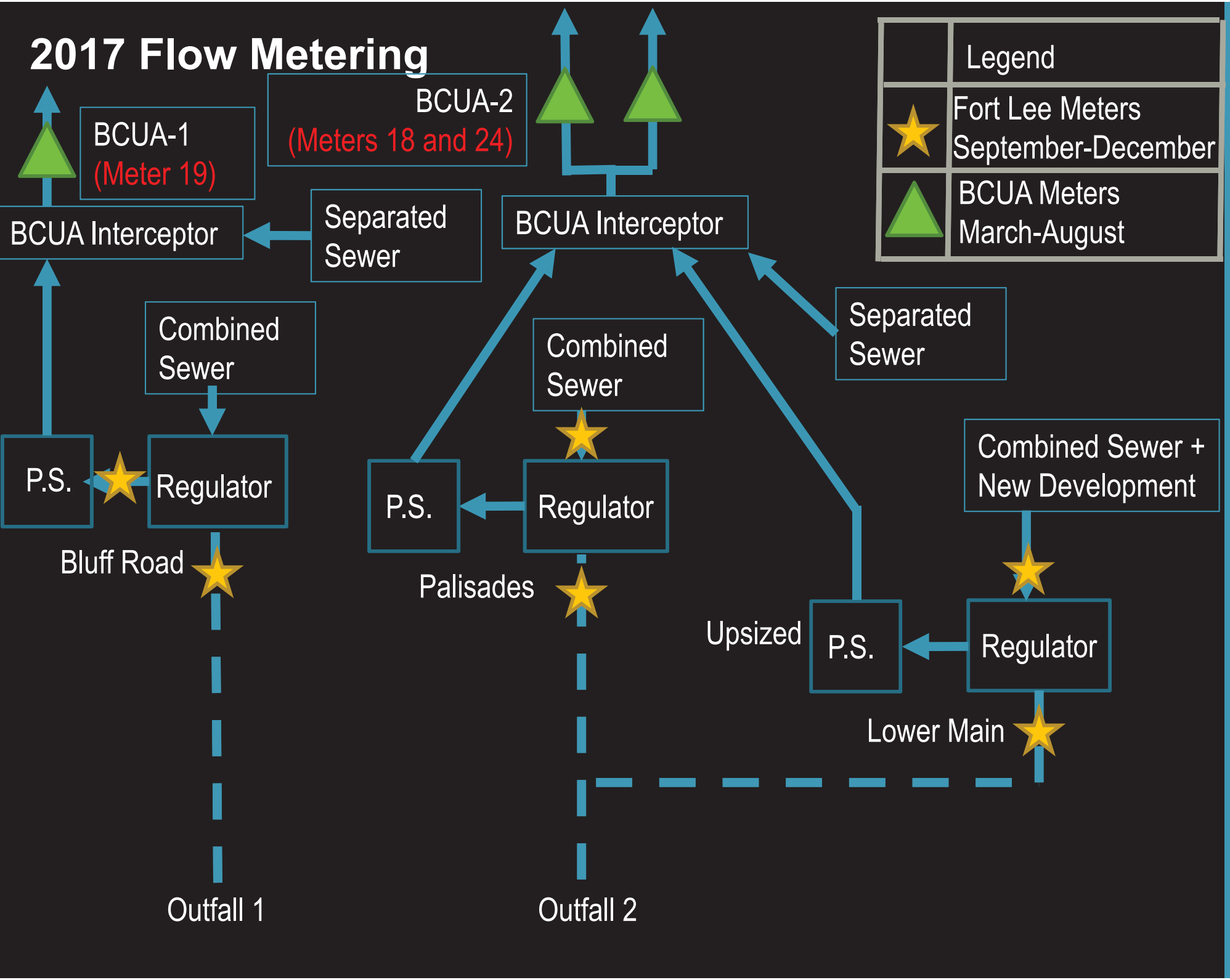
Long Term Control Plan

- Step 1 – System Characterization
  - CSOs
  - Existing controls and performance
  - Landside model
- Step 2 – Evaluation of Alternatives
  - Identify target parameters
  - Select alternatives and control level
  - Cost estimates
- Step 3 – Implementation Schedule
  - Consider median family income and costs of other water quality improvements

FORT LEE's CSOs



2017 Flow Metering



Outfall Summary – 2004 Rainfall

Before Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	1	0.01
Febuary	2	4.58	2	0.79
March	5	1.24	5	0.60
April	5	6.91	7	1.01
May	10	7.14	3	0.69
June	6	3.96	1	0.60
July	7	17.10	8	2.88
August	6	5.93	3	0.45
September	6	19.42	4	3.77
October	1	0.28	2	0.58
November	5	6.03	2	0.33
December	4	3.71	0	0.00
Total	60	77.20	38	11.73

After Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	0	0.00
Febuary	2	4.58	2	0.11
March	5	1.24	0	0.00
April	5	6.91	4	0.01
May	10	7.14	3	0.24
June	6	3.96	1	0.30
July	7	17.10	5	0.94
August	6	5.93	2	0.14
September	6	19.42	3	2.09
October	1	0.28	0	0.00
November	5	6.03	2	0.35
December	4	3.71	0	0.00
Total	60	77.20	22	4.19

CSO CONTROL OBJECTIVES

Presumptive Approach

- 85% Capture
- 4 Overflows per year
- 8 Overflows per year
- 12 Overflows per year
- 20 Overflows per year

Demonstration Approach

- Demonstrate that the selected control program, though not meeting Presumptive Approach criteria, will meet water quality based requirements

CSO CONTROLS

CONTROLS

Source Controls:

Green infrastructure, ***I&I Reduction***, Sewer separation, BMPs, ***Nine Minimum Controls***

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, regulator modification

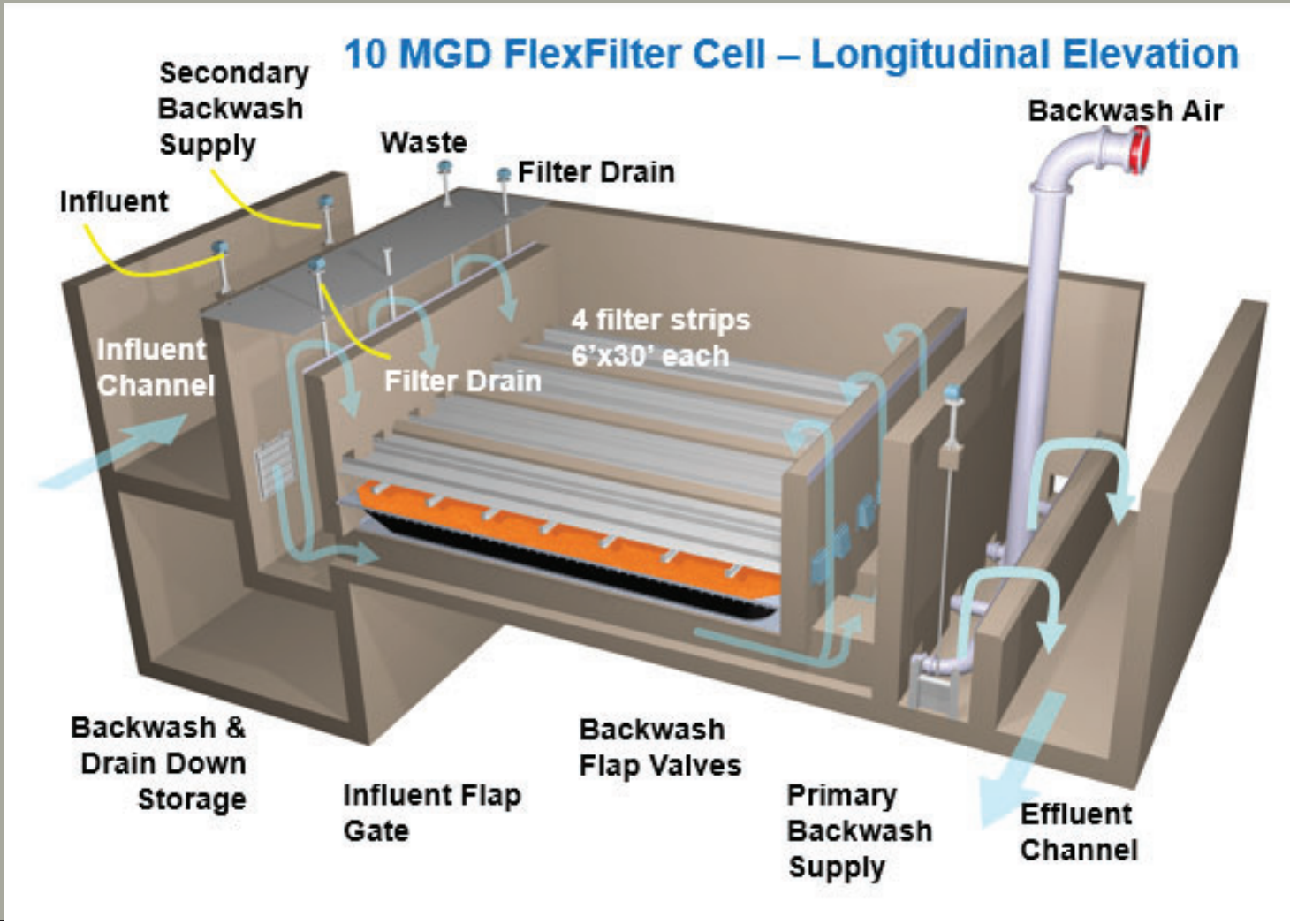
Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, ***high rate filtration/clarification***, chlor/dechlor disinfection, ***PAA disinfection***, UV disinfection, WWTP plant expansion

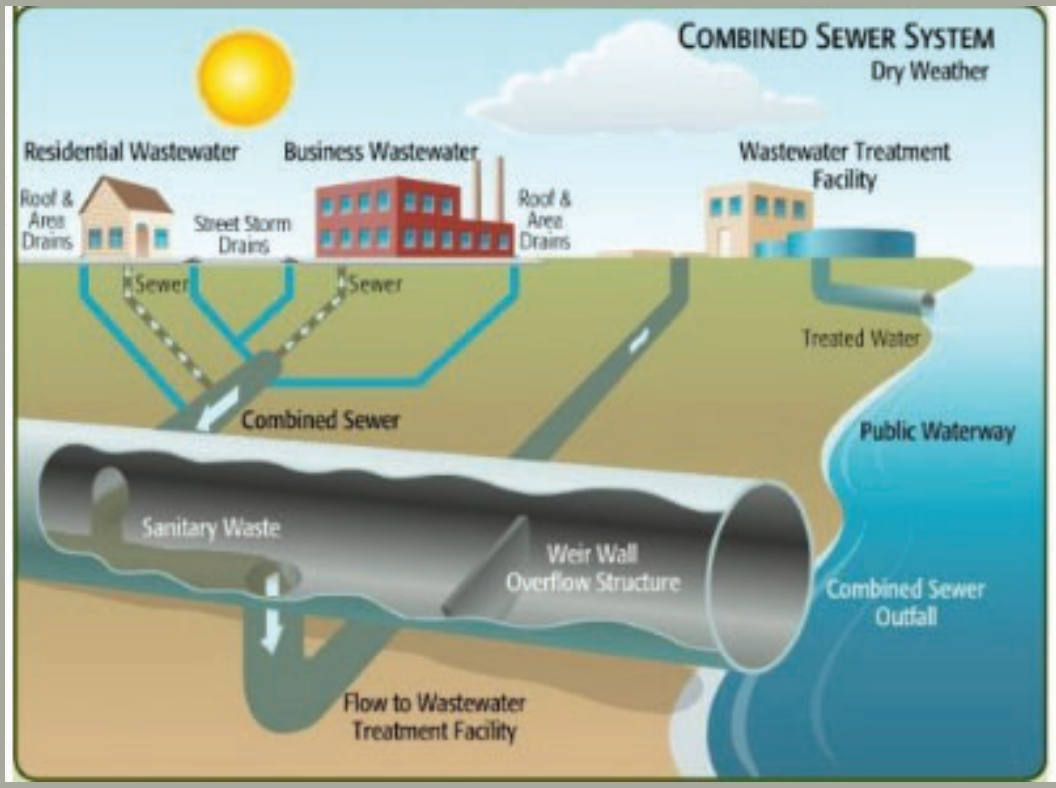
Flex Filter

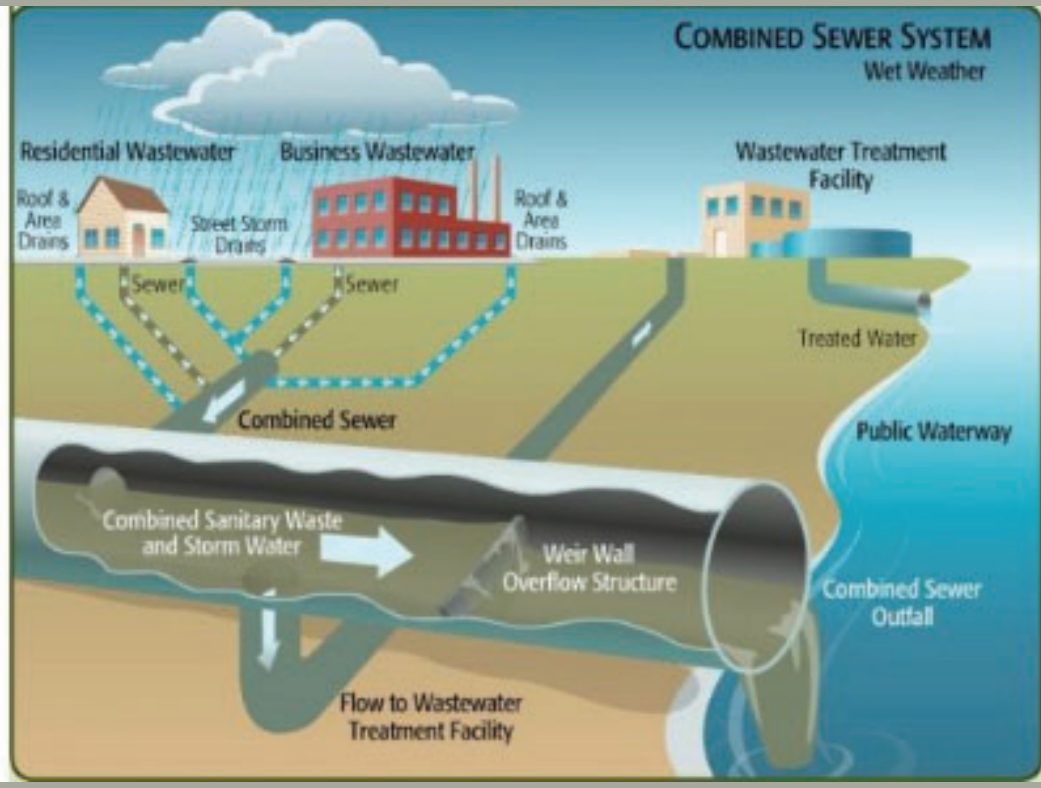

10 MGD FlexFilter Cell – Longitudinal Elevation
Secondary Backwash Supply
Waste
Filter Drain
Backwash Air
Influent
Influent Channel
Filter Drain
4 filter strips 6'x30' each
Backwash & Drain Down Storage
Influent Flap Gate
Backwash Flap Valves
Primary Backwash Supply
Effluent Channel

PAA Disinfection

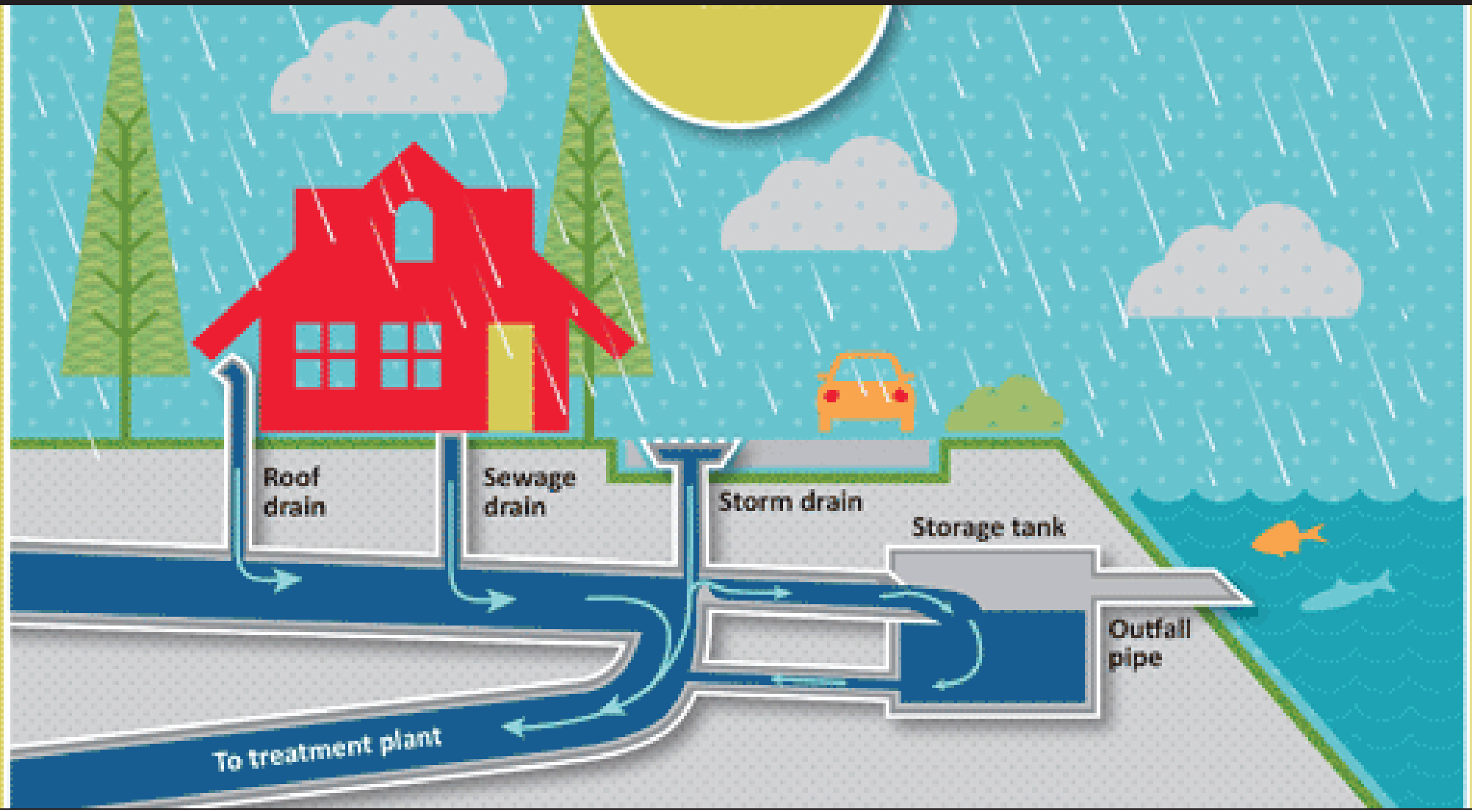
- Peracetic Acid (PAA)
  - Acetic Acid and Hydrogen Peroxide solution
- Common Elements
  - 275 gallon totes or 55 gallon drums
  - Feed pumps
  - Mixers / diffusers
  - Instrumentation (flow, TSS)
  - Sampling equipment
  - Pressure relief
  - Temperature monitoring

In-Line Storage



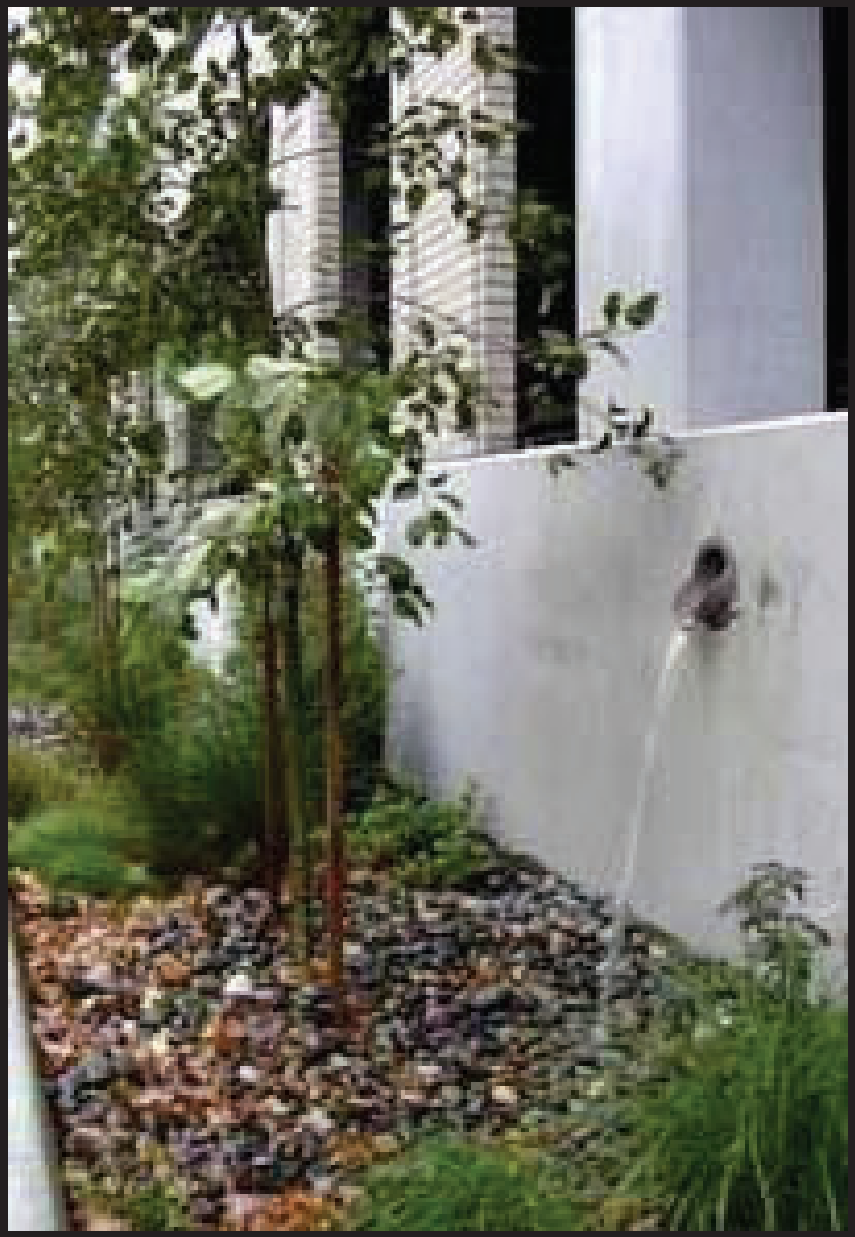


Off-Line Storage



Green Infrastructure Options

Downspout Disconnection



Rain Gardens

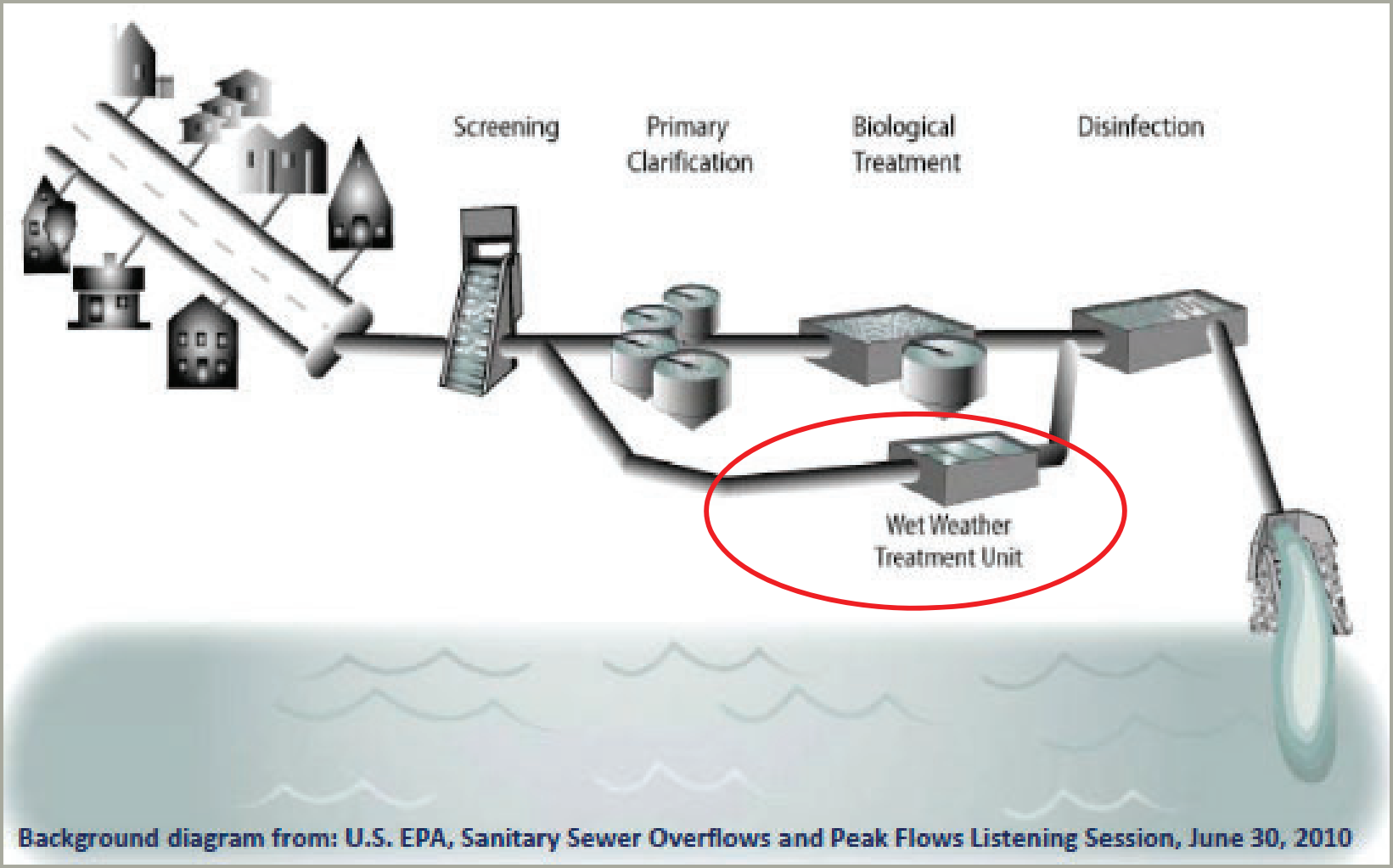
Planter Boxes

Bioswales

Permeable Pavements

Green Streets and Alleys

Auxiliary Treatment at a WWTP (Blending)



Background diagram from: U.S. EPA, Sanitary Sewer Overflows and Peak Flows Listening Session, June 30, 2010

Preliminary Results

CSO Volumes and Frequencies at Each CSO Control Level

	Baseline			0 CSO			4 CSOs			8 CSOs			12 CSOs			20 CSOs		
Outfall	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	90.8%	0	0	100.0%	8.6	4	99.0%	11.1	8	98.8%	20.0	12	97.8%	34.0	20	96.2%
FL-002	4.7	20		0	0	100.0%	1.0	3	98.0%	1.8	6	96.4%	2.9	11	94.3%	4.7	20	90.8%

Storage Tank Size (MG)					
Outfall	0 CSO events	4 CSO events	8 CSO events	12 CSO events	20 CSO events
FL-001	12.5 (1)	4.6	4.1	3.1	2.0
FL-002	1.2	0.4	0.3	0.1	0.0
Total	13.7 (1)	5.0	4.3	3.2	2.0

(2 MG = 150' x 150' x 12')

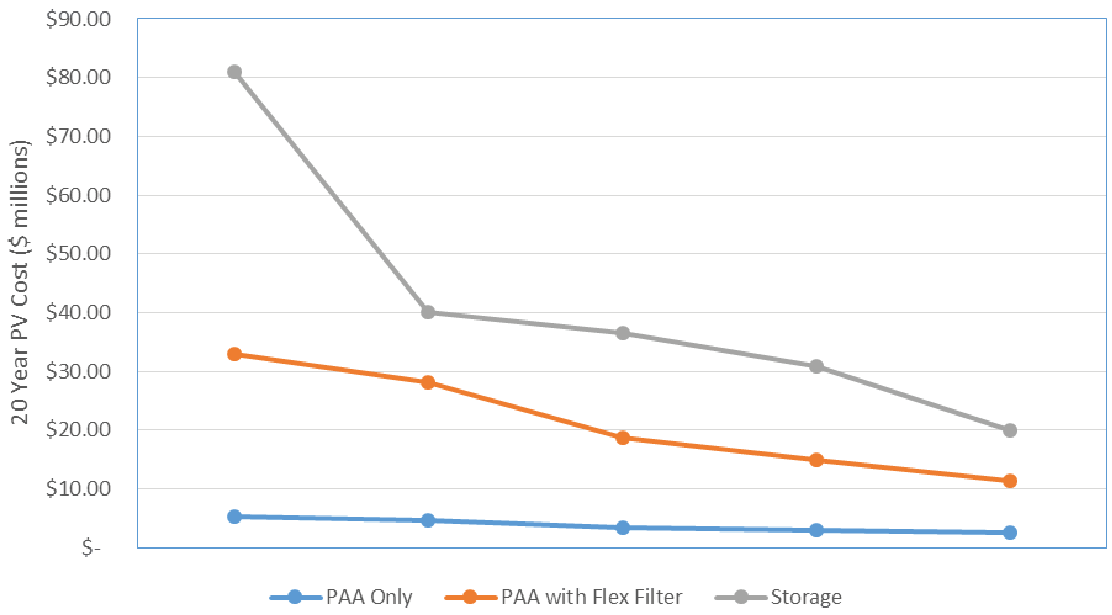
(1) Cannot dewater within 3 days for zero CSO events at FL-001

GI Alternatives									
Outfall	Baseline			5% GI-Bluff Road			10% GI-Bluff Road		
	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	90.8%	79.8	57	91.1%	77.0	58	91.4%
					Additional Percent Capture	0.3%		Additional Percent Capture	0.6%

Preliminary Costs – Gray Infrastructure

Sewer Separation Costs - $400 to $450 million ($478,650/acre)

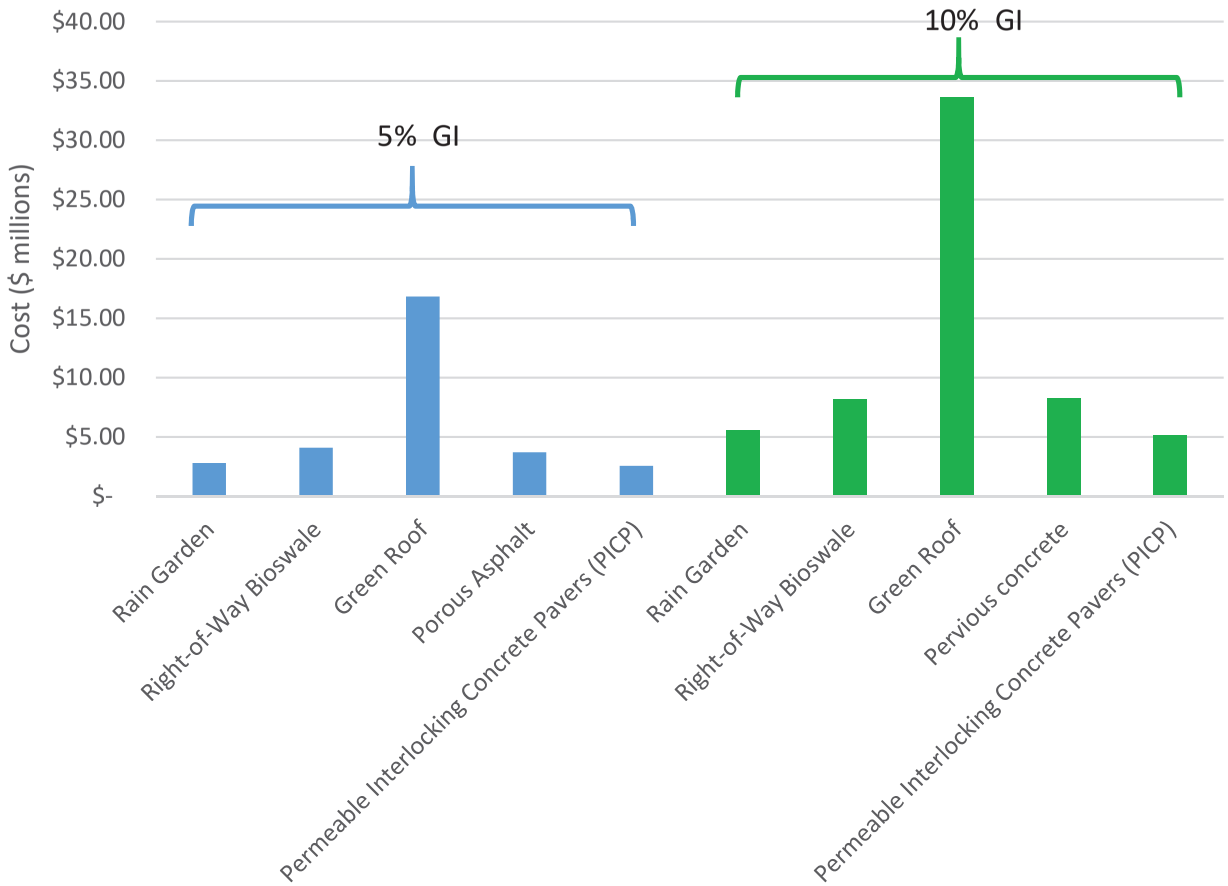
	PAA Only	PAA w/ FlexFilter	Tanks
0 CSOs per year			
Capital Cost ($M)	$ 1.35	$ 28.95	$ 50.64
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80	$ 30.29
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97	$ 80.94
4 CSOs per year			
Capital Cost ($M)	$ 1.27	$ 24.67	$ 22.60
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51	$ 17.48
Total 20 yr PV Cost ($M)	$ 4.67	$ 28.18	$ 40.07
8 CSOs per year			
Capital Cost ($M)	$ 1.07	$ 16.16	$ 20.11
20 yr PV O&M Cost ($M)	$ 2.38	$ 2.45	$ 16.34
Total 20 yr PV Cost ($M)	$ 3.45	$ 18.61	$ 36.45
12 CSOs per year			
Capital Cost ($M)	$ 1.00	$ 12.97	$ 16.31
20 yr PV O&M Cost ($M)	$ 1.99	$ 2.05	$ 14.61
Total 20 yr PV Cost ($M)	$ 2.99	$ 15.01	$ 30.91
20 CSOs per year			
Capital Cost ($M)	$ 0.85	$ 9.75	$ 11.25
20 yr PV O&M Cost ($M)	$ 1.60	$ 1.64	$ 8.72
Total 20 yr PV Cost ($M)	$ 2.44	$ 11.39	$ 19.97



Preliminary Costs – Green Infrastructure

	Green Infrastructure Type	Min Capital Cost ($M)	Max Capital Cost ($M)	20 Year PV O&M Cost ($M)	Min Total 20 year PV Cost ($M)	Max Total 20 year PV Cost ($M)
5% GI (~6.5 Acres)	Rain Garden	$ 0.63	$ 2.00	$ 0.80	$ 1.43	**$ 2.80**
	Right-of-Way Bioswale	$ 0.99	$ 3.29	$ 0.80	$ 1.79	$ 4.09
	Green Roof	$ 3.15	$ 16.03	$ 0.80	$ 3.95	$ 16.83
	Porous Asphalt	$ 1.71	$ 3.58	$ 0.13	$ 1.83	$ 3.71
	Permeable Interlocking Concrete Pavers (PICP)	$ 0.85	$ 2.43	$ 0.13	$ 0.98	**$ 2.56**
10% GI (~13 Acres)	Rain Garden	$ 1.26	$ 4.01	$ 1.60	$ 2.86	**$ 5.61**
	Right-of-Way Bioswale	$ 1.97	$ 6.57	$ 1.60	$ 3.57	$ 8.17
	Green Roof	$ 6.31	$ 32.06	$ 1.60	$ 7.91	$ 33.66
	Pervious concrete	$ 4.01	$ 8.02	$ 0.25	$ 4.26	$ 8.27
	Permeable Interlocking Concrete Pavers (PICP)	$ 1.71	$ 4.86	$ 0.25	$ 1.96	**$ 5.11**

Preliminary Costs – Green Infrastructure



Temaining 2015 CSO Permit Requirements

- ✓CSO signs have been posted near outfalls
- ✓CSO notification system is online (http://NJCSO.hdrgateway.com)
- ✓CSO monthly Discharge Monitoring Reports (DMRs)
- ✓Work plans/QAPPs submitted to NJDEP
  - Baseline Compliance Monitoring Plan
  - System Characterization and Landside Monitoring QAPP
- ✓Monthly CSO Permittee meetings at BCUA
- ✓Evaluation of previous landside model
- ✓Water Quality monitoring
- ✓Complete flow monitoring
- ✓Update landside model
- Conduct alternatives analysis July 1, 2019
- Submit the LTCP June 1, 2020

Questions
Comments
Discussion

Gary Grey
HDR Inc.

Yingying Wu
HDR Inc.

Local CSO Team Meeting – December 10, 2019

Attending:

Ed Mignone – Borough Engineer Fort Lee

Bob Applebaum – Member Supplemental CSO Team

Jan Goldberg – Member Supplemental CSO Team

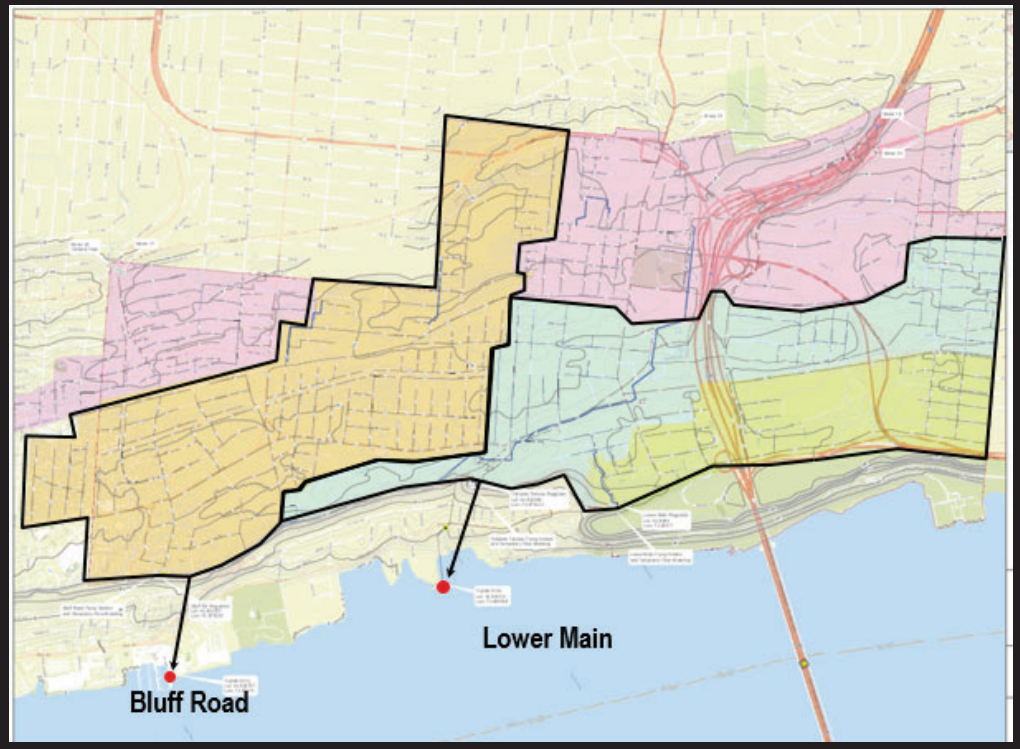
Sal Pagano – Member Supplemental CSO Team

Yingying Wu – HDR Engineering Inc.

Gary Grey – HDR Engineering Inc.

Purpose:

To speak to the Local Team about changes made to the model, CSO estimates, Hudson River Water Quality, overflow frequencies for the LTCP, preliminary selection of CSO Controls, bedrock complication for widespread use of green infrastructure, preliminary cost range of CSO Controls and the concern of Bluff Road netting chamber overflows.



Borough of Fort Lee CSO Team Meeting Long Term Control Plan

December 10, 2019

HDR

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The Remaining 2015 CSO Permit Requirements

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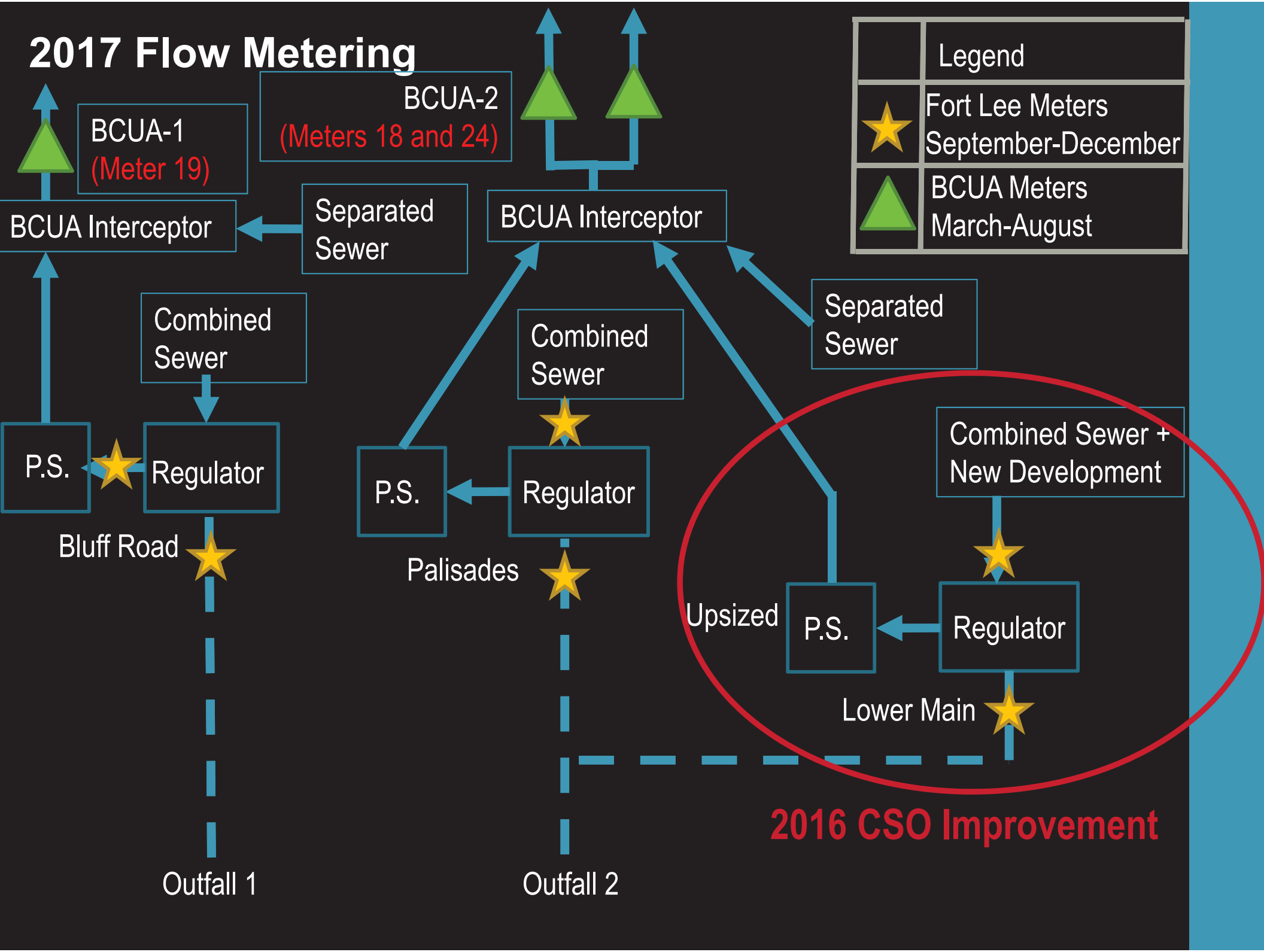
GOAL – 85% Capture with water quality improvement but NJDEP and USEPA can require more.

2017 Flow Metering



Outfall Summary – 2004 Rainfall

Before Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	1	0.01
Febuary	2	4.58	2	0.79
March	5	1.24	5	0.60
April	5	6.91	7	1.01
May	10	7.14	3	0.69
June	6	3.96	1	0.60
July	7	17.10	8	2.88
August	6	5.93	3	0.45
September	6	19.42	4	3.77
October	1	0.28	2	0.58
November	5	6.03	2	0.33
December	4	3.71	0	0.00
Total	60	77.20	38	11.73

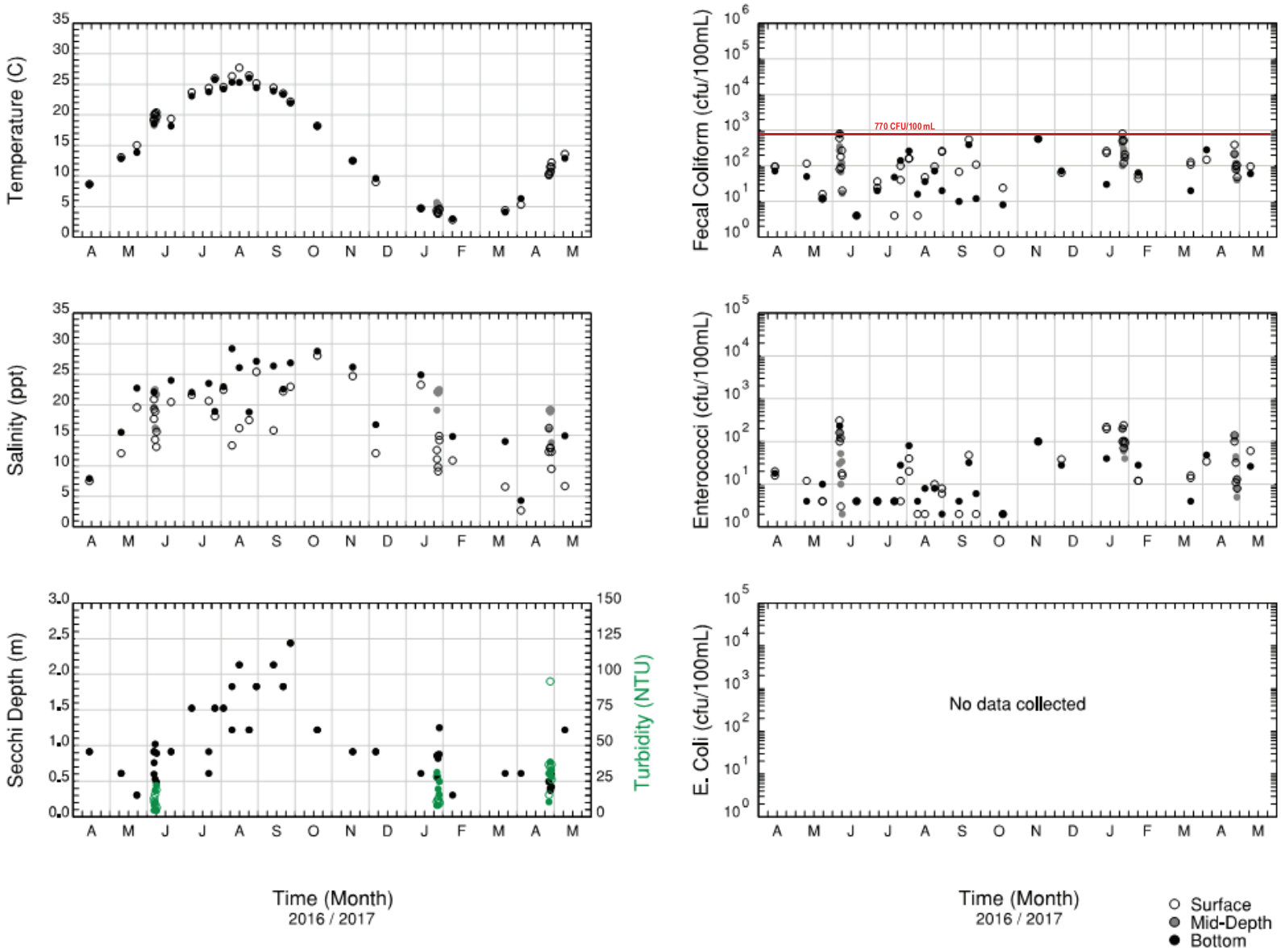
After Model Update

Outfall	001		002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	0.91	0	0.00
Febuary	2	4.58	2	0.11
March	5	1.24	0	0.00
April	5	6.91	4	0.01
May	10	7.14	3	0.24
June	6	3.96	1	0.30
July	7	17.10	5	0.94
August	6	5.93	2	0.14
September	6	19.42	3	2.09
October	1	0.28	0	0.00
November	5	6.03	2	0.35
December	4	3.71	0	0.00
Total	60	77.20	22	4.19

84.7% Capture

Hudson River Water Quality at GW Bridge

Hudson River, Upper Bay, Hudson River, 32, (SE2)



CSO CONTROL OBJECTIVES

Presumptive Approach

- 4 Overflows per year
- 8 Overflows per year
- 12 Overflows per year
- 20 Overflows per year
- 85% Capture

Demonstration Approach

- Demonstrate that the selected control program, though not meeting Presumptive Approach criteria, will meet water quality based requirements

CSO CONTROLS

Bluff Road will require improvements to control flooding

CONTROLS

Source Controls:

Green infrastructure, *I&I Reduction*, Sewer separation, BMPs, **Nine Minimum Controls**

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, **regulator modification**

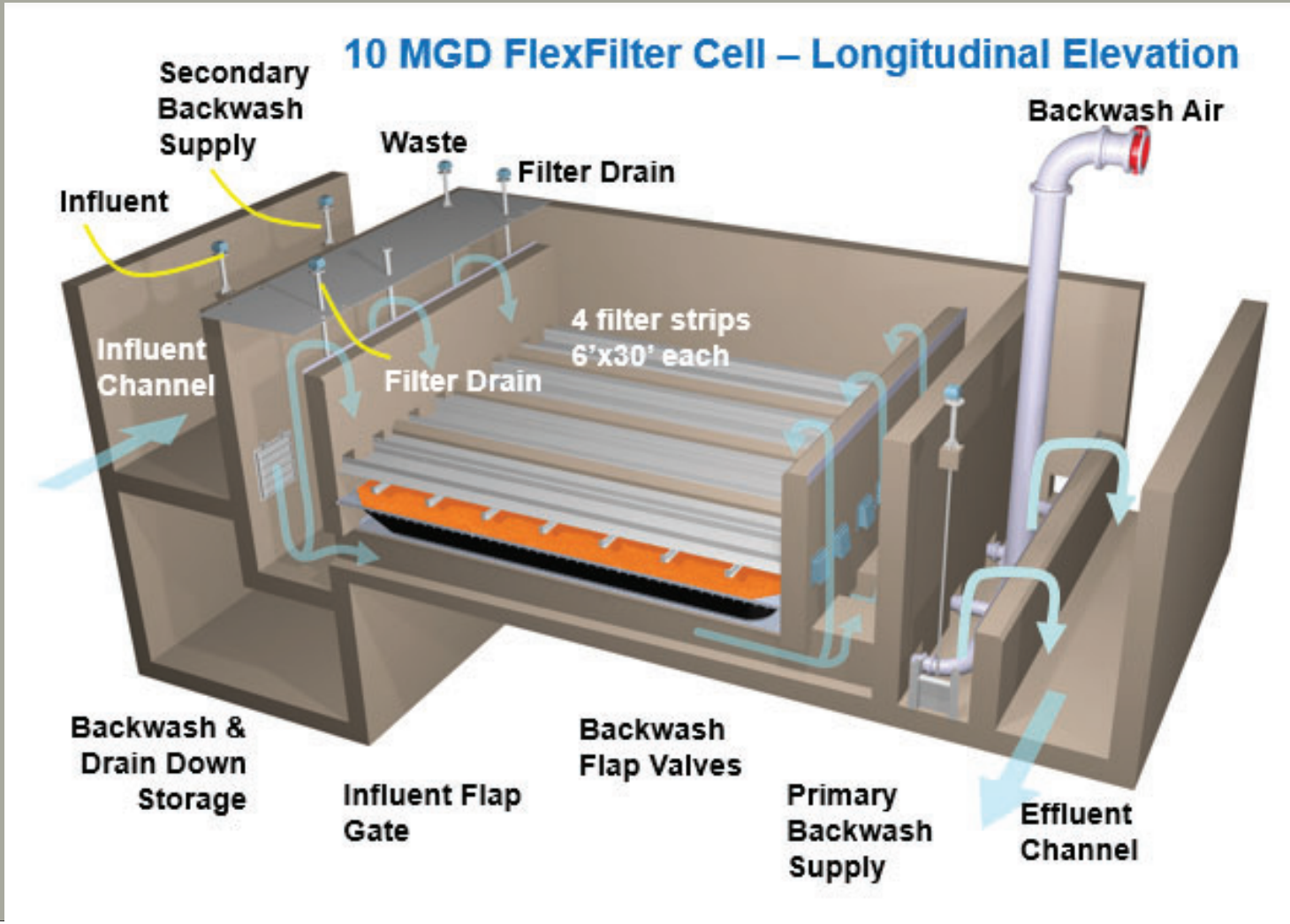
Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, **high rate filtration/clarification**, chlor/dechlor disinfection, **PAA disinfection (with or without filtration)**, UV disinfection, WWTP plant expansion

Flex Filter


10 MGD FlexFilter Cell – Longitudinal Elevation
Secondary Backwash Supply
Waste
Filter Drain
Backwash Air
Influent
Influent Channel
Filter Drain
4 filter strips 6'x30' each
Backwash & Drain Down Storage
Influent Flap Gate
Backwash Flap Valves
Primary Backwash Supply
Effluent Channel

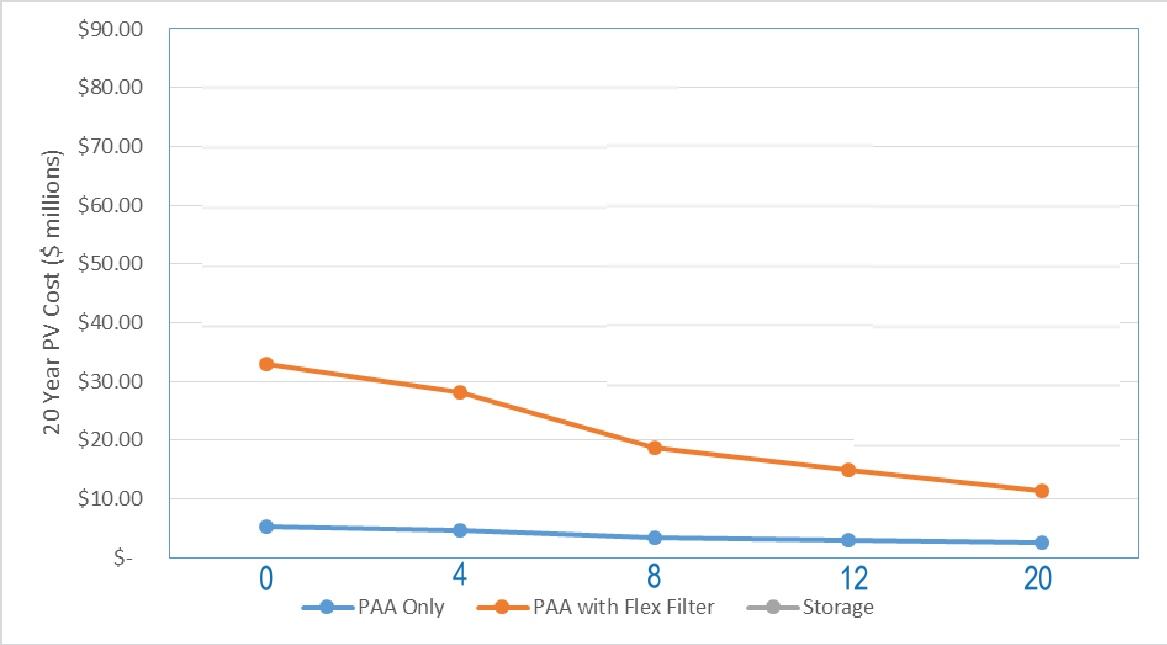
PAA Disinfection

- Peracetic Acid (PAA)
  - Acetic Acid and Hydrogen Peroxide solution
- Common Elements
  - 275 gallon totes or 55 gallon drums
  - Feed pumps
  - Mixers / diffusers
  - Instrumentation (flow, TSS)
  - Sampling equipment
  - Pressure relief
  - Temperature monitoring

Preliminary Costs – Gray Infrastructure

Sewer Separation Costs - $400 to $450 million ($478,650/acre)

	PAA Only	PAA w/ FlexFilter
0 CSOs per year		
Capital Cost ($M)	$ 1.35	$ 28.95
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97
4 CSOs per year		
Capital Cost ($M)	$ 1.27	$ 24.67
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51
Total 20 yr PV Cost ($M)	$ 4.67	$ 28.18
8 CSOs per year		
Capital Cost ($M)	$ 1.07	$ 16.16
20 yr PV O&M Cost ($M)	$ 2.38	$ 2.45
Total 20 yr PV Cost ($M)	$ 3.45	$ 18.61
12 CSOs per year		
Capital Cost ($M)	$ 1.00	$ 12.97
20 yr PV O&M Cost ($M)	$ 1.99	$ 2.05
Total 20 yr PV Cost ($M)	$ 2.99	$ 15.01
20 CSOs per year		
Capital Cost ($M)	$ 0.85	$ 9.75
20 yr PV O&M Cost ($M)	$ 1.60	$ 1.64
Total 20 yr PV Cost ($M)	$ 2.44	$ 11.39



O&M costs are being upgraded to include sampling of the discharge. One sample for fecal coliform will be collected for each event at each outfall.

Green Infrastructure

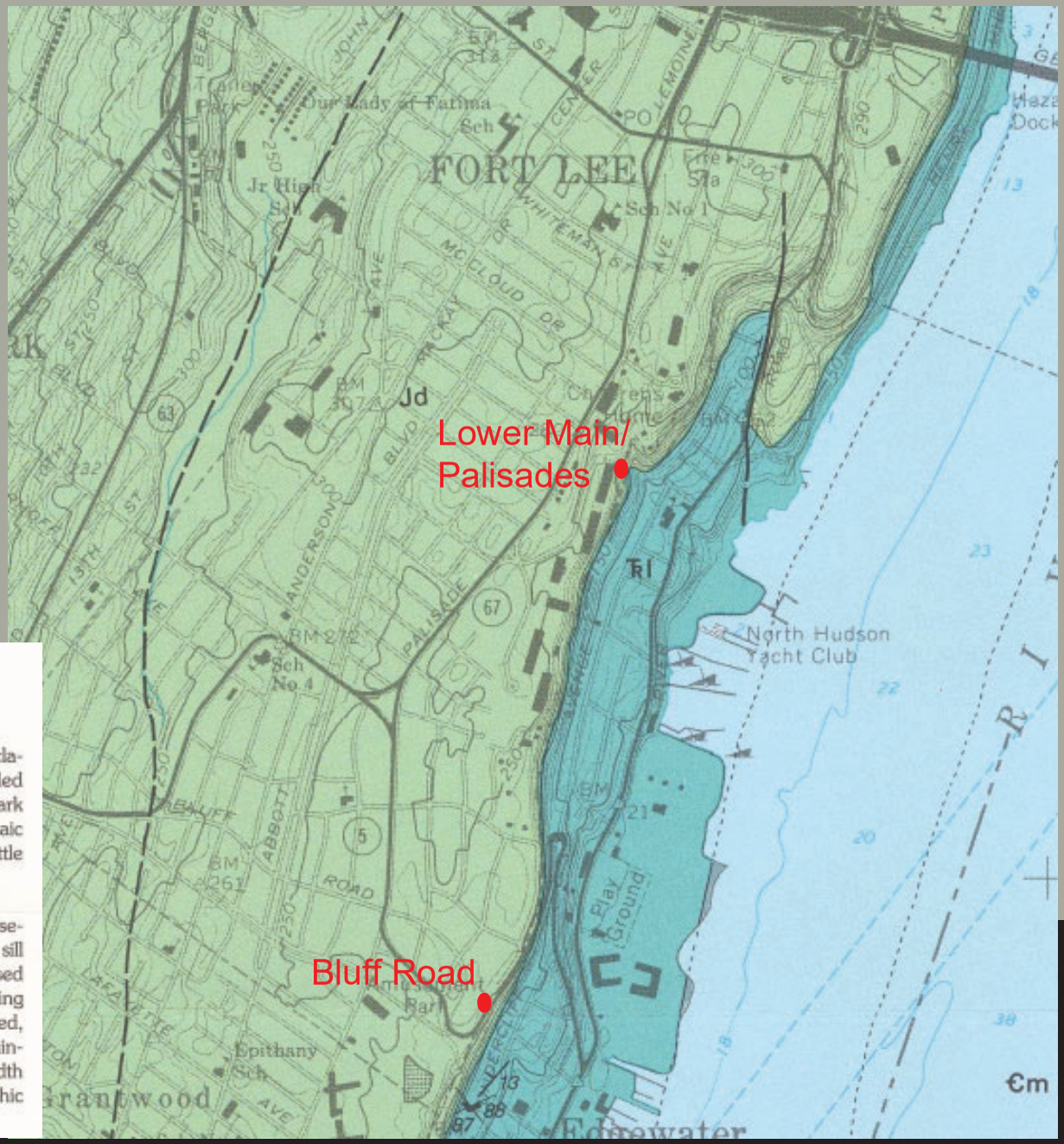
Rain Gardens

Bioswales

Green Infrastructure

Permeable Pavements

Bedrock constrains green infrastructure in Fort Lee



DESCRIPTION OF MAP UNITS

NEWARK BASIN ROCKS

The lithologic descriptions of the Newark basin rocks follow the usage and nomenclature of Lyttle and Epstein (1987) and Puffer (1989). The Newark basin rocks are included in what is known as the Newark Supergroup. The Newark Supergroup of the Newark basin in the map area, from top to bottom, includes the Palisade Diabase, the Passaic Formation, the Lockatong Formation, and the Stockton Formation (Olsen, 1980; Lyttle and Epstein, 1987).

Jd — **Palisade Diabase (Lower Jurassic)**—Dark-gray to black, fine- to coarse-grained (except very fine to fine-grained near chilled borders) diabase sill concordant with the Lockatong Formation. The diabase is composed largely of calcic plagioclase and augite. Shales and siltstones surrounding this intrusive have been thermally metamorphosed to a purplish-red, light-gray and dark-gray, indurated, brittle, fine-grained hornfels containing quartz, plagioclase, sericite, biotite, epidote, and magnetite. The width of this zone depends on the thickness of the intrusive, its topographic expression, and its inclination. The sill is as thick as 1,700 ft

Preliminary Costs – Green Infrastructure

We are currently identifying specific candidate sites for Green Infrastructure

	Green Infrastructure Type	Min Capital Cost ($M)	Max Capital Cost ($M)	20 Year PV O&M Cost ($M)	Min Total 20 year PV Cost ($M)	Max Total 20 year PV Cost ($M)
5% GI (~6.5 Acres)	Rain Garden	$ 0.63	$ 2.00	$ 0.80	$ 1.43	**$ 2.80**
	Right-of-Way Bioswale	$ 0.99	$ 3.29	$ 0.80	$ 1.79	$ 4.09
	Green Roof	$ 3.15	$ 16.03	$ 0.80	$ 3.95	$ 16.83
	Porous Asphalt	$ 1.71	$ 3.58	$ 0.13	$ 1.83	$ 3.71
	Permeable Interlocking Concrete Pavers (PICP)	$ 0.85	$ 2.43	$ 0.13	$ 0.98	**$ 2.56**
10% GI (~13 Acres)	Rain Garden	$ 1.26	$ 4.01	$ 1.60	$ 2.86	**$ 5.61**
	Right-of-Way Bioswale	$ 1.97	$ 6.57	$ 1.60	$ 3.57	$ 8.17
	Green Roof	$ 6.31	$ 32.06	$ 1.60	$ 7.91	$ 33.66
	Pervious concrete	$ 4.01	$ 8.02	$ 0.25	$ 4.26	$ 8.27
	Permeable Interlocking Concrete Pavers (PICP)	$ 1.71	$ 4.86	$ 0.25	$ 1.96	**$ 5.11**

+0.3% Capture

+0.6% Capture

O&M costs are being upgraded to include sampling of the discharge. One sample for fecal coliform will be collected for each event at each outfall.

Preliminary Results

CSO Volumes and Frequencies at Each CSO Control Level

	Baseline			0 CSO			4 CSOs			8 CSOs			12 CSOs			20 CSOs		
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FL-001	82.5	58	84.7%	0	0	100.0%	8.6	4	92.9%	11.1	8	92.7%	20.0	12	91.7%	34.0	20	90.1%
FL-002	4.7	20		0	0	100.0%	1.0	3	91.9%	1.8	6	90.3%	2.9	11	88.2%	4.7	20	84.7%

GI Alternatives									
Outfall	Baseline			5% GI-Bluff Road			10% GI-Bluff Road		
	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	84.7	79.8	57	85%	77.0	58	85.3%
					Additional Percent Capture	0.3%		Additional Percent Capture	0.6%

Preliminary Costs –

Alternative	Capture	Present Worth Cost
Baseline	84.7%	$0
Gray – 20 OF per Year	90.1%	$2.44 to 11.4 M
Green – Rain Garden, Bioswale or Porous Pavement	85%	$2.6 to 4.1 M

Repair of the Netting Facility

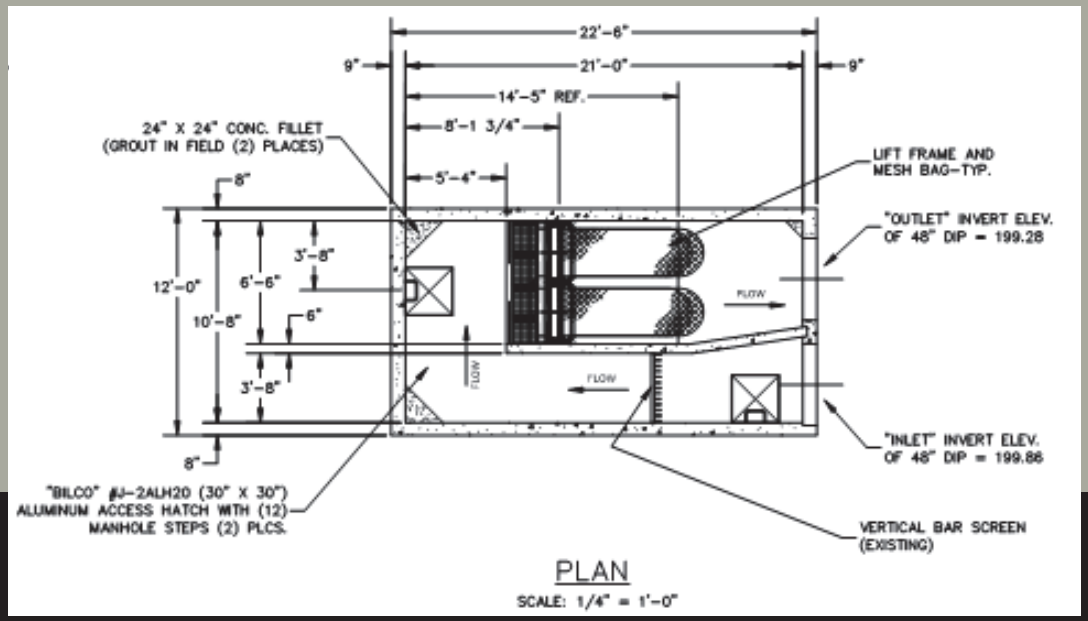
Good Day

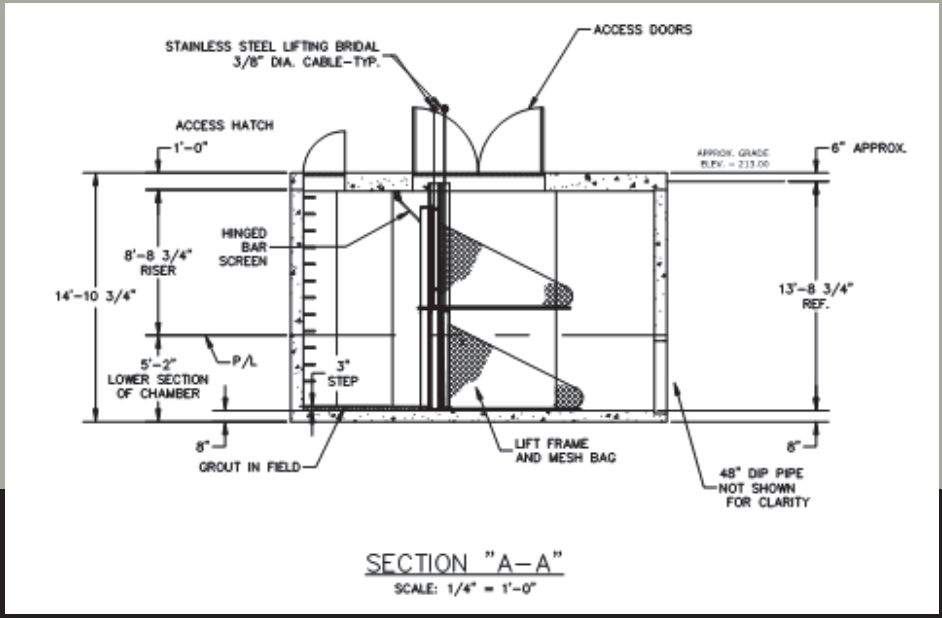
Bad Day
(twice in 2019)

Traffic Hazard on Route 5

Planned Improvements for Bluff Road Netting Facility

- Replace 2 net system with 4 net system
- Add a knee wall to the netting chamber
- Repair erosion damage
- Cost ~$300,000 to $500,000





Questions

Comments

Discussion

Supplemental CSO Team Meeting – January 28, 2020

Attending:

Ed Mignone – Borough Engineer Fort Lee

Bob Applebaum – Member Supplemental CSO Team

Jan Goldberg – Member Supplemental CSO Team

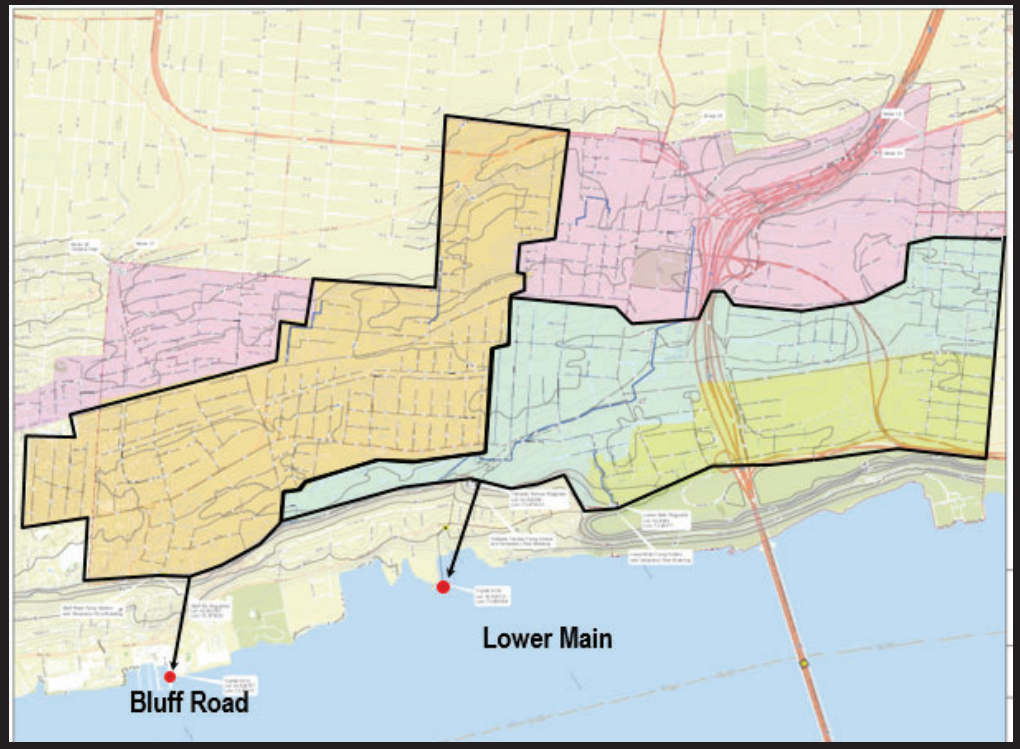
Sal Pagano – Member Supplemental CSO Team

Yingying Wu – HDR Engineering Inc.

Gary Grey – HDR Engineering Inc.

Purpose:

A Supplemental CSO Team meeting was held in Fort Lee to review the status of the BCUA, Ridgefield Park, Hackensack and Fort Lee LTCP development. This report presents the Fort Lee segment of the regional report.



Borough of Fort Lee CSO Team Meeting Long Term Control Plan

January 28, 2020

HDR

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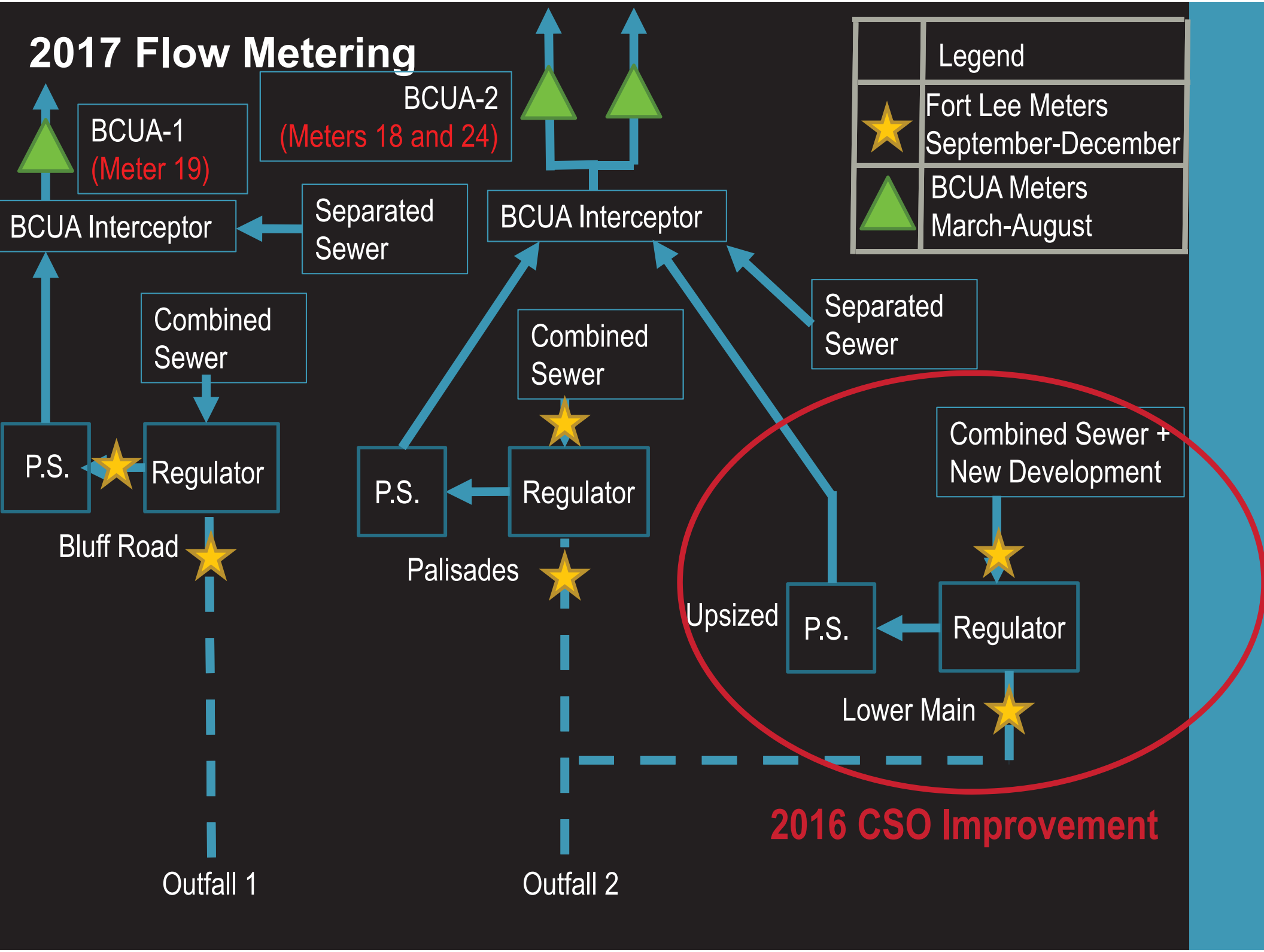

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July	7	17.10	5	0.94
August	6	5.93	2	0.14
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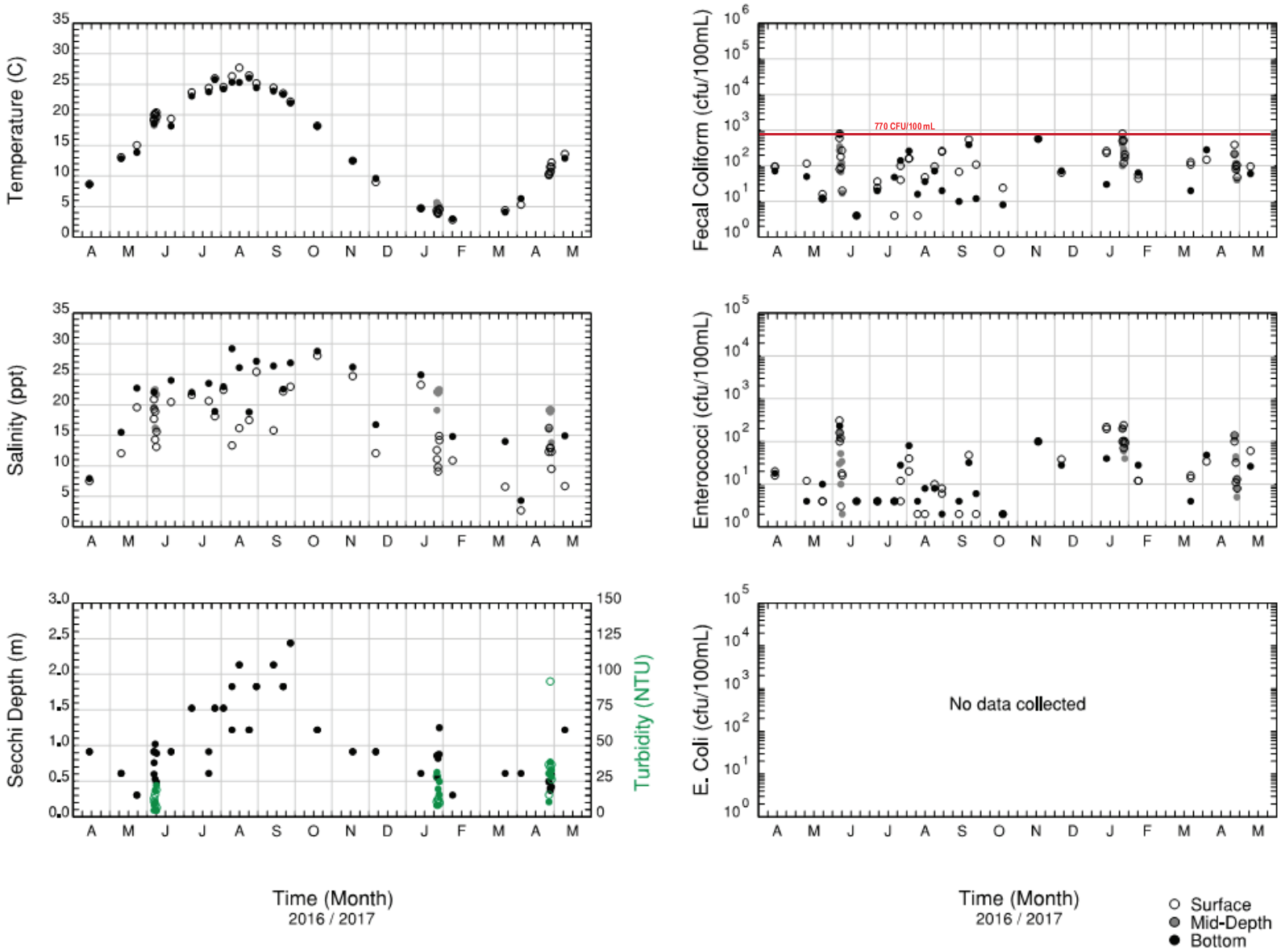
84.7% Capture

Hudson River Water Quality at GW Bridge

Hudson River, Upper Bay, Hudson River, 32, (SE2)



CSO CONTROL OBJECTIVES

Presumptive Approach

- 4 Overflows per year
- 8 Overflows per year
- 12 Overflows per year
- 20 Overflows per year
- 85% Capture

Demonstration Approach

- Demonstrate that the selected control program, though not meeting Presumptive Approach criteria, will meet water quality based requirements

CSO CONTROLS

Bluff Road will require improvements to control flooding

CONTROLS

Source Controls:

Green infrastructure, *I&I Reduction*, Sewer separation, BMPs, **Nine Minimum Controls**

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, **regulator modification**

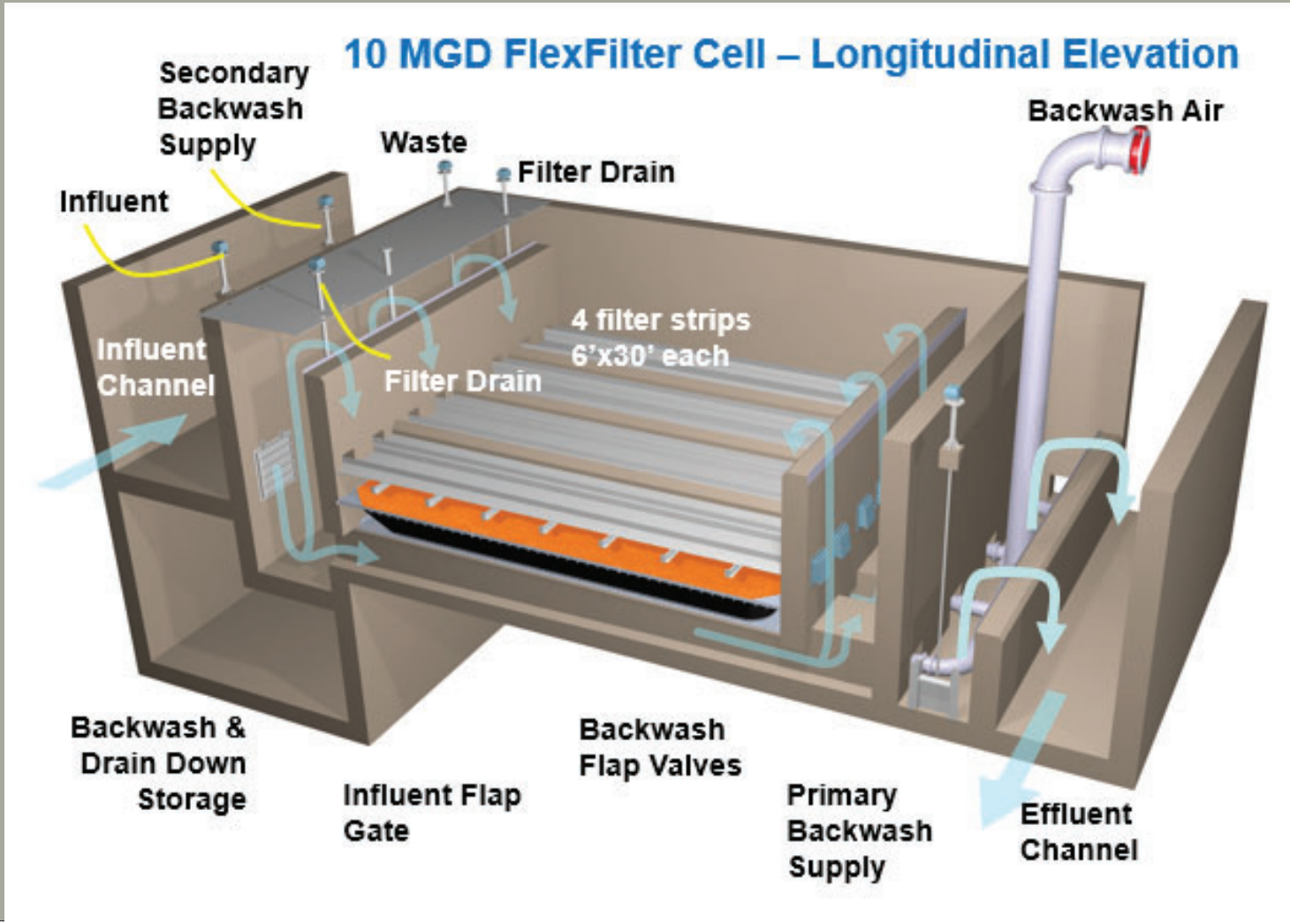
Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, **high rate filtration/clarification**, chlor/dechlor disinfection, **PAA disinfection (with or without filtration)**, UV disinfection, WWTP plant expansion

Flex Filter


10 MGD FlexFilter Cell – Longitudinal Elevation
Secondary Backwash Supply
Waste
Filter Drain
Backwash Air
Influent
Influent Channel
Filter Drain
4 filter strips 6'x30' each
Backwash & Drain Down Storage
Influent Flap Gate
Backwash Flap Valves
Primary Backwash Supply
Effluent Channel

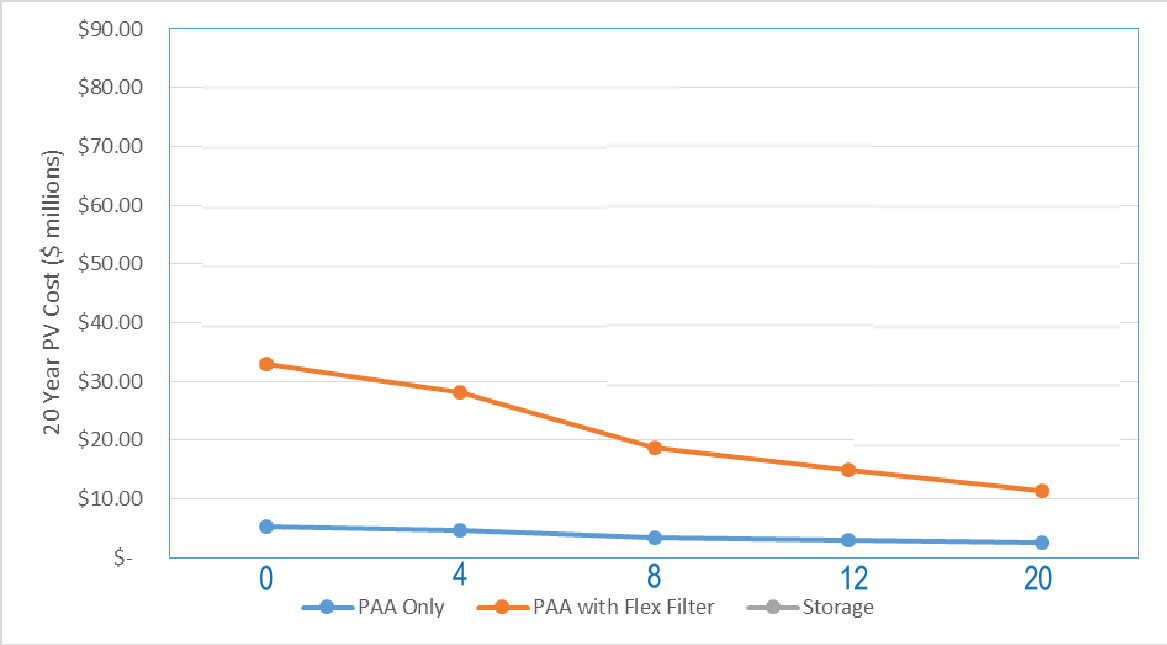
PAA Disinfection

- Peracetic Acid (PAA)
  - Acetic Acid and Hydrogen Peroxide solution
- Common Elements
  - 275 gallon totes or 55 gallon drums
  - Feed pumps
  - Mixers / diffusers
  - Instrumentation (flow, TSS)
  - Sampling equipment
  - Pressure relief
  - Temperature monitoring

Preliminary Costs – Gray Infrastructure

Sewer Separation Costs - $400 to $450 million ($478,650/acre)

	PAA Only	PAA w/ FlexFilter
0 CSOs per year		
Capital Cost ($M)	$ 1.35	$ 28.95
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97
4 CSOs per year		
Capital Cost ($M)	$ 1.27	$ 24.67
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51
Total 20 yr PV Cost ($M)	$ 4.67	$ 28.18
8 CSOs per year		
Capital Cost ($M)	$ 1.07	$ 16.16
20 yr PV O&M Cost ($M)	$ 2.38	$ 2.45
Total 20 yr PV Cost ($M)	$ 3.45	$ 18.61
12 CSOs per year		
Capital Cost ($M)	$ 1.00	$ 12.97
20 yr PV O&M Cost ($M)	$ 1.99	$ 2.05
Total 20 yr PV Cost ($M)	$ 2.99	$ 15.01
20 CSOs per year		
Capital Cost ($M)	$ 0.85	$ 9.75
20 yr PV O&M Cost ($M)	$ 1.60	$ 1.64
Total 20 yr PV Cost ($M)	$ 2.44	$ 11.39



O&M costs are being upgraded to include sampling of the discharge. One sample for fecal coliform will be collected for each event at each outfall.

Green Infrastructure

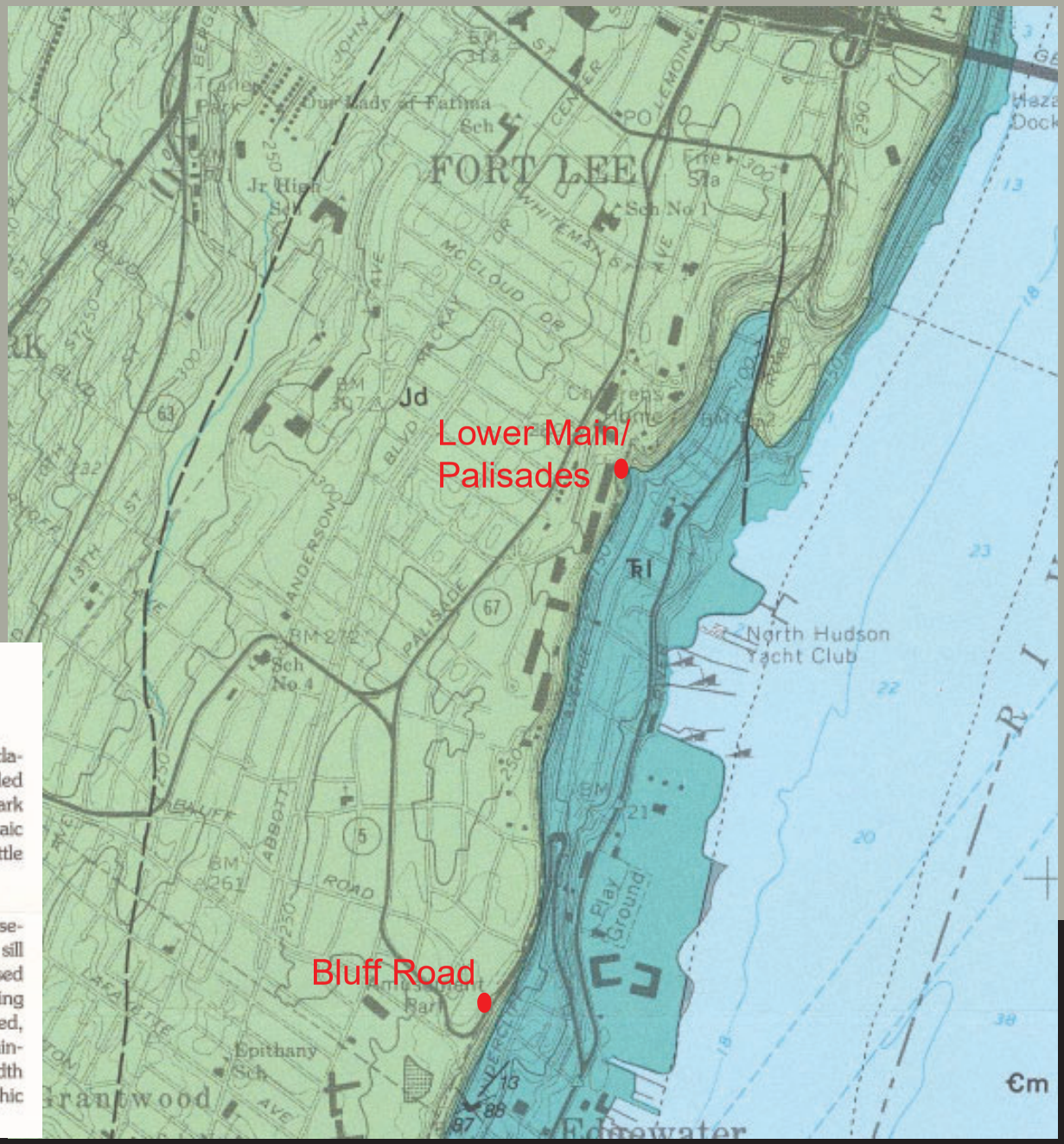
Rain Gardens

Bioswales

Green Infrastructure

Permeable Pavements

Bedrock constrains green infrastructure in Fort Lee



DESCRIPTION OF MAP UNITS

NEWARK BASIN ROCKS

The lithologic descriptions of the Newark basin rocks follow the usage and nomenclature of Lyttle and Epstein (1987) and Puffer (1989). The Newark basin rocks are included in what is known as the Newark Supergroup. The Newark Supergroup of the Newark basin in the map area, from top to bottom, includes the Palisade Diabase, the Passaic Formation, the Lockatong Formation, and the Stockton Formation (Olsen, 1980; Lyttle and Epstein, 1987).

Jd — **Palisade Diabase (Lower Jurassic)**—Dark-gray to black, fine- to coarse-grained (except very fine to fine-grained near chilled borders) diabase sill concordant with the Lockatong Formation. The diabase is composed largely of calcic plagioclase and augite. Shales and siltstones surrounding this intrusive have been thermally metamorphosed to a purplish-red, light-gray and dark-gray, indurated, brittle, fine-grained hornfels containing quartz, plagioclase, sericite, biotite, epidote, and magnetite. The width of this zone depends on the thickness of the intrusive, its topographic expression, and its inclination. The sill is as thick as 1,700 ft

Preliminary Costs – Green Infrastructure

We are currently identifying specific candidate sites for Green Infrastructure

	Green Infrastructure Type	Min Capital Cost ($M)	Max Capital Cost ($M)	20 Year PV O&M Cost ($M)	Min Total 20 year PV Cost ($M)	Max Total 20 year PV Cost ($M)
5% GI (~6.5 Acres)	Rain Garden	$ 0.63	$ 2.00	$ 0.80	$ 1.43	**$ 2.80**
	Right-of-Way Bioswale	$ 0.99	$ 3.29	$ 0.80	$ 1.79	$ 4.09
	Green Roof	$ 3.15	$ 16.03	$ 0.80	$ 3.95	$ 16.83
	Porous Asphalt	$ 1.71	$ 3.58	$ 0.13	$ 1.83	$ 3.71
	Permeable Interlocking Concrete Pavers (PICP)	$ 0.85	$ 2.43	$ 0.13	$ 0.98	**$ 2.56**
10% GI (~13 Acres)	Rain Garden	$ 1.26	$ 4.01	$ 1.60	$ 2.86	**$ 5.61**
	Right-of-Way Bioswale	$ 1.97	$ 6.57	$ 1.60	$ 3.57	$ 8.17
	Green Roof	$ 6.31	$ 32.06	$ 1.60	$ 7.91	$ 33.66
	Pervious concrete	$ 4.01	$ 8.02	$ 0.25	$ 4.26	$ 8.27
	Permeable Interlocking Concrete Pavers (PICP)	$ 1.71	$ 4.86	$ 0.25	$ 1.96	**$ 5.11**

+0.3% Capture

+0.6% Capture

O&M costs are being upgraded to include sampling of the discharge. One sample for fecal coliform will be collected for each event at each outfall.

Preliminary Results

CSO Volumes and Frequencies at Each CSO Control Level

	Baseline			0 CSO			4 CSOs			8 CSOs			12 CSOs			20 CSOs		
Outfall	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	84.7%	0	0	100.0%	8.6	4	92.9%	11.1	8	92.7%	20.0	12	91.7%	34.0	20	90.1%
FL-002	4.7	20		0	0	100.0%	1.0	3	91.9%	1.8	6	90.3%	2.9	11	88.2%	4.7	20	84.7%

GI Alternatives									
Outfall	Baseline			5% GI-Bluff Road			10% GI-Bluff Road		
	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture	CSO Volume (MG)	CSO Events	Percent Capture
FL-001	82.5	58	84.7	79.8	57	85%	77.0	58	85.3%
					Additional Percent Capture	0.3%		Additional Percent Capture	0.6%

Preliminary Costs –

Alternative	Capture	Present Worth Cost
Baseline	84.7%	$0
Gray – 20 OF per Year	90.1%	$2.44 to 11.4 M
Green – Rain Garden, Bioswale or Porous Pavement	85%	$2.6 to 4.1 M

Repair of the Netting Facility

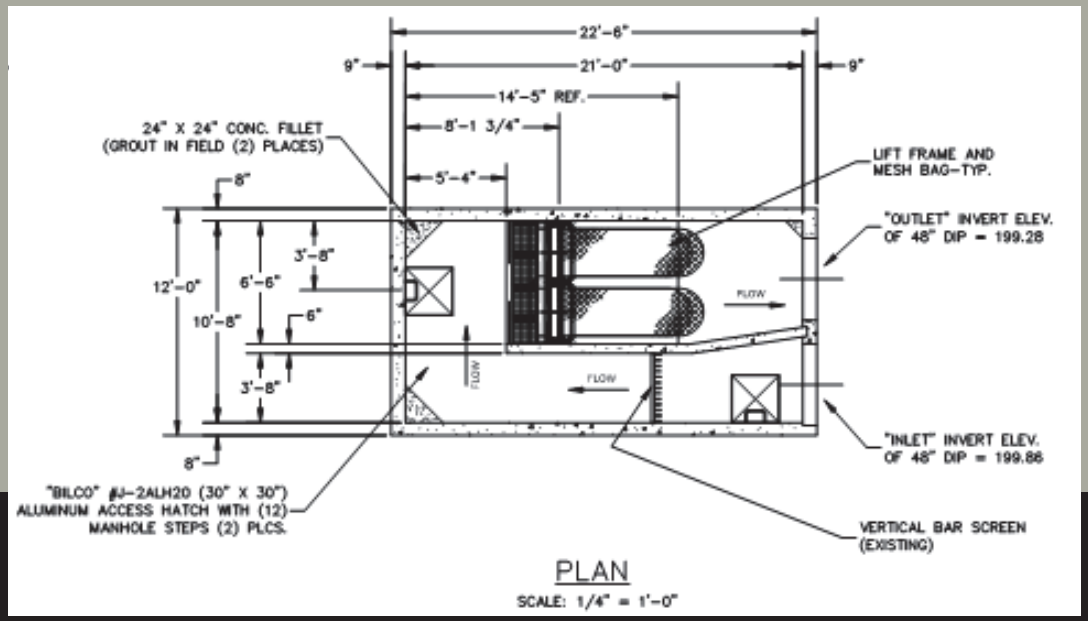
Good Day

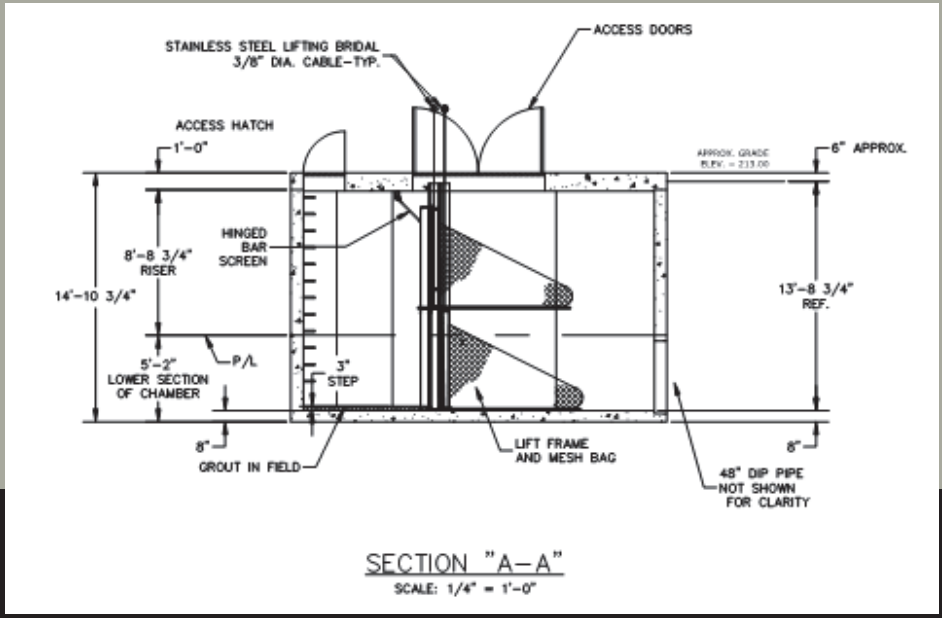
Bad Day
(twice in 2019)

Traffic Hazard on Route 5

Planned Improvements for Bluff Road Netting Facility

- Replace 2 net system with 4 net system
- Add a knee wall to the netting chamber
- Repair erosion damage
- Cost ~$300,000 to $500,000





Questions

Comments

Discussion

Mayor and Council Meeting – August 13, 2020

Attending:

Mayor Mark J. Sokolich
Council President Michael Sargenti
Councilman Joseph Cervieri
Councilwoman Ila Kasofsky
Councilman Harvey Sohmer
Councilman Peter J. Suh
Councilman Paul K. Yoon
Borough Administrator Alfred Restaino
Borough Clerk Evelyn Rosario
Gary Grey – HDR Engineering Inc.

Purpose:

A presentation was made to the Mayor and Council on the preliminary LTCP and the associated costs.

Mayor and Council Meeting – August 13, 2020

Due to the current situation involving the COVID-19 pandemic, the work session meeting of the Mayor and Council will be held remotely. This meeting can be accessed by telephone, by dialing one of the numbers listed below and entering the meeting ID number 986 5733 1399.

+1 646 558 8656 US *+1 312 626 6799 US*
+1 301 715 8592 US *+1 346 248 7799 US*
+1 669 900 9128 US *+1 253 215 8782 US*

AGENDA
BOROUGH OF FORT LEE
MAYOR AND COUNCIL
WORK SESSION MEETING
THURSDAY, AUGUST 13, 2020 at 5:00 P.M.

SALUTE TO THE FLAG
OPEN PUBLIC MEETINGS ACT
ROLL CALL
5:00 P.M. **WORK SESSION (Meeting Begins in Open)**

I. **RESOLUTION FOR CLOSED SESSION TO DISCUSS**
Personnel:
Administration
General Services
Municipal Court
Police Department

- **Contracts:**
  - Materials Conservator for the Examination of the Post Office Murals
  - Third-Party Ambulance Billing
  - Barrymore Film Center Construction Consultant Contract Extension

- 5:30 P.M. **Work Session Meeting Reopened to the Public**

II. **PRESENTATION: COMBINED SEWER OVERFLOW**

1. Authorizing Issuance of Requests for Qualifications for 2021 Professional Services or Extraordinary Unspecifiable Services to the Borough of Fort Lee
2. Closure of a Portion of Abbott Boulevard to Assist the Restaurants and Businesses
3. NJ Transitgrid Project
4. Supporting Moratorium on Fossil Fuel Projects in New Jersey
5. Relief for the Implementation of the United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP) Mandated Long Term Control Plan for Combined Sewer Overflow
6. Food Trucks
7. Shared Services Renewal with Bergen County for Animal Control Services
8. Myrtle Street Motor Vehicle Restrictions
9. Fire Department Training
10. Liquor License No. 0219-33-042-011 Person-to-Person Transfer Hangar Inc. TO Cuba 57, LLC
11. Funding Municipal Alliances for Grant Year 2021
12. Amend Chapter 289 Parking Article IV Parking Meters Street: Linwood Avenue

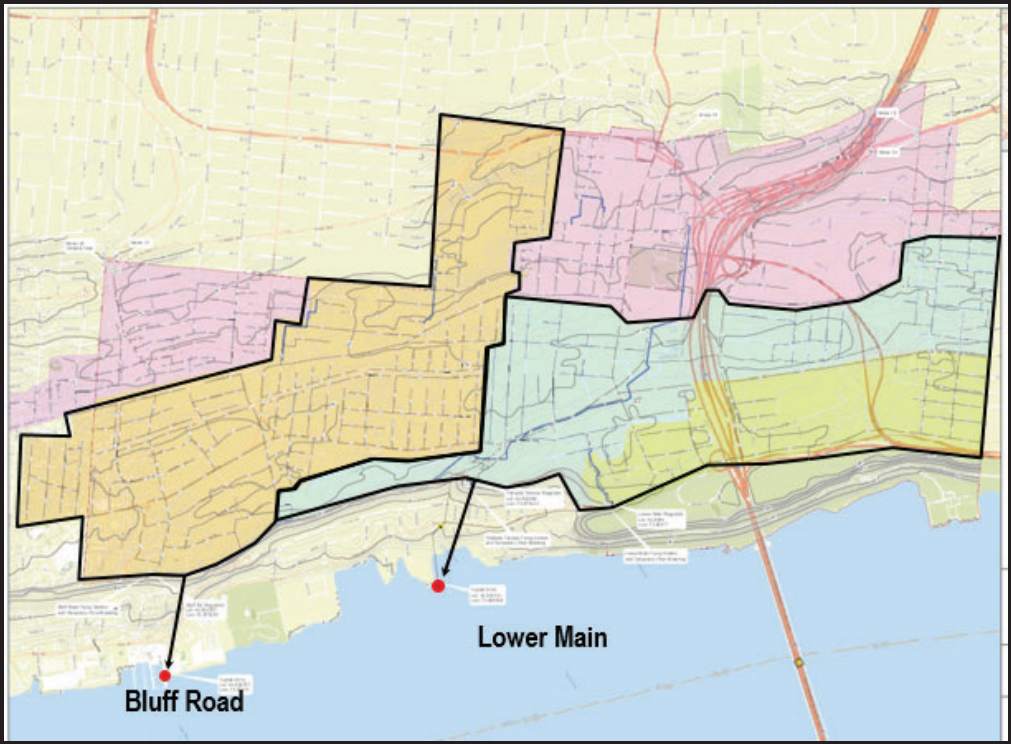
IV. ORDINANCE PUBLIC HEARINGS SCHEDULED AUGUST 13, 2020
None

V. PUBLIC PARTICIPATION

VI. MOTION TO ADJOURN

*Upcoming Meetings: Regular Session August 13, 2020 at 7:00 P.M
Work Session September 3, 2020 at 6:30 P.M.
Regular Session September 10, 2020 at 7:00 P.M.

DISCLAIMER All meetings of the Mayor and Council are subject to additions, deletions and amendments



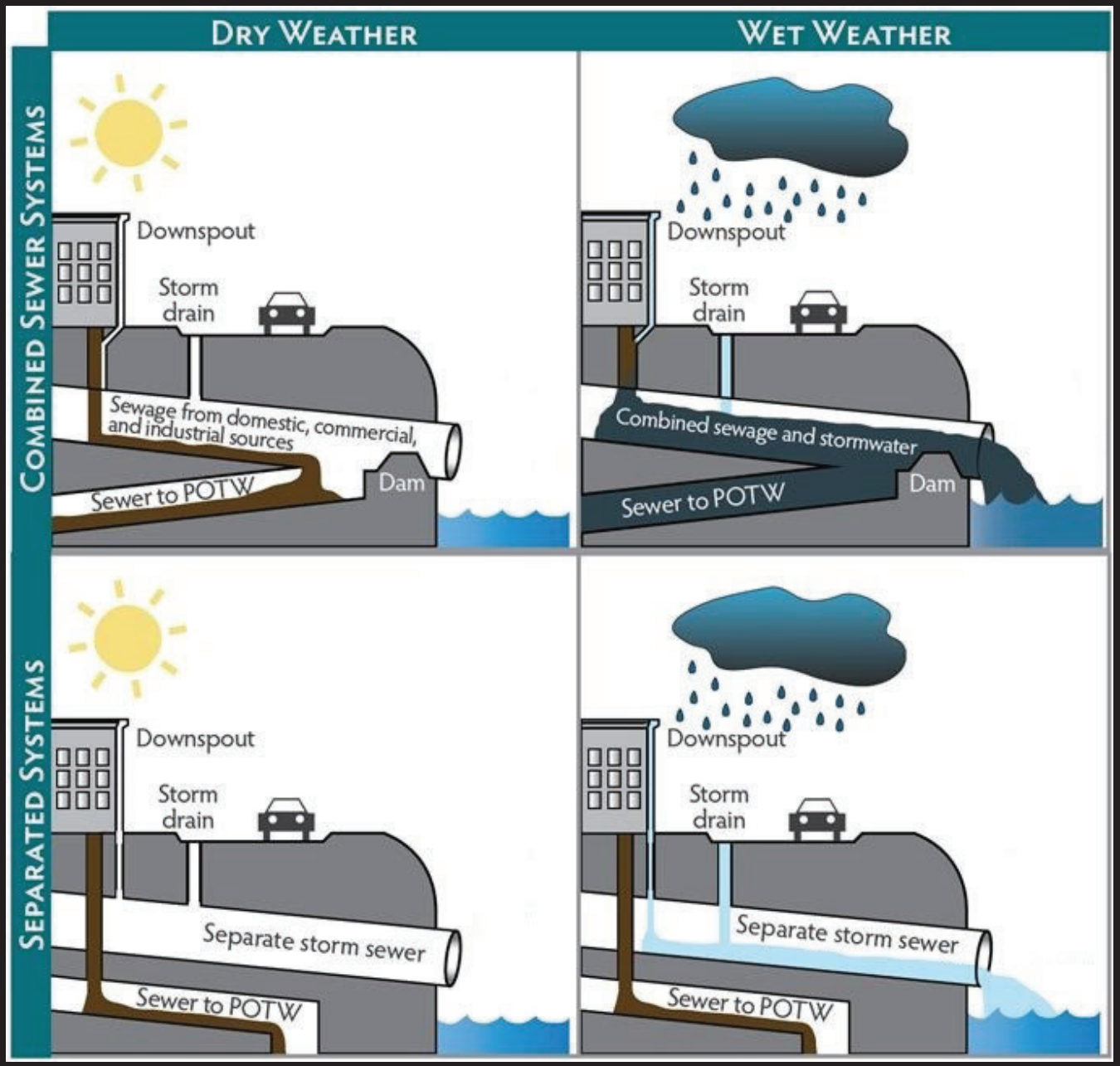
Borough of Fort Lee CSO Team Meeting Long Term Control Plan

August 13, 2020

HDR

© 2015 HDR, all rights reserved.

How Combined Sewers Work



Towns, Boroughs and Cities that have 2015 CSO Permits

- Fort Lee Borough
- Adams Street STP
- Bayonne MUA
- Bergen County UA
- Camden County MUA
- City of Camden
- City of Gloucester
- City of Newark
- East Newark Borough
- Elizabeth Borough
- City of Hackensack
- Harrison Town
- Jersey City MUA
- Joint Meeting of Essex and Union Counties STP
- Kearny Town
- Middlesex County UA
- North Bergen MUA
- North Bergen Woodcliff STP
- Passaic Valley Sewerage Commission
- Paterson City

> $2,000,000,000 will be spent to mitigate CSO's in these communities

The Remaining 2015 CSO Permit Requirements

- ✓ CSO signs have been posted near outfalls
- ✓ CSO notification system is online (http://NJCSO.hdrgateway.com)
- ✓ CSO monthly Discharge Monitoring Reports (DMRs)
- ✓ Work plans/QAPPs submitted to NJDEP
  - Baseline Compliance Monitoring Plan
  - System Characterization and Landside Monitoring QAPP
- ✓ Monthly CSO Permittee meetings at BCUA
- ✓ Evaluation of previous landside model
- ✓ Water Quality monitoring
- ✓ Complete flow monitoring
- ✓ Update landside model
- ✓ Conduct alternatives analysis July 1, 2019
- ▪ **Submit the LTCP October 1, 2020**

New Jersey Department of Environmental Protection

NEW JERSEY POLLUTANT DISCHARGE ELIMINATION SYSTEM

The New Jersey Department of Environmental Protection hereby grants you a NJPDES permit for the facility/activity named in this document. This permit is the regulatory mechanism used by the Department to help ensure your discharge will not harm the environment. By complying with the terms and conditions specified, you are assuming an important role in protecting New Jersey's valuable water resources. Your acceptance of this permit is an agreement to conform with all of its provisions when constructing, installing, modifying, or operating any facility for the collection, treatment, or discharge of pollutants to waters of the state. If you have any questions about this document, please feel free to contact the Department representative listed in the permit cover letter. Your cooperation in helping us protect and safeguard our state's environment is appreciated.

Permit Number: NJ0034517

Final: Surface Water Minor Mod Permit Action

Permittee:
Fort Lee Borough
309 Main Street
Fort Lee, NJ 07024

Co-Permittee:

Property Owner:
Fort Lee Borough
309 Main Street
Fort Lee, NJ 07024

Location Of Activity:
Fort Lee Borough
Combined Sewer Collection System
Fort Lee, Bergen County

Authorization(s) Covered Under This Approval	Issuance Date	Effective Date	Expiration Date
CSM -Combined Sewer Management – Minor Mod.	10/09/2015	07/01/2015	06/30/2020
CSM -Combined Sewer Management	03/12/2015	07/01/2015	06/30/2020

By Authority of:
Commissioner's Office

Joseph Mannick

DEP AUTHORIZATION
Joseph Mannick, Supervisor
Bureau of Surface Water Permitting
Water Pollution Management Element
Division of Water Quality

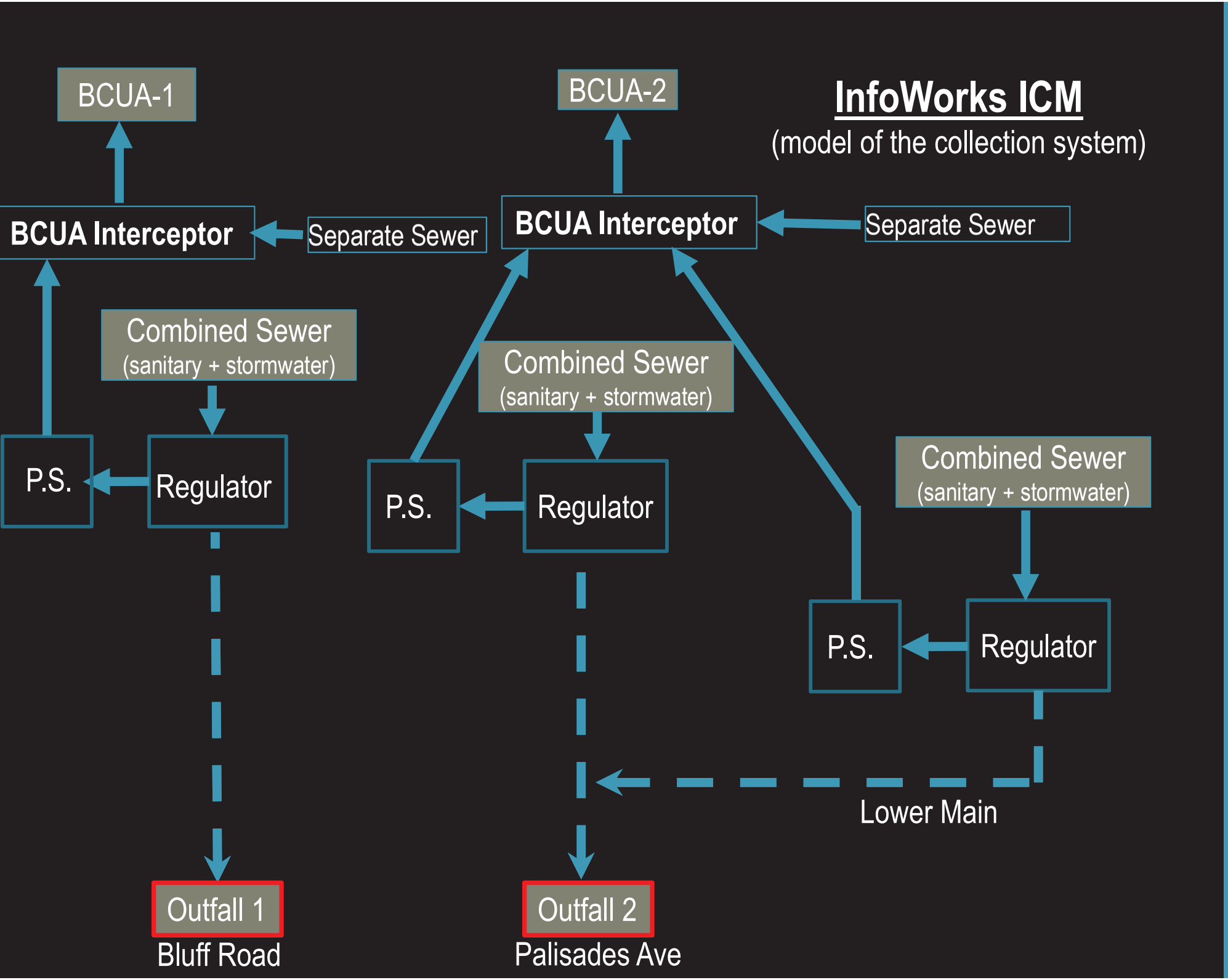
(Terms, conditions and provisions attached hereto)

Division of Water Quality

https://www.nj.gov/dep/dwq/pdf/cso_fort_lee_boro_nj0034517.pdf

fcp_sw.rtf

GOAL – 85% Capture with water quality improvement but NJDEP and USEPA can require more.

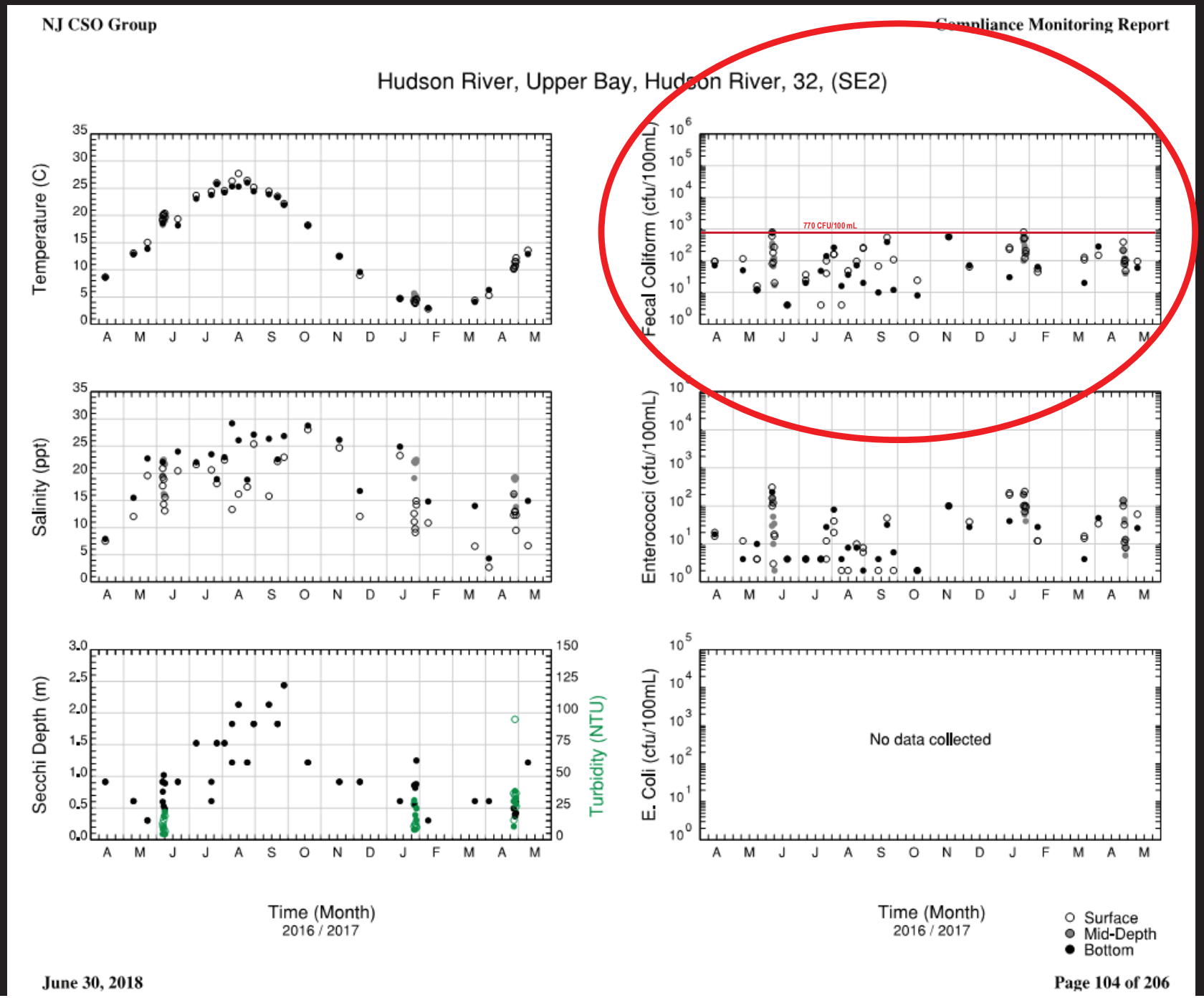

InfoWorks ICM
(model of the collection system)
BCUA-1
BCUA-2
BCUA Interceptor
Separate Sewer
BCUA Interceptor
Separate Sewer
Combined Sewer
(sanitary + stormwater)
Combined Sewer
(sanitary + stormwater)
Combined Sewer
(sanitary + stormwater)
P.S.
Regulator
P.S.
Regulator
P.S.
Regulator
Lower Main
Outfall 1
Bluff Road
Outfall 2
Palisades Ave

CSO Outfall Summary – Baseline Conditions

Outfall	FL-001 Bluff Road		FL-002 Palisade Avenue	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	1.2	0	0.0
February	2	7.0	2	0.7
March	6	1.7	0	0.0
April	4	9.9	3	0.7
May	9	9.8	3	1.7
June	6	7.6	2	1.5
July	7	28.0	6	4.5
August	6	8.5	3	1.2
September	4	34.4	3	8.0
October	2	0.5	0	0.0
November	5	10.0	2	1.8
December	4	5.8	2	0.2
Total	**58**	**124.5**	**26**	**20.4**

$$\frac{\text{CSO Runoff}}{\text{Total Runoff}} = \frac{(124.5\ \text{MG} + 20.4\ \text{MG})}{611\ \text{MG}} = \boxed{76.3\%\ \text{CSO Capture}}$$

Hudson River Water Quality at GW Bridge



CONTROLS

Source Controls:

Green infrastructure, I&I Reduction, **Sewer separation**, BMPs, Nine Minimum Controls

Collection System Controls

Gravity sewers, pump stations, hydraulic relief structures, in-line storage, outfall relocation/consolidation, regulator modification

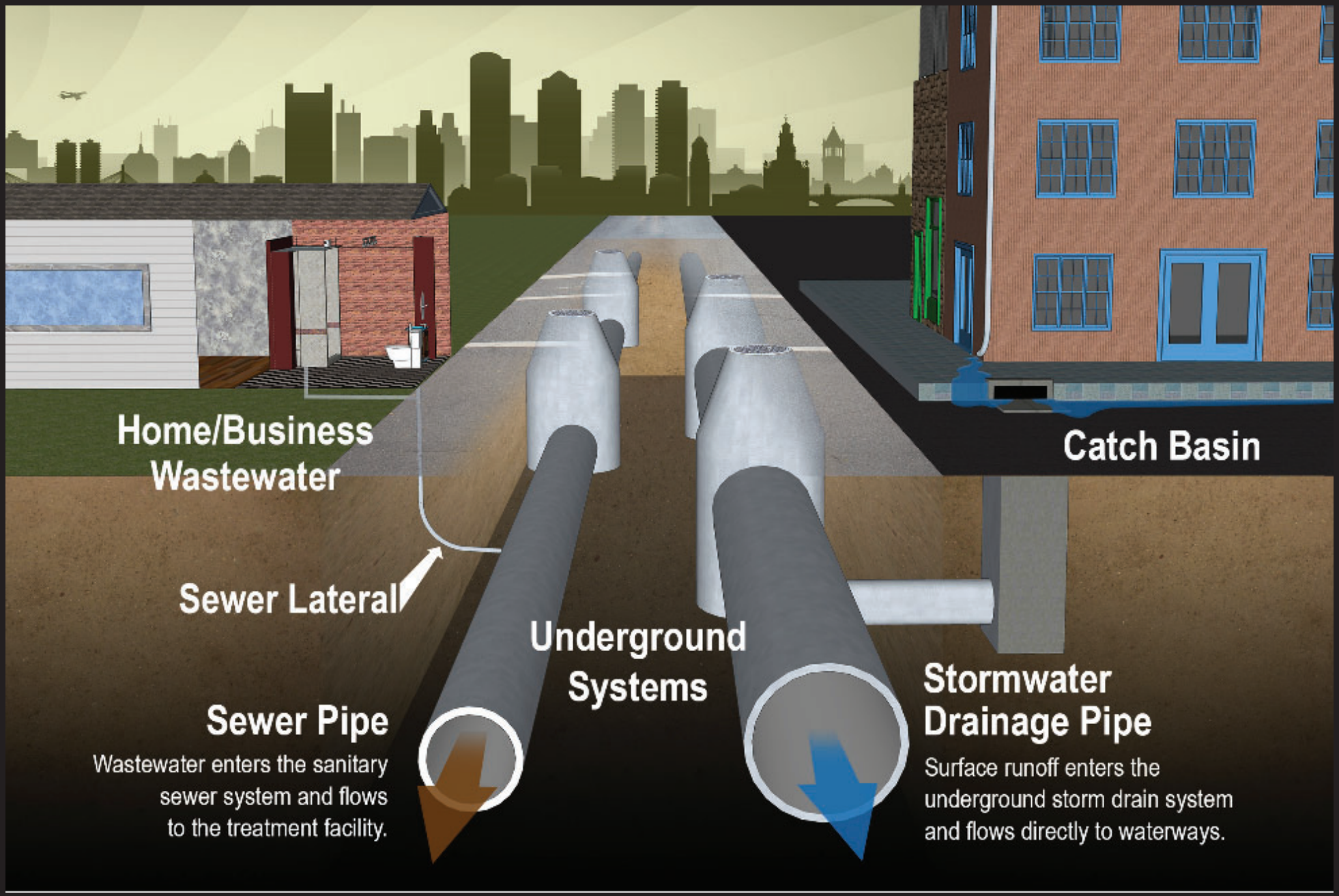
Storage Technologies

Above and below ground storage tanks, storage tunnels

Treatment Technologies

Screening and disinfection, vortex separation, retention/treatment basins, high rate filtration/clarification, chlor/dechlor disinfection, PAA disinfection UV disinfection, WWTP plant expansion

Gray Infrastructure
Sewer Separation



Green Infrastructure

Rain Gardens

Bioswales

Green Infrastructure

Permeable Pavements

2020 Costs Estimate

Alternative	Capture	Present Worth Cost
Baseline	76.3%	$0
Gray – Sewer Separation	85.3%	$14 to $18 M
Green – Rain Garden, Bioswale or Porous Pavement	0.1%	$0.1 to $0.2 M

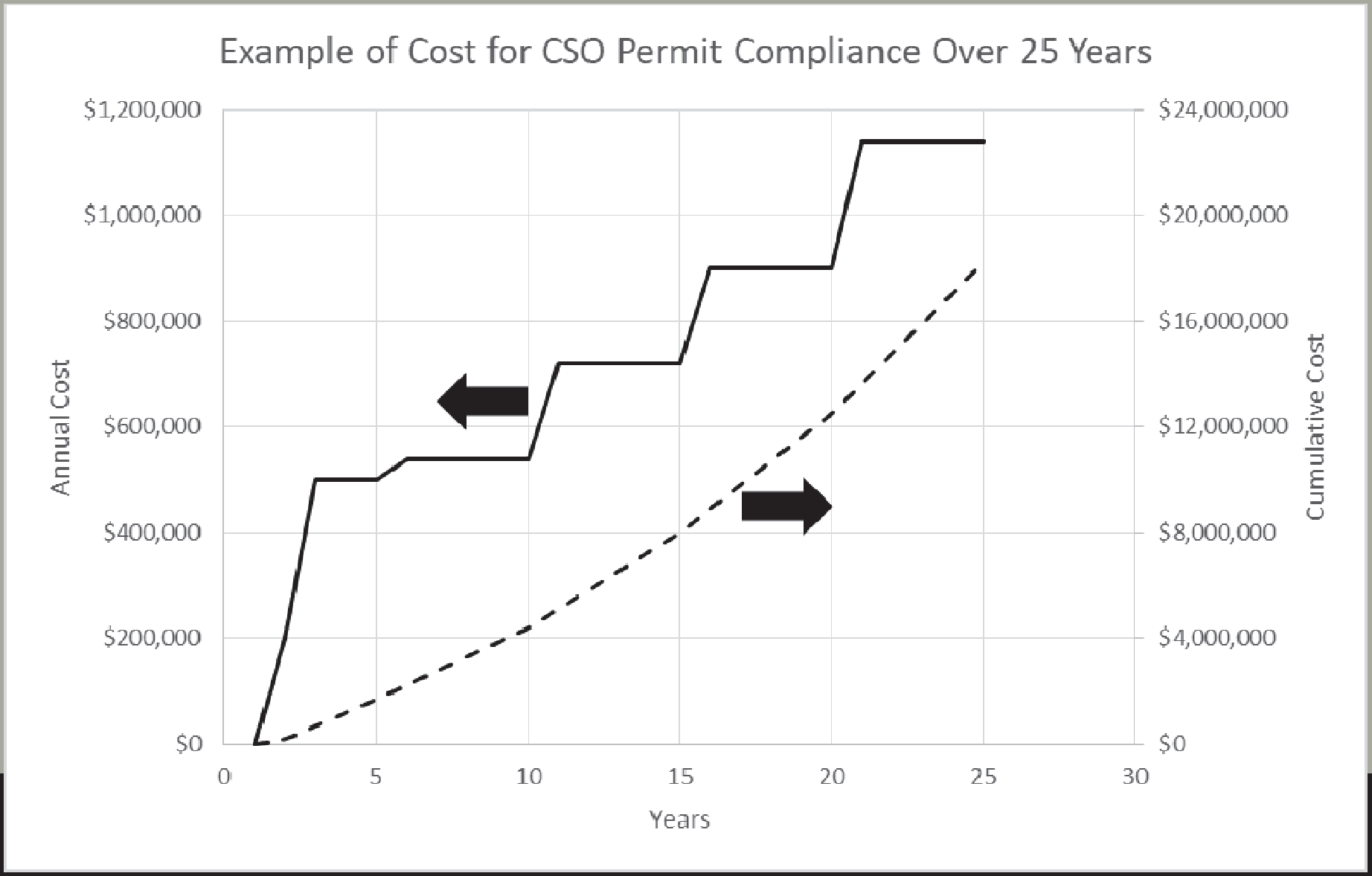
Costs will be incurred over 20 to 30 years in 4 or 5 phases. New flow meters will be installed and monitored to check the program at 85% CSO Control.
Gray infrastructure costs are based on a cost of $300,000 per acre.

PROS of a separate sewer system

- Eliminates combined sewer overflow
- Reduces sewer billing to the WWTF
- Mitigates the problem of street flooding by adding capacity
- Allows stormwater to be used as a resource
- Optimizes performance of the waste water treatment plant (WWTP)
- In the long term, the efficiency and longevity of a separated system will pay for itself (ROI)

CONS of a separate sewer system

- Costly
- Disruptive – the reconstruction process will disrupt the urban area (i.e. residences, businesses, traffic)
- May result in an increase in pollutants loading to receiving waters, as a result of the increased discharge of untreated surface run-off



Example of Annual and Cumulative Cost of CSO Permit Compliance over 25 Years

2007 Review of CSO Mitigation Costs

Outfall Number	Objective B or C
001	$9,000,000 to $14,000,000
002	$7,000,000 to $9,000,000
Total Capital Costs	$16,000,000 to $23,000,000

In addition to the LTCP the Bluff Road Netting Facility May Need To Be Upgraded

Good Day

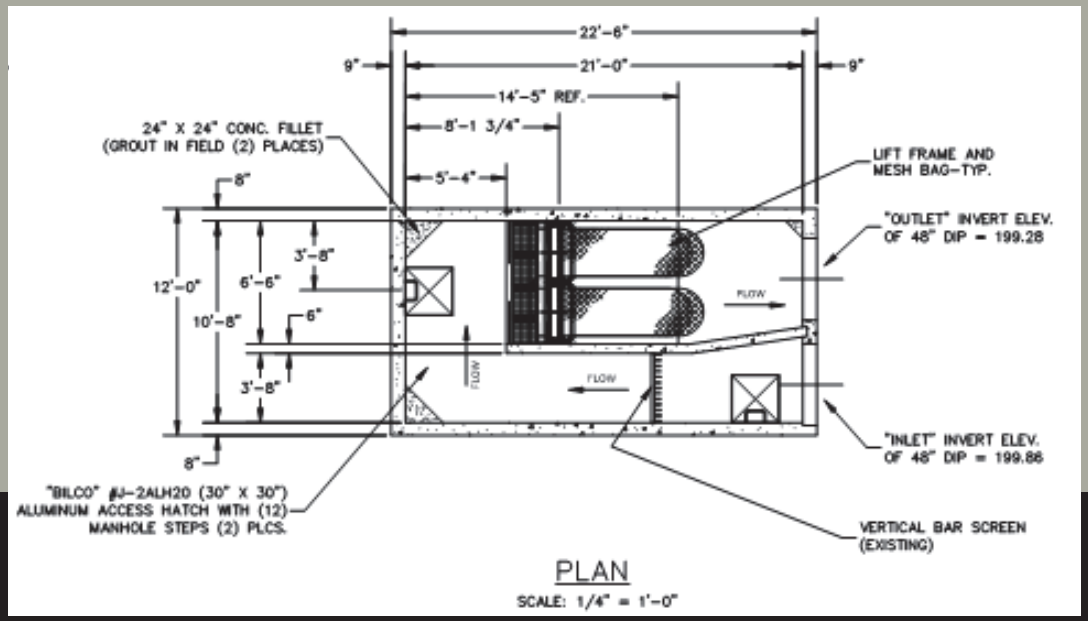
Bad Day
(None in 2020 and twice in 2019)

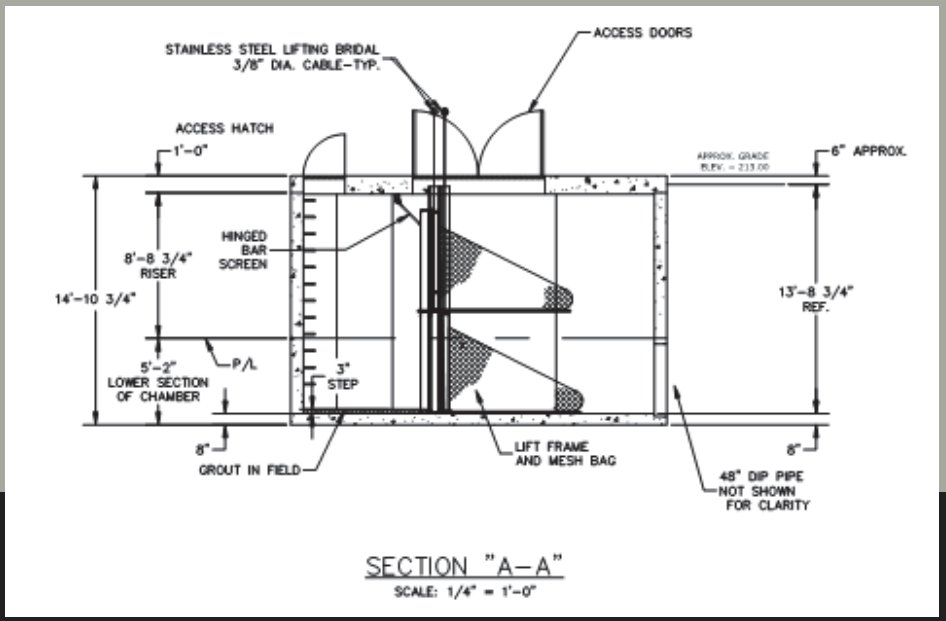
Bluff Road Netting Chamber

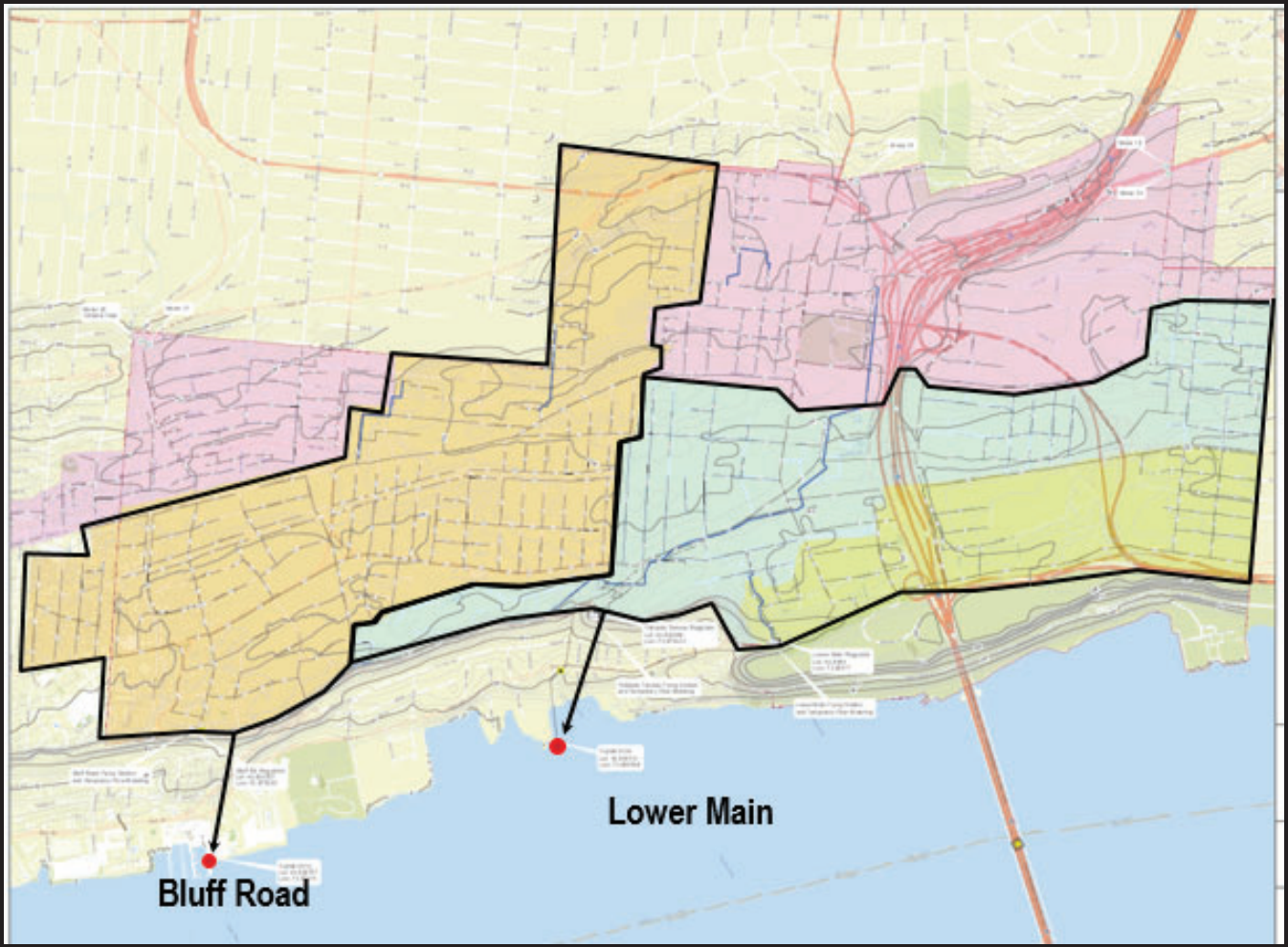
- Expand the facility capacity
- Perform regular maintenance (confined space entry is required)

Planned Improvements for Bluff Road Netting Facility

- Replace 2 net system with 4 net system
- Add a knee wall to the netting chamber
- Repair erosion damage
- Cost ~$300,000 to $500,000







Gary Grey
HDR Inc.
201-335-9368
gary.grey@hdrinc.com

18. Appendix D - Hackensack Public Participation Meeting Minutes and Presentation (Since Public Participation Process Report)

Hackensack Public Participation Team Meeting Minutes – March 13, 2019

Hackensack Public Participation Team Meeting Minutes – April 30, 2019

Hackensack Public Participation Presentation to Steering Committee – March 25, 2019

Hackensack Public Participation Presentation to Public at CoW Council Meeting – June 11, 2019

Supplemental CSO Team Meeting Presentation (Hackensack) – July 21, 2020

Hackensack Public Online Survey Results – September 15, 2020

MINUTES

Arcadis U.S., Inc.
17-17 Route 208 North
Suite 200
Fair Lawn
New Jersey 07410
Tel 201 797 7400
Fax 201 797 4399

CITY OF HACKENSACK

CSO Permit – Public Participation Group Meeting

March 13, 2019	10:00 AM-12:00 PM	City of Hackensack DPW Conference Room

Wednesday – March 13, 2019

ITEMS

1. Open discussion on NJDEP Public Participation Workshop

2. Permit requirements/deadlines
   - Development and Evaluation of Alternatives Report due to NJDEP July 1, 2019
   - Summary of permit requirements for public participation:
     - Actively involve affected public throughout Long Term Control Plan process using a variety of methods
     - Invite members of the affected/interested public of Hackensack to join the Supplemental CSO Team

3. Summary of various groups

Group Name	Description	Who should attend?
NJ CSO Group	- For all municipalities (permittees) regulated by NJPDES CSO permits in New Jersey	- Permittee Program Managers - Consultants (Arcadis, Suburban)
Supplemental CSO Team	- For the municipalities under BCUA's umbrella (Hackensack, Ridgefield Park, Fort Lee) and interested public advocates from these municipalities - Goal is coordination between these municipalities - Meeting content ranges from overall themes to technical	- Permittee Program Managers - Consultants (Arcadis, Suburban) - Susan McVeigh

Hackensack Public Participation Team/Committee	- Goal is to plan outreach activities for City of Hackensack & ensure the City meets permit requirements	- All of us (Permittee Program Managers, Consultants, Susan McVeigh, DMR) - Interested members of Hackensack's public

4. Target groups/new members
   - List of potential members prepared by Susan McVeigh attached

5. Task Forces (internal group working to complete a specific task with defined beginning and end points)

Task Force #	Name	Goal	Key People
1	Public survey	- Prepare survey (using SurveyMonkey or another platform) to share with public - Draft ready for March 25, public by April 1 - Include demographic info (gender, age, tenant/owner) - Include a question as a plug for future public meetings - Incorporate other questions related to DPW or city overall if appropriate - Distribute using a combination of Nixle alert (through Frank Borelli), Albert Dib email blast, and website (and Upper Main Street Alliance?)	- Susan B. - Ryan - Fran - Megan
2	Presentation to Mayor/ Council	- Start with presentation to Mayor and Council to give brief overview of CSO requirements and alternatives - Monday, March 25 steering committee meeting at 10am is potential option to give presentation. Susan & Fran to confirm - Internal meeting Monday, March 18, 10am at Susan McVeigh's office to work on presentation - After this initial presentation, will plan public meetings for general public, e.g. at Planning Board meeting or Town Hall meeting	- Susan M. - Mike - Frank
3	Invite new members	- Aiming to invite one or two individuals to attend the Supplemental CSO meetings by May 14 (ideally not a member of Hackensack's government) - Aiming to add several new members to the Hackensack Public Participation Team as soon as possible	- Susan M. - Fran - Albert Dib

MINUTES

Arcadis U.S., Inc.
17-17 Route 208 North
Suite 200
Fair Lawn
New Jersey 07410
Tel 201 797 7400
Fax 201 797 4399

CITY OF HACKENSACK

CSO Permit – Public Participation Group Meeting

April 30, 2019	10:00 AM-12:00 PM	City of Hackensack City Hall - 3rd Floor Conference Room

Tuesday – April 30, 2019

ITEMS

- **Short-term Goals/Action Items:**
  - Council Meeting 5/21 or 6/11:
    - (City) Susan B. to contact City Clerk to get a 10-15 minute time slot for a presentation at the City Council meeting on 5/21/2019 or 6/11/2019 (in COW session 6pm-7pm)
    - (Arcadis) Prepare/revise presentation that was given to Development Steering Commitee, send to team for internal comments
    - (Arcadis) Print out hardcopies of survey to be distributed to interested public at council meeting
  - Surveys
    - (All) Provide comments to Arcadis for incorporation into survey
    - (Arcadis) Finalize questions and send to Frank Borelli in Google Forms platform to upload to the City website
    - (City) Upload survey to website. Send link to survey out in **email**, onl**y,** through community tab of Nixle.
  - Additional Supplemental CSO Team Member
    - (City) Gary Terzano able to attend BCUA Supplemental CSO Team meetings. Gary to provide additional names to the City of other Environmental Commission members that may be able to attend Supplemental CSO team meetings. Reach out to those interested and select someone to attend 5/15/19 Supplemental CSO team meeting.
  - Newsletter
    - (Arcadis/City) Arcadis to prepare information to be added into the next newsletter. City to assist with coordination

- **Agenda Item 1. Summary of Groups/Teams**

Group Name	Description	Who should attend?
NJ CSO Group	• For all municipalities (permittees) regulated by NJPDES CSO permits in New Jersey • Led by PVSC	• Permittee Program Managers • Consultants (Arcadis, Suburban)
Supplemental CSO Team	• For the municipalities under BCUA's umbrella (Hackensack, Ridgefield Park, Fort Lee) and interested public advocates from these municipalities • Goal is coordination between these municipalities • Meeting content ranges from overall themes to technical	• Permittee Program Managers • Consultants (Arcadis, Suburban) • <u>One other interested member of Hackensack public</u>
Hackensack Public Participation Team/Committee	• Goal is to plan outreach activities for City of Hackensack & ensure the City meets permit requirements	• Permittee Program Managers, Consultants, Susan McVeigh, DMR • Interested members of Hackensack's public

- **Agenda Item 2. NJDEP call recap (4/17/19)**
  - Additional Supplemental CSO Team member
    - Environmental Commission (Gary Terzano) will give names of interested members to the Public Participation Team.
    - The City hopes to have a new member available for the May 15th, 2019 Supplemental CSO Team meeting at BCUA from 10:00AM - 11:30AM.
  - Public meeting - planning for the Council Meeting on May 21st, 2019. More information below in Agenda Item 4.

- **Agenda Item 3. Permit Requirements/deadlines**
  - Development & Evaluation of Alternatives Report – due July 1, 2019
    - Hoping to hold a public meeting prior to the submission of this deliverable so the City can take credit for additional public participation efforts and incorporate any potential public feedback in this report.
  - Selection & Implementation of Alternatives Report – due June 1, 2020

- **Agenda Item 4. Future Outreach Plans**
  - Public meeting - City Council meeting on May 21st or June 11th, 2019 - 6PM
    - 10-15 minute presentation - starting closer to 6PM
    - Survey to be handed out to audience members
    - Advertise for CSO specific presentation at meeting via flyers and website

        - Need to get on the agenda of the meeting - through the City Clerk?
    - Surveys
        - Provide comments and finalize survey by end of week Friday, 5/3/2019
        - Put into Google Form platform
        - Send to Frank Borelli to upload to the Hackensack website and email to community tab
        - Print for hardcopy handouts at the City Council meeting presentation
    - Events
        - Spring/Summer Newsletter
            - Being sent out within a couple of weeks
            - Need to confirm date of the newsletter mailing and deadline for any updates into the newsletter
            - Arcadis will provide information that can be placed into the newsletter
            - Additionally, the DPW has a mailer list if any additional information is needed to be sent out to the public
        - 4th of July Event in Foschini Park
            - The City can provide a table/tent for volunteers to provide CSO related handouts and have conversations for public feedback
        - Summer Concert Series
            - 5 concerts throughout the summer
            - The City can provide a table/tent for volunteers to provide CSO related handouts and have conversations for public feedback

- **Agenda Item 5. Website Updates**
    - Contact Frank Borelli with updates/approved documents to be placed on the hackensack.org/cso website

- **Agenda Item 6. Miscellaneous Discussions**
    - Clean Communities
        - Frank Borelli mentioned the clean-up event that included multiple organizations from around this area
        - Frank Borelli has an email list of the organization heads that could add to the public participation efforts
    - Hackensack High School "Going Green Club"
        - Headed by Mrs. Lorelei Kaminsky, teacher in the High School and member of the Environmental Commission
        - Hope to have Mrs. Kaminsky join the public participation team to bring awareness into the High School to gain volunteers for public participation awareness
    - Shakespeare in the Park
        - Another potential event to share CSO awareness information. Located in the Atlantic Street Park
    - The Chronicle
        - Free advertising in the Record? Every Friday

City of Hackensack

COMBINED SEWER SYSTEM
LONG TERM CONTROL PLAN

MARCH 25, 2019

1

1

Agenda

- Overview of Hackensack's Combined Sewer System
- Overview of the NJDEP permit requirements
  - Development and Evaluation of Alternatives - upcoming deliverable
- Coordination and Public Participation goals
- Summary

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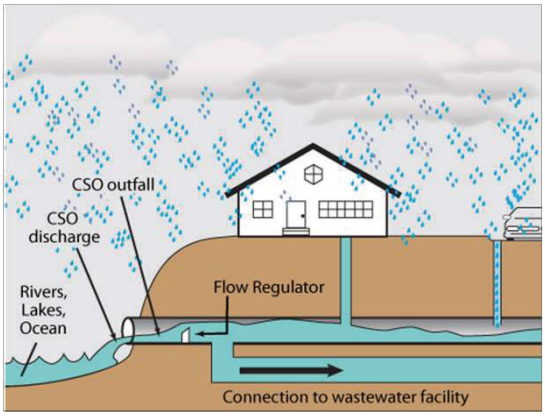
Overview of Hackensack Combined Sewer System

- What is a Combined Sewer Overflow (CSO)?



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Overview of Hackensack Combined Sewer System

- What are the impacts of Combined Sewer Overflows (CSO)?
  - Hackensack River pollution – nutrient imbalances, algae blooms
  - Unsafe recreational waters
  - Human health hazards
  - Wildlife and habitat impairments

Court Street Outfall

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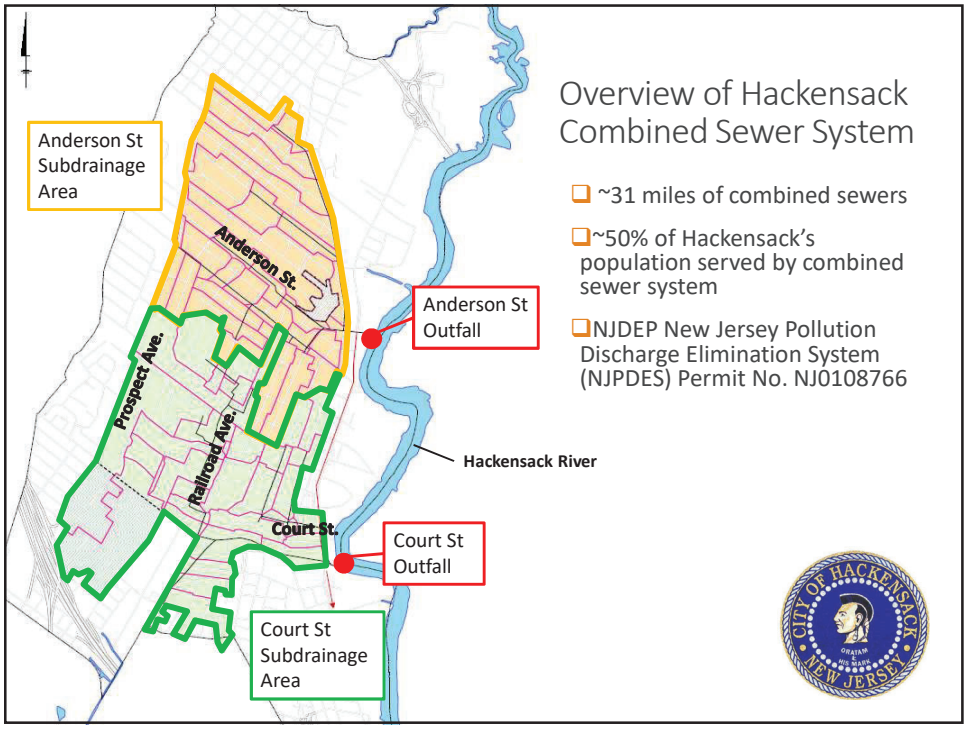
Anderson St Subdrainage Area
Anderson St.
Anderson St Outfall
Prospect Ave.
Railroad Ave.
Hackensack River
Court St.
Court St Outfall
Court St Subdrainage Area
Overview of Hackensack Combined Sewer System
~31 miles of combined sewers
~50% of Hackensack's population served by combined sewer system
NJDEP New Jersey Pollution Discharge Elimination System (NJPDES) Permit No. NJ0108766
CITY OF HACKENSACK NEW JERSEY

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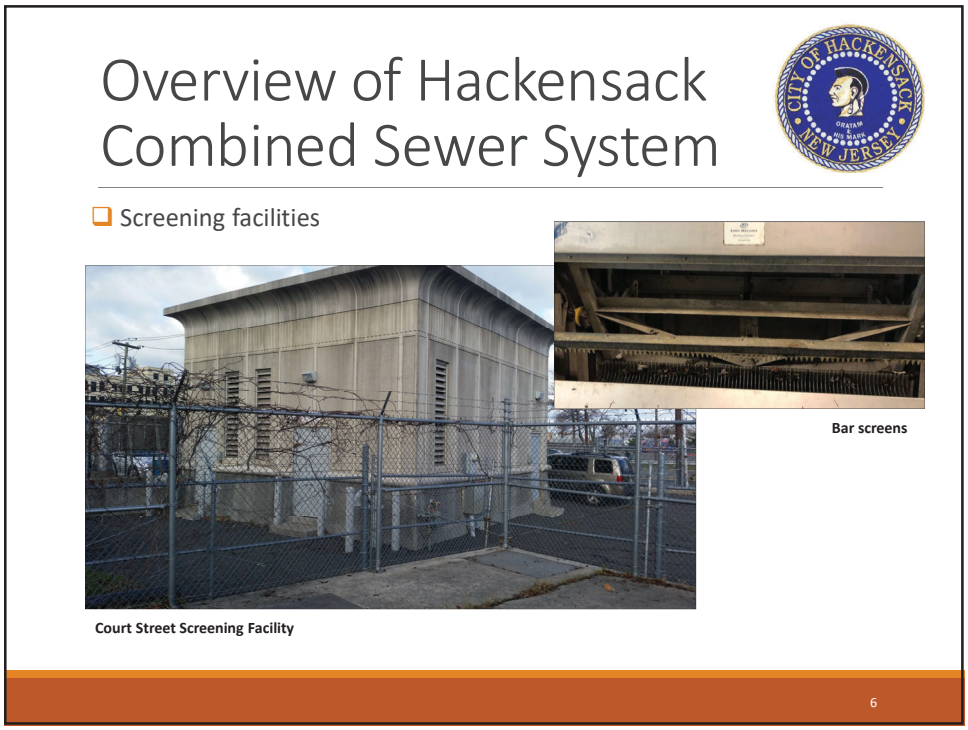
Overview of Hackensack Combined Sewer System
CITY OF HACKENSACK NEW JERSEY
Screening facilities
Bar screens
Court Street Screening Facility
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NJDEP Permit Requirements

- Long Term Control Plan (LTCP) goal
  - Reduce combined sewer overflows to obtain water quality compliance
    - Reduce the number of overflows to 4 per year, or
    - Capture 85% of the volume of combined sewer overflows
  - Utilize important public feedback throughout the process
- Sewer System Characterization Report – submitted July 1, 2018
- Public Participation Process Report – submitted July 1, 2018
- Development and Evaluation of Alternatives Report – due July 1, 2019
  - The NJDEP Permit requires City of Hackensack to evaluate:
    - Green infrastructure
    - Sewer separation
    - Infiltration/inflow control
    - End of pipe treatment
    - Storage – tanks or tunnel

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Development and Evaluation of Alternatives

Green infrastructure – stores, absorbs, and uses storm water runoff

- Positives – lower capital cost, can assist in reducing flooding, streetscape
- Negatives – higher maintenance cost, site specific, low impact on CSOs

Green Roof

Bioswale

Rain Garden

8

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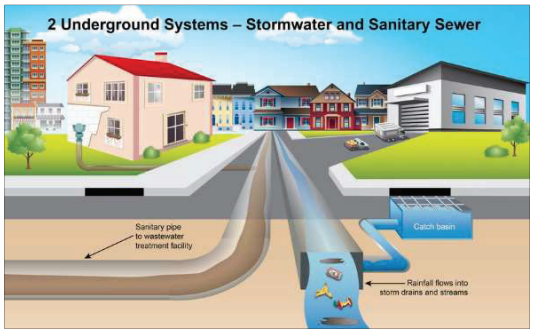
Development and Evaluation of Alternatives

Sewer separation – two separate sanitary and stormwater systems

- Positives – improves water quality, reduces or eliminates untreated sanitary discharge, reduces flooding in basements and streets
- Negatives – high cost, extensive construction, internal plumbing work



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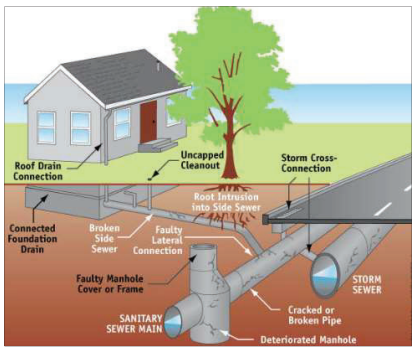
Development and Evaluation of Alternatives

Infiltration/Inflow Control

- Positives – improves water quality, reduces combined sewer volume
- Negatives – high cost, possible disruption in services, extensive construction



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Development and Evaluation of Alternatives

End of pipe treatment – screening and discharge disinfection

- Positives – easy to implement, smaller footprint, chlorine widely used in wastewater treatment
- Negatives – limited use in the US for CSOs, hazardous to transport, potentially produce toxic byproducts

- City of Hackensack currently screening both outfall discharges

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Development and Evaluation of Alternatives

Storage alternatives– temporarily store combined sewer flow and pump back slowly to the treatment plant after rain event

- In-line storage – there is no additional capacity to store combined sewer flow in the current sewer system

- Off-line storage – storage tanks near the outfalls
  - Positives – eliminates or reduces overflow discharges, reduces sewer backups, improves the efficiency of existing treatment capacity
  - Negatives – lack of real estate, high cost

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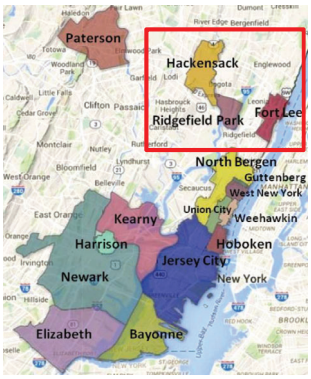
Supplemental CSO Team Coordination

- Coordination with hydraulically connected communities (BCUA, Ridgefield Park, Fort Lee)
- Required by NJDEP permit
- Looking to invite another Hackensack representative to participate in Supplemental CSO team



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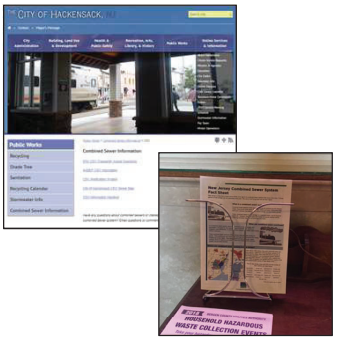
Public Participation Goals

- Educate residents and businesses about the combined sewer system
- Inform residents/businesses about future projects and costs
- Incorporate public feedback into the selection of alternatives
- How?
  - Surveys
  - Public meetings
  - Invite interested residents to join Public Participation Team
- Meet NJDEP Permit requirements



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Summary

- Development and Evaluation of Alternatives
  - Model alternatives
  - Evaluate estimated costs for alternatives
  - Complete report by July 1, 2019
- Coordination and Public Participation
  - Invite general members to join the Supplemental CSO Team and the Hackensack Public Participation Team
  - Conduct outreach efforts to receive public feedback

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Questions?

- Website: www.hackensack.org/cso
- Email: csoteam@hackensackdpw.org

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City of Hackensack

COMBINED SEWER SYSTEM LONG TERM CONTROL PLAN

DEVELOPMENT AND EVALUATION OF ALTERNATIVES SUMMARY RESULTS

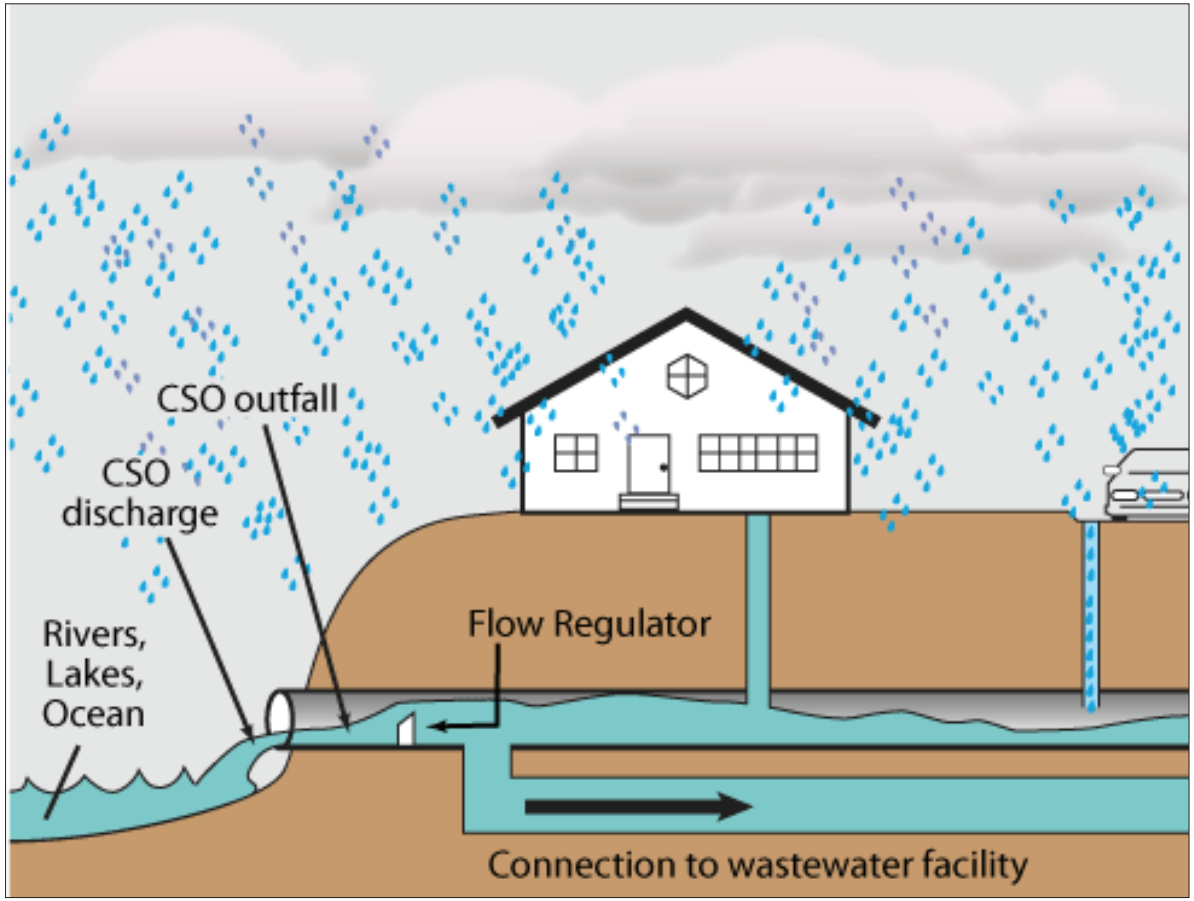
JUNE 11, 2019

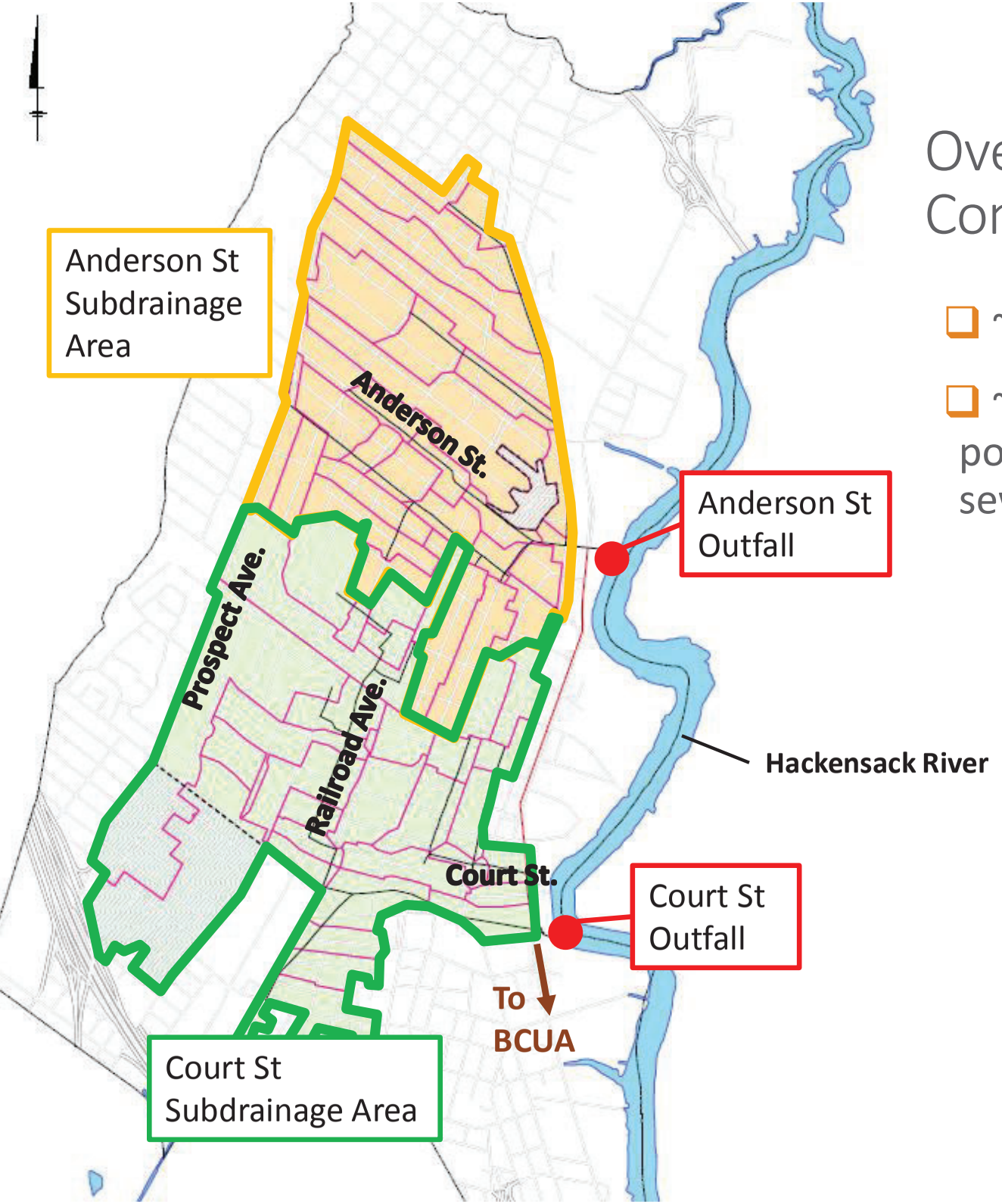
Agenda

- Overview of Hackensack's Combined Sewer System (CSS)
- Overview of the Combined Sewer System Long Term Control Plan (LTCP) Goals
- Combined Sewer Overflow (CSO) Control Alternatives
- Coordination and Public Participation goals
- Summary

Overview of Hackensack Combined Sewer System

- What is a Combined Sewer Overflow (CSO)?





Overview of Hackensack Combined Sewer System

- ~31 miles of combined sewers
- ~50% of Hackensack's population served by combined sewer system

Overview of Hackensack Combined Sewer System

- Screening facilities

Court Street Screening Facility

Bar screens

Court Street Outfall

Long Term Control Plan (LTCP) Goals

- Reduce CSO to obtain water quality compliance with public input

- Two approaches:
  - **Presumption Approach:** 85% Capture of CSO discharge or reduce number of CSOs to 4-6 per year
  - **Demonstration Approach:** Demonstrate water quality compliance

CSO Control Alternatives

- Green Infrastructure
  - Bioswales/Raingardens
  - Permeable Pavement
- Sewer Separation
- Infiltration/Inflow Control
- Treatment of CSO discharge
- Storage
  - Tank(s)
  - Tunnel
  - In-line

Development and Evaluation of Alternatives

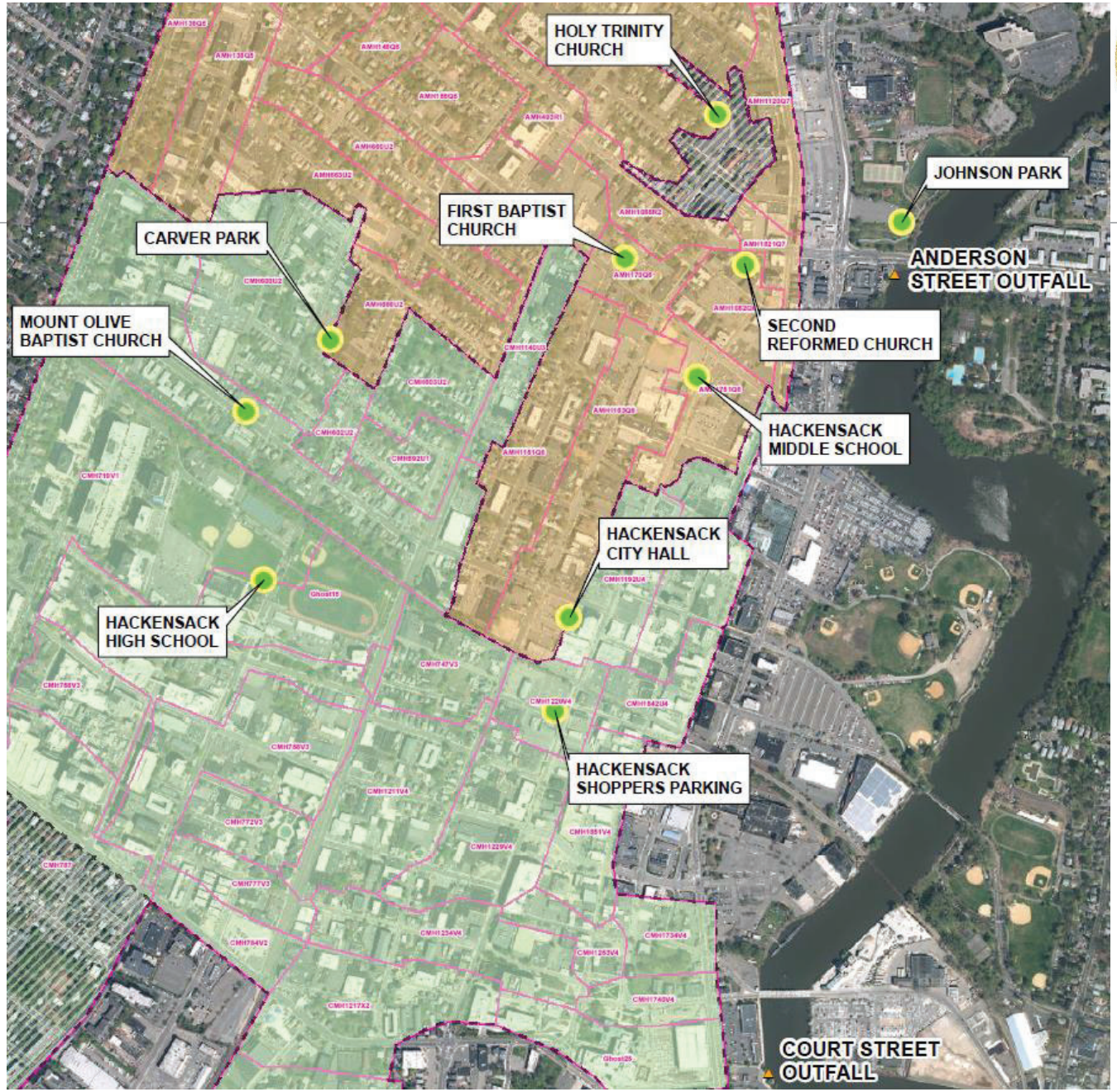
Green infrastructure (GI) – stores, absorbs, and uses storm water runoff

- Positives – lower capital cost, can assist in reducing flooding, streetscape
- Negatives – higher maintenance cost, site specific, low impact on CSOs

Bioswale

Rain Garden

Possible GI Location Map



Development and Evaluation of Alternatives

Green infrastructure (GI) Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Key Constraints
Baseline conditions for 2004	68%	56	N/A	-
GI - 5% Impervious Area	70%	51	13.0%	Does not reach performance & water quality goals, number of overflows not reduced.
GI - 10% Impervious Area	70%	51	14.8%	Does not reach performance & water quality goals, number of overflows not reduced.

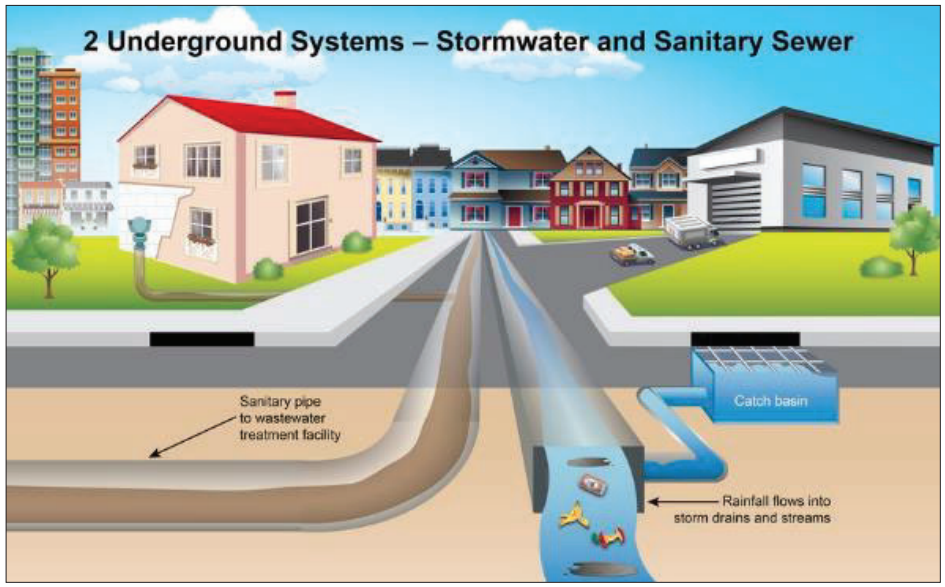
Development and Evaluation of Alternatives

Sewer separation – two separate sanitary and stormwater systems

- Positives – improves water quality, reduces or eliminates untreated sanitary discharge, reduces flooding in basements and streets
- Negatives – high cost, extensive construction, internal plumbing work

Alternative prescreening – City wide cost

- Estimated cost $555M
  - Cost Source: Updated 2007 Cost and Performance Analysis Report
- Includes new storm sewers in the CSS



Development and Evaluation of Alternatives

End of pipe treatment – pretreatment and discharge disinfection

- Positives – smaller footprint, chlorine widely used in wastewater treatment
- Negatives – limited use in the US for CSOs, potentially produce toxic byproducts
- City of Hackensack currently has screening facilities at both outfalls

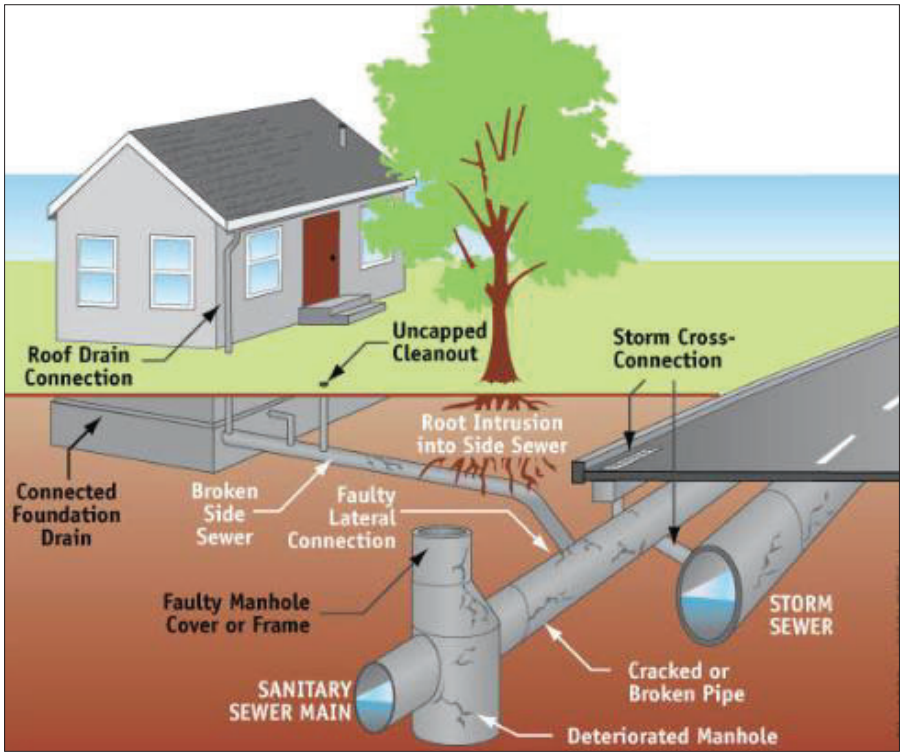
Alternative prescreening – still under consideration

- Potential lower cost for disinfection alone
  - Unsure if disinfection alone will satisfy water quality requirements

Development and Evaluation of Alternatives

Infiltration/Inflow (I/I) Control

- Positives – improves water quality, reduces combined sewer volume
- Negatives – high cost, possible disruption in services, extensive construction



Development and Evaluation of Alternatives

Infiltration/Inflow (I/I) Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows per Year	Reduction of Overflow Volume from Baseline (%)	Key Constraints
Baseline conditions for 2004	68%	56	N/A	-
Removal of Inflow and Infiltration (I&I)*	68%	56	0.1%	Does not reach performance & water quality goals, number of overflows not reduced.

***Removal of I/I based on 2015 Combined Sewer System Condition Assessment completed by Arcadis**

Development and Evaluation of Alternatives

Storage alternatives– temporarily store combined sewer flow and pump back slowly to the treatment plant after rain event

- In-line storage – not feasible because there is no additional capacity to store combined flow in the current sewer system
- Off-line storage – underground storage tanks near the outfalls or a tunnel
  - Positives – eliminates or reduces overflow discharges, reduces sewer backups, improves the efficiency of existing treatment capacity
  - Negatives – lack of real estate, high cost

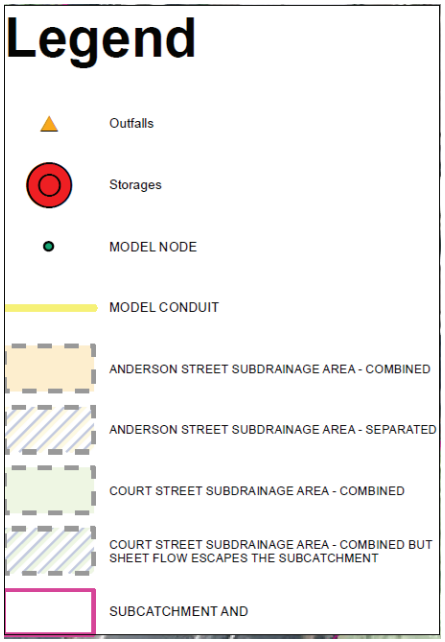
Storage Tunnel from Anderson to Court

Development and Evaluation of Alternatives

Storage Tunnel from Anderson to Court Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Key Constraints
Baseline condltions for 2004	68%	56	N/A	-
Tunnel Storage - 17.8ft Diameter	96%	4	89.6%	Constructability of a deep tunnel has risks, high cost.
Tunnel Storage - 17ft Diameter	95%	8	87.2%	Constructability of a deep tunnel has risks, high cost.
Tunnel Storage - 14ft Diameter	93%	12	79.7%	Constructability of a deep tunnel has risks, high cost.
Tunnel Storage - 10.5 ft Diameter	86%	20	60.9%	Constructability of a deep tunnel has risks, high cost.

Storage Prescreening Alternative – 2 Underground Storage Tanks (100-foot deep) near Court and Anderson Outfalls



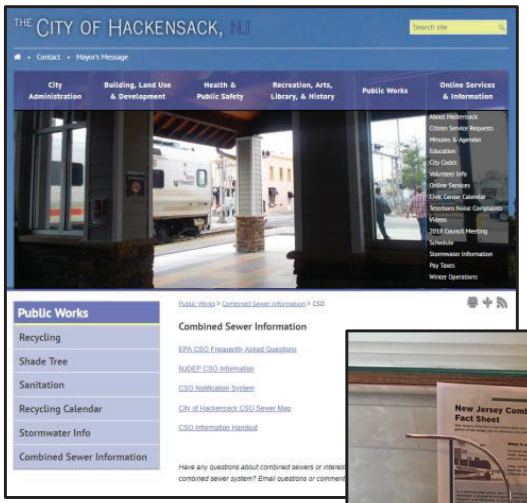
Development and Evaluation of Alternatives

Storage Prescreening Alternative – 2 Underground Storage Tanks (100-foot deep) near Court and Anderson Outfalls Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Key Constraints
Baseline condltions for 2004	68%	56	N/A	-
Two tanks, 115 ft dia.	98%	4	93.0%	Siting issues for tank locations, high cost.
Two tanks, 105 ft dia.	96%	8	89.7%	Siting issues for tank locations, high cost.
Two tanks, (1) 90 ft dia., (1) 87 ft dia.	94%	12	81.6%	Siting issues for tank locations, high cost.
Two tanks, 73 ft dia.	89%	20	66.9%	Siting issues for tank locations, high cost.
Two tanks, 60 ft dia., (85% Capture)	85%	25	52.7%	Siting issues for tank locations, high cost.

Public Participation Goals

- Educate residents and businesses about the combined sewer system
- Inform residents/businesses about future projects and costs
- Incorporate public feedback into the selection of alternatives
- How?
  - Surveys – posted to the City's website
  - Public meetings
  - Invite interested residents to join Public Participation Team



Summary

- Development and Evaluation of Alternatives
  - Evaluate alternatives
  - Refine estimated costs for alternatives
  - Continue outreach efforts to receive public feedback
- Next Steps
  - 2019-2020 selection of LTCP program alternatives for CSO control
- Questions?
  - Website: www.hackensack.org/cso
  - Email: csoteam@hackensackdpw.org

Dearborn, Michigan: http://www.we-technologies.com/wastewater-projects.php

CITY OF HACKENSACK

Combined Sewer System LTCP

Selected Plan Update

Supplemental CSO Team Meeting, July 21, 2020

Agenda

- Overview of Hackensack's Combined Sewer System (CSS)
- Development and Evaluation of Alternatives (DEAR) Review
- Selection and Implementation of Alternatives (SIAR) Update
  - Selection of Approach – "Presumption" or "Demonstration"
  - SIAR Selected CSO Control Plan
    - Projects
    - Implementation Schedule / Phased Approach
    - Updated Cost Estimate
- Next Steps

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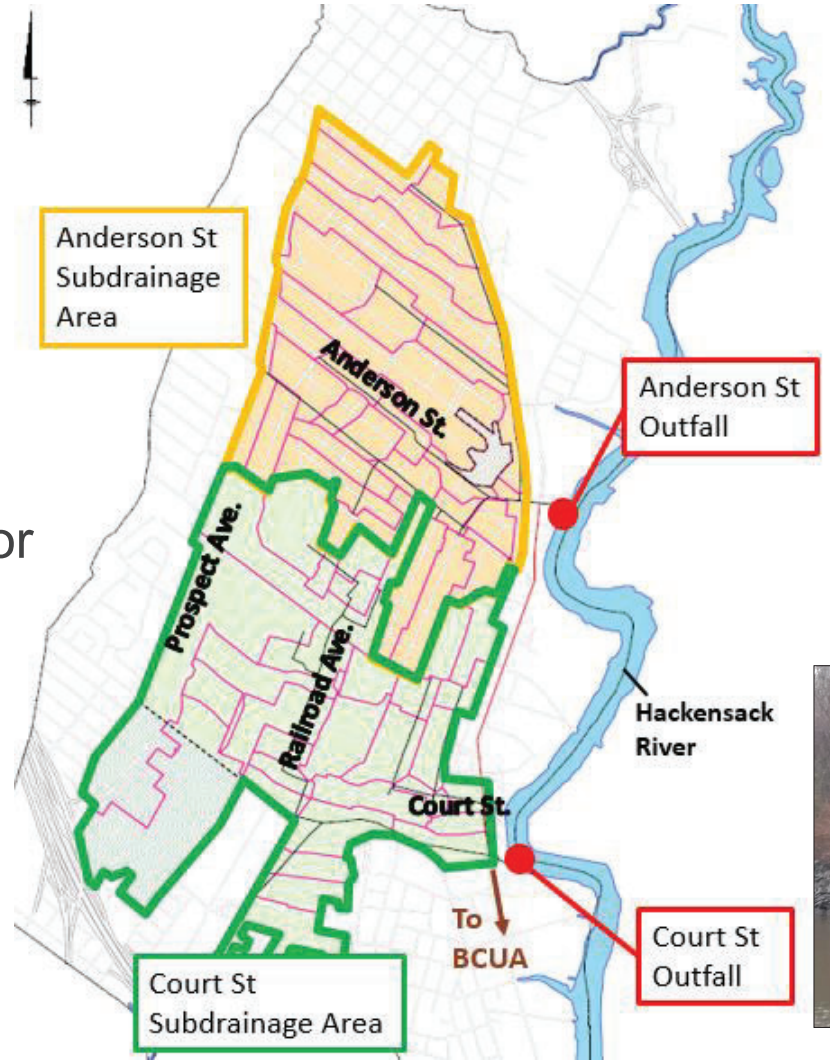
CSS Overview

- Approximately 31 miles of combined sewers
- Approximately 50% of Hackensack's population is served by the CSS
- Screening facilities installed for both outfalls



DEAR Control Alternatives Review

- Development and Evaluation of Alternatives Report (DEAR)
  - Submitted to NJDEP on June 30, 2019
  - Approved by NJDEP on February 12, 2020

Alternative	Percent Capture	Total Estimated Costs
Baseline Conditions for 2004	68%	-
Full City-wide Sewer Separation	100%	$560M
Pretreatment and Disinfection	-	$50M
GI - 10% Impervious Area	70%	$43M
Removal of I&I	68%	$11M
Tunnel Storage - 85%	86%	$74M
Satellite Storage Tanks - 85%	85%	$66M
Regional Storage Tank - 85%	85%	$63M

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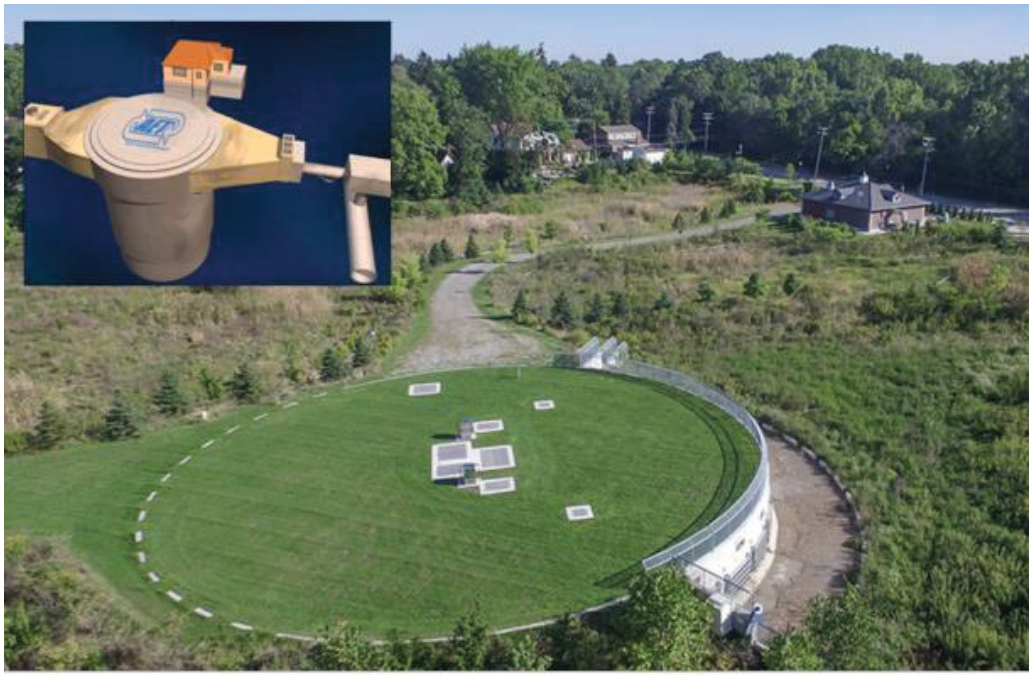
DEAR Control Alternatives Review

- Storage Tank Alternative



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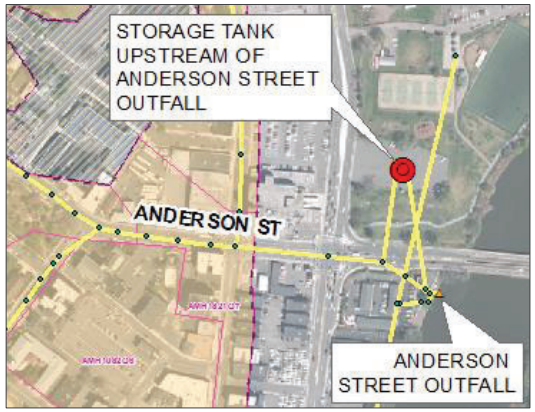

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Sewer Separation Control Alternative

- **Supplemental Alternative - Court Street Subdrainage Area Stormwater Project:**
  - Mitigates flooding issues and increases CSO capture
  - Stormwater interceptor with in-line storage along Railroad Avenue
  - Pump Station near the Hackensack River

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SIAR CSO Approach Selection

- Selection of approach: “Presumption” or “Demonstration”?
- Due to water quality compliance issues in the Hackensack River, the “presumption” approach is selected.
- **Goal:** Increase system-wide percent CSO capture in Hackensack from 68.5% (baseline) to a minimum of 85%

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SIAR Selected CSO Control Plan

- **Selected CSO Long-Term Control Plan Projects:**
  - Green Infrastructure Program
  - Court Street Subdrainage Area Stormwater Project
  - Additional Localized Sewer Separation Projects
  - Anderson Street Storage Tank

© Arcadis 2020

SIAR Selected CSO Control Plan

- **Green Infrastructure (GI) Program:**
  - A certain amount of funds, including grant funding, per year of the LTCP (to be determined) will be allocated towards a green infrastructure program
  - Create an ordinance to require more GI for developers to install
  - The green infrastructure program will serve as a functional and educational program for the public:
    - Provides localized benefits of stormwater management and aids in flooding mitigation
    - Provides awareness of the impact of CSOs and impervious coverage on the environment
    - Potential GI sites and technologies will be evaluated, designed and installed during the LTCP

Permeable Pavement

Bioswale

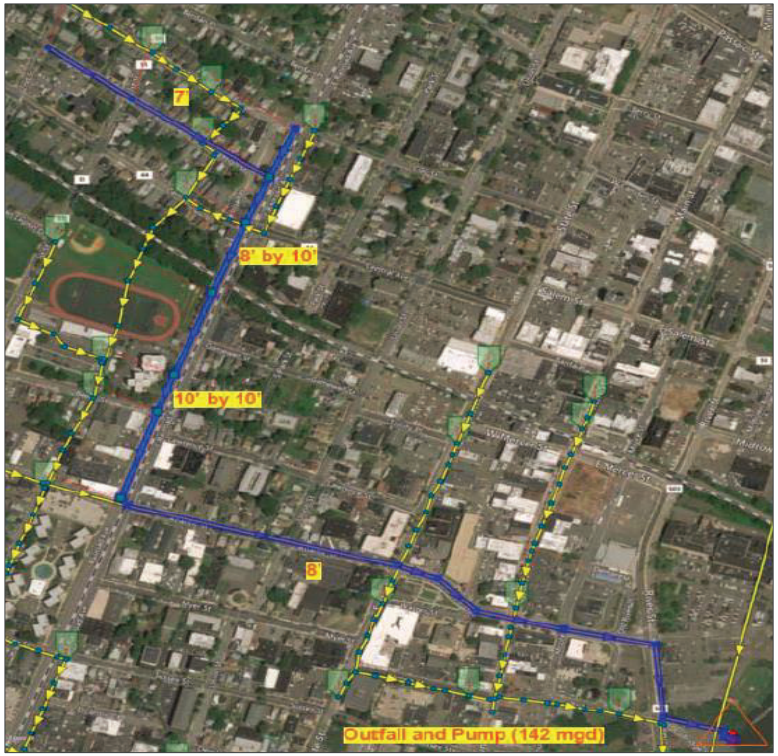
Rain Garden

© Arcadis 2020

SIAR Selected CSO Control Plan

- **Court Street Subdrainage Area Stormwater Project:**
  - Stormwater mitigation project located in the Court Street Subdrainage Area
  - Project objectives based on Court Street Stormwater Study completed by Arcadis
  - Dual benefit project: flood mitigation and CSO reduction

Court Subdrainage Area (Outfall 002A)	
	% CSO Capture
Baseline (existing)	72.0%
Stormwater Project	88.3%



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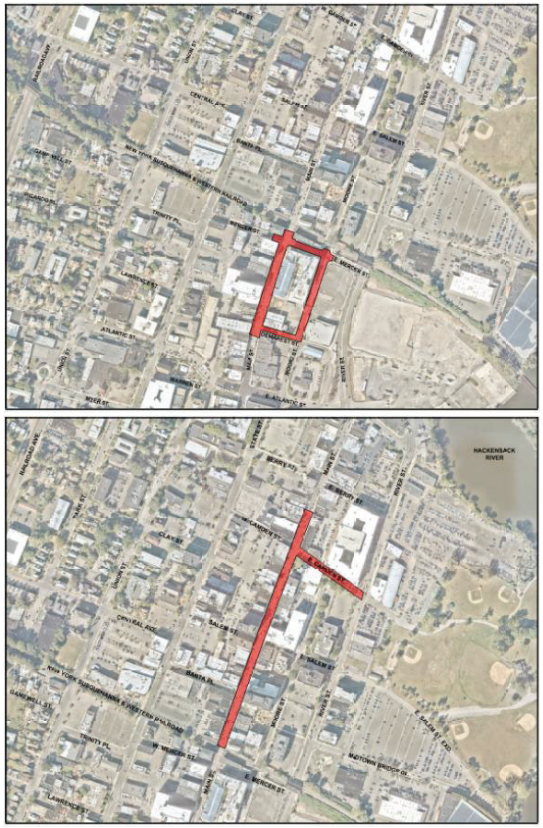
SIAR Selected CSO Control Plan

- **Localized Sewer Separation Projects:**
  - The City currently has two sewer separation projects in construction on Main Street
  - These projects will contribute to localized sewer separation projects noted in the City's LTCP
  - Approximately 22 acres* of contributing runoff area reduced from the CSS, primarily in Court Street area
  - The City will undertake additional localized sewer separation projects and construct adequately sized stormwater outfalls during the LTCP
    - Additional sewer separation project locations to be developed after submission of SIAR Report



Design and figures courtesy of Suburban Consulting Engineers, Inc.

*Does not account for all roof runoff that may still connect to combined sewer system after construction

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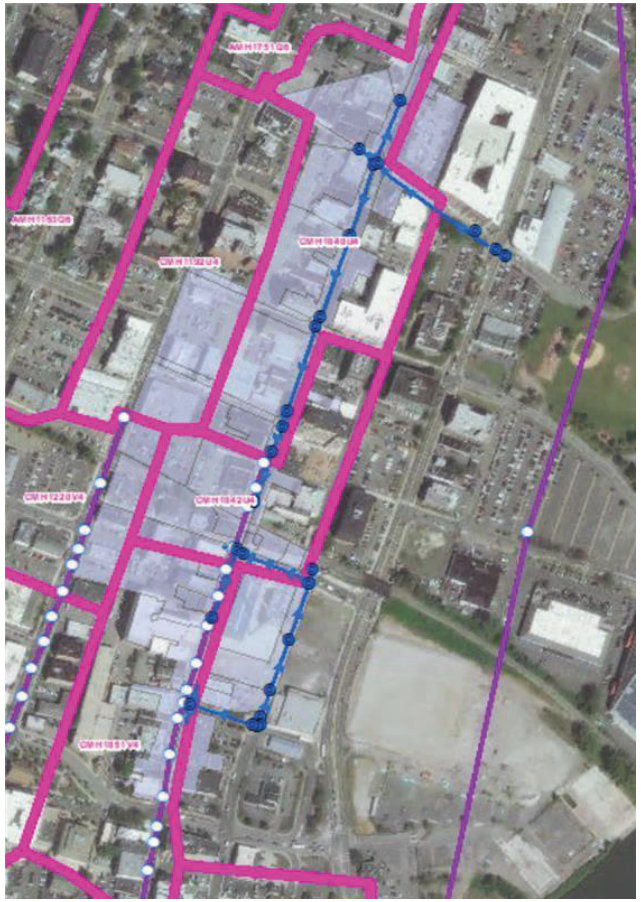
SIAR Selected CSO Control Plan

- **Localized Sewer Separation Projects:**

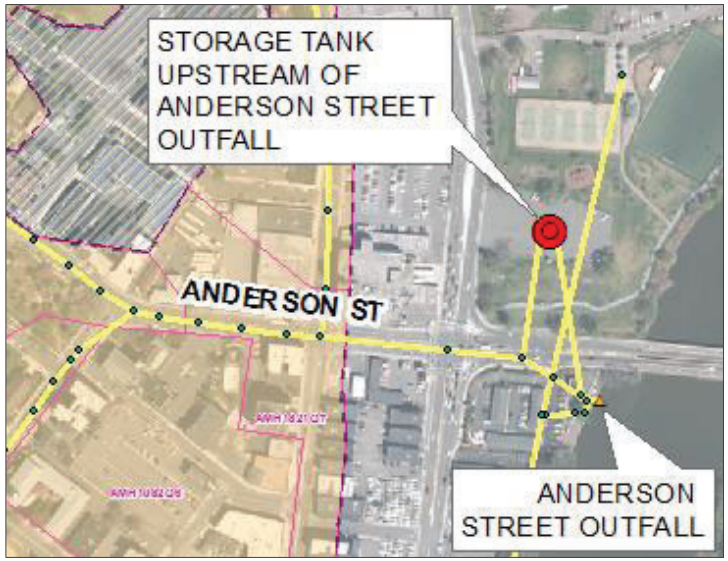


Design courtesy of Suburban Consulting Engineers, Inc.

© Arcadis 2020

SIAR Selected CSO Control Plan

- **Anderson Street Storage Tank:**
  - Storage tank in the Anderson Street subdrainage area to reach the minimum 85% capture system-wide goal is still anticipated
  - Storage Tank size:
    - Approximately 2.5 MG
    - Approximately 100 feet deep by 65 feet in diameter
  - Storage Tank will be primarily underground and potentially underneath the parking lot near Johnson Park
  - Stored CSO will be pumped back to BCUA when the BCUA interceptor has adequate capacity to receive the flow



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SIAR Selected CSO Control Plan

- **Summary Model Results:**
  - Court Street Subdrainage Area Stormwater Project
  - Localized Sewer Separation Projects (x2 ongoing Main Street projects thus far)
  - Anderson Street Storage Tank

Area	Overflow Volume (MG)	Captured Volume (MG)	% Capture
Baseline Conditions Total CSS	256.6	558.1	68.5%
Anderson Street Area (Outfall 001A)	40.1	204.8	83.6%
Court Street Area (Outfall 002A)	37.5	353.6	90.4%
Total Hackensack CSS	77.7	558.4	87.8%

  - Conservatively above the 85% capture goal

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SIAR Selected CSO Control Plan

- **Implementation Schedule / Phased Approach**
  - 30-year implementation to reach system-wide 85% capture goal
  - Phased implementation approach DRAFT:

Year	0-5	6-10	11-15	16-20	21-25	26-30
Main Street Sewer Separation Projects (ongoing)	Ongoing					
Court Street Stormwater Project	Start			Completion		
Additional Localized Sewer Separation Projects	Start			Evaluate		
Anderson Street Storage Tank					Re-evaluate	
Green Infrastructure Program	Start					Completion

  - The size and necessity of a storage tank at Anderson Street will be re-evaluated after construction of additional localized sewer separation projects. A flow monitoring program and model recalibration process would be required to determine the system-wide percent capture prior to final design of a storage tank.

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SIAR Selected CSO Control Plan

- **Revised Opinion of Probable Cost**
  - Updated the capital costs based on 30-year schedule to reach 85% capture goal
  - Utilized PVSC cost reference guide from 2020 for consistency amongst CSO communities

Selected Plan	Capital Cost ($M)
Main Street Sewer Separation Projects (ongoing)	$5.8
Court Street Stormwater Project	$61
Additional Localized Sewer Separation Projects	TBD
Anderson Street Storage Tank	$42
Green Infrastructure Program ($100K/year - TBD)	$3
Total (without additional sewer separation projects)	$111.8

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Next Steps

- Refine cost estimates
- Finalize the Financial Capabilities Analysis (FCA)
- Finalize Implementation Schedule
- Host a public meeting for the residents of Hackensack
  - Date to be determined
  - Virtual or In-person meeting to be determined
- Finalize SIAR Report – submit to NJDEP by October 1, 2020

- Questions?
  - Website: www.Hackensack.org/cso
  - Email: csoteam@hackensackdpw.org

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City of Hackensack CSO Survey

Questions Responses 32

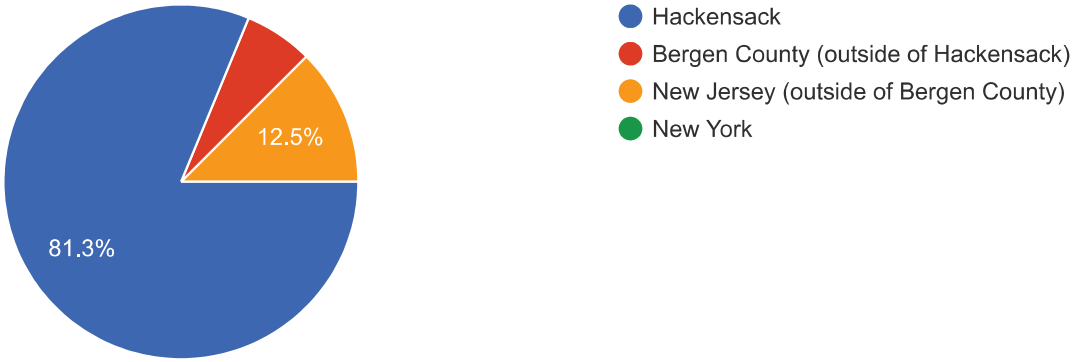
32 responses

Accepting responses

Summary Question Individual

Where do you live?

32 responses

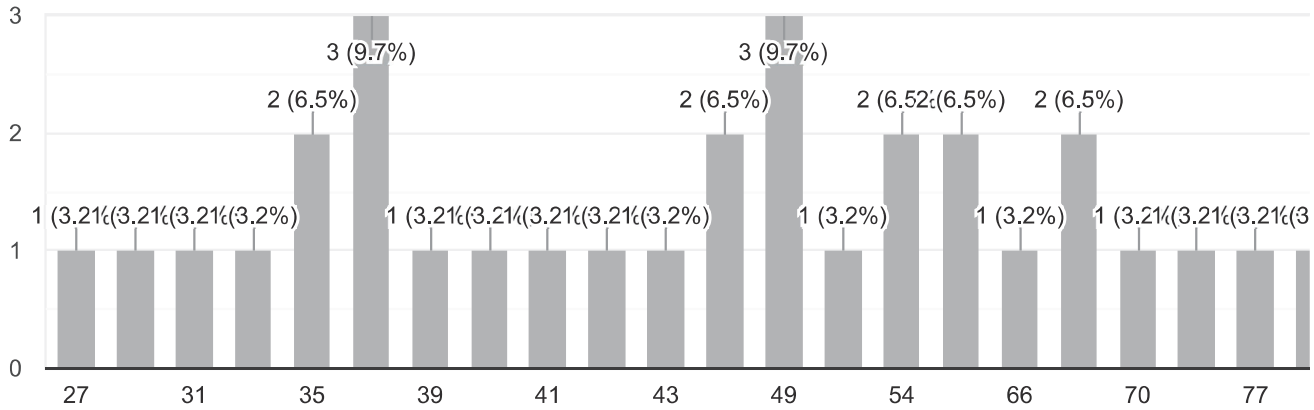


Where do you work?

32 responses

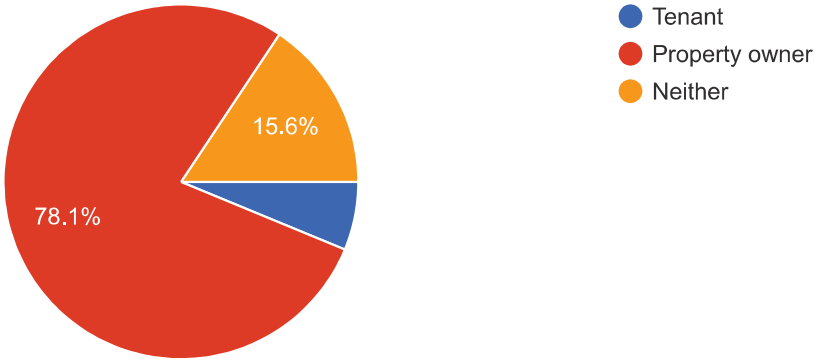
How old are you?

31 responses



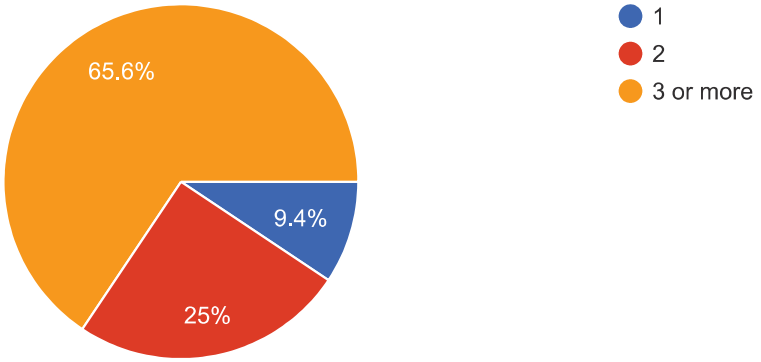
Are you a tenant or a property owner in Hackensack?

32 responses



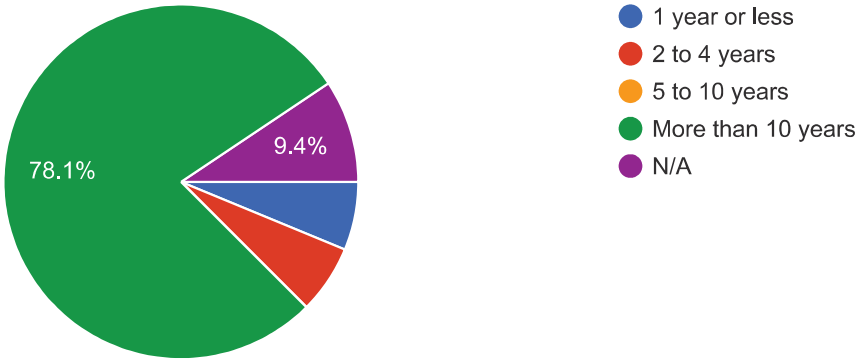
How many people live in your household (including yourself)?

32 responses



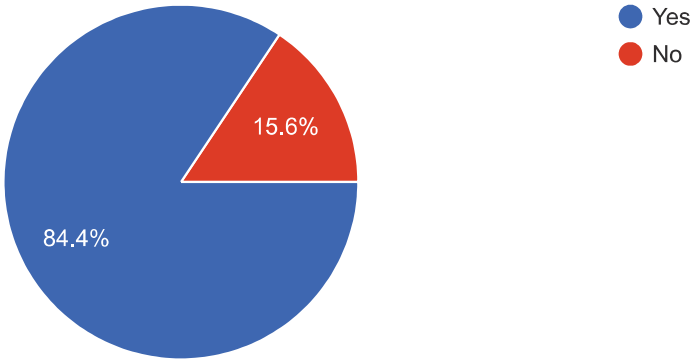
How long have you lived or worked in Hackensack?

32 responses



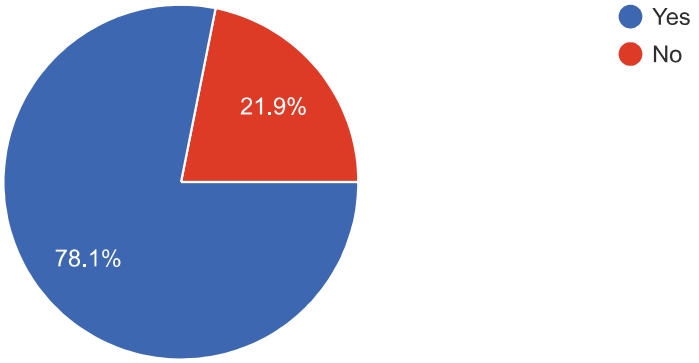
Do you know that a portion of Hackensack has a combined sewer system (stormwater and sanitary sewage enter into a single pipe system)?

32 responses

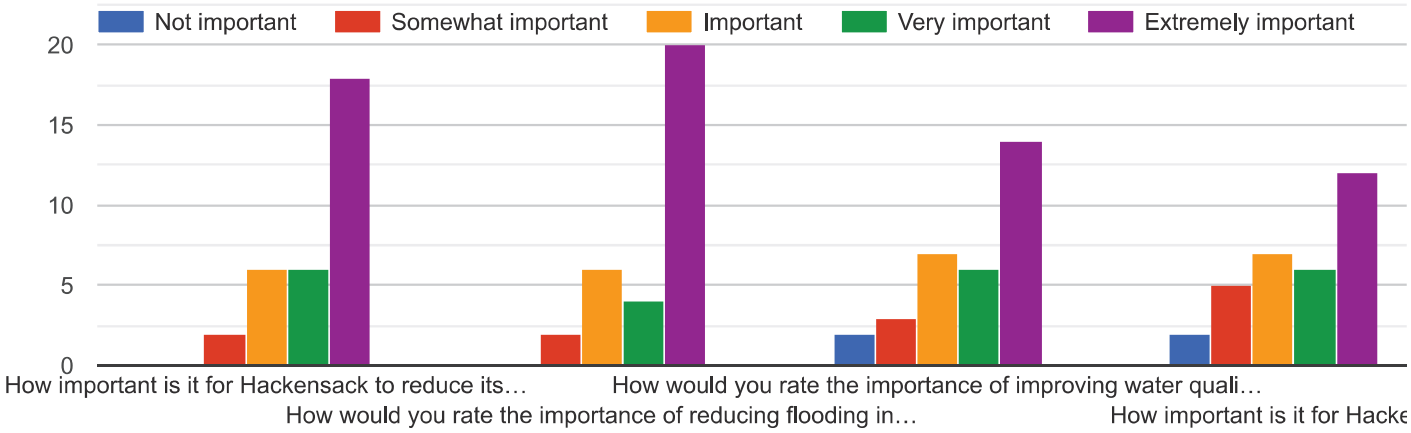


Do you know that the combined sewer system sometimes overflows to the Hackensack River during rain events?

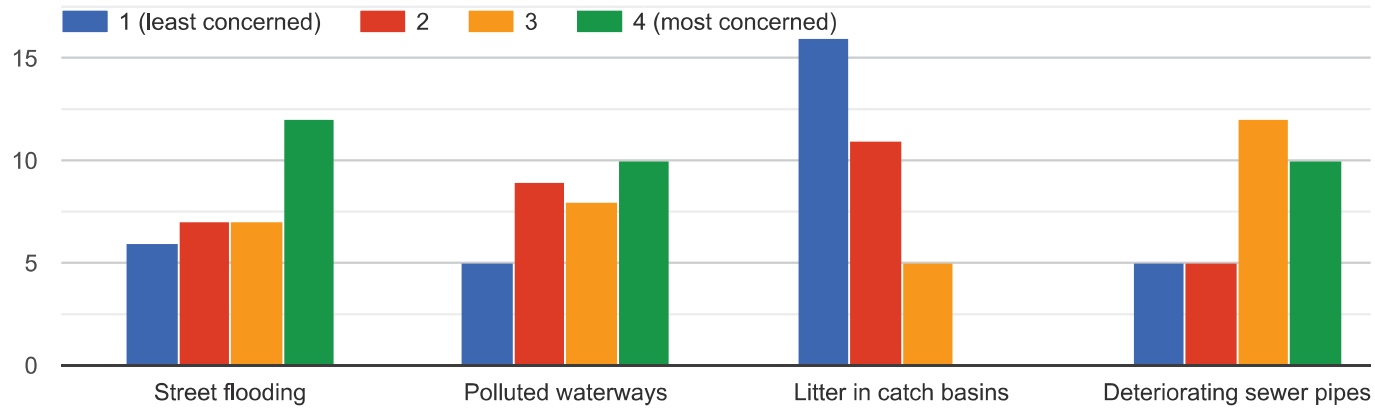
32 responses



Please rate the importance of the following:

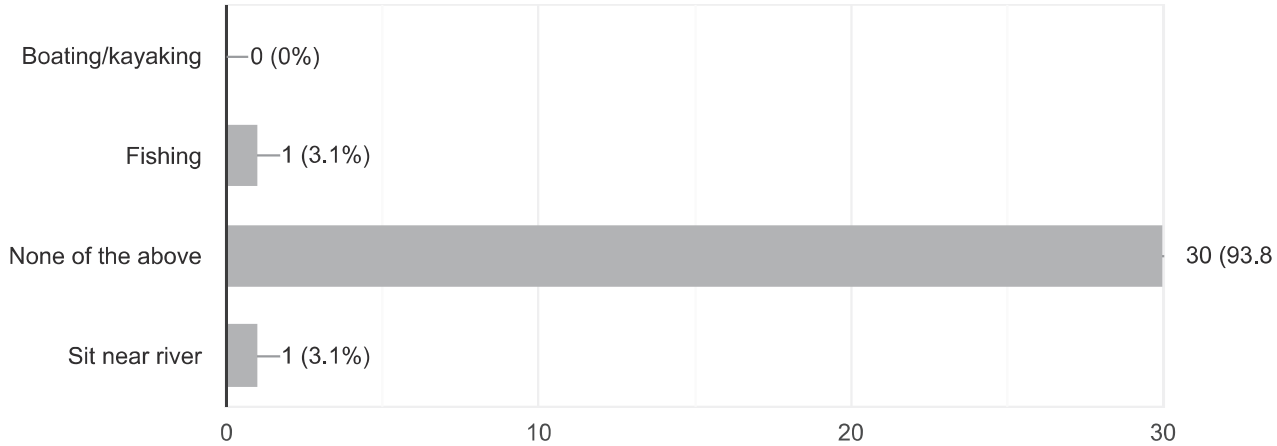


Please rank your concerns from 1 to 4 (1=least concerned, 4 = most concerned):



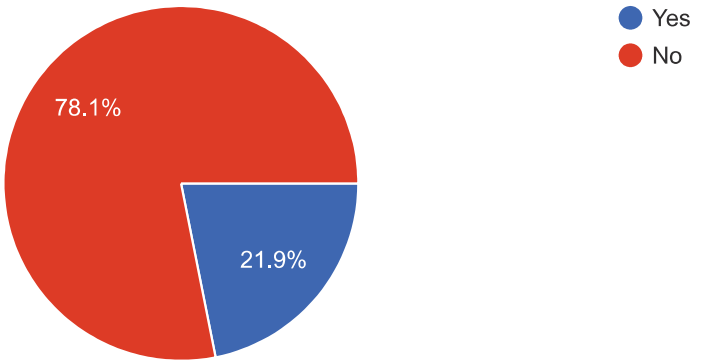
Do you use the Hackensack River for any of the following activities?

32 responses



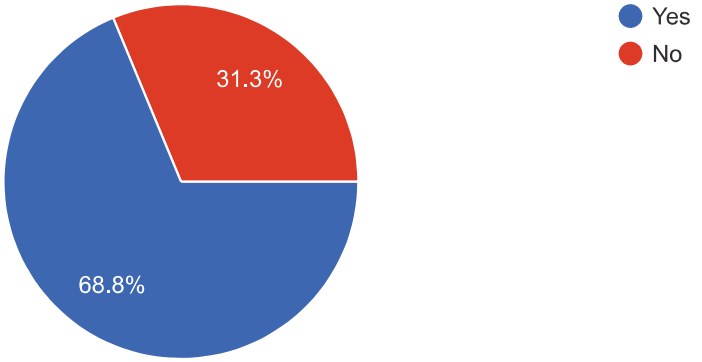
Are you interested in joining a committee to help plan public outreach about combined sewer overflows and to provide input on combined sewer overflow infrastructure projects?

32 responses



Would you attend a public information session to learn more about combined sewer overflows and what the City is doing to address them?

32 responses



Attend a public session about combined sewer overflows!

Please share any additional comments or questions.

5 responses

My main concern is in the event of a mass amount of flooding, many of the residents and their property could be exposed to unsanitary and/or unhealthy sewer water. Example would include from River Street to Jackson Ave. during hurricane Sandy. Not to mention a fairly consistent amount of sewer manholes with sewage pouring into the streets during heavy rain storms

The solution to Street Flooding should be a top priority

Update the infrastructure of roads also!

I lived in Hackensack for 35 years

UPDATES AND PROGRESS

Please provide your email address if you would like to be included in future email correspondence about the City's combined sewers (optional).

10 responses

itsamike@gmail.com

Petermarchesani@optonline.net

erin.liz.bracken@gmail.com

wjd22@aol.com

jpepe3691@aol.com

Ultraviolet3@aol.com

jewelusa@aol.com

candi121892@gmail.com

ericmartindale2@gmail.com

19. Appendix E – Village of Ridgefield Park Public Participation Meeting Minutes and Presentation (Since Public Participation Process Report)

Village Website – Home Page and CSO Page

Village Newsletter Copy – March 2020

Village Caucus Meeting – April 4, 2019

Village Caucus Meeting – October 17, 2019

Public Presentation Slides- Posted to Village Website, and Presented at Hearing on September 29, 2020

Supplemental CSO Team Meeting #7 – January 23, 2019

Supplemental CSO Team Meeting #8 – May 28, 2019

Supplemental CSO Team Meeting #9 – September 24, 2019

Supplemental CSO Team Meeting #10 – February 5, 2020

Supplemental CSO Team Meeting #11 – July 30, 2020

The Village of Ridgefield Park
Settled in 1685

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Local News

Notice of CSO Public Hearing - Tuesday Sept 29th »

Combined Sewer Overflow (CSO) Long Term Control Plan

Press Release from the Board of Commissioners »

Critical Information for all Village Residents and Business Owners --

Voter Registration Deadline for General Election »

Hackensack, NJ, August 27, 2020 - Bergen County Superintendent of Elections Patricia DiCostanzo issued a notice that...

View all

Meetings

Bulletins

Citizen Action Center

- COVID-19 Real-Time Information
- Subscribe to News & Alerts
- Forms & Applications
- Online Bill Pay
- Ordinances
- Recreation
- CSO General Info & Meeting Minutes
- CSO Notification
- Minutes & Agendas
- Service Requests
- Volunteer
- Contact Us

Village Events

« September »

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

All upcoming events

Village of Ridgefield Park
234 Main St, Ridgefield Park, NJ 07660
Phone: 201-641-4950 Fax: 201-641-1248

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Home

Ridgefield Park: The Future of our Waterways is in Your Hands

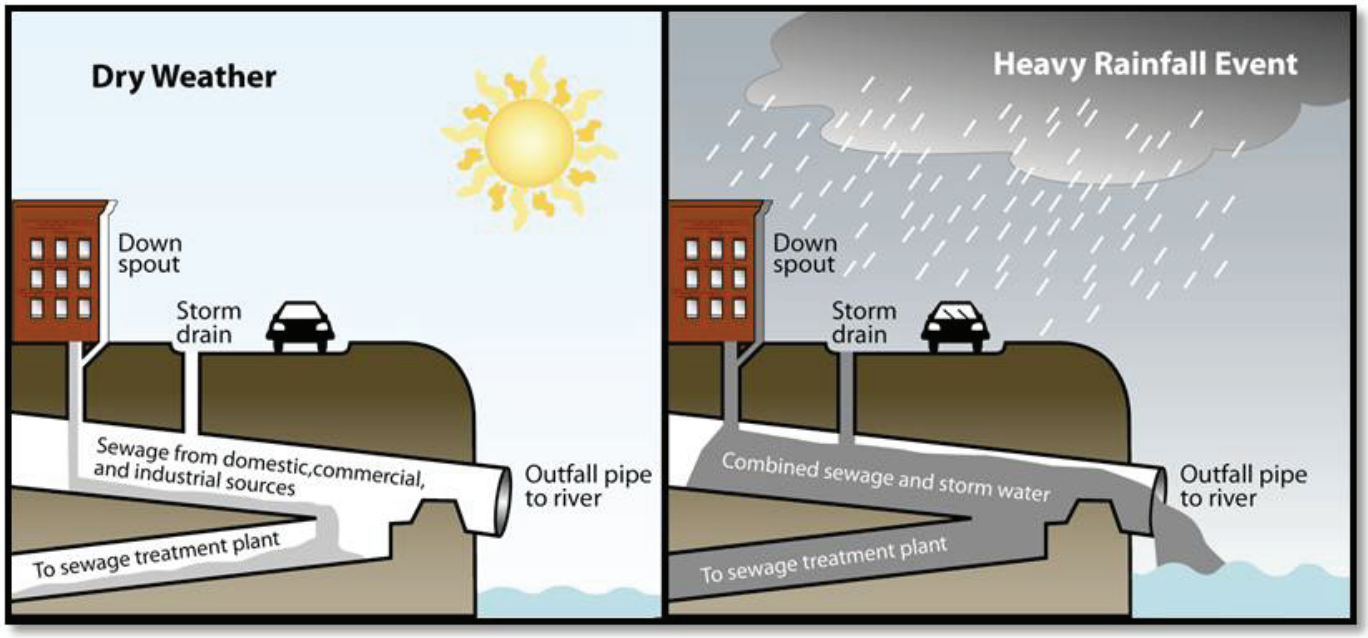
Meeting Minutes

Plese be advised that the Board of Commissioners will hold a Public Hearing on Tuesday, September 29, 2020 at 7:30pm concerning the Combined Sewer Overflow (CSO) Long Term Control Plan. The meeting will be held in the Municipal Building Courtroom (3rd Floor).

Click on this LINK to view a video on the Village CSO Long Term Control Plan...

Did you know that the Village of Ridgefield Park, like many older urban areas, has a Combined Sewer System (CSS) that discharges into local waters during heavy rainfall?

The Village of Ridgefield Park has six combined sewer outfalls. Four of these outfalls discharge to the Hackensack River, which is classified as Saline Estuary (SE1) waters. Two outfalls discharge to the Overpeck Creek, which is classified as Saline Estuary (SE2) waters. The designated uses for SE1 waters are primary and secondary contact recreation, and for SE2 waters are secondary contact recreation.



Combined Sewer Systems are typically located in older urban areas and were constructed to provide for the transportation of sanitary sewage, industrial discharges and stormwater within the same pipe. The combined sewer systems in these municipalities were designed to transport all sewage flows and some wet weather flows for treatment at the Bergen County Utilites Authority Water Pollution Control Facilities in Little Ferry. The system was also designed to discharge excess flows from the Combined Sewer System owned and operated by these municipalities as a Combined Sewer Overflow (CSO) discharge into the adjacent waterways. The transport and treatment systems owned and operated by the BCUA have limited capacity and if CSSs were not permitted to overflow, the community would flood.

What can you do to help? SLOW the FLOW

As a community and as an individual you can help reduce the amount of water that enters the Combined Sewer System during wet weather events but this will take a shift in thinking. In the past, homeowners treated stormwater as something that should be diverted off their property as quickly as possible. The result would be flows in the combined sewer system that would exceed the treatment plant's capacity.

By taking a few simple and inexpensive steps, you can hold some of the rainwater on your property during the storm. The water you retain can be used on your property for watering plants or released to the sewer system gradually during dry weather.

Bergen County Utilities Authority offers a Rain Barrel Incentive Program as well as other tips for reducing the impact of rain water on the combined sewer system.

- Rain-derived Infiltration and Inflow Reduction Program (BCUA)
  https://www.bcua.org/index.asp?SEC=37286623-B069-4C00-8F98-A37A7D3EBCD1&Type=B_BASIC
- Homeowner's Guide (BCUA) and Rain Barrel Incentive Program
  https://www.bcua.org/vertical/sites/%7BF76805AC-71CD-427F-AD9B-9E08876F224A%7D/uploads/II_brochure.pdf

In addition, the Department of Environmental Protection offers information about Green Infrastructure that you can install when making modifications to your property.

- Environmental Protection Agency
  Green Infrastructure
  https://www.epa.gov/green-infrastructure

Ridgefield Park's Green Team also provides education on things that you can do to reduce your impact on the waterways.

- The Green Team
  https://www.ridgefieldpark.org/green-team

For More Information See these Important Links

- PVSC CSO Notification System
  https://njcso.hdrgateway.com
- Bergen County Utilities Authority
  History of CSOs and What is Being Done to Solve the Problem
  https://www.bcua.org
- New Jersey Department of Environmental Protection Division of Water Quality
  Combined Sewer Overflows
  https://www.state.nj.us/dep/dwq/cso.htm
- Environmental Protection Agency
  National Enforcement Initiative: Keeping Raw Sewage and Contaminated Stormwater Out of Our Nation's Waters
  https://www.epa.gov/enforcement/national-compliance-initiative-keeping-raw-sewage-and-contaminated-stormwater-out-our
- Clean Water New Jersey
  https://www.cleanwaternj.org

Meeting Minutes

- CSO Meeting 1 - May 25, 2017
- CSO Meeting 2 - September 11, 2017
- CSO Meeting 3 - December 11, 2017
- CSO Meeting 4 - March 12, 2018
- CSO Meeting 5 - June 11, 2018
- CSO Meeting 6 - October 1, 2018
- CSO Meeting 7 - January 23, 2019
- CSO Meeting 8 - May 28, 2019
- CSO Meeting 9 - September 24, 2019
- CSO Meeting 10 - February 5, 2020
- CSO Meeting 11 - July 30, 2020

Village of Ridgefield Park
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village newsletter

www.ridgefieldpark.org

VOL. 37 NO. 1 | Ridgefield Park, N.J. | MARCH, 2020

SPRING IN RIDGEFIELD PARK

Spring is here! But, did we actually have Winter? It didn't seem like it. But, that is what life is all about. Sometimes the expected is really the unexpected. So, let's talk about what we do expect for the coming months: April showers, Passover, Easter, warmer weather, flowers, baseball, soccer, shorts and short-sleeve shirts, and a lot of smiles for the feeling of renewal that Spring always brings.

Upcoming events in the Village: Little League Opening Day, Soccer Assoc. Opening Day, Arbor Day, Earth Day, Election Day on May 12th, Memorial Day, Flag Day, School graduations; and getting ready for the 4th of July! See inside for further details.

Spring is also the time for "spring cleaning." Time to tackle those chores that we have been putting off until Spring, Well now is the time to do it. House cleaning, painting the house, cleaning up the yard, recycling those old clothes, etc.

The ground is also warming up; and we can play farmer for a few months. Time to turn over the soil in the garden and plant those early Spring vegetables, etc. Get the rest of your garden planted as soon as the last day of frost passes. The last day of frost is May 12th.

Appreciate who you are and where you live — Ridgefield Park, New Jersey, It is a great place to live, work, raise your family, have fun, and sit back and relax. Now, let's charge into Spring.

Happy Spring!
Commissioner John Anlian
Commissioner Theresa Kohles
Commissioner Adam MacNeill
Commissioner Hugo Poli
Mayor George Fosdick

DRIVERS — YIELD TO PEDESTRIANS IN CROSSWALKS!

FROM THE VILLAGE CLERK'S OFFICE..... COMMISSIONERS MEETINGS

The Board of Commissioners of the Village of Ridgefield Park, pursuant to the Open Public Meetings Act NJSA 10:4-6 et seq., has established their Caucus and Regular meeting dates for the year 2020. The Caucus Meetings will be held on the Thursday preceding each Regular Meeting, unless otherwise indicated, at 7:00 PM at the Municipal Building, 234 Main Street, Third Floor. Regular meetings will be held on the second and fourth Tuesday of each month, unless otherwise indicated, at 7:30 PM at the Municipal Building, 234 Main Street, Third floor

Remaining 2020 Meetings:

2020 Caucus Meeting Dates:

March	5 and 19
April	9 and 23
May	7 and 21
June	4 and 18
July	9 and 23
August	6 and 20
September	3 and 17
October	8 and 22
November	5 and 19
December	8 and 22

2020 Regular Meeting Dates:

March	10 and 24
April	14 and 28
May	7 and 26
June	9 and 23
July	14
August	11
September	8 and 22
October	13 and 27
November	10 and 24
December	3 and 17

The Caucus Meeting of May 7, 2020 will begin at 6:00 PM with the Regular Meeting of May 7, 2020 immediately following.

RAFFLES

All Clubs, Organizations, PTAs or Individuals that conduct 50/50's, tricky trays, basket raffles, bingo, casino nights, or any other type of raffle must register with the State of New Jersey Legalized Games of Chance Commission to obtain an Identification Number. Only after obtaining this ID number can you apply for a raffle license.

The State will not issue a raffle license unless you are a registered organization. To register: www.njconsumeraffairs.gov/ lgccc

Failure to comply can result in your event being shut down.

Raffle license applications are available in the Village Clerk's office. Applications must be completed six (6) weeks prior to your raffle.

PROPERTY TAX PAYMENTS

Property Tax Payments can now be made online using a debit/credit card, or your bank account information. There will be convenience fees charged for this service. The convenience fee is charged by the provider and not the Village. To make a payment, visit the Village website: www.ridgefieldpark.org and click on the link: "Make online property tax payments"

When making tax payments, by mail or in person, please submit your entire tax bill for receipting purposes. If making payments by mail, please include a self-addressed stamped envelope if you request a receipt.

**THERE IS A DROP BOX LOCATED IN THE POLICE DEPARTMENT LOBBY FOR TAX PAYMENTS. PLEASE — NO CASH PAYMENTS

CIVIC CENTER UNDERGOES TRANSFORMATION

The building that we now call the Ridgefield Park Civic Center has had an interesting and varied history. It was originally built and was the home of the Union Church more than 125 years ago. In the 1940s, it was transferred to the Village ownership, and became a Civic Center which was the focal point for civic activities and a meeting place for community groups. Expanded about 45 years ago to also house

our nutrition center, it still provides a place for local groups to meet and enjoy their many activities,

More recently, under the guidance of Commissioner Adam MacNeill, the old "church section" of the civic center has been renovated and rehabilitated and is now being used as the Village's Youth Center. That part of the building is now ADA compliant, has accessible WiFi and Cable TV, is Firewall protected, and has closed circuit cameras for security. This new feature of the Civic Center provides a place for our youth to meet, study, read, play games, watch TV and have fun after school. It is open from 3pm to 7pm for grades 7 thru 12 — with parental consent. If you have a teenager in the family, please stop by and take a look.

VILLAGE'S FINANCIAL RATING INCREASED

With significant improvements in our Financial and Administrative Office, the Village's financial rating has been increased by Moodys Investors Service. On December 18th, Moody's issued a press release upgrading Ridgefield Park's general obligation rating to AL This was based upon a marked improvement during the past 2 years which has raised the Village's financial position with strong financial reserves and liquidity.

NATURE PRESERVE TO SEE NEW TRAIL AND BOARDWALK

Through the efforts of Commissioner John Anlian and Environmental Commission Chairman Steve Quinn, the Village's Nature Preserve will see the development of a new trail and boardwalk system during the coming year. The Village has been working on this project for some time, and with a $200,000 grant from the Bergen County Open Space Trust Fund, the nature trail and boardwalk will become a reality within the next year.

The nature preserve, which is located north of the High School, has been created by the Village acquiring various parcels of land during the past years with the purpose of preserving a little bit of Ridgefield Park in its natural state. Steve Quinn said that "it contains three different natural land zones — woodland, marsh, and field." and Anlian noted that "the trail and boardwalk will give residents a better opportunity to see these land zones and all of the flora and fauna that live there."

GREEN TEAM. WHAT'S A GREEN TEAM?

A number of years ago, the State of New Jersey established a program called "Sustainable Jersey" which encourages municipalities to form "Green Teams" to make their communities more environmentally friendly, more aware of the talents of residents, and essentially make their towns more "sustainable" - meaning having the ability to sustain themselves without a lot of outside costs, products and influences without compromising the ability of future generations to meet their needs. Examples of Green Team projects are the two community gardens (in McGowan Park and Fellowship Park), expanded recycling, making the Village more electric car friendly, establishing an Arts Association, etc.

The State awards sustainability points for each successful project that a municipality completes, and when you reach a certain level of points, you are designated to be either a Bronze, Silver or Gold Sustainable Community. Through the leadership of Mark Olsen (the first Green Team chairman), our Village Green Team has achieved the Bronze Level and is building towards the Silver. The net result of all of this activity is that Ridgefield Park is becoming more "sustainable" and has brought in a multitude of new people who are now active participants in our community. If you are interested in joining the Green Team or in any of their activities, please leave your name and contact information at the Village Clerk's Office.

VILLAGE GARDENERS

As you may know, a small group of residents plant flowers in the planters within the Main Street Business District and in the various neighborhood districts (Teaneck Rd., Ridgefield Ave., North Main St, and Central Ave). Our next planting will be taking place this Spring. If you are interested in helping, please leave your name and contact information at the Village Clerk's Office or you can e-mail your information to John Anlian at johnanlian@yahoo.com.

Early Spring planting will be in early April; and then the Mid-Spring planting will take place in mid-May. You don't need to be an expert gardener. All you need is a little time and a spoonful of enthusiasm. Come on and join the fun!

RIDGEFIELD PARK: THE FUTURE OF OUR WATERWAYS IS IN YOUR HANDS

Most of the Village of Ridgefield Park west of the Turnpike is served by combined sewers, which carry a mixture of sewage and stormwater runoff during wet weather. Combined sewer overflows (CSOs) discharge into local waterways during rain events, which takes place about 50 times in a typical year. Ridgefield Park has six CSO outfalls: four discharge to the Hackensack River and two discharge to the tidal portion of Overpeck Creek. Our Summer 2018 newsletter (http://tinyurl.com/vrpcsos) covered the basics of CSOs in Ridgefield Park and how you can help reduce CSOs.

A public meeting will be held on May 26th at 7:30p.m. in the municipal courtroom (234 Main Street). All reseidents are encouraged to attend to hear how the Village plans to address these CSOs and to offer comments on how it may impact the Village.

The Village's CSOs are regulated by the New Jersey Department of Environmental Protection (NJDEP) through a permit issued in July of 2015. The permit mandated that the Village prepare a Long-Term Control Plan (LTCP) by June 1, 2020 to reduce the occurrence of CSOs. Over the last year, the Village of Ridgefield Park, in collaboration with the Bergen County Utilities Authority and the engineering firm Mott MacDonald, has been working to develop and evaluate different approaches to reducing CSOs. These efforts are summarized here and described in a report submitted to the NJDEP which is available at https://www.state.nj.us/dep/dwq/cso-ltcpsubmittals.htm.

Alternatives

Alternative approaches to CSO control were evaluated using a two-tiered process. First, a broad range of possible approaches were screened based on their logistical, technical and economic feasibility. Approaches which passed this screening were then fur-

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ther developed into six control programs:

1. Using existing pipes to consolidate two outfalls to simplify other alternatives.
2. Two underground combined sewage storage tanks.
3. One combined sewage storage tunnel serving all outfalls.
4. Two CSO treatment facilities.
5. Installing new sewer pipes to separate sewage and stormwater into different systems.

Capturing runoff with "green infrastructure" (GI) which would infiltrate some runoff into the soil, rather than draining to the combined sewer.

Programs #2 through #5 were evaluated based on reducing CSOs from 53 currently in a typical year to 0, 4, 8, 12 and 20 overflows. Estimated (planning level) costs over a 20-year period are presented in the table below, including both capital (construction costs) and annual operation and maintenance costs over 20-years. Costs are expressed as "net present worth" to allow comparison. Costs are lowest for the Program #2 (storage tanks). It is important to understand that the costs will not be paid all at once, rather they will be spread out over as much as 20 to 30 years.

	Number of overflows per year				
	0	4	8	12	20
Control Program	**Cost (Net Present Worth in Million $)**				
1) Eliminate Outfall 006	not beneficial; not considered				
2) Storage (Consolidated)	$84	$54	$52	$47	$34
3) Tunnel	$118	$99	$99	$92	$86
4) Treatment (Consolidated)	$87	$77	$77	$77	$60
5) Sewer Separation	$193	NA	NA	NA	NA

Green infrastructure (Program #6) alone is not able to reduce CSOs to the targeted number of events per year but could be employed to supplement another program. Accordingly, GI was costed based on its ability to manage stormwater runoff from between 2.5% and 10% of the impervious area draining directly to the combined sewers. However, it is estimated that only 4% of the Village's impervious area can feasibly be directed to GI. Again, costs include construction, operation and maintenance over 20 years expressed as net present worth.

	Percent of Impervious Area Managed			
	2.50%	5%	7.50%	10%
Control Program	**Cost (Net Present Worth in Million $)**			
6) Green Infrastructure	$2.7	$5.8	$8.8	$11.6

Note: Green Infrastructure alone is unable to meet the requirements of the permit and an estimated maximum of 4% of the Village's impervious area can be directed to GI.

Each alternative program was scored on the six criteria below on a scale of 1 (lowest performance) to 5 (highest performance).

- Cost per unit volume reduction of CSOs
- Reduction volume of CSOs
- Reduction in the frequency of occurrences of CSOs
- Institutional feasibility (e.g., the difficulty in obtaining permits from regulatory agencies to construct facilities)
- Technical feasibility (e.g., probability that unexpected conditions such as poor soil or underground utilities could disrupt construction plans)
- Public acceptance

Each criterion was assigned a weighting to determine an overall, weighted-average score for each program, as shown below.

NEXT STEPS

During the coming months, the Village will determine the target level of control (i.e., number of overflows or volume per typical year). Then, the Village will select and plan specific projects to be implemented over the next 20 to 30 years to achieve the target. The report detailing this plan must be submitted to NJDEP by June 1, 2020.

HOW YOU CAN BE INVOLVED

You have the opportunity to influence what control programs and facilities will be planned. First, you can read the details of each alternative control programs in the full report, which includes a five-page executive summary, available at the URL above. The Village has also set up a Supplemental CSO Team consisting of Village officials and residents, which provides advice on the CSO control project. You can read minutes of and presentations given at previous meetings of the Team on the Village's CSO webpage at http://tinyurl.com/vrpcsos.

Be sure to attend the public meeting about the proposed plan on May 26th at 7:30 p.m. in the municipal courtroom at 234 Main Street.

You can email your comments or questions to john.dening@mottmac.com, please include "VRP CSO Public Input" in the subject line.

Control Program	Cost per CSO volume reduction	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consolidated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

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Status Update
Village of Ridgefield Park
CSO Long Term Control Plan

Village of Ridgefield Park
Commissioners Caucus Meeting

April 4, 2019

1

Why is the Village Undertaking this Project?

New Jersey Pollutant Discharge Elimination System (NJPDES)

NJPDES Individual Permit Issued March 12, 2015 (5-Year Permit Cycle)

Requires Permittees to:

- Install New Outfall Signs (completed)
- Create and Maintain a CSO Hotline or Website
  - Completed thru NJ CSO Group
- Discharge Monitoring Reports (monthly DMRs) (compliant)
- Update System Data compiled in 2006 (completed)
  - GIS Map Developed
- Global Positioning System (GPS) Data (completed)
- Update Operation and Maintenance Manual (completed)
- Update Standard Operational Procedures (SOPs) (completed)
- Develop an Asset Management Plan (completed)

4/4/2019 Update 2

2

Why is the Village Undertaking this Project?

New Jersey Pollutant Discharge Elimination System (NJPDES)

NJPDES Individual Permit Issued March 12, 2015 also required:

- Baseline Compliance Monitoring Program
  - Completed thru NJ CSO Group
- System Characterization Study (completed)
- Public Participation Process Report (completed)
- Consideration of Sensitive Areas (completed)
  - Completed thru NJ CSO Group
- **Develop and Evaluation of Alternatives – Deadline Jul 1, 2019**
- **Submission and Implementation of Alternatives Report**

  Deadline Jun 1, 2020

4/4/2019 Update 3

3

Ridgefield Park CSO Long Term Control Plan

Update

Summary of Findings to Date

- Baseline Compliance Monitoring
- Consideration of Sensitive Areas

Update 4 4/4/2019

4

Ridgefield Park CSO Long Term Control Plan

Update

Baseline Compliance Monitoring Program
Water Quality Standards within the Region

Class	Description	Bacterial Standards	Monthly Mean	Single Sample Max	Protected Uses
SC	Saline Ocean	Entero	35	104	Primary Contact, Shellfishing
SE1	Saline Estuary	Entero	35	104	Primary Contact
SE2	Saline Estuary	Fecal	770	NA	Secondary Contact
SE3	Saline Estuary	Fecal	1500	NA	Secondary Contact
FW2	Fresh Water	Ecoli	126	235	Primary Contact and Public Water Supply

Update 5 4/4/2019

5

Ridgefield Park CSO Long Term Control Plan

Update

Class	Bacterial Standards	Monthly Mean	Single Sample Max	Protected Uses
SE1	Entero	35	104	Primary Contact
SE2	Fecal	770	NA	Secondary Contact
FW2	Ecoli	126	235	Primary Contact Public Water Supply

Update 6 4/4/2019

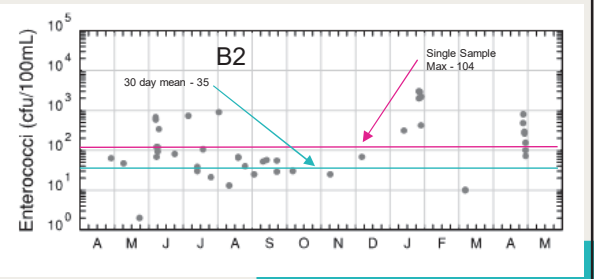
6

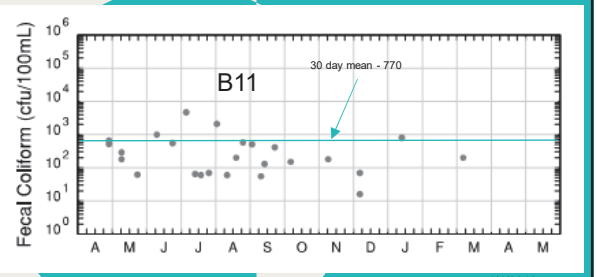
Ridgefield Park CSO Long Term Control Plan

Update

Hackensack River

- Dry Weather Monitoring
- B2 & B11



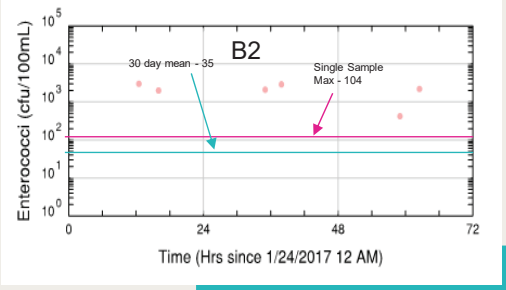


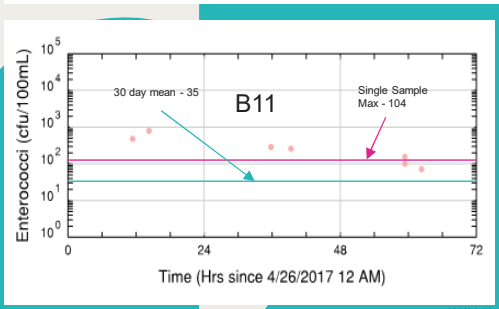
Ridgefield Park CSO Long Term Control Plan

Update

Hackensack River (SE1 Region)

- Wet Weather Monitoring B2





Ridgefield Park CSO Long Term Control Plan

Update

Baseline Compliance Monitoring Program

- Hackensack River (SE1 Region)
  - Is Not Consistently Meeting Water Quality Standards for Pathogens
- Overpeck Creek (SE2 Region)
  - Is Not Consistently Meeting Water Quality Standards for Pathogens

Update 9 4/4/2019

9

Consideration of Sensitive Areas

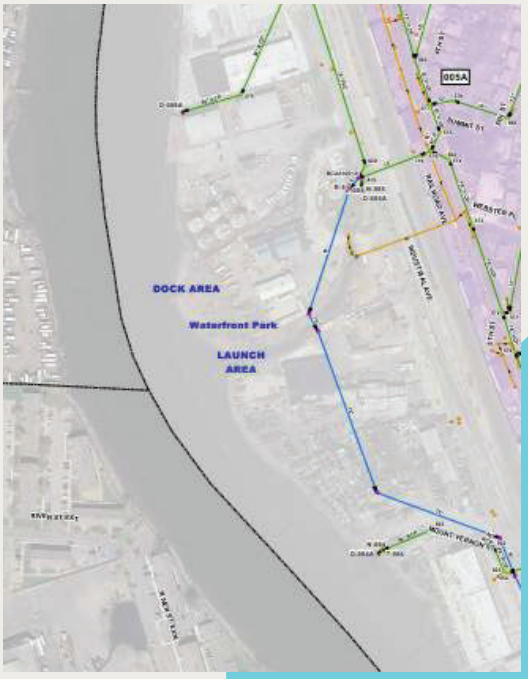
Primary Contact Recreation Waters

Hackensack River Classified as SE1
Along Waterfront Part
Intended Use - Primary Contact

Waterfront Park is Used by the Wanda Canoe Club to launch Canoes and Kayaks

NJDEP Considers Kayaking Primary Contact

There are no other known potential Primary Contact Areas in and around Ridgefield Park.



4/4/2019 Update

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Ridgefield Park CSO Long Term Control Plan

Update

Development and Evaluation of Alternatives

- What are the Regulatory Requirements?

  Presumptive Approach
  - No More than 4 Overflows per year
  - Not less than 85% capture of Annual Overflow Volume
  - Removal of pollutant loads equivalent to 85%

  Demonstrative Approach
  - Control Level that will not prevent the attainment of water quality in the future

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Ridgefield Park CSO Long Term Control Plan

Update

What does the permit say?

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

12

Ridgefield Park CSO Long Term Control Plan
Update

The Permit Requires the Evaluation of the Following Alternative Controls:

- Green Infrastructure
- Increased Storage Capacity
- Infiltration and Inflow Reduction
- Sewer Separation
- Satellite Treatment of CSO Discharge
- Bypass of Secondary Treatment at STP (BCUA)
- Treatment Plant Expansion (BCUA)

13

Green Infrastructure

We previously reviewed:

- Rain gardens
- Bioswales
- Pervious Pavement
- Green Roofs
- Downspout Diversion
- Rain Barrels

14

Ridgefield Park CSO Long Term Control Plan
Update

Green infrastructure (GI) = practices which reduce stormwater volume or flow rate by allowing the stormwater to infiltrate, to be treated by vegetation or by soils, or to be stored for reuse

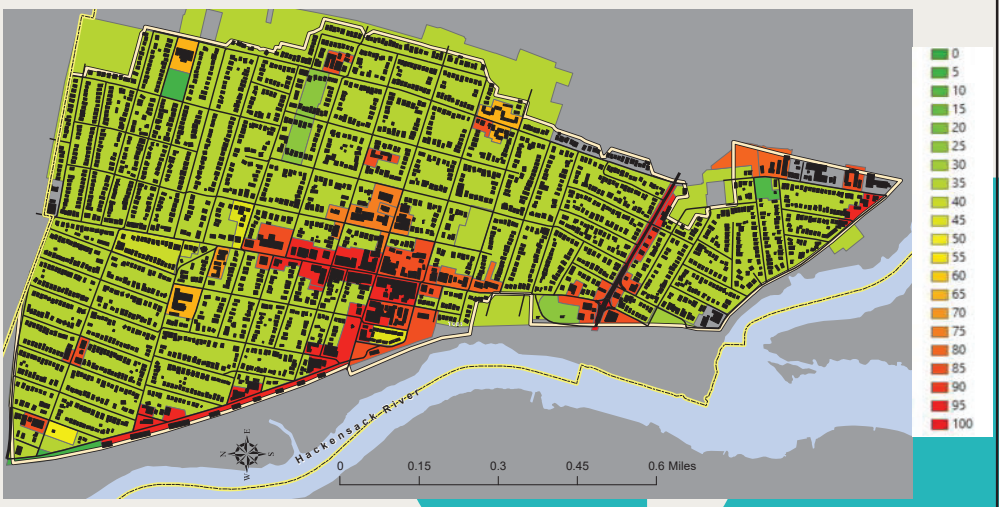
- Desktop, planning-level study
- Estimate upper bound on impervious acres that could be feasibly managed by GI practices
- Following Chapter 2 “Locating and Assessing the Feasibility of Green Infrastructure” from NJDEP guidance document *Evaluating Green Infrastructure: A Combined Sewer Overflow Control Alternative for Long Term Control Plans*

Update 15 4/4/2019

15

Ridgefield Park CSO Long Term Control Plan
Update

- Building footprints
- Impervious area



Update 16 4/4/2019

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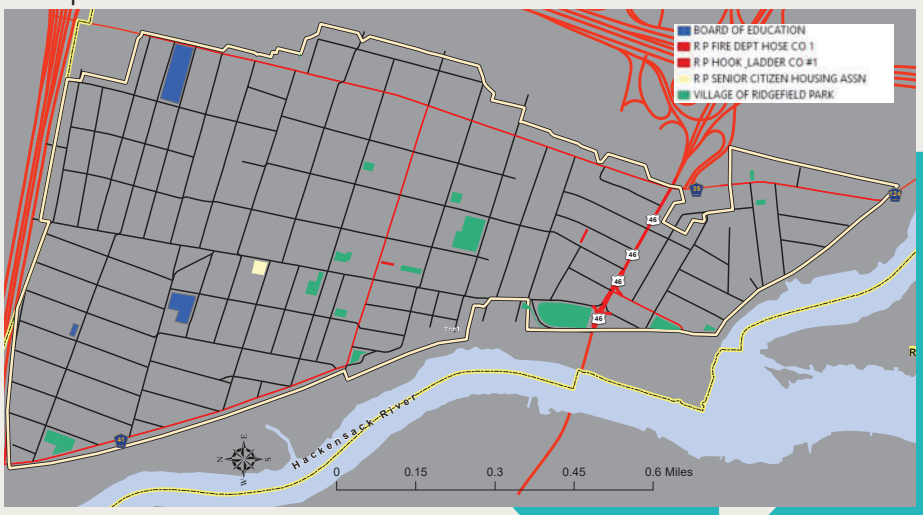
Ridgefield Park CSO Long Term Control Plan
Update

- Property Ownership



Update 4/4/2019

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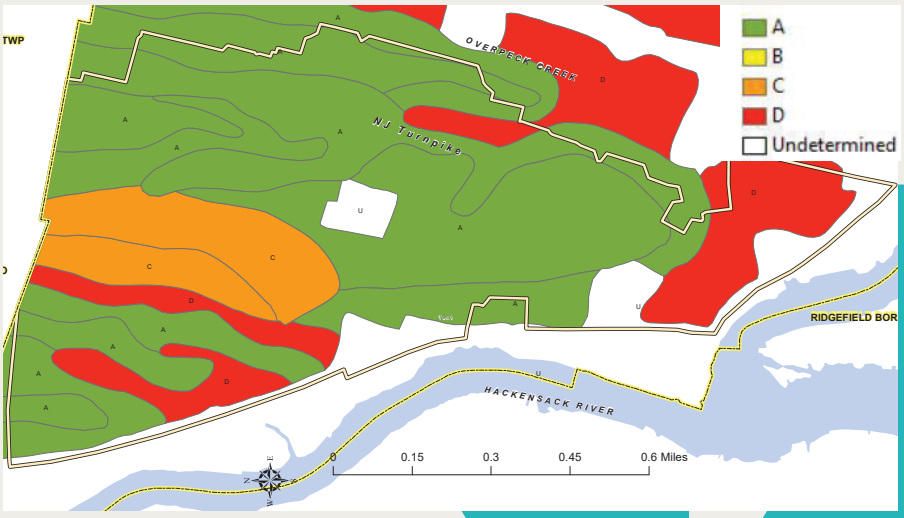
Ridgefield Park CSO Long Term Control Plan
Update

- Soil Type



Update 18 4/4/2019

18

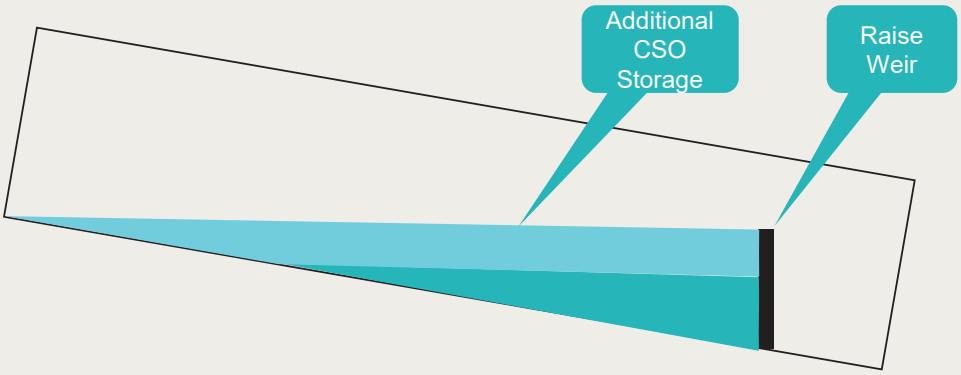
Increased Storage Capacity

- Inline Storage
- New and Larger Sized Sewer Pipes
- Underground Storage Tanks
- Tunnels

19

Ridgefield Park CSO Long Term Control Plan
Update

Maximize inline storage capacity



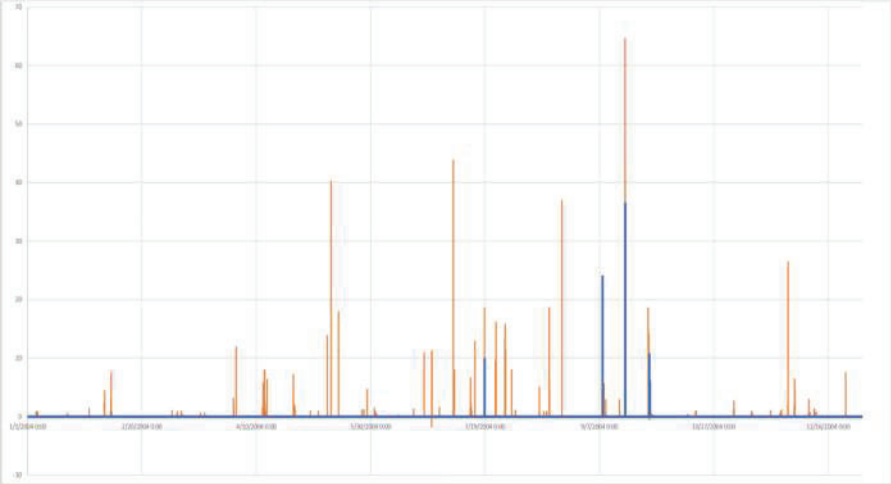
Update 20 4/4/2019

20

Ridgefield Park CSO Long Term Control Plan
Update

NJ CSO Group Coordination
Storage Required to Reduce the Number of Overflows to:

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture



Update 21 4/4/2019

21

Ridgefield Park CSO Long Term Control Plan
Update

NJ CSO Group Coordination
Storage Required to Reduce the Number of Overflows to:

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture

Ridgefield Park 2004 Simulation

Total Inflow Volume	230.4MG
Total Overflow Volume	61.07MG
Current Percent Capture	**73.50%**
Total Inflow Volume	230.4MG
Total Overflow Volume Required for 85%	34.56MG
Additional Annual Capture Required	**26.51MG**

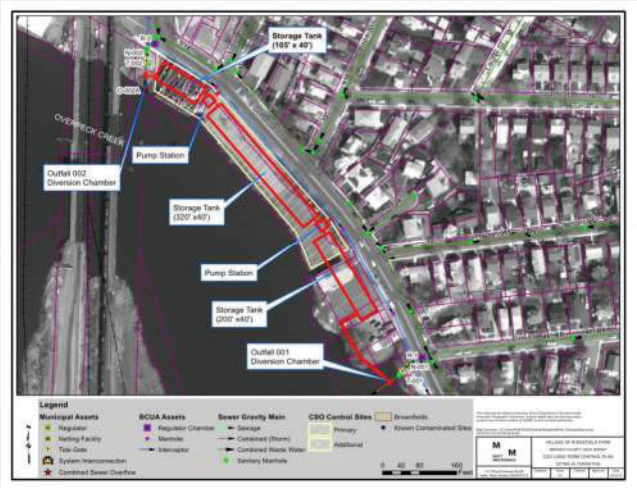
Update 22 4/4/2019

22

Ridgefield Park CSO Long Term Control Plan
Update

NJ CSO Group Coordination
Storage Required to Meet Levels of Control

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture



Update 23 4/4/2019

23

Ridgefield Park CSO Long Term Control Plan
Update

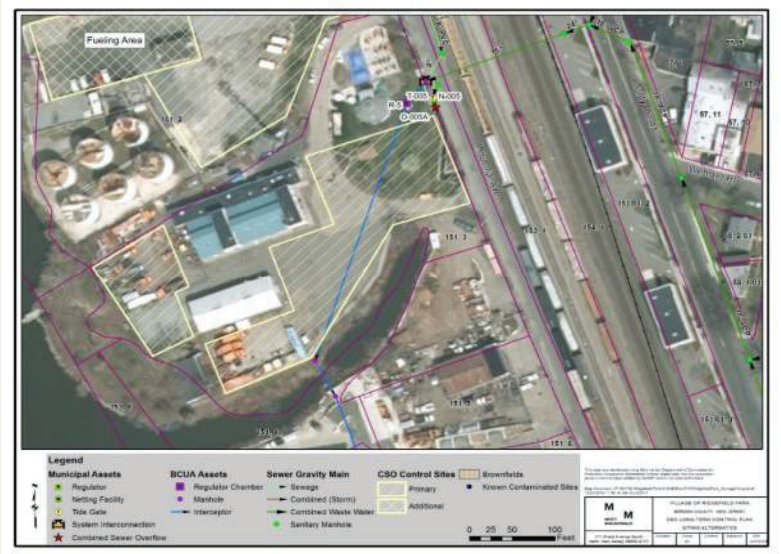
Evaluation of Other Sites

Area available: 0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations



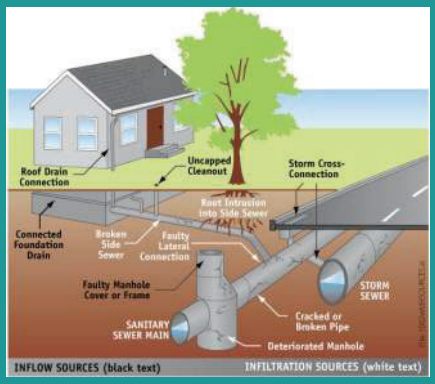
Update 19

24

Inflow and Infiltration Reduction

- Sump pump disconnections
- Sewer lining or repairs
- Grout leaking joints
- Manhole rehabilitation

Issue – Previous studies have found that a large percentage of the I/I comes from private property. A desktop analysis by BCUA indicates I/I is not an issue in the Village.

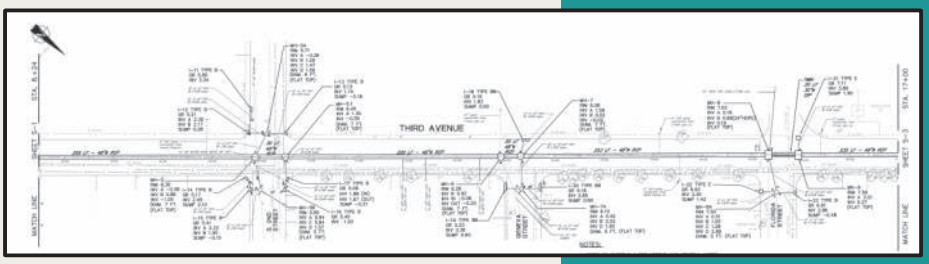


25

Sewer Separation

- New Storm Sewer
- New Sanitary Sewer

Issue – Stormwater contributes to pollution of the receiving waters and will eventually need to be treated or controlled.



26

Satellite Treatment of CSO Discharges

- Wet Weather Facility
- End of Pipe Treatment

Issues - Difficult to have these facilities operating without an operator (automatic mode) since equipment failures need to be addressed in a timely manner. Most require storage of backwash and concentrated waste.

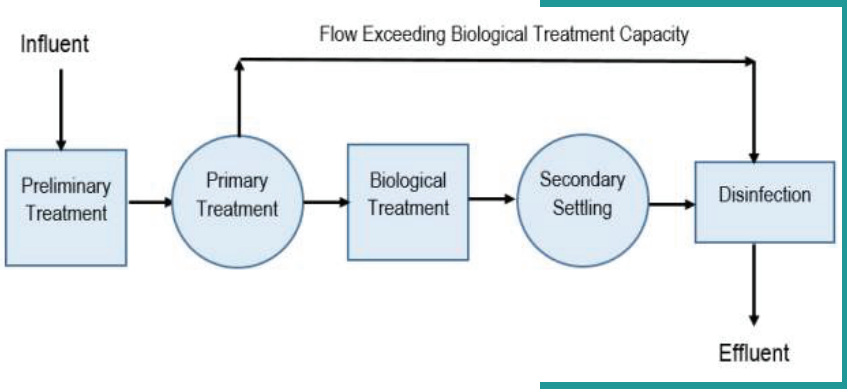
NJDEP is looking for primary treatment and disinfection.

NJDEP may impose additional requirements in the future.

27

Bypass of Secondary Treatment at Sewage Treatment Plant (Blending) BCUA Responsibility

- Primary Treatment and Disinfection

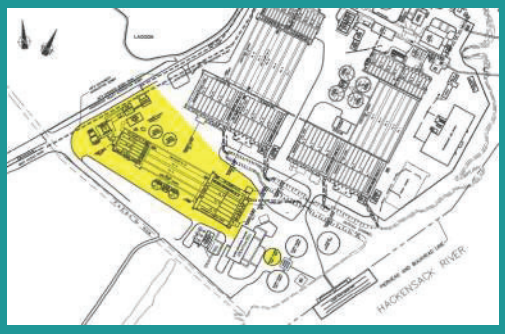


28

Increased Treatment Plant Capacity
BCUA Responsibility

- Increased conveyance to plant
- Full treatment expansion
- Wet weather facility

Issue – Transport Capacity
in Trunk Sewers



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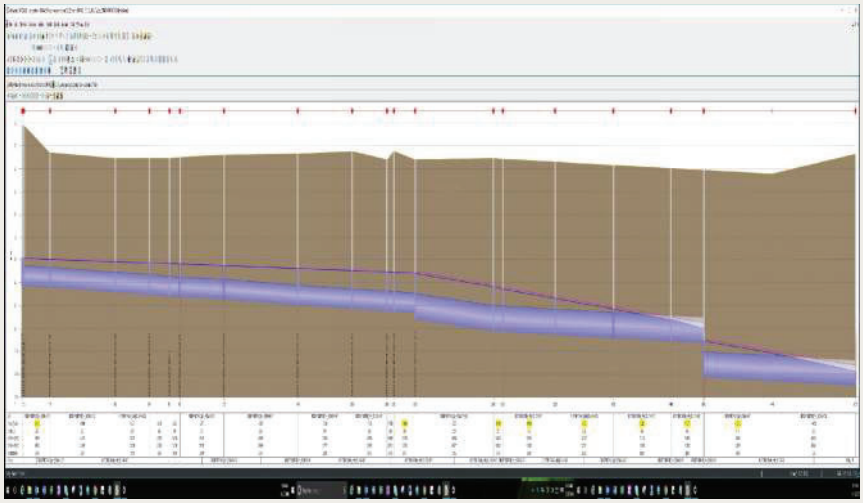
Ridgefield Park CSO Long Term Control Plan
Update

Limited Existing
Conveyance Available



Update 30 4/4/2019

30

NJDEP Expectation for Development and Evaluation of Alternatives Report

- Thorough and comprehensive
- Reasonable number of alternatives (5-10)
- Contribution to water quality
- Identify alternatives eliminated from consideration
- Document evaluation and decision making process.
- Positive feedback on outline
- Positive feedback on alternatives presentation

31

Ridgefield Park CSO Long Term Control Plan

Update

Upcoming Schedule – Development and Evaluation of Alternatives

Mid-April 2019: Refine alternatives

Mid-May 2019: Finalize alternatives, draft report submission

June 2019: Submit final report to NJDEP

Supplemental CSO Team Meeting

Update 32 4/4/2019

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Final Questions?

33

Thank You?

34

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Status Update
Village of Ridgefield Park
CSO Long Term Control Plan

October 17, 2019

1

Agenda

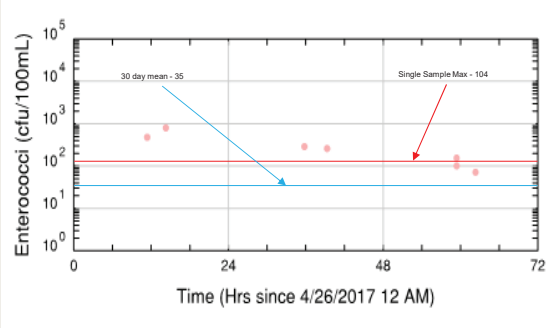
- Introduction – Review of prior meeting
- Permit Compliance Status
- Development and Evaluation of Alternatives
- Public Participation
- Financial Capabilities Analysis
- Next Steps and Timeline

2

Introduction

What we talked about last time. (4/4/2019)

- Permit schedule
- Receiving waters standards and quality



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October 17, 2019

3

3

Introduction

What we talked about last time. (4/4/2019)

Preliminary Results from
Baseline Compliance Monitoring Program

- Hackensack River (SE1 Region)
  - Is Not Consistently Meeting Water Quality Standards for Pathogens
- Overpeck Creek (SE2 Region)
  - Is Not Consistently Meeting Water Quality Standards for Pathogens

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4

4

Introduction

What we talked about last time. (4/4/2019)

- Permit schedule
- Receiving waters standards and quality
- Potential sensitive areas – None (definitions) / Kayak Launch Area (NJDEP) RJJ1
- Approaches to Regulatory compliance
  - Presumptive
  - Demonstrative
- Development and Evaluation of Alternatives Report (DEAR)
  - Overall Requirements
  - Required Alternatives to Investigate
  - Levels of Control

Mott MacDonald 5 October 17, 2019

5

Introduction

What we talked about last time. (4/4/2019)

Development and Evaluation of Alternatives

What are the Regulatory Requirements?

Presumptive Approach

No More than 4 Overflows per year

Not less than 85% capture of Annual Overflow Volume

Removal of pollutant loads equivalent to 85%

Demonstrative Approach

Control Level that will meet or not prevent the attainment of water quality in the future

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6

Introduction

What we talked about last time. (4/4/2019)

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

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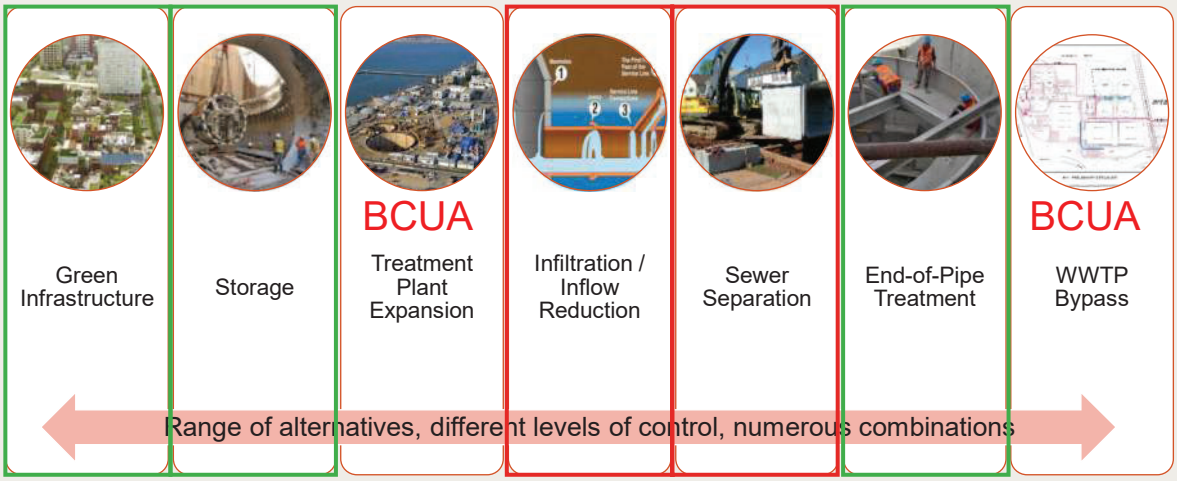
Introduction

Range of Alternatives



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8

Introduction

Evaluated a Range of Control Levels For Demonstrative Approach

Levels of Control

- 0 Overflows
- 4 Overflows
- 8 Overflows
- 12 Overflow
- 20 Overflows
- 85% Capture

Permit Compliance Status

Overview of Permit Schedule

NJPDES Individual Permit Issued March 12, 2015 (5-Year Permit Cycle)

Requires Permittees to:

- Install New Outfall Signs (completed)
- Create and Maintain a CSO Hotline or Website
  - Completed thru NJ CSO Group (compliant)
- Discharge Monitoring Reports (monthly DMRs) (compliant)
- Update System Data compiled in 2006 (completed)
  - GIS Map Developed
- Global Positioning System (GPS) Data (completed)
- Update Operation and Maintenance Manual (completed)
- Update Standard Operational Procedures (SOPs) (completed)
- Develop an Asset Management Plan (completed)

Permit Compliance Status

Overview of Permit Schedule – Contd.

NJPDES Individual Permit Issued March 12, 2015 also requires:

- Baseline Compliance Monitoring Program
  - Completed through NJ CSO Group
- System Characterization Study (completed)
- Public Participation Process Report (completed)
- Consideration of Sensitive Areas (completed)
  - Completed thru NJ CSO Group
- Development and Evaluation of Alternatives (completed)
- **Selection and Implementation of Alternatives Report**
  - **Deadline June 1, 2020**

Alternatives Evaluation

Cost Estimating Procedures

Order of Magnitude Estimate (Class 5)

Planning Level Cost Estimate – True Cost is within -50%+100% of Estimated Cost

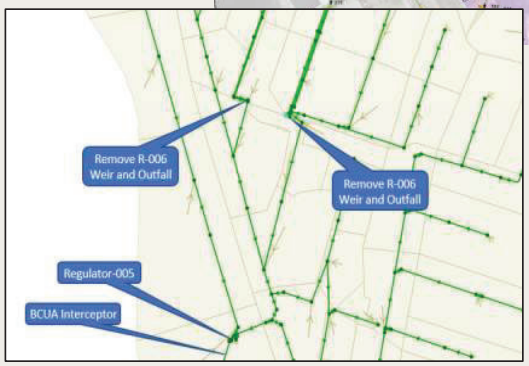
- Capital Costs
  - Design = 10% of Construction Costs
  - Construction Management = 10% of Construction Costs
  - Administrative/Legal = 5% of Construction Costs
- O&M
  - Only routine costs – no large-scale overhauls or replacements due to 20 yr planning period
- Net Present Worth
  - n=20 years i=2.75%
  - PW from O&M costs used the following:
    - $(P|A, i\%, n) = ((1+i)^n-1)/((i(1+i)^n)$

Alternatives Evaluation

Control Program 1 - Elimination of Outfall 006A

Small overflow volume at 006A

- Feasible to combine 005A and 006A, at low cost, to reduce burden on other alternatives
- Model shows additional upgrades required to the downstream system if 006A is eliminated
- Will require further review of the system to see if there is a cost-effective solution, i.e. diverting connected catch basins to existing storm sewers.



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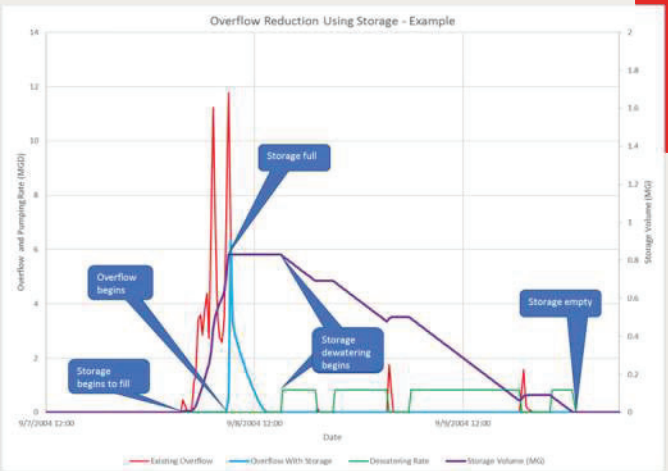
Alternatives Evaluation

Storage – Tanks and Tunnels

Temporary storage tunnels and tanks reduce and delay overflows



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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

Consists of:

- Diversion structures with fine screens;
- Consolidation piping
- An offline below grade tank equipped with:
  - flushing system
  - odor control;
- Tank overflow to an outfall;
- Dewatering pumping station; and
- Discharge connection back to the interceptor.

- 2 Consolidated Tanks for 001A & 002A and 003A-006A
- Consolidation - pros and cons to individual outfall storage
- Challenges of large-scale construction in an urban area

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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

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er 17, 2019

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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

Control Program 2 - End of Pipe Storage (Consolidated Sites)					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$73.8	$46.6	$45.4	$40.6	$29.1
O&M Cost ($ Million)	$0.7	$0.4	$0.4	$0.4	$0.3
Net Present Worth ($ Million)	$83.9	$53.9	$51.8	$46.6	$34.2

$34-$84 M (Class 5 Cost Estimate: -50%+100%)

$1.1-1.7/gal of CSO removed during typical year.

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October 17, 2019

17

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Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one

- Results in only one outfall
- Consists of:
  - Consolidation piping from Outfall 006A
  - Diversion piping from each outfall
  - Control Gates
  - Drop shafts along Industrial Avenue and at intersection of 2nd Avenue, and Bergen Turnpike.
  - Deaeration chambers
  - A dewatering pumping station
  - Grit and screening facilities
  - Force main connection back to the BCUA Main Trunk Sewer.
  - A tunnel overflow with tide gate
- Issues are typical with large-scale urban construction, though tunnels introduce further complications
  - Mining and construction across the entire route
  - Complexity in tunnel management

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Alternatives Evaluation

Control Program 3 – Consolidated Tunnel Storage Contd.

Consolidated Tunnel Map

Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one, central tunnel

Control Program 3 - Tunnel					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$88.4	$72.3	$72.3	$67.3	$62.3
O&M Cost ($ Million)	$2.0	$1.7	$1.7	$1.7	$1.6
Net Present Worth ($ Million)	$118.5	$98.6	$98.6	$92.5	$86.3

$86-$118 M (Class 5 Cost Estimate: -50%+100%)

$2.20-$2.40/gal of CSO removed during typical year.

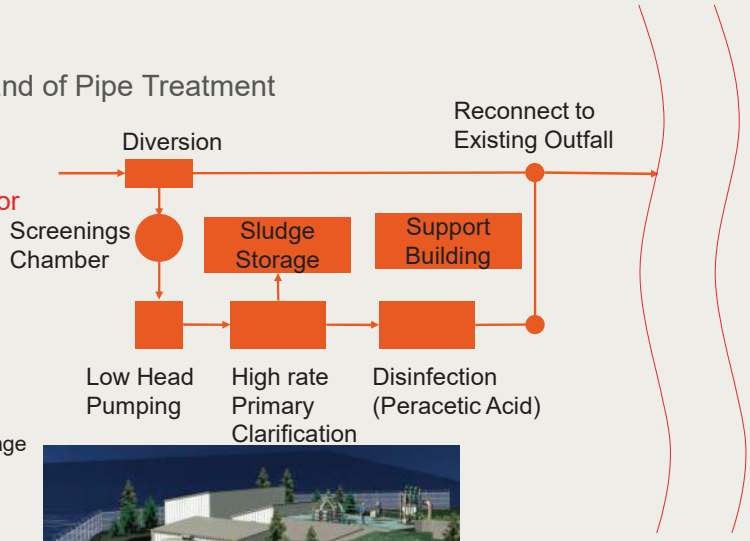
Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

Similar to EOP storage,

but overflow is not returned to interceptor

- Treatment capacity governed by flow rate.
- Treatment process:
  - Fine Screening for floatable and course particles
  - Pump Station
  - High-rate primary treatment (i.e. ActiFlo)
  - Disinfection by peracetic acid
  - Storage of underflow
- Similar pros and cons to consolidation as storage
- Large-scale urban construction



Example: High-Rate CSO Treatment Facility in Bremerton, WA

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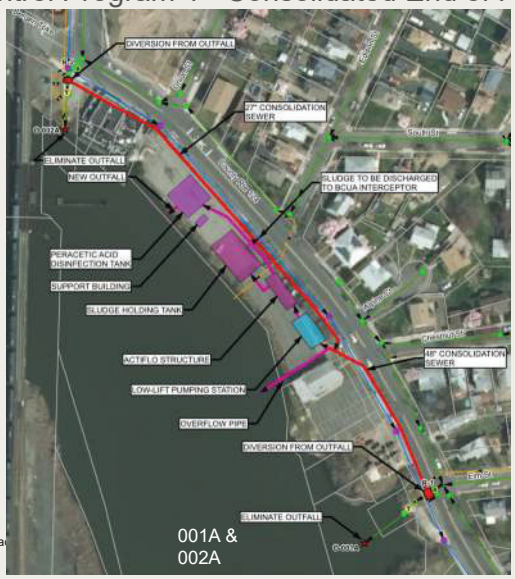
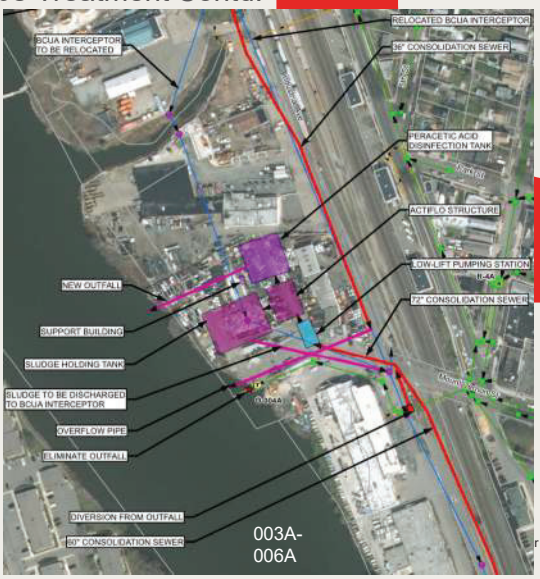
Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.



001A & 002A



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Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

Control Program 4 - End of Pipe Treatment (Consolidated Sites)					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$75.2	$65.8	$65.8	$65.5	$49.7
O&M Cost ($ Million)	$0.8	$0.7	$0.7	$0.7	$0.6
Net Present Worth ($ Million)	$87.3	$77.0	$77.0	$76.7	$59.5

$60-$87 M (Class 5 Cost Estimate: -50%+100%)

$1.30-$1.70/gal of CSO removed during typical year.

Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

- Pros:
  - Work in public right-of-way; no new land needed
  - Opportunity for current system renewal and reconstruction
  - Elimination of outfalls
- Cons:
  - Highly disruptive to roads and traffic
  - Need to redirect every sanitary service connection on the street
  - Need for stormwater controls and treatment in the future
- Issues are general for large-scale construction in urban areas
- Pollutant loads (excepting some pathogens) to receiving water will increase 40%

Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

$193M (Class 5 Cost Estimate: -50%+100%)

$3.8/gal of CSO removed during typical year

Issue – Stormwater contributes to pollution of the receiving waters and will eventually need to be treated or controlled.

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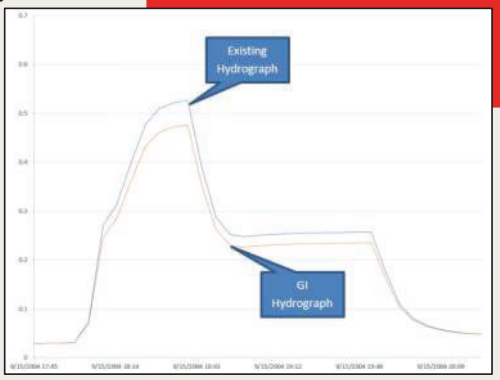
Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

- Bioswales selected as representative GI
  - Anticipated GI would consist largely of bioswales and permeable pavement
- Site suitability was a major issue
  - Land-use, impervious cover, hydrologic soil group (HSG), and publicly owned land
- Maximum of 4% of total impervious area directed to GI
- Minimal institutional/implementation issues



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Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

$2.7-$12 M* (Class 5 Cost Estimate: -50%+100%)

$5.80 - $9.10/gal of CSO removed during typical year

*For controlling 2.5%-10% of Village impervious area with GI, estimated a maximum of 4% could be feasible controlled.

Cannot accomplish control goals on its own.

Alternatives Evaluation - Costing

NPW Calculations

Control Program	Cost per Gallon Volume CSO Reduction ($/gal)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$1.7	$1.2	$1.2	$1.1	$1.2
3) Tunnel	$2.4	$2.2	$2.2	$2.2	$2.2
4) Treatment (Consolidated)	$1.7	$1.5	$1.5	$1.5	$1.3
5) Sewer Separation	$3.8	NA	NA	NA	NA
	Volume Reduction for Impervious Area Managed (MG)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$9.1	$7.2	$6.3	$5.8	

Control Program	NPW Summary - Overflows per Year ($M)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$84	$54	$52	$47	$34
3) Tunnel	$118	$99	$99	$92	$86
4) Treatment (Consolidated)	$87	$77	$77	$77	$60
5) Sewer Separation	$193	NA	NA	NA	NA
	NPW Summary - % of Impervious Area Managed ($M)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$2.7	$6	$9	$12	

Alternatives Rating

Rating Procedure

Control Programs rated 1 (worst) to 5 (best) on several categories and a weighted average found

- Cost
  - Normalized by $/gallon
  - Based on 4 overflows per year
- CSO Reduction – Volume
- CSO Reduction - Frequency
- Institutional Issues
- Implementability
- Public acceptance

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Alternatives Evaluation - Rating

Ranking – **NO SELECTION MADE AT THIS PHASE!**

Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

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Public Participation

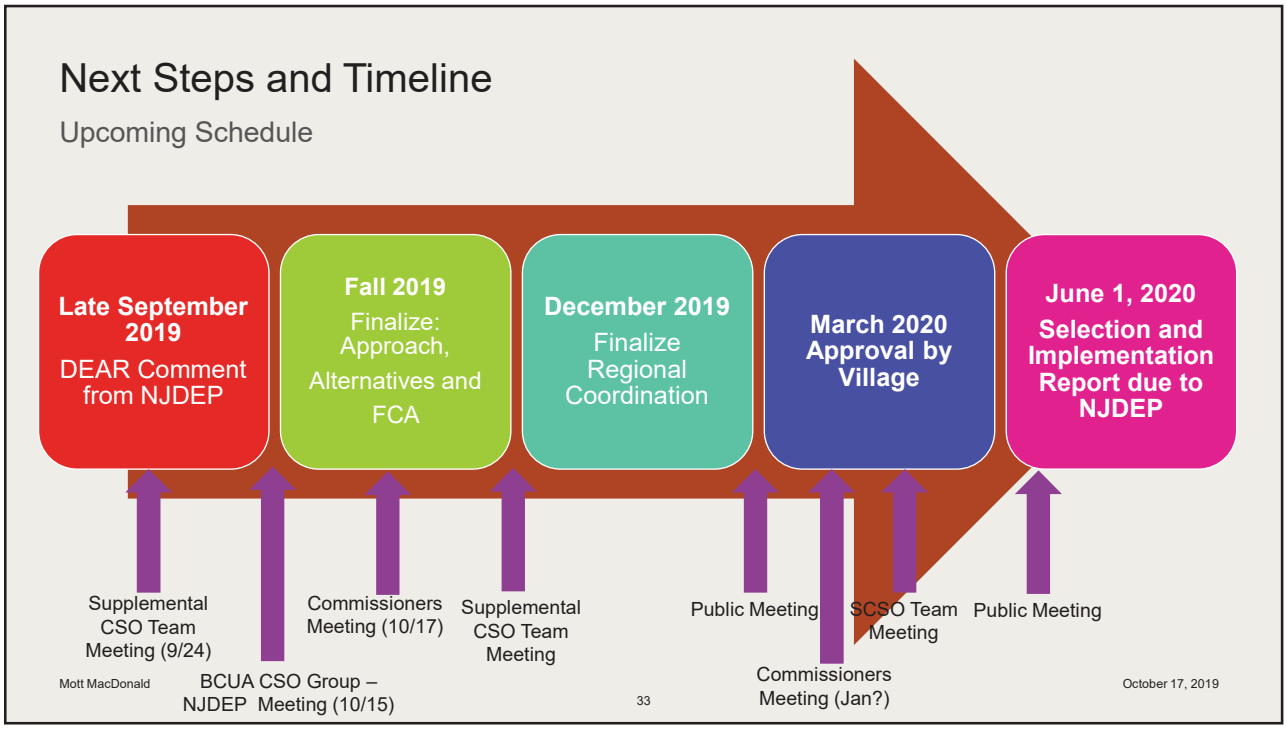
Anticipated Future Public Participation Events

- Continuation of SCSO team meetings on approximately a quarterly basis
  - Continue to seek members of the SCSO team
- Present project progress to the Village Council at 2 meetings
- Hold 2 public meetings in the evening in a public building such as a school
- Include an article on CSOs in the Village's newsletter
- Present the project to 2 community groups, using input of SCSO team
- Publicize the project at the Earth Day 2020 celebration

Financial Capabilities Analysis (FCA)

How much CSO Control can the Village afford?

- Generally focuses on 2% of Median Household Income (MHI).
- EPA Guidance
  - Allows for other consideration and guidance.
- Impacts schedule.
- Impacts level of control.
- Need to plan out required rate increases.
- Need to know the true cost of maintaining and operating current sewer system!


Next Steps and Timeline
Upcoming Schedule
Late September 2019
DEAR Comment from NJDEP
Fall 2019
Finalize: Approach, Alternatives and FCA
December 2019
Finalize Regional Coordination
March 2020 Approval by Village
June 1, 2020
Selection and Implementation Report due to NJDEP
Supplemental CSO Team Meeting (9/24)
BCUA CSO Group – NJDEP Meeting (10/15)
Commissioners Meeting (10/17)
Supplemental CSO Team Meeting
Public Meeting
Commissioners Meeting (Jan?)
SCSO Team Meeting
Public Meeting
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October 17, 2019

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Questions?

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Thank you

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Village of Ridgefield Park
CSO LTCP – Public Meeting
Selection and Implementation of Alternatives
Village of Ridgefield Park Municipal Building – Courtroom
September 29, 2020; 7:30 P.M.

Name	Organization	Email
Chelsea Gleis	Benecke Economics	chelsea.gleis@gmail.com
Diego Rodriguez	Mott MacDonald	diego.Rodriguez@MottMac.com
John Anuian	R.P.	johnanlian@yahoo.com
William G. Gerken	R.P. Commissioner	WGERKEN@RIDGEFIELDPARK.ORG
John Dening	Mott MacDonald	john.dening@mottmac.com

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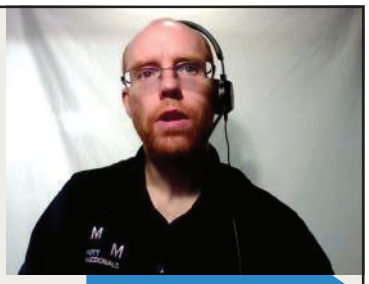


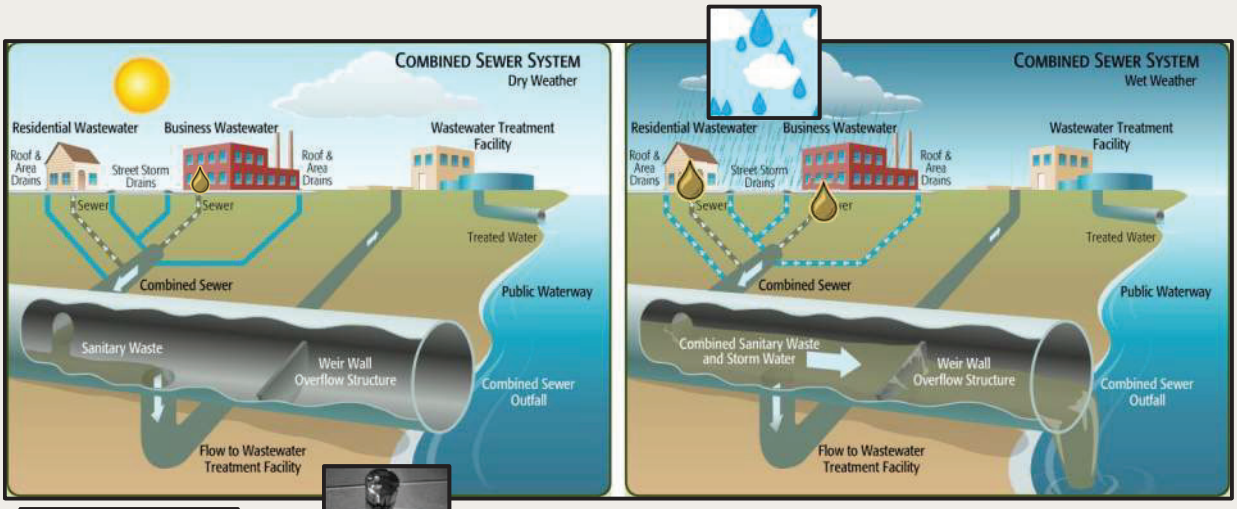
Combined Sewer Overflow (CSO) Long Term Control Plan Overview

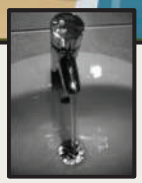
Village of Ridgefield Park

The Village of Ridgefield Park
Settled in 1685

1

What is a Combined Sewer Overflow (CSO)?





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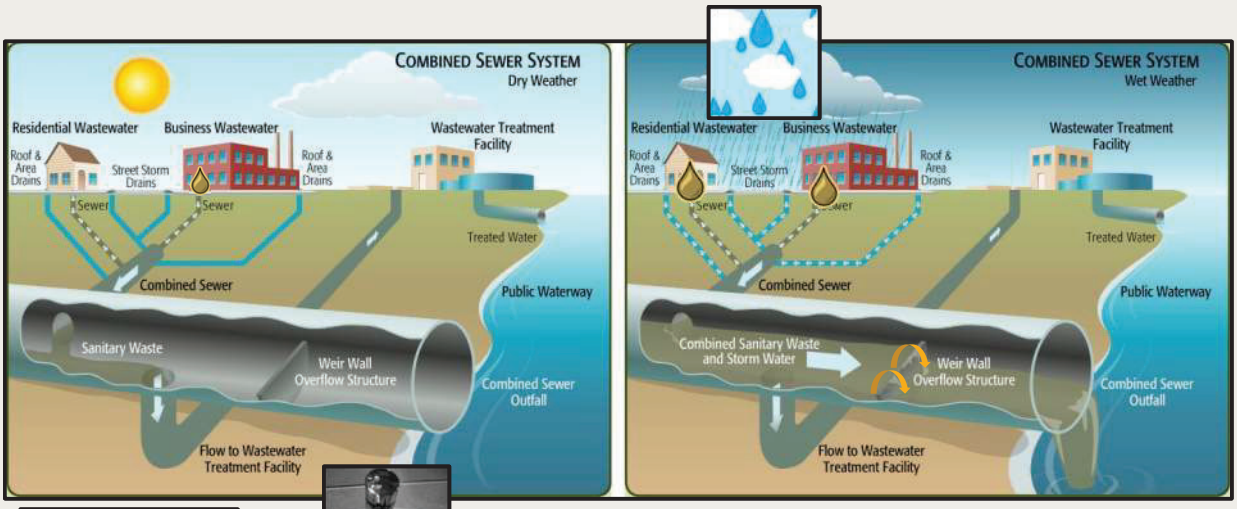
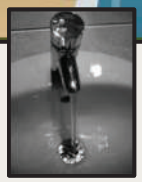
What is a Combined Sewer Overflow (CSO)?





- CSOs provide hydraulic relief during wet weather, but are sources of water pollution

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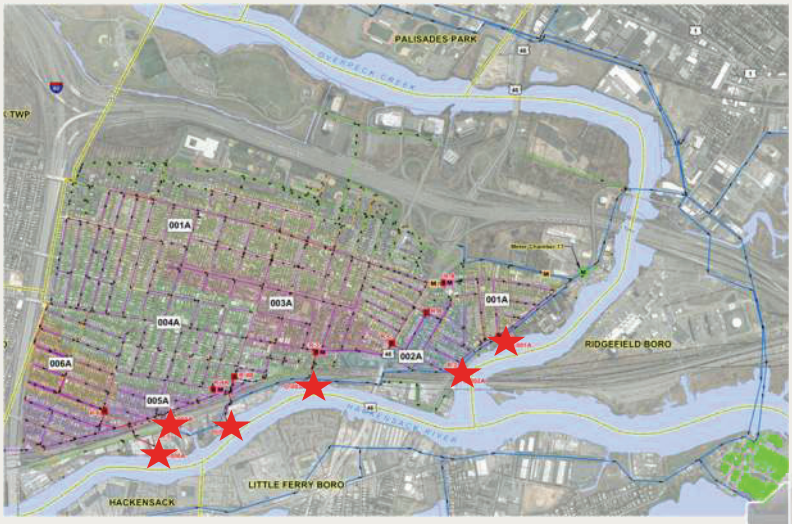
CSOs in Ridgefield Park

- 6 Outfalls
- 55 Overflow per Year
- 53 Million Gallons of Overflow



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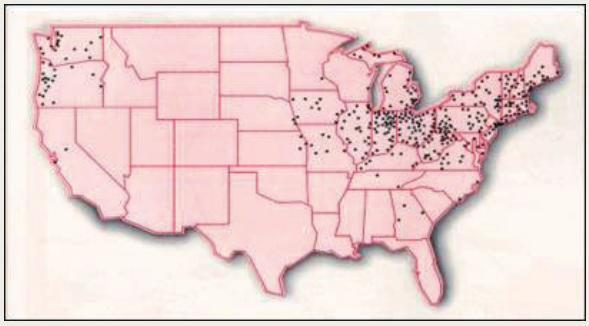
The Village is not Alone

- 860 communities in US
- 21 communities in NJ
  - Over 200 Outfalls



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So what does the Village have to do?

Step 1.

- System Characterization Report
- Baseline Compliance Monitoring Program Report
- Consideration of Sensitive Areas Report
- Public Participation Process Report

Step 2.

- Development and Evaluation of Alternatives Report

Step 3.

- Selection and Implementation of Alternatives
  Final LTCP – Due October 1st

(Extension from June 1 to October 1 due to COVID-19)

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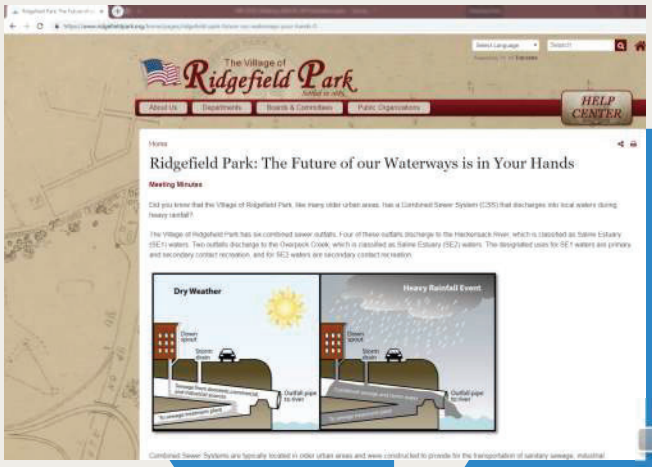
Public Involvement is Essential!

- Supplemental Combined Sewer Overflow Team
- Articles in Village Newsletter
- Literature Distribution
- Village Website page
- Village Caucus Meetings
- This Presentation



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What does the Village have to do?

Presumption Approach Targeting 85 Percent Capture

Presumption Approach (performance based)	**Demonstration Approach (water quality based)**
• No less than 85 percent capture of annual overflow volume; • No less than the equivalent mass of the pollutants causing water quality impairment; or • No more than 4 overflows in the typical year	• Use receiving water model to identify control level needed to meet WQ-based requirements
SELECTED as best balance between permit compliance, water quality benefit and allocation of municipal funds.	**NOT SELECTED:** WQ modelling not very insightful due to high background levels.

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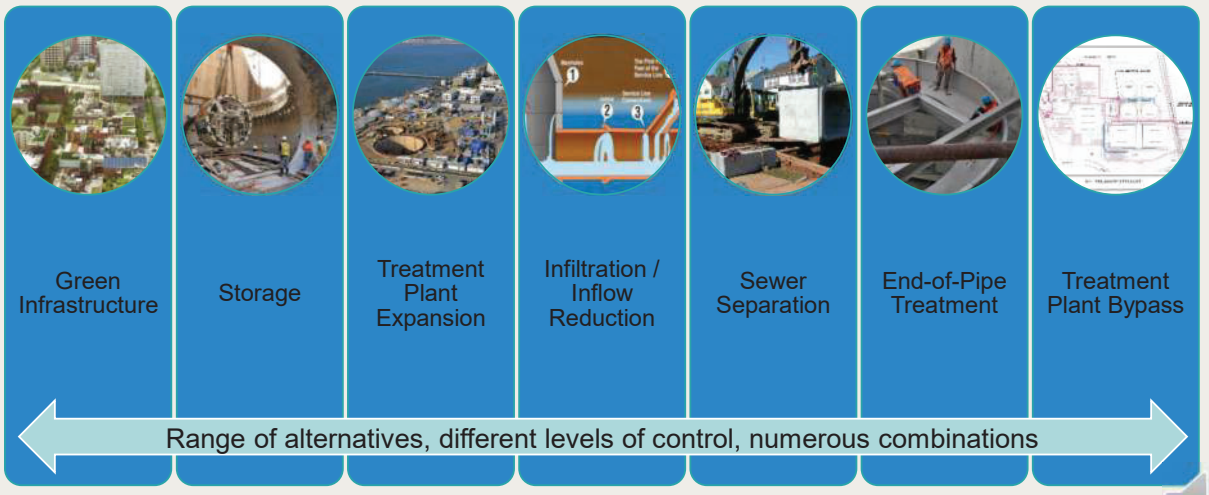
Range of CSO Control Alternatives



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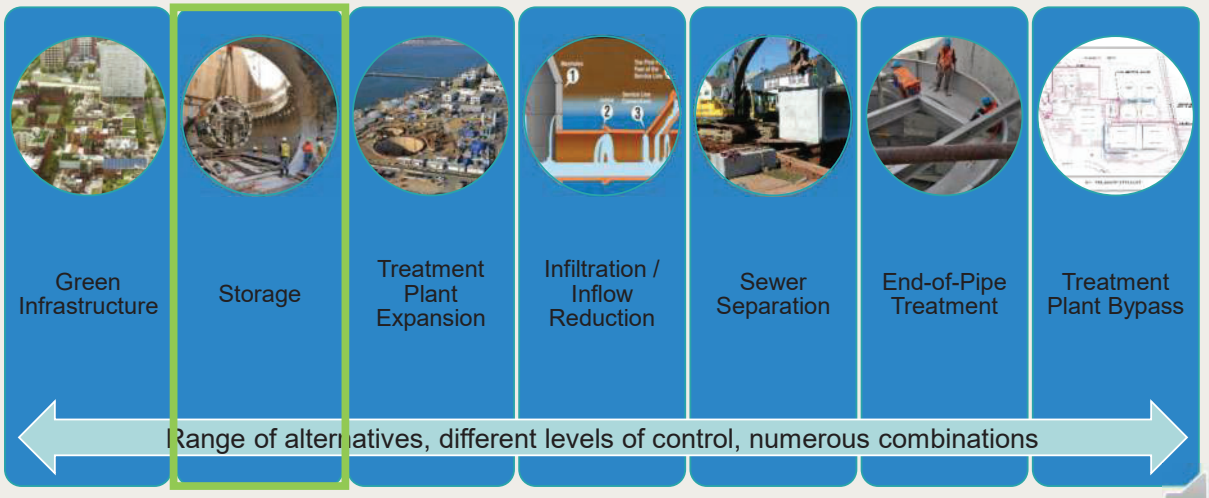
Range of CSO Control Alternatives



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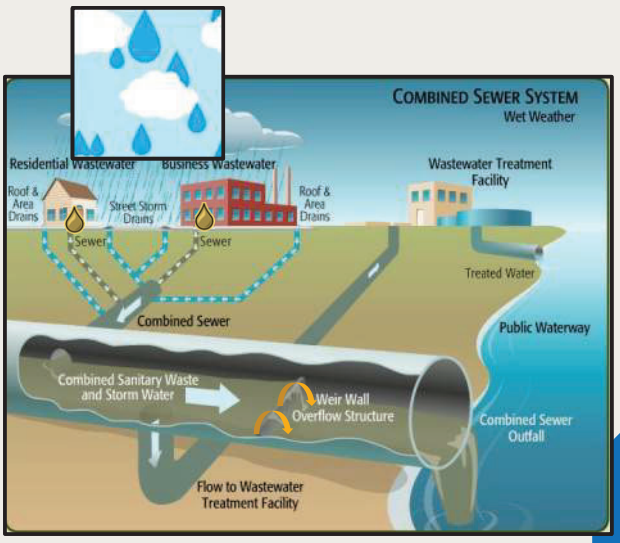
How does storage work?



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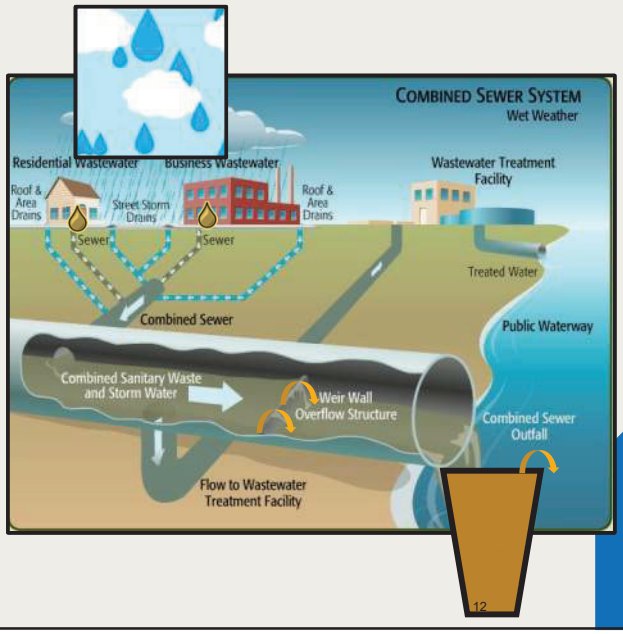
How does storage work?



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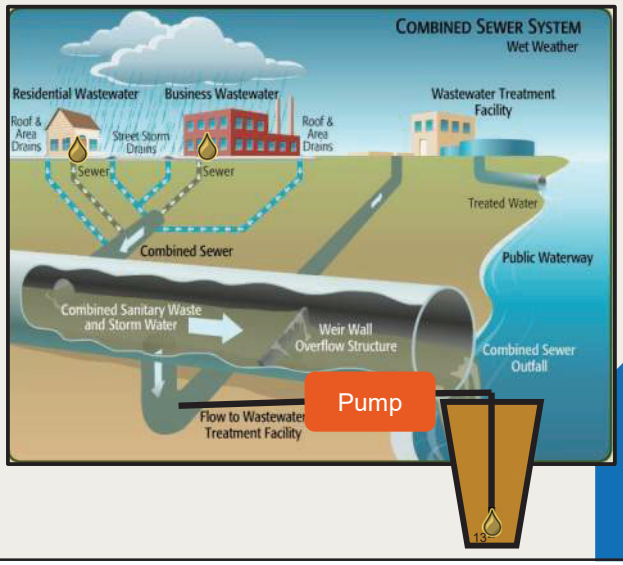
How does storage work?



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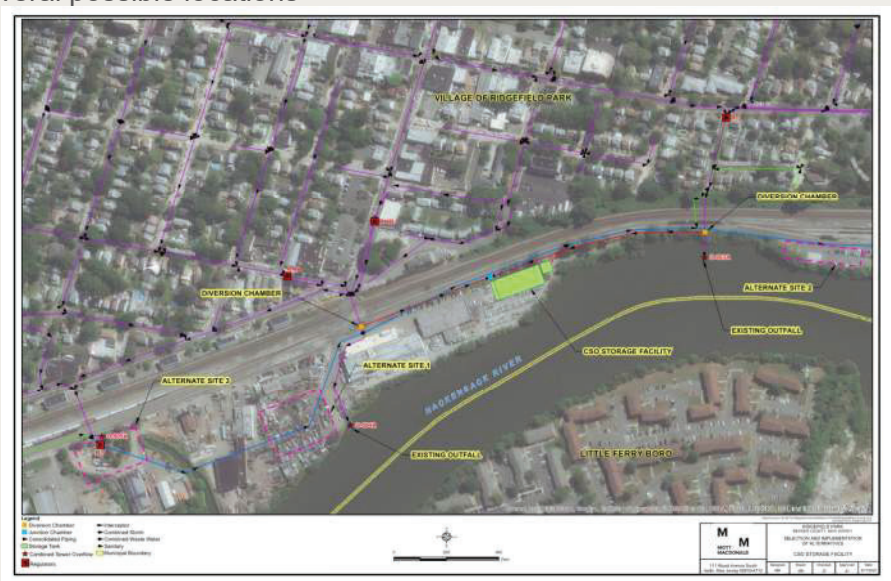
Where Will the Tank Be Located?

Several possible locations



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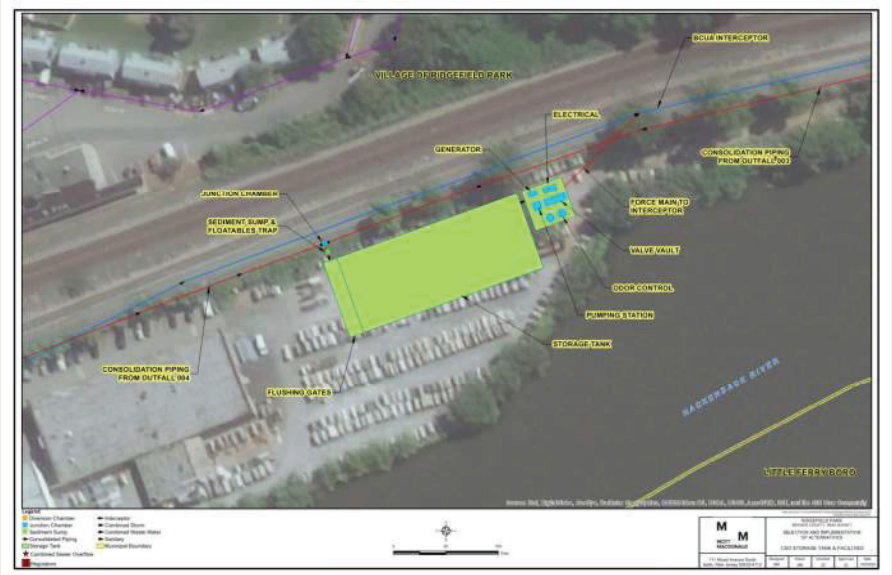
Where Will the Tank Be Located?

Possible Layout



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How long will this take?

Year 1-2:
Feasibility Study

Years 3-5:
Acquire Property

Years 6-9:
Design – Permitting – Funding

Years 9-14:
Construction

Years 14-16
- Monitoring
- Recalibration
- Performance Verification
- O&M

Years 16+
O&M

16

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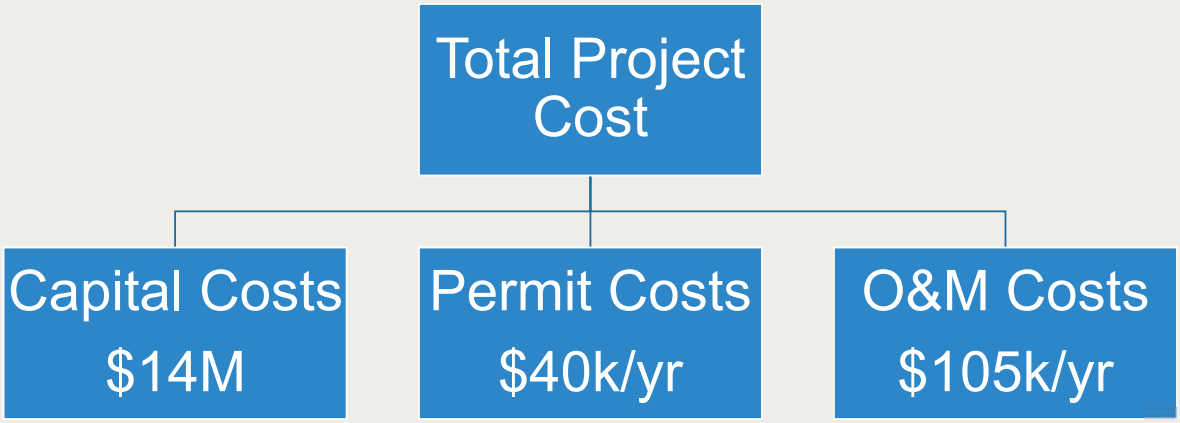
What will this cost the Village?



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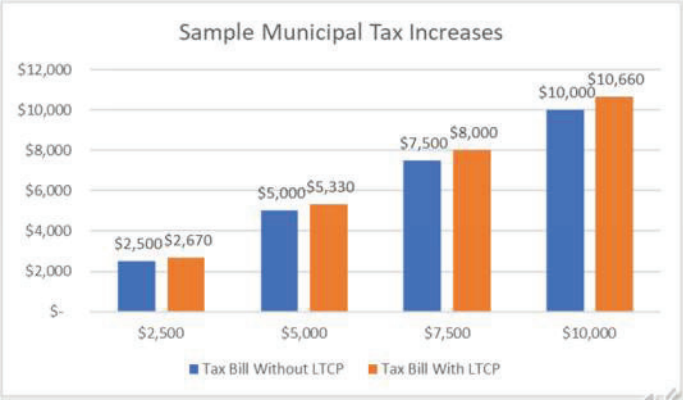
What will it cost me?

- Sewer costs will climb gradually
- Peak sewer costs expected in 2036 at 27% higher than without project.
- Average municipal annual tax bill estimated to increase approximately 6.5%



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What is the Benefit?

Before	53 Million Gallons Overflow	55 Overflows events	75.5% Wet Weather Capture
After	31 Million Gallons Overflow	26 Overflows events	85.6% Wet Weather Capture

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What can I do?

- Plant a rain garden
- Follow Village rules
  - Pet waste
  - Yard waste
- Conserve water
- Help spread the word
- Let us know what you think
  - Contact information at the end of this video

20

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Questions?

John Dening P.E.
Mott MacDonald
Email john.dening@mottmac.com
Phone 973-912-2464

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Village of Ridgefield Park Supplemental CSO Team
Meeting Number 7
Commissioner's Conference Room
Village of Ridgefield Park Municipal Building
January 23, 2019, 9:00 am

Group Meeting Minutes

1. Introduction
    a. Meeting began at 9:00 am
    b. John Rolak opened the meeting with an introduction of our new member – John Ponticorvo of the Wanda Canoe Club and questioned John on his knowledge of combined sewer systems. John Ponticorvo indicated that he had reviewed the information on the Village website.
    c. John Dening introduced a safety discussion on post-holiday blues.
    d. John Dening reviewed the topics discussed at the last quarterly meeting held on October 1, 2018 and asked if there were any questions on the previous meetings. There were no questions.
2. Presentation by John Dening on the project status followed by a discussion of the preliminary evaluation of alternatives and the draft report (see presentation).
3. Discussion and Questions:
    a. Mark Olsen asked whether allowing more flow into Overpeck Creek would reduce street flooding on Bergen Turnpike, which is serviced by separate stormwater sewers. It was explained that the area of flooding has a low elevation and that this segment of the Overpeck was tidal. It is anticipated that the flooding is caused by extreme high tides and that there was not much difference between the street flood elevation and the tide. It was suggested that the solution of the problem would be to pump stormwater out of the system during these events.
    b. There was some discussion on Earth Day event on May 11th and whether the Village should again have some information on the current project. Mott MacDonald agreed and just asked that we be informed of anything being planned so that we could assist with possible materials.
    c. John Ponticorvo asked what NYC was doing with their CSOs and whether we could follow their lead. It was explained that the Village needed to follow the requirements under the Village's NJPDES permit, but that we would use any information that may be available from NYC and their program.
    d. Mark Olson then said that various groups had events at Waterfront Park to encourage boating and fishing and whether the CSO signs that had been installed as part of the permit process (including no fishing) meant that they should not be doing these programs since might be dangerous and if nothing else confusing to residents and parents. John Rolak noted that due to other contaminates in the sediments, including dioxin that only catch and release should be practiced. Mark noted that is what they are practicing, but that it was not in agreement with the signage. John Rolak indicated that we would bring this question to the NJDEP to see if they could clarify the issue.
4. Next meeting will be scheduled for end of April or beginning of May.
5. Meeting concluded at 10:15 am

Minutes submitted by John Rolak

Village of Ridgefield Park
Supplemental CSO Team
Meeting Number 7 – Characterization Report
Commissioner's Conference Room
Village of Ridgefield Park Municipal Building
January 23,2019, 9:00 AM

Initials	Name	Organization	Email	Phone Number
JR	John Rolak	Mott MacDonald	john.rolak@mottmac.com	973-912-2521
JD	John Dening	Mott MacDonald	John.dening@mottmac.com	973-912-2464
	Donna Gregory	Mott MacDonald	donna.gregory@mottmac.com	
FM	Flo Muller	Ridgefield Park Shade Tree Commission	flomart@nj.rr.com	201-814-9019
MO	Mark Olson	Chairman, Green Team	mark-olson@verizon.net	201-440-5989
SQ	Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com	201-440-5652
LQ	Linda Quinn	Ridgefield Park Environmental Commission	linda.quinn125@gmail.com	201-440-5652
JP	John Ponticorvo	Wanda Canoe Club	jponticorvo@aol.com	201-803-3643
	Alan O'Grady	R.P. DPW	AOG560@Aol.com	201-440-4860
	Edward Monroe	RP DPW	EMONROE@ ridgefieldpark.org	201-440-4860

MOTT MACDONALD

Development and Evaluation of Alternative Controls – Update

Ridgefield Park Supplemental CSO Team Meeting #7

January 23, 2019

Safety Topic

Post Holiday Blues

Causes

- Loss of social activities and interactions
- Seasonal conditions – cold and dark
- Fatigue
- Overindulging

Recommendations

- Schedule social interactions
- Exercise
- Set attainable goals
- Plan things to look forward to.
- Take care of yourself

Adapted Psychology today Jan, 12, 2014

Ridgefield Park Supplemental CSO Team

Meeting No. 7 Agenda

Refresher – In meeting #6 we covered:

Development and Evaluation of Alternatives

- What is the Goal of Alternative Control?
- What are the Regulatory Requirements?
- This Leads us to:
  - Overview of Alternatives
  - Treatment of CSO discharge

    Bayonne Pilot Study

Ridgefield Park Supplemental CSO Team

Meeting No. 7 Agenda

- Submissions Status
- Comments from NJDEP on Characterization and Public Participation Reports
- Preliminary Evaluation of Alternatives
  - Siting
  - Green Infrastructure
  - Inline Storage
  - Conveyance
- NJ CSO Group Coordination
- Draft Report Outline
- Future Public Participation
- Upcoming Schedule

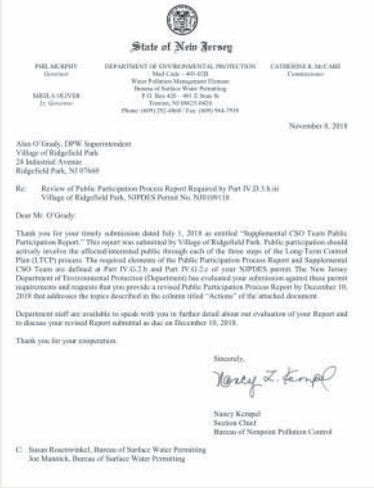
Ridgefield Park Supplemental CSO Team

DEP review status – July 1, 2018 submittals

- **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.
- **Public Participation Process Report**: comment letter dated 11/8/2018; revised report submitted 1/7/2019 – On Time!
- **System Characterization Reports**: comment letter dated 12/17/2018, revised report progressing. Due 02/15/2019.

Ridgefield Park Supplemental CSO Team

Public Participation Report NJDEP Review Comments



State of New Jersey

PHIL MURPHY
Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02D
Water Pollution Management Element
Bureau of Surface Water Permitting
P.O. Box 420 – 401 E. State St
Trenton, NJ 08625-0420
Phone: (609) 292-4860 / Fax: (609) 984-7938

CATHERINE R. McCABE
Commissioner

SHEILA OLIVER
Lt. Governor

November 8, 2018

Alan O'Grady, DPW Superintendent
Village of Ridgefield Park
24 Industrial Avenue
Ridgefield Park, NJ 07660

Re: Review of Public Participation Process Report Required by Part IV.D.1.b.iii
Village of Ridgefield Park, NJPDES Permit No. NJ0109118

Dear Mr. O'Grady:

Thank you for your timely submission dated July 1, 2018 as entitled "Supplemental CSO Team Public Participation Report." This report was submitted by Village of Ridgefield Park. Public participation should actively involve the affected/interested public through each of the three stages of the Long-Term Control Plan (LTCP) process. The required elements of the Public Participation Process Report and Supplemental CSO Team are defined at Part IV.G.2.b. and Part IV.G.2.c of your NJPDES permit. The New Jersey Department of Environmental Protection (Department) has evaluated your submission against these permit requirements and requests that you provide a revised Public Participation Process Report by December 10, 2018 that addresses the topics described in the column titled "Actions" of the attached document.

Department staff are available to speak with you in further detail about our evaluation of your Report and to discuss your revised Report submittal as due on December 10, 2018.

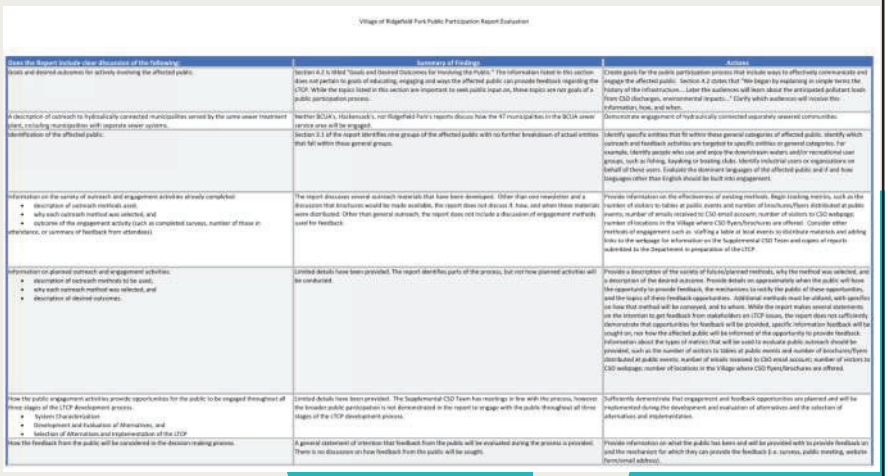
Thank you for your cooperation.

Sincerely,

Nancy L. Kempel

Nancy Kempel
Section Chief
Bureau of Nonpoint Pollution Control

C: Susan Roseowinkel, Bureau of Surface Water Permitting
Joe Mannick, Bureau of Surface Water Permitting



Village of Ridgefield Park Public Participation Report Evaluation

Does the Report include clear discussion of the following:	Summary of Findings	Actions
Goals and desired outcomes for actively involving the affected public.	Section 4.2 is titled "Goals and Desired Outcomes for Involving the Public." The information listed in this section does not pertain to goals of educating, engaging and ways the affected public can provide feedback regarding the LTCP. While the topics listed in this section are important to seek public input on, these topics are not goals of a public participation process.	Create goals for the public participation process that include ways to effectively communicate and engage the affected public. Section 4.2 states that "We began by explaining in simple terms the history of the infrastructure.....Later the audiences will learn about the anticipated pollutant loads from CSO discharges, environmental impacts..." Clarify which audiences will receive this information, how, and when.
A description of outreach to hydraulically connected municipalities served by the same sewer treatment plant, including municipalities with separate sewer systems.	Neither BCUA's, Hackensack's, nor Ridgefield Park's reports discuss how the 47 municipalities in the BCUA sewer service area will be engaged.	Demonstrate engagement of hydraulically connected separately sewered communities.
Identification of the affected public.	Section 3.1 of the report identifies nine groups of the affected public with no further breakdown of actual entities that fall within these general groups.	Identify specific entities that fit within these general categories of affected public. Identify which outreach and feedback activities are targeted to specific entities or general categories. For example, identify people who use and enjoy the downstream waters and/or recreational user groups, such as fishing, kayaking or boating clubs. Identify industrial users or organizations on behalf of these users. Evaluate the dominant languages of the affected public and if and how languages other than English should be built into engagement.
Information on the variety of outreach and engagement activities already completed: • description of outreach methods used; • why each outreach method was selected; and • outcome of the engagement activity (such as completed surveys, number of those in attendance, or summary of feedback from attendees).	The report discusses several outreach materials that have been developed. Other than one newsletter and a discussion that brochures would be made available, the report does not discuss if, how, and when these materials were distributed. Other than general outreach, the report does not include a discussion of engagement methods used for feedback.	Provide information on the effectiveness of existing methods. Begin tracking metrics, such as the number of visitors to tables at public events and number of brochures/flyers distributed at public events, number of emails received to CSO email account, number of visitors to CSO webpage, number of locations in the Village where CSO flyers/brochures are offered. Consider other methods of engagement such as: staffing a table at local events to distribute materials and adding links to the webpage for information on the Supplemental CSO Team and copies of reports submitted to the Department in preparation of the LTCP.
Information on planned outreach and engagement activities: • description of outreach methods to be used; • why each outreach method was selected; and • description of desired outcomes.	Limited details have been provided. The report identifies parts of the process, but not how planned activities will be conducted.	Provide a description of the variety of future/planned methods, why the method was selected, and a description of the desired outcome. Provide details on approximately when the public will have the opportunity to provide feedback, the mechanisms to notify the public of these opportunities, and the topics of these feedback opportunities. Additional methods must be utilized, with specifics on how that method will be conveyed, and to whom. While the report makes several statements on the intention to get feedback from stakeholders on LTCP issues, the report does not sufficiently demonstrate that opportunities for feedback will be provided, specific information feedback will be sought on, nor how the affected public will be informed of the opportunity to provide feedback. Information about the types of metrics that will be used to evaluate public outreach should be provided, such as the number of visitors to tables at public events and number of brochures/flyers distributed at public events; number of emails received to CSO email account; number of visitors to CSO webpage; number of locations in the Village where CSO flyers/brochures are offered.
How the public engagement activities provide opportunities for the public to be engaged throughout all three stages of the LTCP development process: • System Characterization • Development and Evaluation of Alternatives, and • Selection of Alternatives and implementation of the LTCP	Limited details have been provided. The Supplemental CSO Team has meetings in line with the process, however the broader public participation is not demonstrated in the report to engage with the public throughout all three stages of the LTCP development process.	Sufficiently demonstrate that engagement and feedback opportunities are planned and will be implemented during the development and evaluation of alternatives and the selection of alternatives and implementation.
How the feedback from the public will be considered in the decision making process.	A general statement of intention that feedback from the public will be evaluated during the process is provided. There is no discussion on how feedback from the public will be sought.	Provide information on what the public has been and will be provided with to provide feedback on and the mechanism for which they can provide the feedback (i.e. surveys, public meeting, website form/email address).

Ridgefield Park Supplemental CSO Team

Public Participation Report NJDEP Review Comments

Many of the Comments Went Far Beyond NJPDES Requirements, e.g.

- Tracking and Reporting on Visitors to Website
- Tracking Handouts and Where they are Placed
- Obtaining other Public Input on Plan
- Detailing How Public Will be Informed
  - On Progress of LTCP
  - Implementation

Issue – Some difficult to implement
Some part of next permit cycle.

Ridgefield Park Supplemental CSO Team

Public Participation Report – Key Comments

Demonstrate engagement of hydraulically connected separately sewered communities.

- Begin tracking metrics, such as the number of visitors to tables at public events and number of brochures/flyers distributed at public events; number of emails received to CSO email account; number of visitors to CSO webpage; number of locations in the Village where CSO flyers/brochures are offered.
- Consider other methods of engagement such as staffing a table at local events to distribute materials.
- Add links to the webpage for information on the Supplemental CSO Team and copies of reports submitted to the Department in preparation of the LTCP.

Ridgefield Park Supplemental CSO Team

Public Participation Report – Key Comments

Permittees may consider providing opportunities for the Supplemental CSO Team to review key draft submittals.

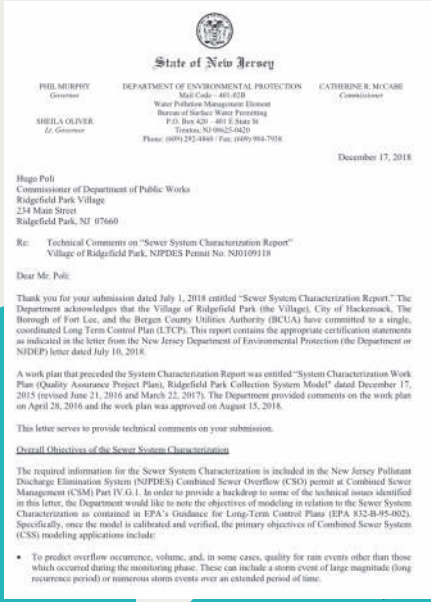
- If BCUA/Ridgefield Park considers this option, it is recommended that a general timeline is provided with target dates for distribution of draft reports, deadline for submission of comments, and how any changes to the reports before final submission will be shared back to the team.
- Consider how BCUA/Ridgefield Park will inform the team that this type of information is available for review.
- There are some members of the team that may have left the position or are inactive. An effort should be made to bring additional members to the team as soon as possible.

Ridgefield Park Supplemental CSO Team

Public System Characterization NJDEP Review

27 Comments total

Most requested additional clarification, or minor corrections



State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02B
Water Pollution Management Element
Bureau of Surface Water Permitting
P.O. Box 420 – 401 E State St
Trenton, NJ 08625-0420
Phone: (609) 292-4860 / Fax: (609) 984-7938

CATHERINE R. McCABE
Commissioner

December 17, 2018

Hugo Poli
Commissioner of Department of Public Works
Ridgefield Park Village
234 Main Street
Ridgefield Park, NJ 07660

Re: Technical Comments on "Sewer System Characterization Report"
Village of Ridgefield Park, NJPDES Permit No: NJ0109118

Dear Mr. Poli:

Thank you for your submission dated July 1, 2018 entitled "Sewer System Characterization Report." The Department acknowledges that the Village of Ridgefield Park (the Village), City of Hackensack, The Borough of Fort Lee, and the Bergen County Utilities Authority (BCUA) have committed to a single, coordinated Long Term Control Plan (LTCP). This report contains the appropriate certification statements as indicated in the letter from the New Jersey Department of Environmental Protection (the Department or NJDEP) letter dated July 10, 2018.

A work plan that preceded the System Characterization Report was entitled "System Characterization Work Plan (Quality Assurance Project Plan), Ridgefield Park Collection System Model" dated December 17, 2015 (revised June 21, 2016 and March 22, 2017). The Department provided comments on the work plan on April 28, 2016 and the work plan was approved on August 15, 2018.

This letter serves to provide technical comments on your submission.

Overall Objectives of the Sewer System Characterization

The required information for the Sewer System Characterization is included in the New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) permit at Combined Sewer Management (CSM) Part IV.G.1. In order to provide a backdrop to some of the technical issues identified in this letter, the Department would like to note the objectives of modeling in relation to the Sewer System Characterization as contained in EPA's Guidance for Long-Term Control Plans (EPA 832-B-95-002). Specifically, once the model is calibrated and verified, the primary objectives of Combined Sewer System (CSS) modeling applications include:

- To predict overflow occurrence, volume, and, in some cases, quality for rain events other than those which occurred during the monitoring phase. These can include a storm event of large magnitude (long recurrence period) or numerous storm events over an extended period of time.

Ridgefield Park Supplemental CSO Team

Public System Characterization – Key Comments

For the sake of completeness please clarify why additional rainfall monitoring was conducted; confirm that the same location was utilized for the rain gage;

Section 4.1, Collection System. Part IV.G.1.b of the permit requires a thorough review of the entire collection system that conveys flows to the STP, including areas of sewage overflows. Therefore, the report must include a discussion of areas that are prone to flooding based on observed and reported incidents, including dates of occurrence, type of storm events that cause the flooding, and antecedent conditions, if known.

Ridgefield Park Supplemental CSO Team

Public System Characterization – Key Comments

Section 5.3, Wet Weather Flow and Subcatchment Characteristics. This section describes the variables used in the SWMM Runoff method including Subcatchment Area; Subcatchment Width; Subcatchment Slope, Depression Storage, Infiltration Coefficients; and Overland Flow Routing Coefficient (Manning's Roughness). Please provide a table to include all sub-catchments for each of these input parameters for the modeled areas in tabular format and be sure to include data for Directly Connected Impervious Area (Effective Impervious). In addition, please provide the final values used after successful model calibration and a comparison to the range of acceptable literature values.

Ridgefield Park Supplemental CSO Team

Public System Characterization – Key Comments

Section 7, Consideration of Sensitive Areas. This section addresses the Consideration of Sensitive Areas which is the subject of a separate report submitted on behalf of Ridgefield Park by the NJCSO Group.

- Given that this report is not yet approved and that the Department required additional information regarding primary contact and kayaking in its September 20, 2018 comments on that report, the Department does not agree that it is appropriate to conclude that "There are no identified sensitive areas within Ridgefield Park, accordingly no addition[al] steps are planned to address sensitive areas."

Ridgefield Park Supplemental CSO Team

What does the permit say?

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

- Green Infrastructure
- Increased Storage Capacity
- Infiltration and Inflow Reduction
- Sewer Separation
- Satellite Treatment of CSO Discharge
- Bypass of Secondary Treatment at STP
- Treatment Plant Expansion

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report - Siting

Objective: To identify potential sites for storage or end-of-pipe treatment.

Analysis using GIS (mapping) data, including:

- Aerial photography
- Land Use / Land Cover
- Property data (vacant land, land ownership, etc.)
- Open Space / Green Acres
- Soil Type
- Topography
- Contaminated Sites
- Brownfields

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report - Siting

Objective: To identify potential sites for storage or end-of-pipe treatment.

Analysis using GIS (mapping) data, including:

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- Contaminated Sites
- Brownfields

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report - Siting

- Aerial Imagery and Land Use Classification
  - Structures vs. Paved vs. Vegetated
  - Open Space, Industrial, and Commercial vs. Residential and Transportation Corridors
  - Green Acres – NJDEP Approval – Propose GSI
- Parcel Data
  - Public vs. Private Ownership
- Soil Type
- Topography
  - Difference in elevation between site and outfall/regulator
  - Distance between site and outfall/regulator
- Known Contaminated Sites and Brownfields
  - Severity of contamination
  - Status of cleanup

Favorable	Unfavorable
Open paved or grass areas, vacant land	Buildings / Structures
Industrial, Commercial, Open Space	Green Acres, Residential, Transportation Corridors
Publicly owned	Privately owned
Small elevation change to outfall or regulator	Large elevation change to outfall or regulator
Close to outfall or regulator	Far from outfall and regulator
No soil or groundwater contamination	Known contaminated site or brownfield site

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report - Siting

- Aerial Imagery and Land Use Classification
  - Structures vs. Paved vs. Vegetated
  - Open Space, Industrial, and Commercial vs. Residential and Transportation Corridors
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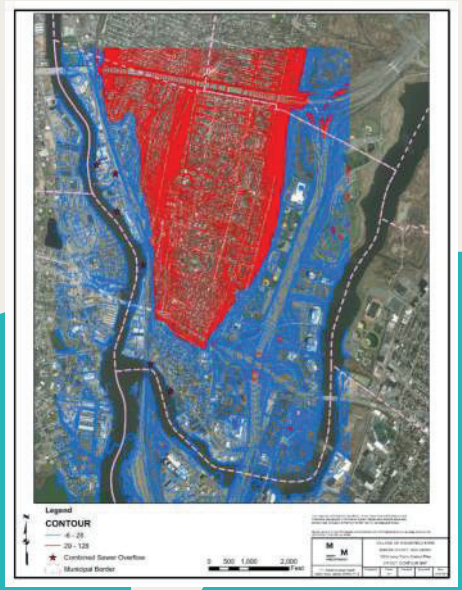


Ridgefield Park Supplemental CSO Team

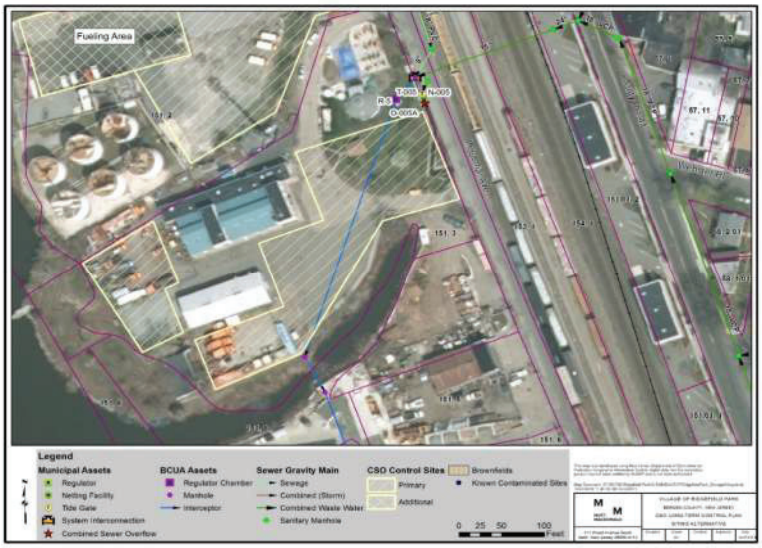
Development and Evaluation of Alternatives Report – Example Site

Area available: 0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

Green infrastructure (GI) = practices which reduce stormwater volume or flow rate by allowing the stormwater to infiltrate, to be treated by vegetation or by soils, or to be stored for reuse

- Desktop, planning-level study
- Estimate upper bound on impervious acres that could be feasibly managed by GI practices
- Following Chapter 2 "Locating and Assessing the Feasibility of Green Infrastructure" from NJDEP guidance document *Evaluating Green Infrastructure: A Combined Sewer Overflow Control Alternative for Long Term Control Plans*

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

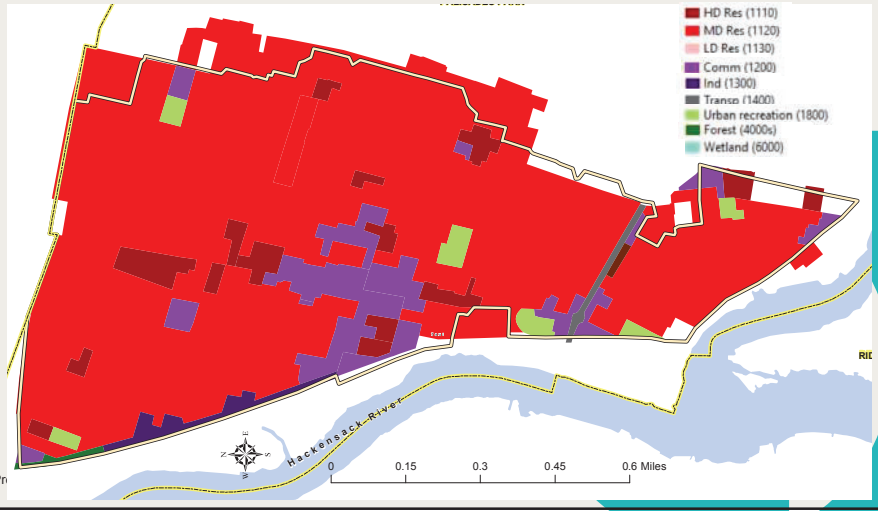
Analysis using GIS (mapping) data, including:

- Boundary of combined sewer area
- Aerial photography
- Land Use / Land Cover
- Tax parcels including area and ownership
- Building footprints
- Impervious area
- Streets
- Soil Type / Depth to Water (limited info on soil infiltration potential b/c urban land)
- Contaminated Sites

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Land Use / Land Cover



Ridgefield Park Supplemental CSO Team

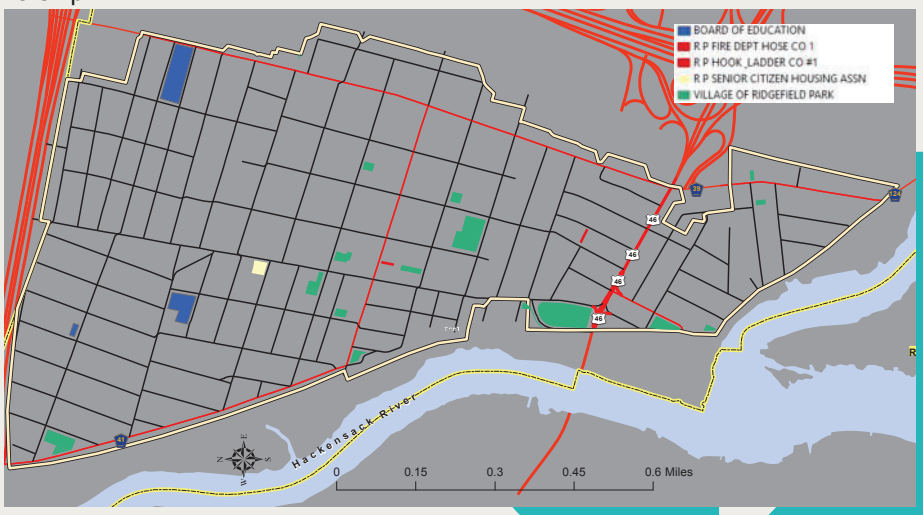
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Building footprints
- Impervious area

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Property Ownership



Ridgefield Park Supplemental CSO Team

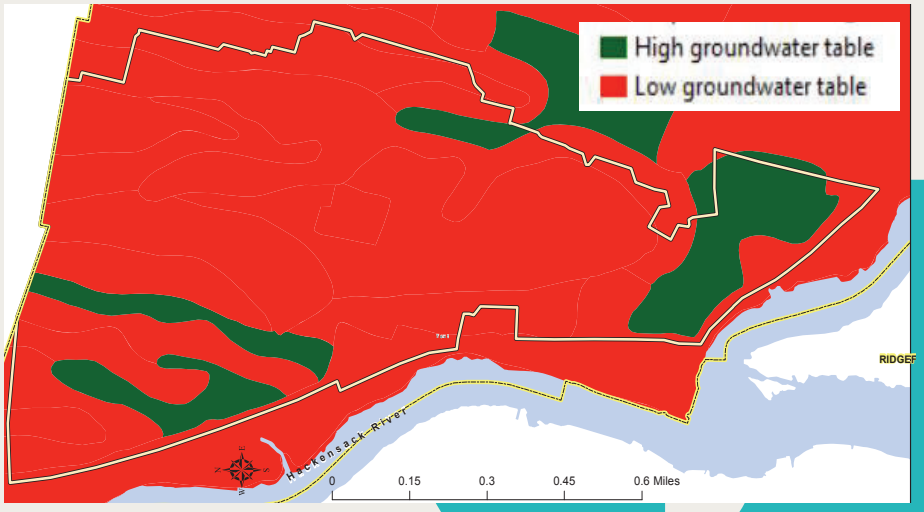
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Soil Type

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Depth to Water



Ridgefield Park Supplemental CSO Team

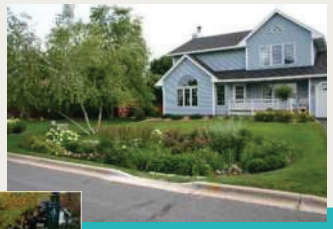
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

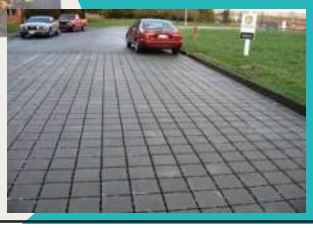
Strategies considered:

- Bioretention (raingardens, bioswales, etc.)
- Pervious pavement
- Dry wells

Potential locations considered:

- City right-of-way – curb strip
- City right-of-way – shoulder in non-parking locations
- City public and school properties
- Parking lanes
- Parking lots
- Roofs – dry wells

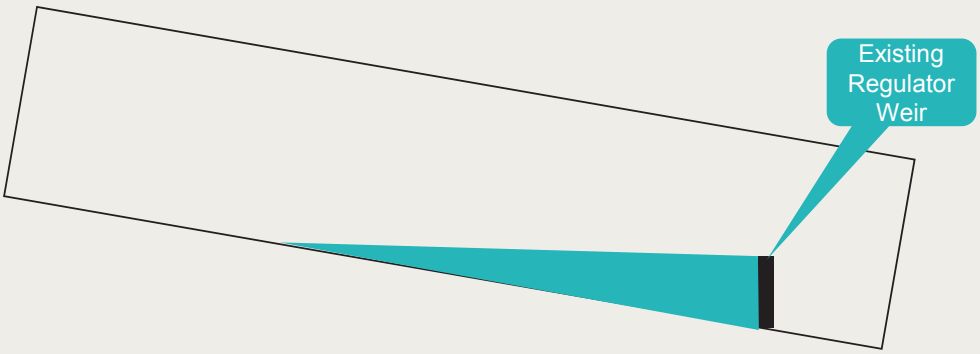




Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

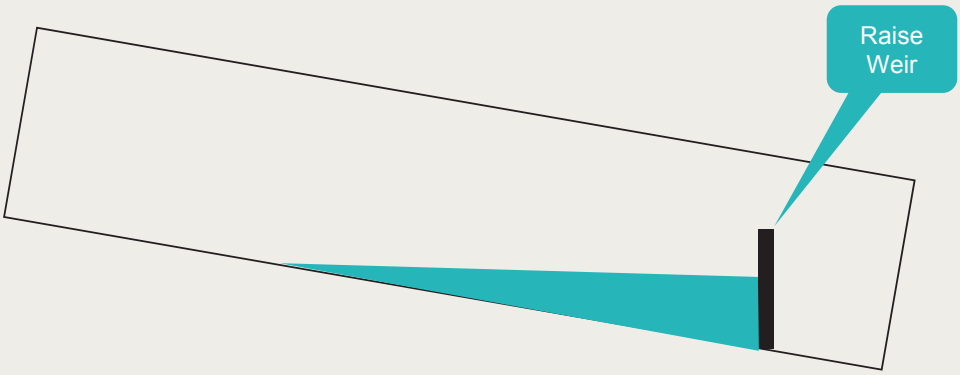
Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

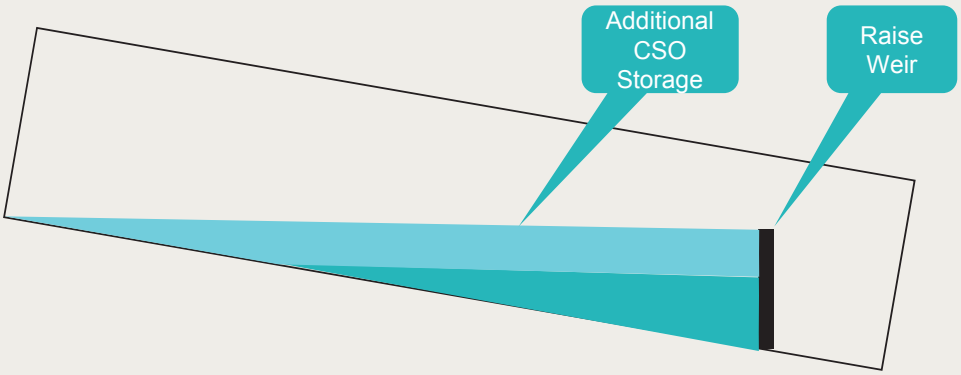
Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

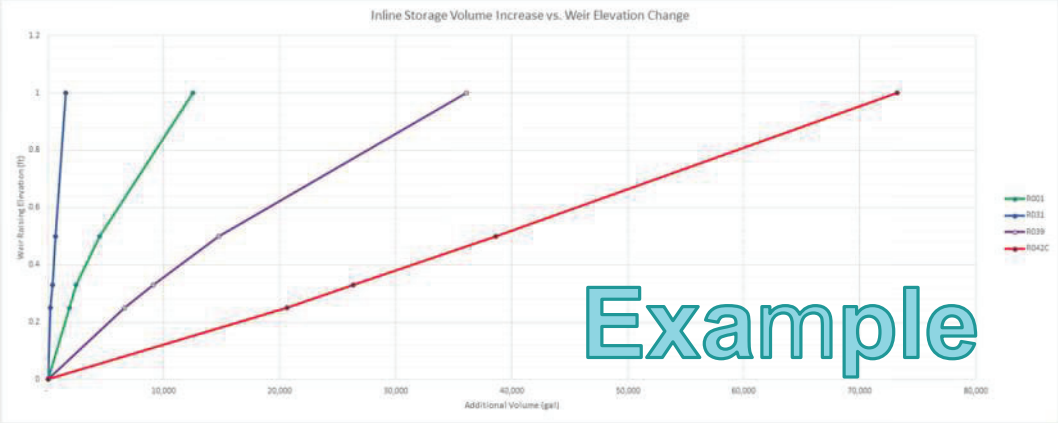
Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

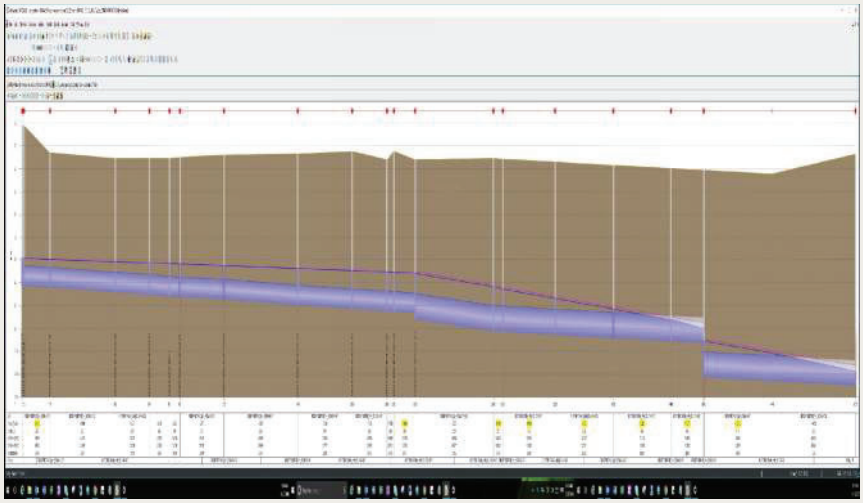
Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity

Works best with large flat pipes, which are not typical in Ridgefield Park

Ridgefield Park Supplemental CSO Team

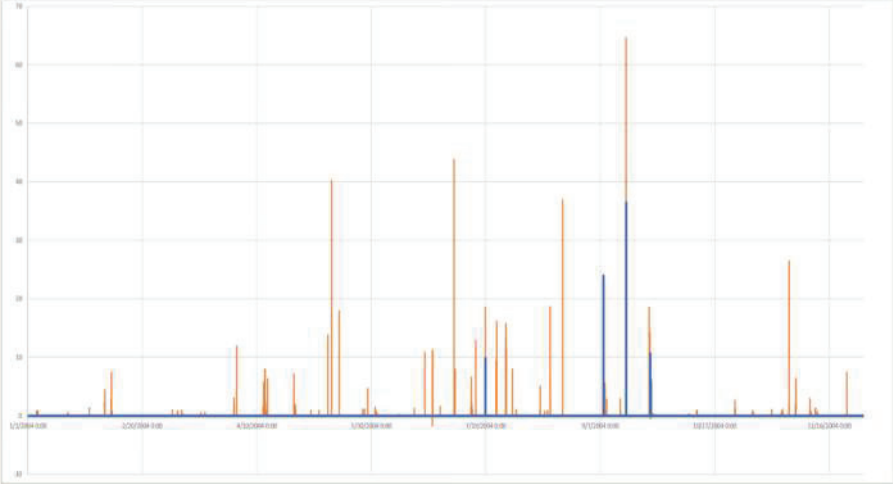
Development and Evaluation of Alternatives Report – Maximize Conveyance to WWTP



Ridgefield Park Supplemental CSO Team

NJ CSO Group Coordination

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – DRAFT Outline

- Introduction
- General Information
- Water Quality Objectives
- Development of Alternatives
  - Development and Screening Levels
- Costing
- Available Land Analysis
- Alternatives Evaluation
- Summary
- References

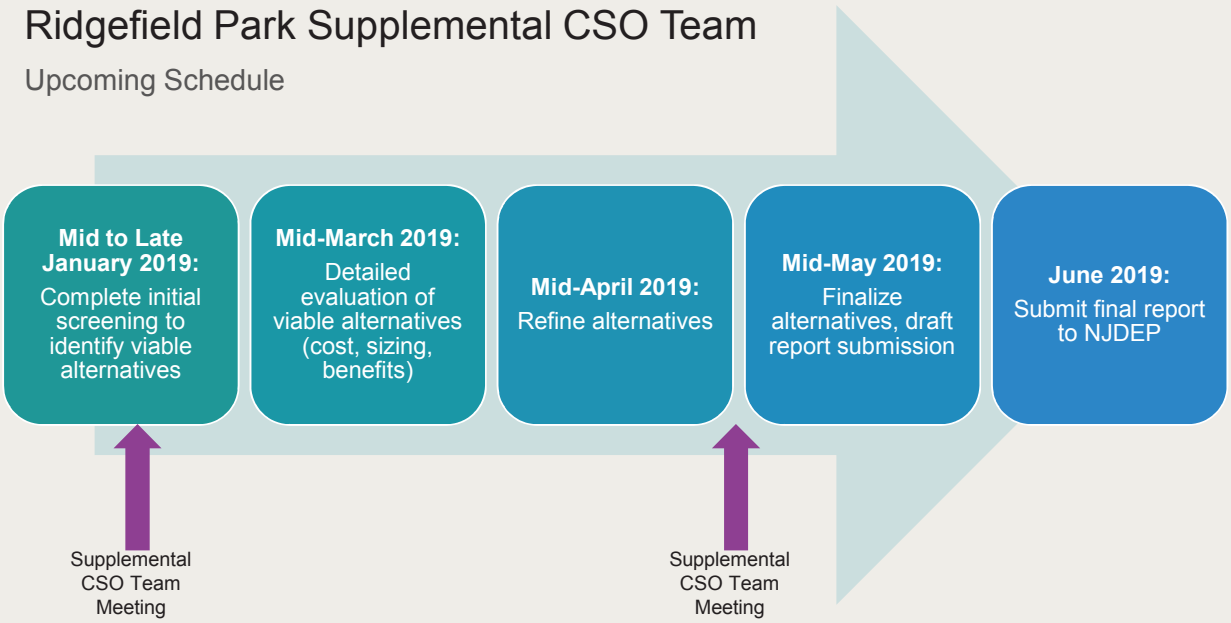
Ridgefield Park Supplemental CSO Team

Future Public Participation Activities

- Looking for Supplemental CSO Team to liaise with public and other groups.
- New members
- Input on additional outreach opportunities.

Ridgefield Park Supplemental CSO Team

Upcoming Schedule



Upcoming Schedule

January 25, 2019 – Quarterly Report Due to NJDEP

March 2019 – Anticipated Next Supplemental CSO Team Meeting

July 1, 2019 – Development and Evaluation of Alternatives Report Due to NJDEP

- Develop Comprehensive List of Alternatives
- Screen Alternatives
- Evaluate Alternatives
- Cost Estimates
- Coordinate with other Members of BCUA Group
- Produce and Submit Report

Final Questions?

Thank You?

MOTT MACDONALD

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Subtitle will go here and build downward
Please don't go smaller than 16pt

MOTT MACDONALD

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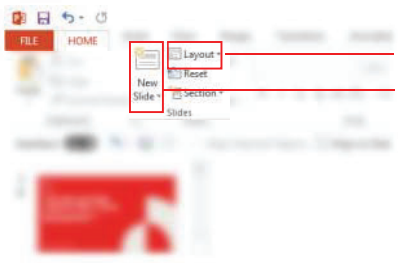
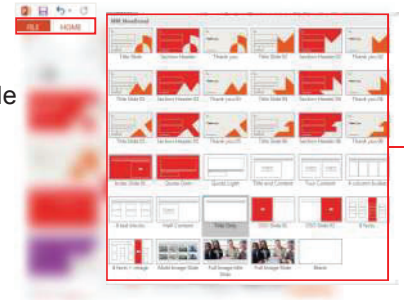
Subtitle will go here and build downward
Please don't go smaller than 16pt

Client name may be inserted in this section

Where to find the most commonly used slides



Home → layout
Home → new slide



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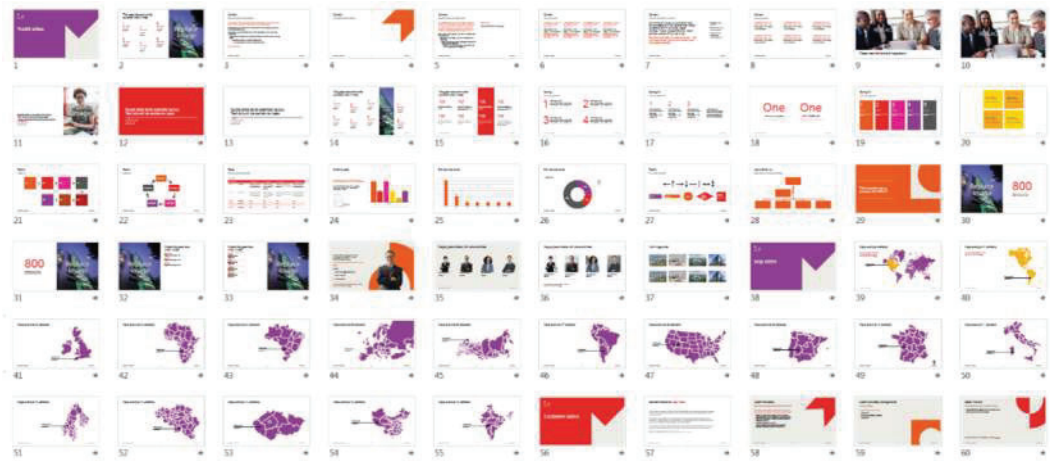
Where to find the toolkit slides, to enhance your presentation

Go to: File → New → Toolkit, open the file and copy over the slides you want



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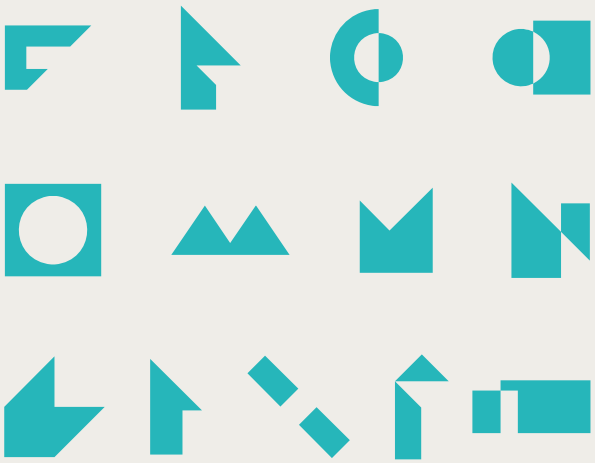
Copy and paste onto your slide, follow the rules below

Change the colour according to your colour palette (cool or warm)

- Never use more than one shape per slide
- Whenever a shape is used it must be accompanied with a stone background
- Can be resized, flipped or rotated 45° or 90°
- Must overlap at least one edge of the slide
- Shapes go behind isolated (cut out) images
- Try not to use a shape with too much content (one side only please)



Colours

We use **either** cool **or** warm palette within a presentation.

Warm palette

YELLOW	RED	PINK
GOLD	ORANGE	PURPLE

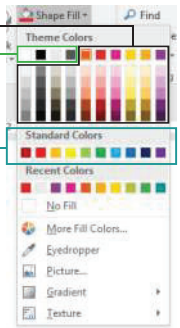
Cool palette

BLUE	TURQUOISE	GREEN	PURPLE
DK BLUE	DK TURQUOISE	LIME GREEN	

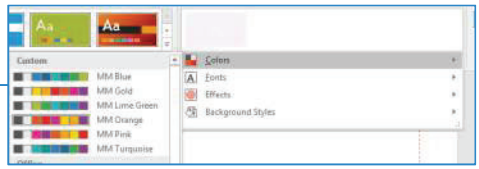
Use top line theme colours only, tints are mainly for tables and charts

DO NOT USE standard colours

Use the dark shades for text and light shades for background

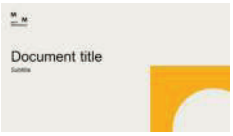


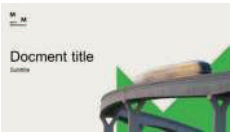
Colours can be changed using the variants menu (Design (tab) → Variants → Colors → then select colour group of your choice)



Quick checklist

Helping you stay on brand!





1. For title slide use **shape or shape + cut out photo**

2. Use **Arial font** only

3. Remove all effects – gradients, blurs, round corners and strokes from your graphics and photos.

4. Use a photo **or** shape per slide. Only a cut out photo can be used with a shape
Check our guidance on what makes a photo on brand

5. Need more slide options? Hold Ctrl and click here for the toolkit

Content

Title and content layout subtitle

If you type in the field titled “Click to add text”, you get this text style. This is used as a header for new paragraphs

Highlight the text entered then hit tab and the text changes to black for second paragraph style.

To go back: Hold shift button then hit the tab button (While text is still highlighted)

- Repeat same trick again and it indents and changes to a smaller bullet style (sub bullet)
  - A fourth tab sequence is a further indented bullet
    - A fifth tab sequence is another indented bullet style

Village of Ridgefield Park Supplemental CSO Team

Meeting Number 8

Commissioner's Conference Room

Village of Ridgefield Park Municipal Building

May 28, 2019, 10 am

Group Meeting Minutes

1. Introduction
    a. Meeting began at 10 am with introductions. Several members of the general public were in attendance in addition to the Supplemental CSO Team.
    b. John Dening opened the meeting with a safety discussion about proper ladder usage.
    c. John Dening welcomed new attendees and presented a recap of the topics discussed at all meeting held to date and opened for questions. John explained the purpose of the meeting and the role of the Supplemental CSO team. No questions were asked at that time.
2. Presentation by John Dening about the Development and Evaluation of Alternative Controls (see power points).
3. Discussion and Questions
    a. The following outlines the questions that were asked and the discussions that followed: Question: If there is no extra capacity at BCUA, will Ridgefield Park be required to pay for the cost of expansion?

    Answer: Yes, if additional capacity is needed at BCUA Ridgefield Park and any other entities that need the capacity will cover the cost of the expansion.

    b. Question: If we stop sending storm water to BCUA will our bill be reduced?

    Answer: Ridgefield Park will pay for the amount of flow into the plant measured at the BCUA meter. Ultimately, for any solution that is proposed the costs will be compared and evaluated.

    c. Question: How much of Ridgefield Park is currently separated?

    Answer: Approximately half of Ridgefield Parks wastewater system is separated.

    d. Question: Should the State share in some of the costs due to the fact that much of the storm water resulted from the construction of Route 80 and the reconstruction of North Avenue?

    Answer: This would be a legal matter for the Village to investigate.

    e. Question: Would we need to run a new sewer line along Teaneck Road?

    Answer: At this time, we are looking at more general broad solutions. Specific streets are not being considered at this time.

f. Question: What percentage of the flow could be reduced by green infrastructure such as bioswales, pervious pavement and rain gardens?

Answer: Many factors such as soil characteristics/infiltration capacity will have to be studied to determine the performance of any green initiatives.

g. Question: If we separate the sewer system will that solve the problem?

Answer: Separation will keep storm water from entering the BCUA treatment plant, Nevertheless, storm water may still need some level of treatment before being discharged.

h. Question: What if we implement CSO controls and the water quality does not improve due to the tidal nature of the waterways?

Answer: The overall water quality may not improve, but the permit requires a reduction in the overflows regardless. The DEP is looking for permittees to do whatever can be done feasibly. The ultimate goal would be for all waterways to be fishable and swimmable, but the DEP recognizes that the solution must be affordable.

i. Question: Are there any other movements underway to address other causes of river pollution?

Answer: Yes, the riverkeeper and the baykeeper are consistently looking for ways to improve water quality. In addition, the NJDEP is targeting stormwater from separate sewer systems through NJPDES Permits.

j. Question: If a tank is put in the Village could businesses continue to operate on the property?

Answer: Most likely a business could operate or a park could be built over the storage tank after it is completed. The tank would be below ground except for a pump station and a few manholes. Depends on the type of business and what they would want to put on top of the tank.

k. Question: Could a tank be located on the property under the Route 80 bridge?

Answer: That is a possibility that can be explored.

l. Question: Could a tunnel follow the railroad right of way?

Answer: It is unlikely that that would be feasible due to railroad restrictions and rules.

m. Lastly, a general discussion about the need for a boat ramp concluded the discussion.

n. The next meeting of the Supplemental CSO Team will be held in September.

4. Meeting concluded at noon.

Minutes submitted by Donna Gregory

Village of Ridgefield Park
Supplemental CSO Team
Meeting Number 8 – Characterization Report
Commissioner's Conference Room
Village of Ridgefield Park Municipal Building
May 28,2019; 10:00 AM

Initials	Name	Organization	Email	Phone Number
	John Rolak	Mott MacDonald	john.rolak@mottmac.com	973-912-2521
JRD	John Dening	Mott MacDonald	John.dening@mottmac.com	973-912-2464
DMG	Donna Gregory	Mott MacDonald	donna.gregory@mottmac.com	
	Flo Muller	Ridgefield Park Shade Tree Commission	flomart@nj.rr.com	201-814-9019
	Mark Olson	Chairman, Green Team	mark-olson@verizon.net	201-440-5989
SQ	Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com	201-440-5652
LQ	Linda Quinn	Ridgefield Park Environmental Commission	linda.quinn125@gmail.com	201-440-5652
	John Ponticorvo	Wanda Canoe Club	jponticorvo@aol.com	201-803-3643
	JOHN ANLIAN	Bd of Commissioner	johnanlian@yahoo.com	201.943-1110
	GERARD GARDFALOW			201-440-4694
	Leslie Olson	R.P. GreenTeam R.P Environ. Cmsn	leslie-olson@verizon.net	201-440-5989
SS	Steve Seeberger	NJDEP	stephen.seeberger@dep.nj.gov	609 292-4860
RP	Rachael Pepe	NJDEP	Rachael.Pepe@dep.nj.gov	609-292-9977
NK	Nancy Kempel	NJDEP	Nancy.kempel@dep.nj.gov	609 633-7021

Village of Ridgefield Park
Supplemental CSO Team
Meeting Number 8 – Characterization Report
Commissioner's Conference Room
Village of Ridgefield Park Municipal Building
May 28,2019; 10:00 AM

Initials	Name	Organization	Email	Phone Number
GLA	Guillermo	1st PRESB. CHURCH	pastorgla@ridgefieldparkchurch.org	201.440.4629

MOTT MACDONALD

Development and Evaluation of Alternative Controls

Village of Ridgefield Park
Supplemental CSO Team

Meeting #8

May 28, 2019

Safety Topic

Ladders

1

Pick the Right Ladder for the Job

Type

Length

Material

2

Inspect the Ladder

Corrosion

Rot

Clean

3

Set up the Ladder

4:1 Rule

Level Ground

3' Above Roof

4

Use the Ladder

Keep centered

3 Points of Contact

Proper footwear

Use a toolbelt

Ridgefield Park Supplemental CSO Team

Meeting No. 8 Agenda

Refresher – In meeting #7 we covered:

- Submissions Status
- Comments from NJDEP on Characterization and Public Participation Reports
- Preliminary Evaluation of Alternatives
- NJ CSO Group Coordination
- Draft Report Outline
- Future Public Participation
- Upcoming Schedule

Ridgefield Park Supplemental CSO Team

Meeting No. 8 Agenda

- Submissions Status
- Public Participation Status
- Development and Evaluation of Alternatives
  - Coordination with BCUA
  - Future Baseline
  - Preliminary Alternatives
- Upcoming Schedule

Ridgefield Park Supplemental CSO Team

DEP review status – July 1, 2018 submittals

- **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. DEP comment letter dated 3/01/19. Approved 4/8/19
- **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. DEP **Approval** letter dated 3/01/19.
- **Public Participation Process Report**: comment letter dated 11/08/2018; revised report submitted1/07/19. Received NJDEP Comments 4/23/19. Responded due 5/22/19.
- **System Characterization Reports**: comment letter dated 12/17/2018, Revised Report submitted 2/11/19. NJDEP **Approval** letter dated 03/11/19

Public Participation Comment Letter

To all members of the BCUA CSO Group

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02B
Water Pollution Management Element
Bureau of Surface Water Permitting
P.O. Box 420 – 401 E State St
Trenton, NJ 08625-0420
Phone: (609) 292-4860 / Fax: (609) 984-7938

CATHERINE R. McCABE
Commissioner

April 23, 2019

To: Distribution List

Re: Review of Revised Public Participation Process Report Required by Part IV.D.3.b.iii
Bergen County Utilities Authority, NJPDES Permit No. NJ0020028
Borough of Fort Lee, NJPDES Permit No. NJ0034517
City of Hackensack, NJPDES Permit No. NJ0108766
Village of Ridgefield Park, NJPDES Permit No. NJ0109118

Dear Permittees:

The New Jersey Department of Environmental Protection (the Department) is in receipt of the following public participation process reports:

- BCUA CSO Group, "Public Participation Program Report," June 27, 2018, revised January 4, 2019,
- City of Hackensack's "Public Participation Process Report," June 2018, revised January 2019,
- Village of Ridgefield Park's "Supplemental CSO Team Public Participation Report," July 1, 2018, revised January 7, 2019,
- Borough of Fort Lee's "Public Participation Program Report for the Borough of Fort Lee," January 18, 2019.

These reports were submitted in accordance with Part IV.D.3.b.iii of your New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) permit and serve as a necessary element to the Long Term Control Plan (LTCP) as due on June 1, 2020. The Department acknowledges that Bergen County Utilities Authority, the Borough of Fort Lee, the City of Hackensack and the Village of Ridgefield Park have committed to a single, coordinated LTCP where the Public Participation Process Report contains the appropriate certification statements. The Department also acknowledges that the Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park submitted Public Participation Process Reports intended to supplement the BCUA CSO Group report. On November 7, 2018 the Department issued comments on the initial June/July 2018 submittals. This letter serves to provide a determination on these submissions and to document the phone call on April 17, 2019 held between Department representatives and representatives for each of the above referenced CSO permittees. While Fort Lee is a participant in the BCUA CSO Group, note that comments on the January 18, 2019 submission entitled "Public Participation Program Report for the Borough of Fort Lee" will be made under separate cover.

As discussed in the April 17, 2019 phone call, the Department acknowledges that the revised submissions reflect the Department's recommendation to expand the composition of the regional supplemental team by stating the intention to invite additional non-governmental members of the community. The Department also acknowledges that in addition to the regional Supplemental CSO Team, Fort Lee and Ridgefield Park

Public Participation Comment Letter

Response Due May 23, 2019

Delivered May 22

Looking for Planned and Future Activities

Actively Engage Public

Through LTCP Submission June 1, 2020

have formed local Supplemental CSO Teams. However, gaps exist in the permittee planned efforts to engage the affected public beyond those that sit on the Supplemental CSO Teams. As required by Part IV.G.2.b, of the permit, "implementation shall actively involve the affected public throughout each of the 3 Steps of the LTCP process." As such, active involvement, including feedback opportunities, must be provided by the permittee to the affected public beyond those who sit on the Supplemental CSO Team. Additionally, as this next year or so will be the time frame during which the permittee will be developing and selecting alternatives, this will be the most advantageous time to solicit and address input from the affected public on the alternatives.

During the call we discussed several ways to demonstrate active involvement with the affected public. Below is a bulleted list of some of the ideas the Department suggested on the call:

- Update the Homeowner's guide, and other pamphlets/flyers to add a brief mention of the CSO LTCP process underway and how to get more information;
- Partner with local community groups to incorporate CSO outreach into their efforts that they are already undertaken;
- Present at a local community group's existing meeting, such as but not limited to, homeowner's associations, boating/kayaking clubs, service-based groups, business associations (ex. chamber of commerce, downtown associations), neighborhood associations, Parent Teacher Organizations, and religious or cultural associations;
- Present at the environmental commission, planning board, and town council/committee meetings.

When hosting your own public meeting, please consider:

- Locations that are most convenient and familiar to residents, such as a local library, community building or school;
- Inviting the local groups that you have offered a presentation to and ask them to inform their members of the meeting;
- Advertising the meeting through multiple avenues, include social media, flyers in high visible locations, municipal email distribution lists, municipal meeting calendars and advertisement in local newspaper; and
- Partnering with a local group for the meeting, which will likely draw a larger attendance.

The above is not a comprehensive list of what could done to demonstrate active involvement and the Department encourages you to think about which approaches are most efficient and effective for your individual communities and the specific segments of the affected public you are seeking to engage. Additionally, as offered during the conference call, the Department is available to meet with you to further discuss specific approaches for public participation, including, sharing best practices from other public participation efforts; feedback on upcoming meeting agenda, format and presentations; suggesting methods to advertise feedback opportunities and upcoming meetings.

The Department requests that the previous submissions be supplemented with additional information **within 30 days of the date of this letter** to detail planned and/or future efforts to actively engage the affected public leading up to the submission of the Development and Evaluation of Alternatives Report and the Selection and Implementation of Alternatives Report. This supplement may be in the form of a letter or as revisions to the plan itself.

2

Public Participation Comment Letter

Since last submission:

- Jan SCSO Team Meeting
- Posted SCSO Team Meeting Minutes
- Added John Porticorvo – Wanda Canoe Club
- Presented to Town Caucus April 4th
- BCUA SCSO Team Meetings
- Ridgefield Park Earth Day

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2

Public Participation Comment Letter

Proposed:

- Continue SCSO Team Meetings
- Seek additional SCSO Team Members
- Present to Council
- Newsletter Article
- Public and Community Group Meetings
- Earth Day 2020

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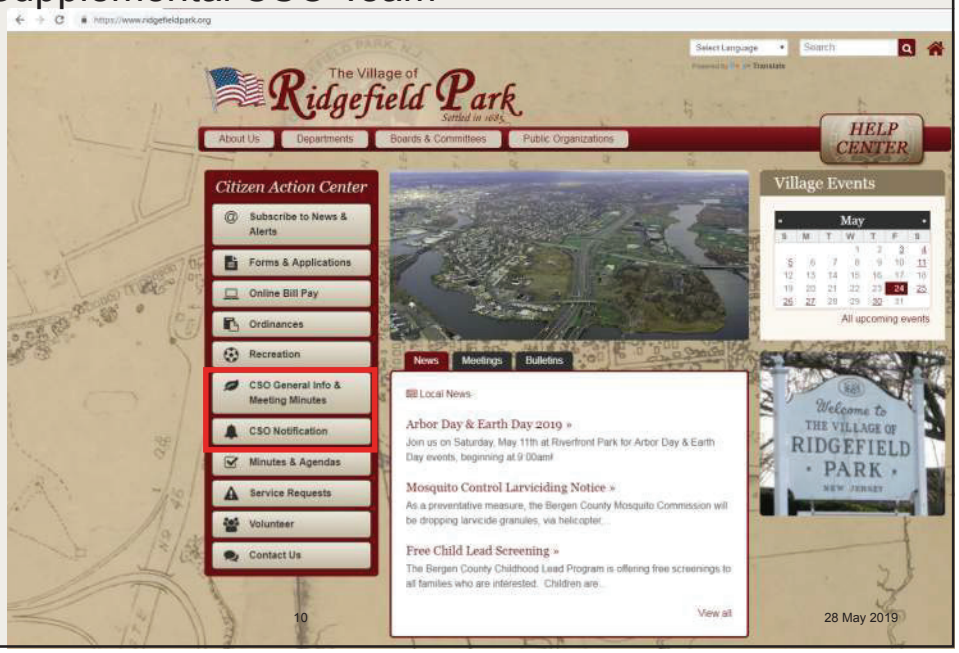
2

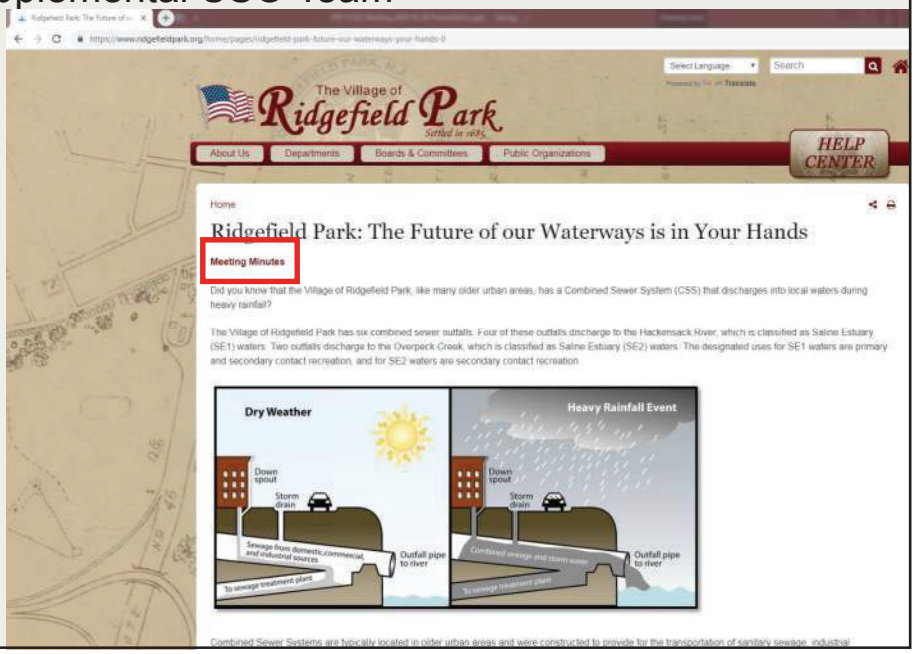
Ridgefield Park Supplemental CSO Team

Meeting Minutes



Ridgefield Park Supplemental CSO Team

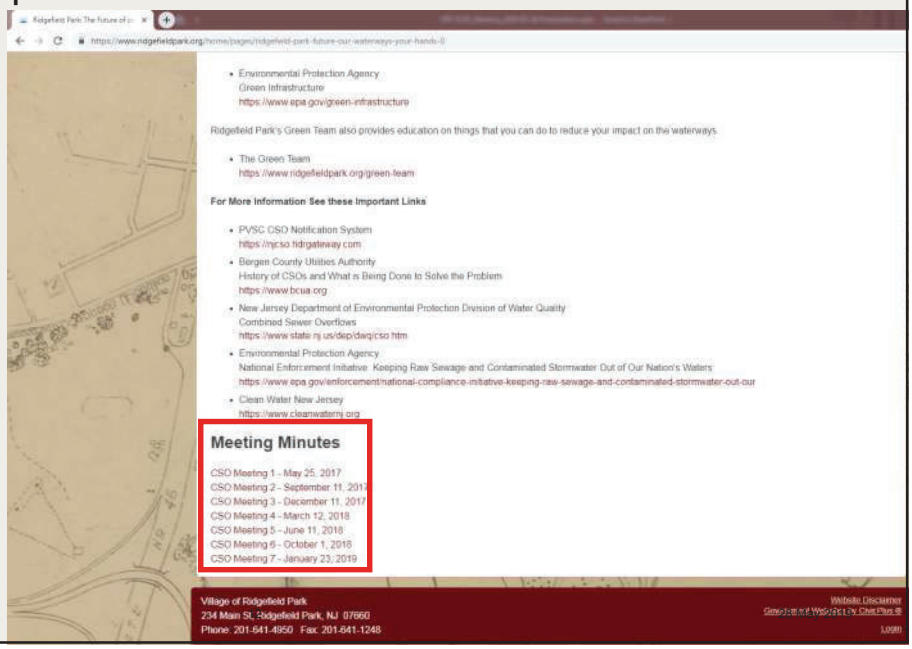
Meeting Minutes



Mott MacDonald | Presentation

Ridgefield Park Supplemental CSO Team

Meeting Minutes



Mott MacDonald | Presentation

Ridgefield Park Supplemental CSO Team

Future Public Participation Activities

- Looking for Supplemental CSO Team to liaise with public and other groups.
- Suggest Activities
- New member(s)

Ridgefield Park Supplemental CSO Team

What does the permit say about Development and Evaluation of Alternatives?

The permittee 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 permittee 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

The permittee shall select either the Demonstration or Presumption Approach

Ridgefield Park Supplemental CSO Team

Range of Alternatives

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

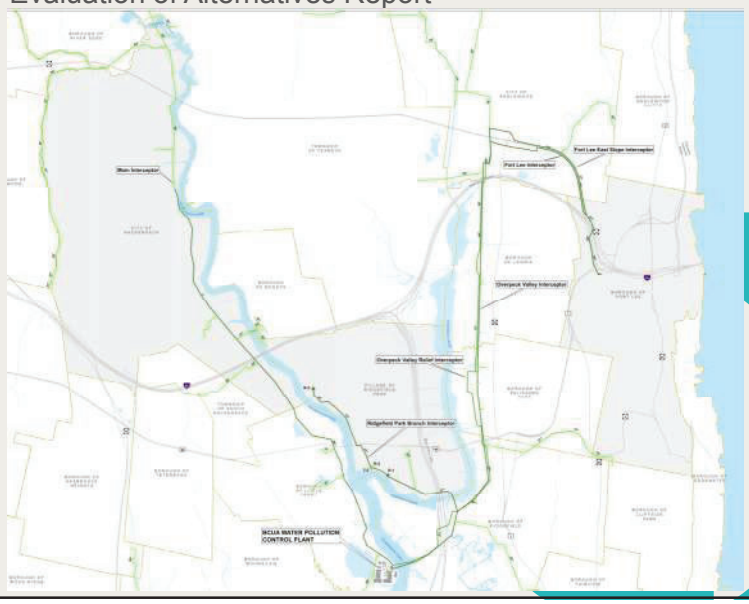
The Big Picture

BCUA Facilities

- Transport
- Treatment

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

InfoWorks ICM Model was Used to Estimate Sewer Flow Capacity near WPCF:

Trunk Sewer	Estimated Max Flow (mgd)*
Main Trunk Sewer	115
Overpeck Trunk & Relief Sewers	95
Total Max Peak Flow to WPCF	210

* Based on average wet well elevations and no system surcharge.

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

Arcadis evaluation:

- Hydraulic and Process Capacity of each Treatment Unit:
  - Influent Pumping Station
  - Grit Removal
  - Primary Settling Tanks
  - Secondary Aeration Tanks
  - Final Settling Tanks
  - Chlorination and Dechlorination
  - Outfall

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

Arcadis Evaluated:

- Existing Plant Capacity
- Bypassing of Secondary Treatment
  - Process Improvements
    - Needed to Meet NJPDES Permit Limits with Bypass
    - Construction and O&M Costs for Process Improvements Required
- Expanding STP Capacity
  - Treatment Improvements using
    - Ballasted Flocculation
    - Cost for Construction and O&M

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

BCUA Water Pollution Control Facility Preliminary Information

Description	Max Flow (mgd)
NJPDES Permitted*	94
Average Daily Flow	75
Treatment Capacity (10 state standard)	105
Existing Hydraulic Capacity	220
Max. Peak Flows	>200

Trunk Sewer	Estimated Max Flow (mgd)*
Main Trunk Sewer	115
Overpeck Trunk & Relief Sewers	95
Total Max Peak Flow to WPCF	210

* BCUA is currently undertaking a TMDL Study to potentially increase

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

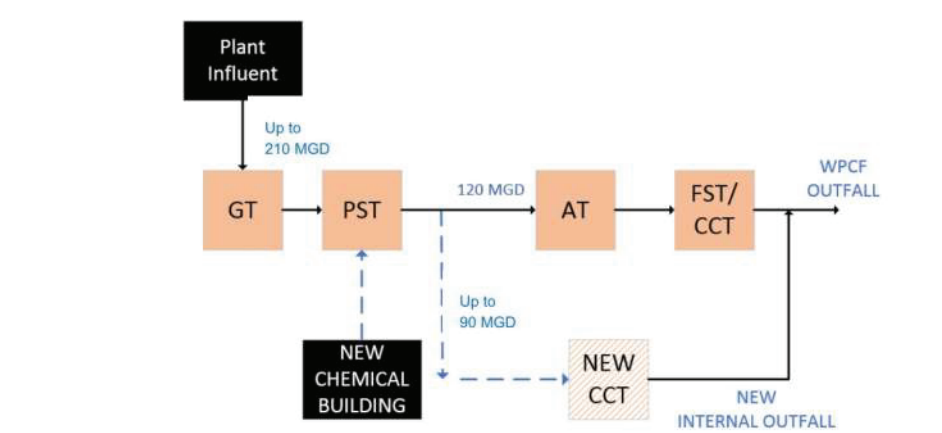


Figure 6. CEPT Alternative Block Flow Diagram

Chemically Enhanced High Rate Treatment

Chemically Enhanced High Rate Treatment

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

Alternative	Construction Cost	Operation Costs	20-Year Present Worth
Chemically Enhanced High Rate Treatment	$32M-$127M ($64M)	$0.8M	$44M-$139M ($76M)
Ballasted Flocculation	$55M-$220M ($110M)	$1.2M	$73M-$238M ($128M)

Class 5 Cost Estimate (+100% -50%)

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

Village of Ridgefield Park

Preliminary Alternatives

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Screening Process

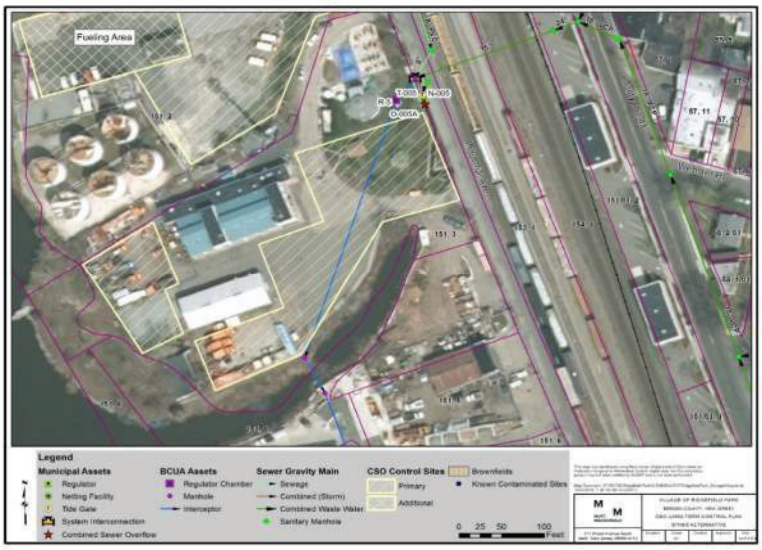
Area available: 0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations

BCUA Interceptor



Ridgefield Park Supplemental CSO Team

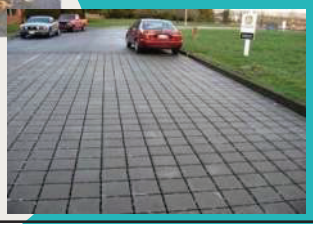
Development and Evaluation of Alternatives Report – Screening Process

Strategies considered:

- Bioretention (raingardens, bioswales, etc.)
- Pervious pavement
- Dry wells

Potential locations considered:

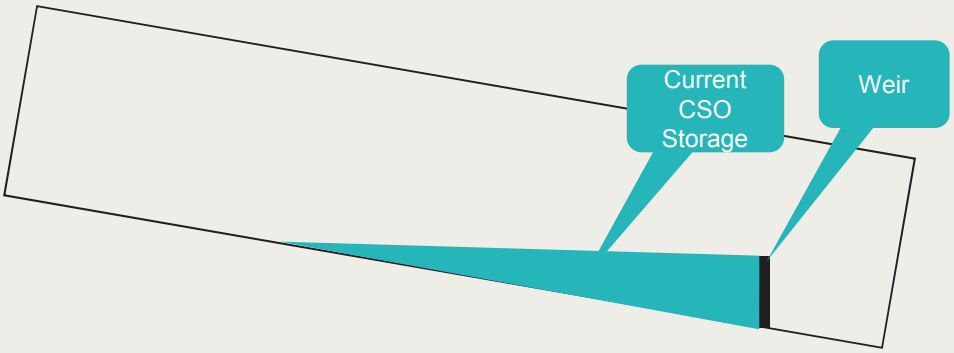
- City right-of-way – curb strip
- City right-of-way – shoulder in non-parking locations
- City public and school properties
- Parking lanes
- Parking lots
- Roofs – dry wells



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Screening

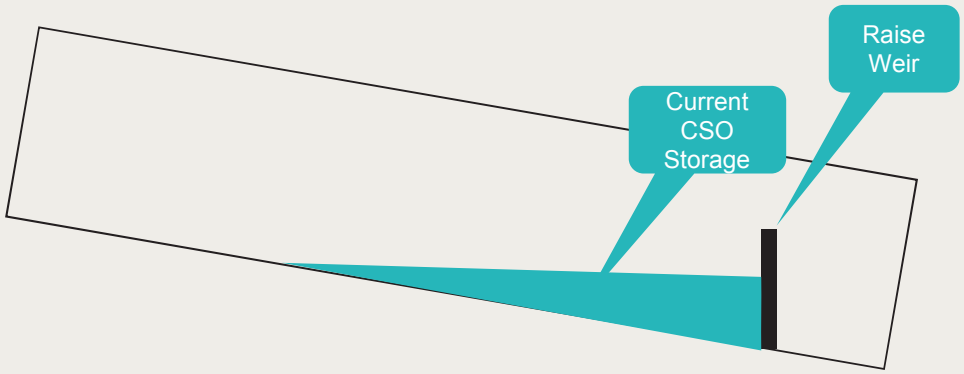
Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Screening

Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

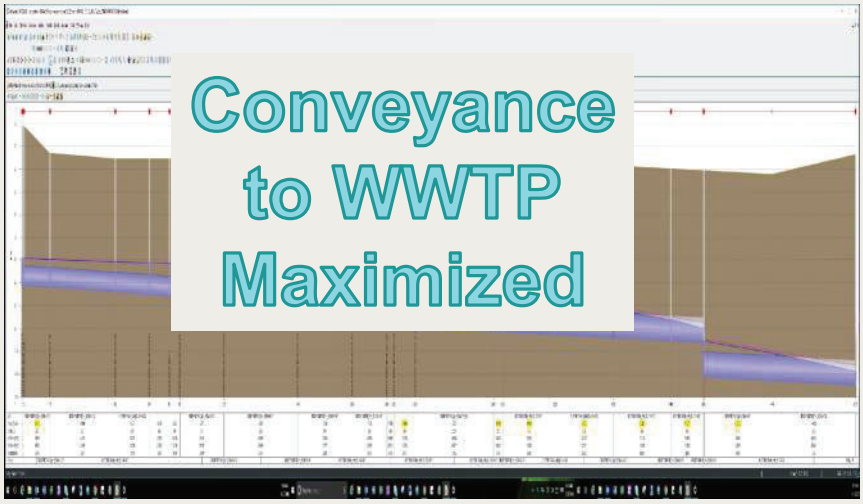
Development and Evaluation of Alternatives Report – Screening

Maximize inline storage capacity

Works best with large flat pipes, which are not typical in Ridgefield Park

Ridgefield Park Supplemental CSO Team

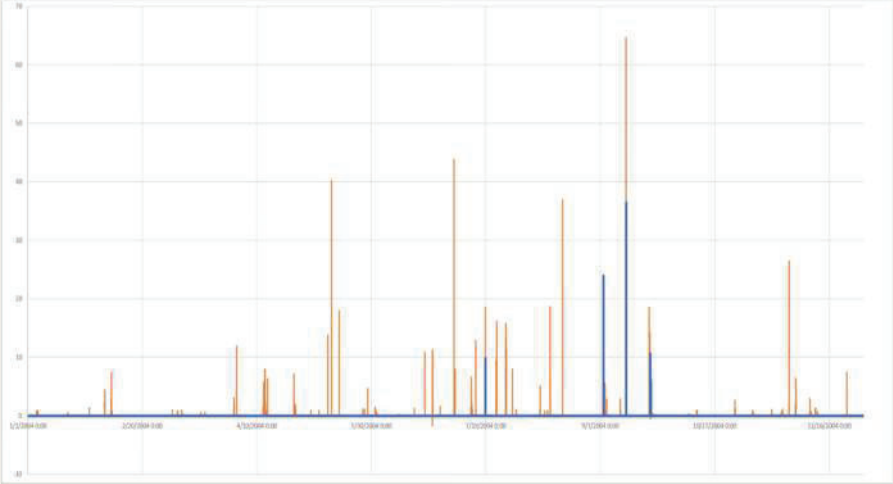
Development and Evaluation of Alternatives Report – Screening



Ridgefield Park Supplemental CSO Team

NJ CSO Group Coordination

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture



Ridgefield Park Supplemental CSO Team

NJ CSO Group Coordination – Agreed with BCUA Modeled Output

- Levels of Control
  - 0 Overflows
  - 4 Overflows
  - 8 Overflows
  - 12 Overflow
  - 20 Overflows
  - 85% Capture

	Rank	Event	Total CSO (MG)	Start	End
Top 4 Storm Events by Overflow	1	49	262.0	9/28/2004 5:30	9/30/2004 13:45
	2	46	154.4	9/8/2004 3:30	9/9/2004 22:00
	3	48	129.4	9/18/2004 7:15	9/18/2004 15:15
	4	36	115.0	7/18/2004 16:30	7/19/2004 2:00
Top 8 Storm Events by Overflow	5	56	106.9	11/28/2004 3:30	11/29/2004 0:15
	6	35	101.0	7/12/2004 9:15	7/14/2004 23:30
	7	32	98.1	6/25/2004 17:00	6/26/2004 6:15
	8	37	94.4	7/23/2004 10:30	7/24/2004 4:15
Top 12 Storm Events by Overflow	9	6	89.9	2/6/2004 8:00	2/6/2004 23:45
	10	23	87.6	5/12/2004 15:30	5/12/2004 21:45
	11	38	78.9	7/27/2004 16:15	7/28/2004 8:45
	12	15	78.5	4/12/2004 18:15	4/14/2004 21:00
Top 20 Storm Events by Overflow	13	44	59.7	8/21/2004 13:30	8/21/2004 18:30
	14	17	59.5	4/26/2004 1:30	4/27/2004 6:00
	15	34	57.7	7/5/2004 3:00	7/5/2004 16:45
	16	43	57.2	8/14/2004 22:30	8/16/2004 12:30
	17	52	44.4	11/4/2004 14:15	11/5/2004 17:30
	18	57	44.3	12/1/2004 4:30	12/1/2004 15:15
	19	24	38.7	5/15/2004 21:30	5/16/2004 9:00
	20	22	38.6	5/10/2004 23:45	5/11/2004 5:45

Ridgefield Park Supplemental CSO Team

Existing Conditions

Outfall No.	Outfall Name	Annual Total		Maximum	
		No. Overflow Events	Overflow Volume (Mgal)	Duration (hours)	Peak Flow (mgd)
001A	Bergen Turnpike	44	12.99	273.15	20.86
002A	Main Street and Bergen Turnpike	37	2.10	125.30	7.89
003A	Christie Street	59	15.49	310.99	31.87
004A	Mount Vernon Street	72	23.41	652.37	49.36
005A	Industrial Avenue	37	4.32	75.92	7.84
006A	Hackensack Avenue	35	0.75	205.94	3.74
System-wide Total		**not appl.**	**59.05**	**not appl.**	**not appl.**
System-wide Maximum		**72**	**23.41**	**652.37**	**49.36**

Ridgefield Park Supplemental CSO Team

Future Baseline Conditions - 2050

- Required by Permit

Year	Population
1970	13,990
1980	12,738
1990	12,522
2000 (US Census)	12,873
2010 (US Census)	12,729
2017 (US Census 7-Year Estimate)	13,154

Ridgefield Park Supplemental CSO Team

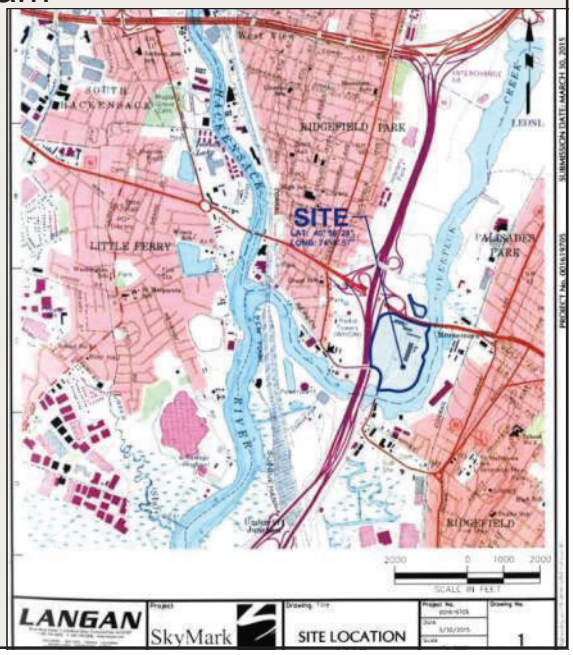
Future Baseline Conditions

Data Source	Projected Population to 2050 - Conservative (people)	Projected Population to 2050 – All Sources (People)
NJTPA	17,960	17,960
US Census Projection		15,910
NJ Department of Labor	15,720	15,720
Sky Mark Development Analysis	16,470	16,470
BCUA Projections		14,620
Average	16,720	16,100

Ridgefield Park Supplemental CSO Team

Future Baseline Conditions

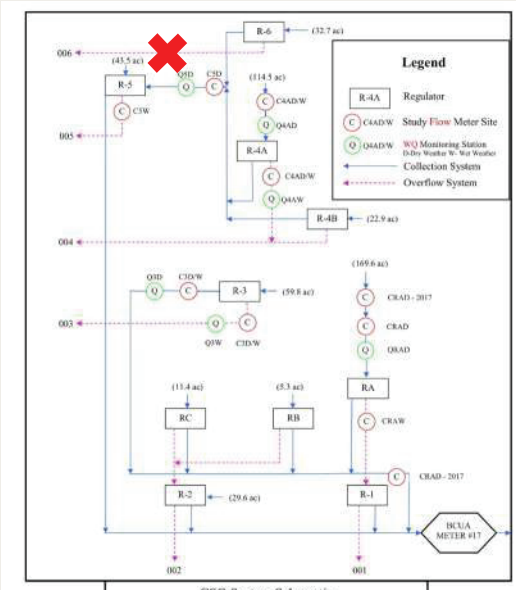
- Future growth associated with Skymark and outside of combined area.



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006

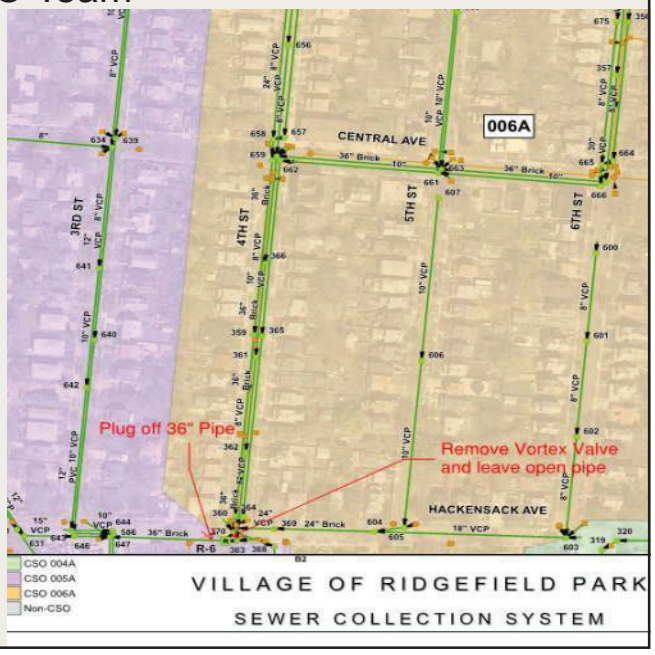


CSO System Schematic
Village of Ridgefield Park
CSO Characterization Study

Ridgefield Park Supplemental CSO Team

Control Programs

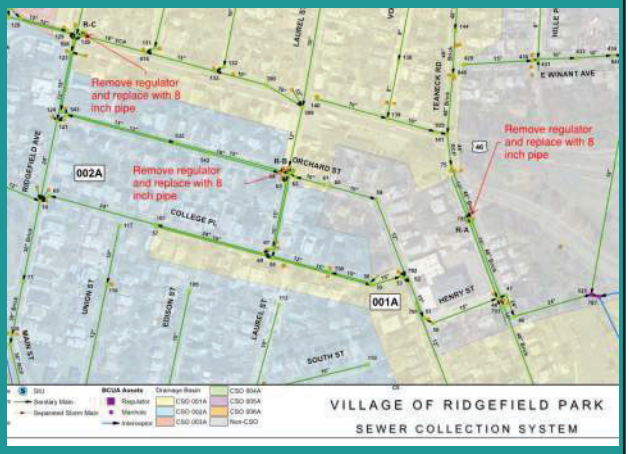
- Eliminate Regulator 006



Ridgefield Park Supplemental CSO Team

Control Programs

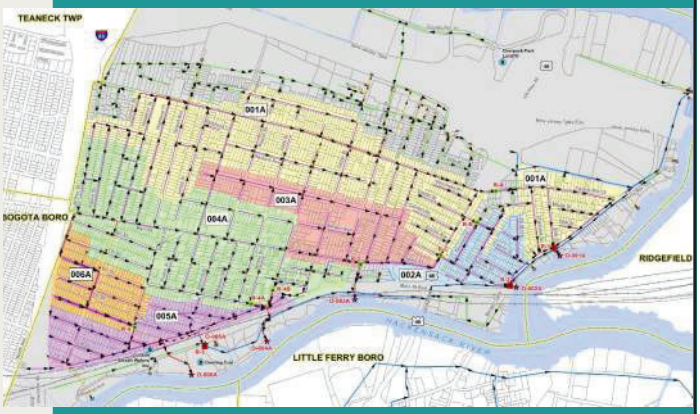
- Eliminate Regulator 006
- Eliminate Internal Regulators



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation



Ridgefield Park Supplemental CSO

Control Programs

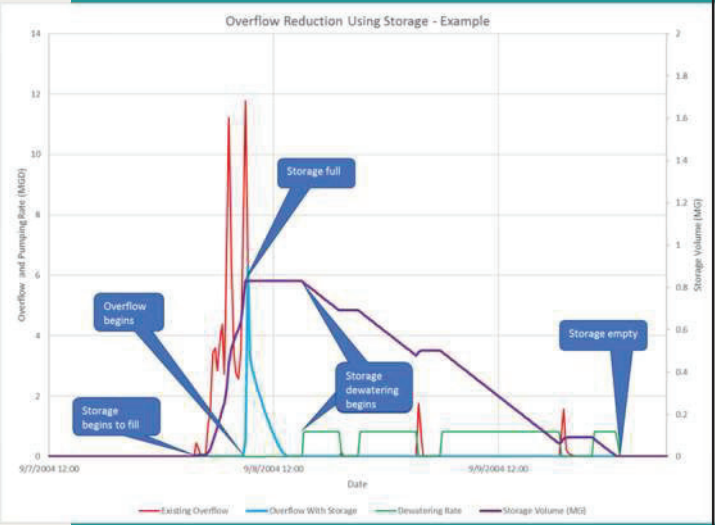
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation

- Preliminary Cost $150-$200M

Ridgefield Park Supplemental CSO Team

Control Programs

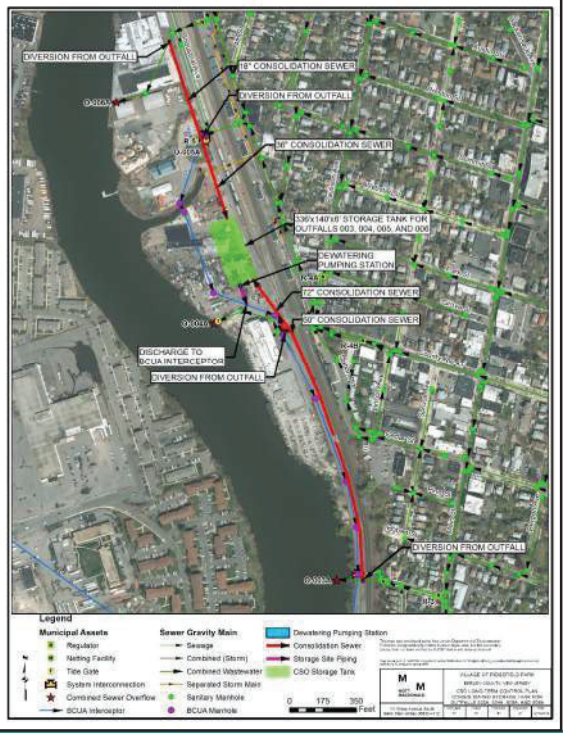
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage



Ridgefield Park Supplemental CSO Team

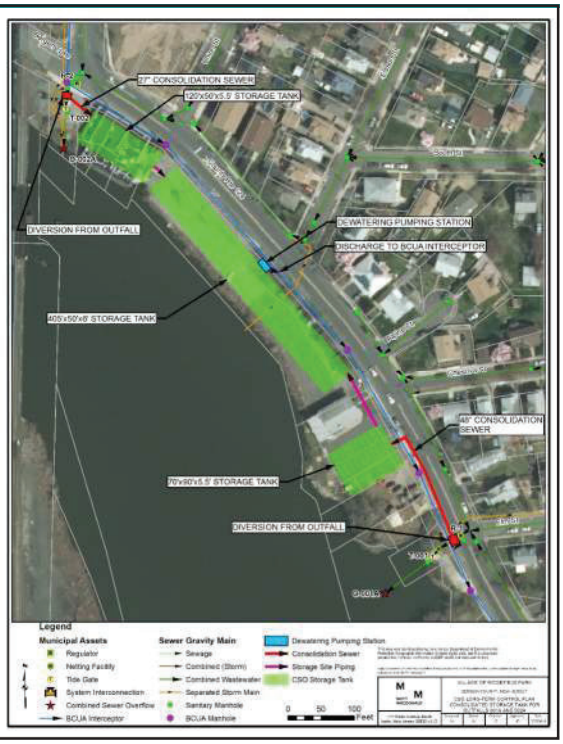
Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage

Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage

- Preliminary Cost $40-$90M

Ridgefield Park Supplemental CSO Team

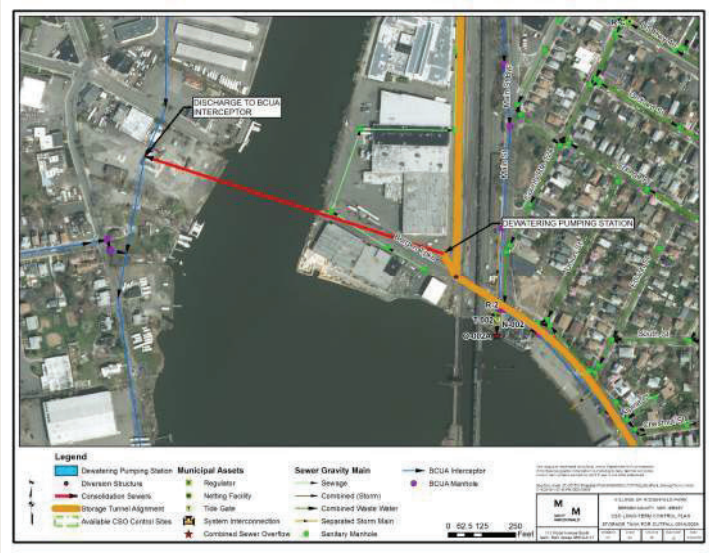
Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel

Ridgefield Park Supplemental CSO Team

Control Programs

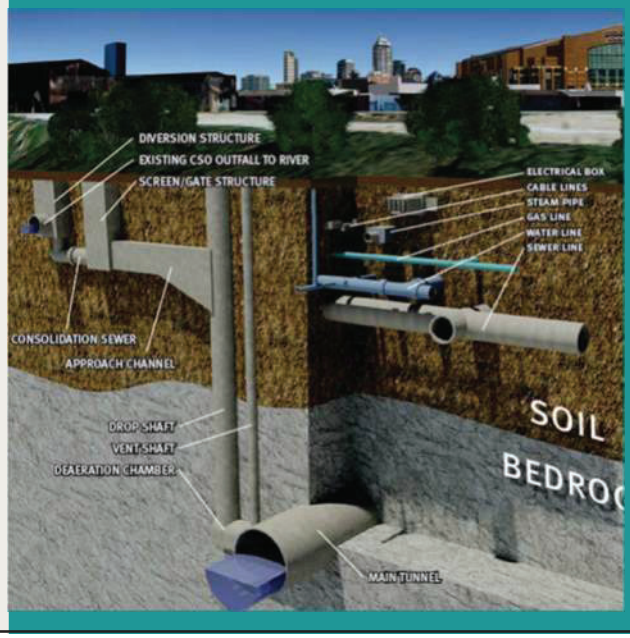
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel



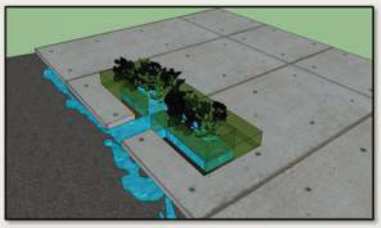
Ridgefield Park Supplemental CSO Team

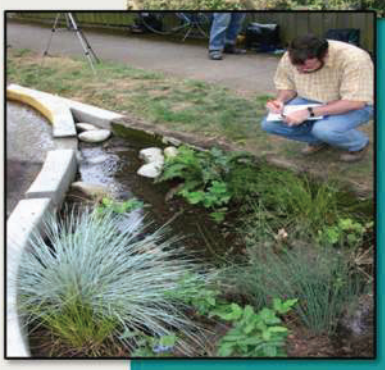
Control Programs

Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel
- Green Infrastructure

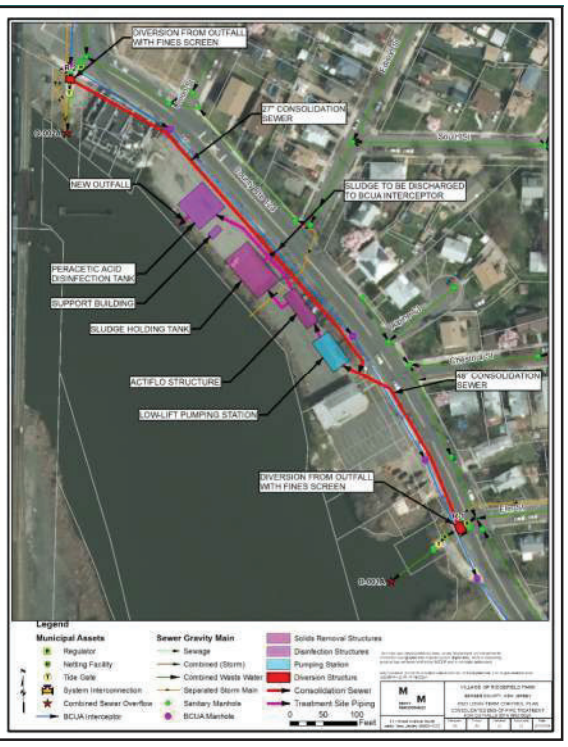




Ridgefield Park Supplemental CSO Team

Control Programs

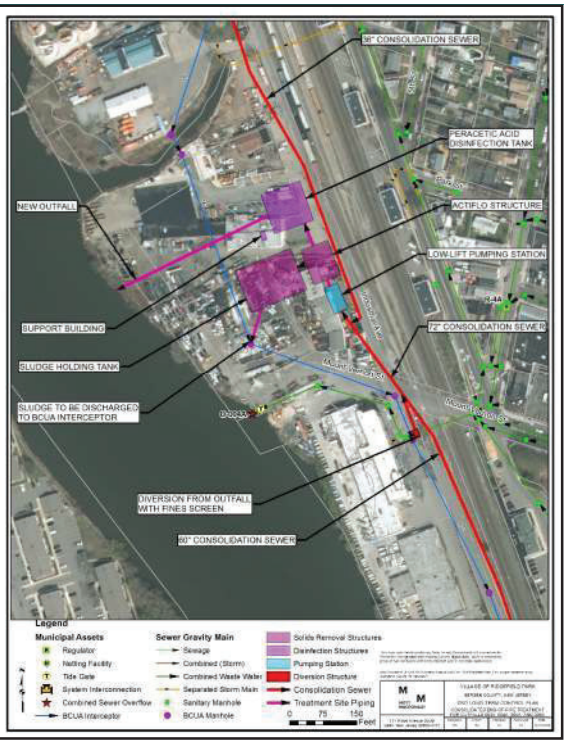
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel
- Green Infrastructure
- End of Pipe Treatment



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel
- Green Infrastructure
- End of Pipe Treatment



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – DRAFT Outline

- Introduction
- General Information
- Public Participation Update
- Water Quality Objectives
- Development of Alternatives
  - Development and Screening Levels
- Costing
- Available Land Analysis
- Alternatives Evaluation
- Summary
- References

Ridgefield Park Supplemental CSO Team

Long term control plan submission and NJDEP review status

Step 1.

- ✓ System Characterization Report – NJDEP Approval on 3/11/2019
- ✓ Baseline Compliance Monitoring Program Report – NJDEP Approval on 3/1/2019
- ✓ Consideration of Sensitive Areas Report – NJDEP Approval on 4/8/2019
- ✓ Public Participation Process Report – NJDEP Approval Pending

Step 2.

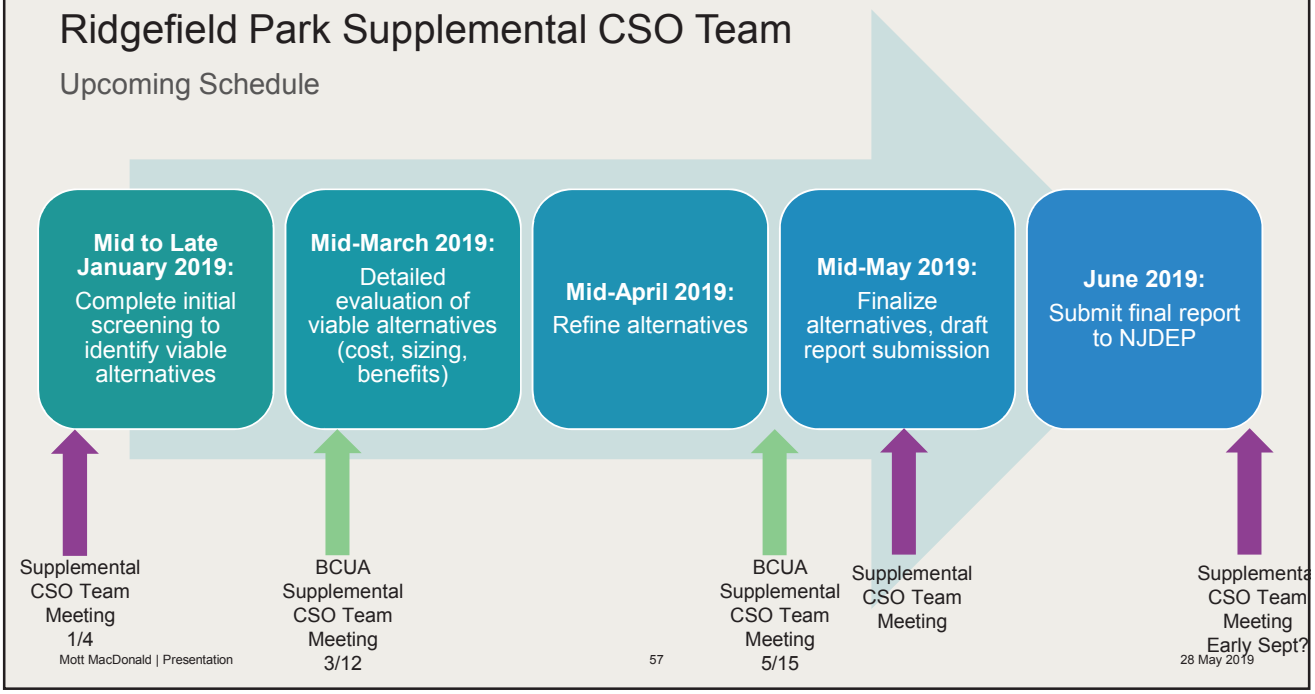
- Development and Evaluation of Alternatives – Due on 7/1/2019

Step 3.

- Selection and Implementation of Alternatives Report
- Final LTCP – Due on 6/1/2020

Ridgefield Park Supplemental CSO Team

Upcoming Schedule



Ridgefield Park Supplemental CSO Team

Upcoming Schedule

July 1, 2019 – Development and Evaluation of Alternatives Report Due to NJDEP

- Develop Comprehensive List of Alternatives
- Screen Alternatives
- Evaluate Alternatives
- Cost Estimates
- Coordinate with other Members of BCUA Group
- Produce and Submit Report

Final Questions?

Thank You?

Village of Ridgefield Park Supplemental CSO Team

Meeting Number 9

Commissioner's Conference Room

Village of Ridgefield Park Municipal Building

September 24, 2019 10:00 AM

Attendees – See attached sign in sheet

Presentation slides attached

Group Meeting Minutes

1. Introductions
    a. Meeting began at 10:00 AM with John Dening welcoming new attendees and introductions.
    b. John Dening opened the meeting with a presentation on food safety, see attached presentation.
    c. John Dening presented a summary of the topics discussed at the previous meeting. John explained the purpose of this meeting and the role of the SCSO team. John opened for questions on prior meeting, but no questions were asked at this time.
    d. John Dening indicated that meeting minutes are posted on the Ridgefield Park website.

2. Presentation by John Dening on the Development and Evaluation of Alternatives Report, see attached presentation.

3. Discussion and Questions – The following outlines questions that were asked during the presentation and the discussions that followed:

    a. Question: How many overflows per year do we average?

       Answer: It varies by years, using the Typical Year the highest individual outfall would be around 53 with the lowest being 12.

    b. Question: Is there any way to test the overflows we had before compared to what we will have after?

       Answer: The effectiveness of the controls is tested in the model using the Typical Year. This serves as the basis of compliance for the LTCP. Throughout the LTCP there will be periodic requirement for compliance monitoring.

c. Question: Where is the treatment for the water?

   Answer: The flow is treated across the river at the BCUA treatment plant in Little Ferry.

d. Question: We share a line with Fort Lee are they also developing a plan? How much flow are they adding and how will this affect us?

   Answer: Fort Lee is also developing a plan and their added flow, if any, will be accounted for in the model.

e. Question: Control Program 2 (CSO storage tanks) facilities are dependent on us acquiring the land?

   Answer: Yes, but most facilities would be below ground, so it may be possible to continue business above ground, or to repurpose the sites.

f. Question: Would the land next to Rt. 80 be a better fit?

   Answer: There's columns, it's next to a highway and it is in a more remote location so it is still on the list as potential land to be used but at the end of the day it will all be dependent on if it could be acquired, pricing and feasibility.

   Clarification on question e: The VFW post building adjacent to Overpeck Creek is owned by the Village and is abandoned.

g. Question: The alternatives pricings we are seeing is just what Ridgefield Park must pay?

   Answer: Yes, the other communities have prepared their own reports which can be downloaded from the NJDEP.

h. Question: What is the annual overflow volume.

   Answer: It is a little over 50 million gallons for the typical year, keep in mind this is mostly for rain water, some sewage and whatever is picked up off the streets.

i. Question: Would Control Program 3 (CSO storage tunnels) follow the railroad right of way?

   Answer: It would be under Industrial Avenue, parallel to the railroad.

j. Question: For anything underground such as the tunnels would there have to be soil investigation?

   Answer: Yes. It is easier to tunnel through rock, so the depth to rock is

important, we would need to know how deep we would have to go to hit rock. If rock is about 50 feet it is probably feasible to place the tunnel in rock. If the depth to rock is deeper like 100 feet or more, it may not feasible and soft ground tunneling which is more difficult would be required.

Comment from Village resident: On the other side of the town to hit rock it was about 175 feet to 250 feet. Not sure what it would be on this side of town, but I would assume it would be similar.

k. Question: You mentioned separation of sewers could bring further costs in the future, doesn't this make it obsolete?

   Answer: Stormwater is a major contributor of pollutants to the watercourse. Currently, the NJDEP requires some level of solids removal. In the future the NJDEP requirements may be stricter depending on regulations. So it is possible that there will be additional costs in the future even if you separate.

l. Question: If we did separate would there be additional costs for links to the new system?

   Answer: You wouldn't be asking individual people to pay for reconnecting their laterals in the street. The cost would be part of the overall project and it would be paid for with taxes or sewer fees.

m. Question: Is the BCUA prepared for the increase in flow from the towns?

   Answer: The might have to expand depending on the increase in flow and if that were the case then the towns would be responsible to pay for that expansion.

n. Question: The end of pipe alternatives would cause the least disruption to the citizens correct?

   Answer: It appears the impacts would be less than working on every street as would be required by sewer separation.

o. Questions: Are the properties in Industrial Avenue the only ones being considered?

   Answer: On the report we showed others, but this seemed to be the most promising candidate based on location. Other factors will play into the final siting.

p. Question from John Dening: What community group meetings could we attend to share this information with people?

Answer from SCSO Team and resident: Is the goal to reach hundreds of people? That is not going to happen at community group meetings.

Response: The idea is to talk to as many people as we can, then those people can talk to other people and the message is spread.

Suggestions: The Village newsletter is a great place to post this information and it would be smart to hold a meeting on the day that all the community groups meet at the municipal building or you can also invite all community groups to one big meeting in the municipal building instead of meeting just one group individually.

q. Question: You said it is likely that with a separation of sewer we will have further costs in the future, but would this be the case with the other alternatives as well?

   Answer: With any alternative there is potential for them to come back in the future and make you spend more.

r. Question: What is meant financial capability analysis?

   Answer: The DEP doesn't want to bankrupt cities over this, they want cities to spend a reasonable amount. The financial capability analysis compares the costs of alternatives to thresholds set by the EPA to see how much should be spent.

s. One of the SCSO Team members discussed distributing material on CSOs at the Village's street fair. John Dening stressed that public participation is an important part of the process and that it is not limited to the SCSO team. He asked for an email detailing what was done at the street fair, so it could be documented in the upcoming report.

4. John passed around handouts that included the Summary section of the Development and Evaluation of Alternatives Report. He focused on the information that indicated how the rating for each alternative came about. He specifically requested input on the ratings applied to the Public Acceptance. He requested that the attendees will comment on it in the next week or two.

5. Meeting concluded at 11:40 AM.

Village of Ridgefield Park
Supplemental CSO Team
Meeting Number 9 – Alternatives Analysis
Commissioner's Conference Room
Village of Ridgefield Park Municipal Building
September 24,2019; 10:00 AM

Initials	Name	Organization	Email	Phone Number
	John Rolak	Mott MacDonald	john.rolak@mottmac.com	973-912-2521
JRD	John Dening	Mott MacDonald	John.dening@mottmac.com	973-912-2464
	Donna Gregory	Mott MacDonald	donna.gregory@mottmac.com	
FM	Flo Muller	Ridgefield Park Shade Tree Commission	flomart@nj.rr.com	201-814-9019
	Mark Olson	Chairman, Green Team	mark-olson@verizon.net	201-440-5989
	Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com	201-440-5652
LQ	Linda Quinn	Ridgefield Park Environmental Commission	linda.quinn125@gmail.com	201-440-5652
	John Ponticorvo	Wanda Canoe Club	jponticorvo@aol.com	201-803-3643
AOG	Alan O'Grady	Village of Ridgefield Park DPW	aog560@aol.com	201-440-8860
	Mike Monroe	Village of Ridgefield Park DPW	ed81563@gmail.com	
	GERARD GARofalow			201-661-0767 201-440-4694
	Diego Rodriguez	Mott MacDonald	diego.Rodriguez@mottmac.com	973-262-1543

MOTT MACDONALD

Development and Evaluation of Alternative Controls

Village of Ridgefield Park
Supplemental CSO Team

Meeting #9

September 24, 2019

Safety Topic

September is Food Safety Month

Stats

In the U.S.

76,000,000 cases a year

325,000 hospitalized

5,000 deaths

1

Chill

Within 2 hours

40ºF of colder

Thaw in Fridge

2

Clean

Wash hands 20 sec

Cutting boards

Countertops

3

Cook

Check temperature

Stir

Boil – soups, sauces and gravies

4

Separate

Meat

Cutting boards

Shopping Carts

Prevent dripping

http://safetytoolboxtopics.com/

Ridgefield Park Supplemental CSO Team

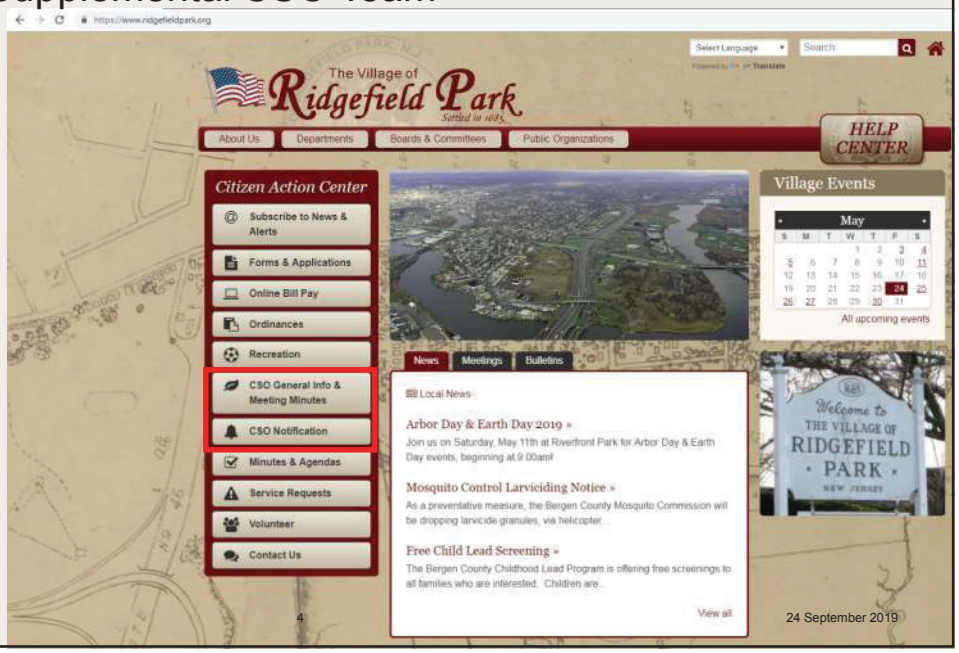
Meeting No. 9 Agenda

Refresher – In meeting #8 we covered:

- Submissions Status
- Public Participation Status
- Development and Evaluation of Alternatives
  - Coordination with BCUA
  - Future Baseline
  - Preliminary Alternatives
- Upcoming Schedule

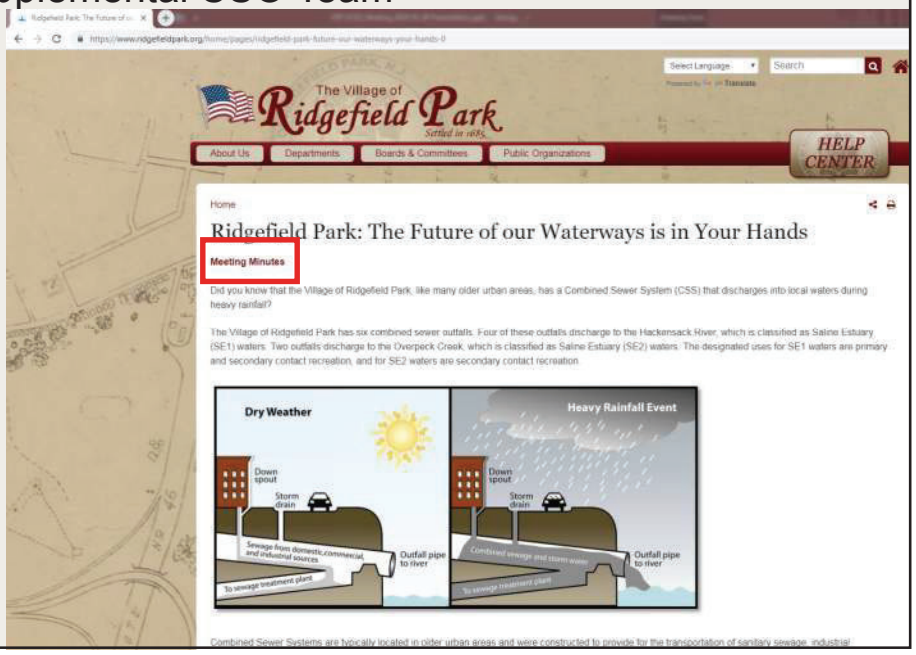
Ridgefield Park Supplemental CSO Team

Meeting Minutes



Ridgefield Park Supplemental CSO Team

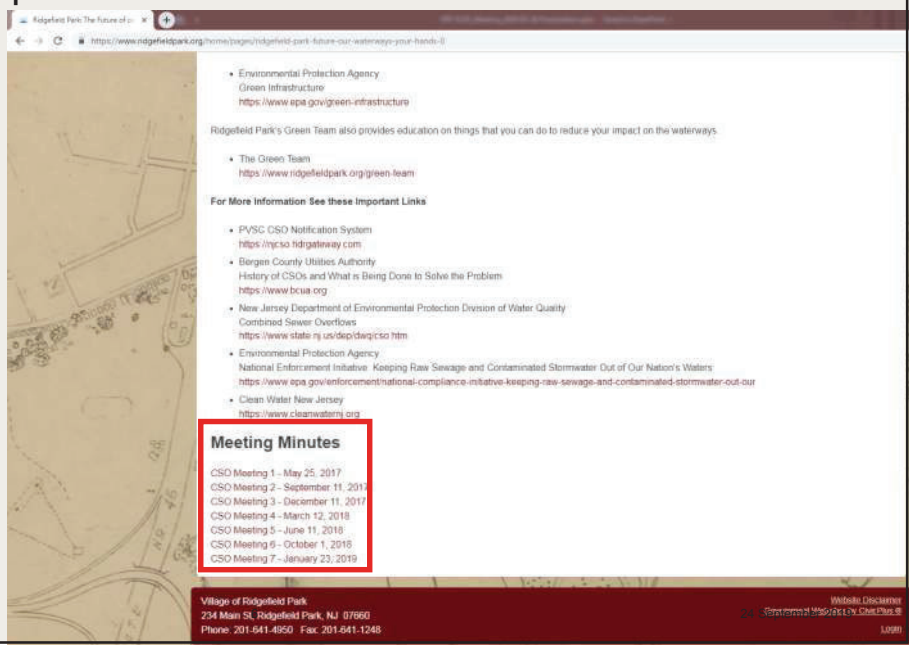
Meeting Minutes



Mott MacDonald | Presentation

Ridgefield Park Supplemental CSO Team

Meeting Minutes



Mott MacDonald | Presentation

Ridgefield Park Supplemental CSO Team

Meeting No. 9 Agenda

- Submissions Status
- Development and Evaluation of Alternatives
  - Control Programs
  - Performance
  - Cost
- Financial Capabilities Analysis
- Selection and Implementation of Alternatives
- Public Participation
- Upcoming Schedule

Ridgefield Park Supplemental CSO Team

DEP review status thru – July 1, 2019 submittals

- **Consideration of Sensitive Areas Report**: Approval Letter dated 4/8/19.
- **Baseline Compliance Monitoring Program Report**: Approval letter dated 3/01/19.
- **System Characterization Reports**: Approval letter dated 03/11/19
- **Public Participation Process Report:** Approval letter dated June 26, 2019.
- **Development and Evaluation of Alternatives Control Report: Submitted June 2019 Currently under review by the NJDEP.**

Ridgefield Park Supplemental CSO Team

What does the permit say about Development and Evaluation of Alternatives?

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

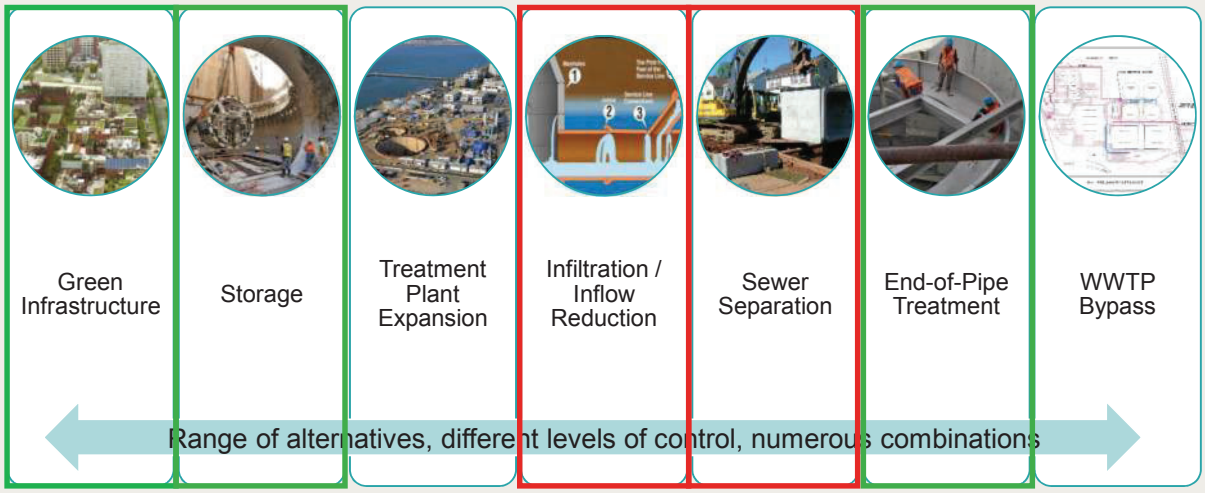
The Development and Evaluation of Alternatives Report shall include a list of control alternative(s) evaluated for each CSO enabling the permittee, …to select the alternatives to ensure the CSO controls will meet the water quality-based requirements of the CWA

The permittee 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

The permittee shall select either the Demonstration or Presumption Approach

Ridgefield Park Supplemental CSO Team

Range of Alternatives



Costing

Cost Estimating Procedures

Order of Magnitude Estimate (Class 5)

Planning Level Cost Estimate – True Cost is within -50%+100% of Estimated Cost

- Capital Costs
  - Design = 10% of Construction Costs
  - Construction Management = 10% of Construction Costs
  - Administrative/Legal = 5% of Construction Costs
- O&M
  - Only routine costs – no large-scale overhauls or replacements due to 20 yr planning period
- NPW
  - n=20 years i=2.75%
  - PW from O&M costs used the following:
    - $(P|A, i\%, n) = ((1+i)^n-1)/((i(1+i)^n)$

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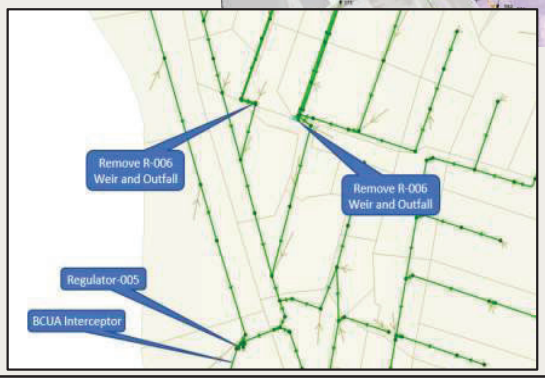
Alternatives Evaluation

Control Program 1 - Elimination of Outfall 006A

Small overflow volume at 006A

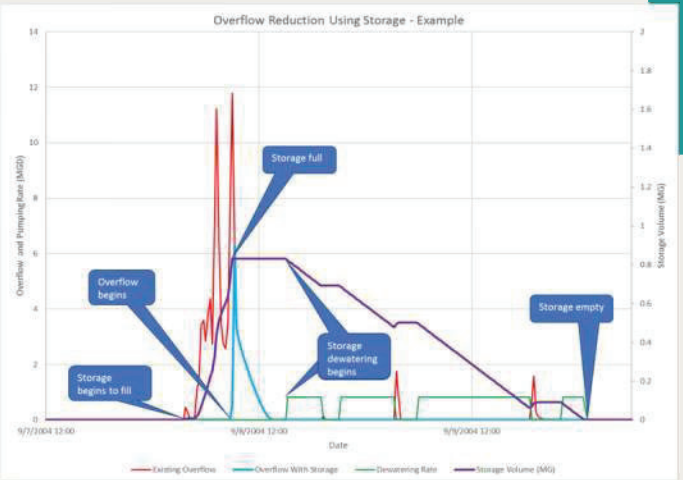
- Feasible to combine 005A and 006A, at low cost, to reduce burden on other alternatives
- Model shows additional upgrades required to the downstream system if 006A is eliminated
- Will require further review of the system to see if there is a cost-effective solution, i.e. diverting connected catchbasins to existing storm sewers.



Alternatives Evaluation

Storage – Tanks and Tunnels

Temporary storage tunnels and tanks reduce and delay overflows



13

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

Consists of:

- Diversion structures with fine screens;
- Consolidation piping
- An offline below grade tank equipped with a flushing system and odor control;
- Tank overflow to an outfall;
- Dewatering pumping station; and
- Discharge connection back to the interceptor.

- 2 Consolidated Tanks for 001A & 002A and 003A-006A
- Consolidation - pros and cons to individual outfall storage
- Challenges of large-scale construction in an urban area

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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

Control Program 2 - End of Pipe Storage (Consolidated Sites)					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$73.8	$46.6	$45.4	$40.6	$29.1
O&M Cost ($ Million)	$0.7	$0.4	$0.4	$0.4	$0.3
Net Present Worth ($ Million)	$83.9	$53.9	$51.8	$46.6	$34.2

$34-$84 M (Class 5 Cost Estimate: -50%+100%)

$1.1-1.7/gal of CSO removed during typical year.

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Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one, central tunnel

- Results in only one outfall near current 002A
- Consists of:
  - Consolidation piping from Outfall 006A
  - Diversion piping from each outfall
  - Control Gates
  - Drop shafts along Industrial Avenue and at intersection of 2nd Avenue, and Bergen Turnpike.
  - Deaeration chambers
  - A dewatering pumping station
  - Grit and screening facilities
  - Force main connection back to the BCUA Main Trunk Sewer.
  - A tunnel overflow with tide gate
- Issues are typical with large-scale urban construction, though tunnels introduce further complications
  - Mining and construction across the entire route
  - Complexity in tunnel management

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Alternatives Evaluation

Control Program 3 – Consolidated Tunnel Storage Contd.

Consolidated Tunnel Map

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Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one, central tunnel

Control Program 3 - Tunnel					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$88.4	$72.3	$72.3	$67.3	$62.3
O&M Cost ($ Million)	$2.0	$1.7	$1.7	$1.7	$1.6
Net Present Worth ($ Million)	$118.5	$98.6	$98.6	$92.5	$86.3

$86-$118 M (Class 5 Cost Estimate: -50%+100%)

$2.20-$2.40/gal of CSO removed during typical year.

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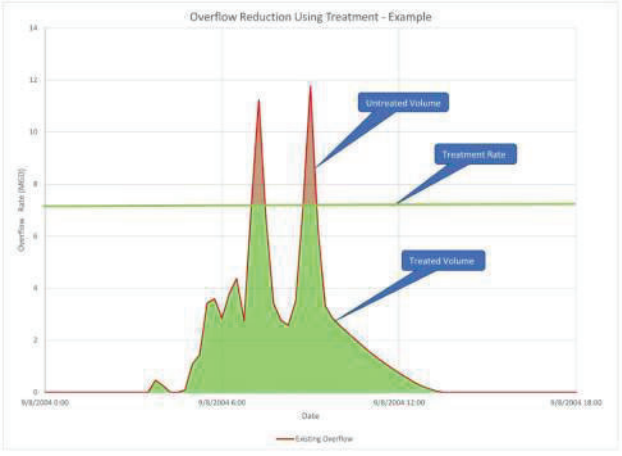
Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

Similar to EOP storage, but overflow is not returned to interceptor

- Treatment capacity governed by flow, not volume like the storage tanks
- Treatment process:
  - Fine Screening for floatable and course particles
  - Pump Station
  - High-rate primary treatment (i.e. ActiFlo)
  - Disinfection by peracetic acid
  - Storage of underflow
- Similar pros and cons to consolidation as storage
- Large-scale urban construction



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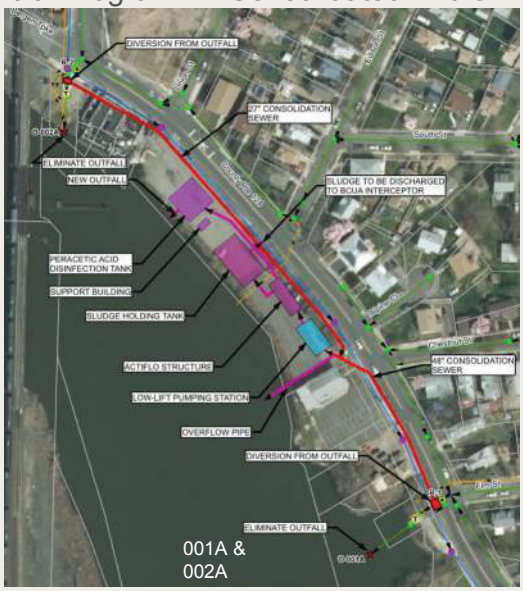
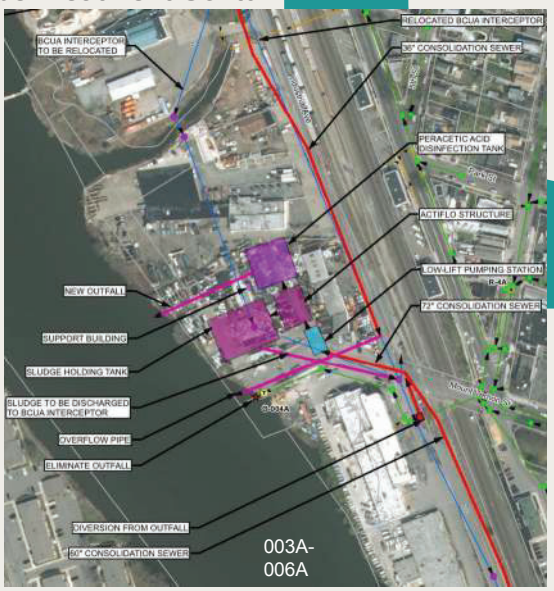
Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.





Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

Control Program 4 - End of Pipe Treatment (Consolidated Sites)					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$75.2	$65.8	$65.8	$65.5	$49.7
O&M Cost ($ Million)	$0.8	$0.7	$0.7	$0.7	$0.6
Net Present Worth ($ Million)	$87.3	$77.0	$77.0	$76.7	$59.5

$60-$87 M (Class 5 Cost Estimate: -50%+100%)

$1.30-$1.70/gal of CSO removed during typical year.

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Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

- Pros:
  - Work in public right-of-way; no new land needed
  - Opportunity for current system renewal and reconstruction
  - Elimination of outfalls
- Cons:
  - Highly disruptive to roads and traffic
  - Need to redirect every sanitary service connection on the street
  - Need for stormwater controls and treatment in the future
- Issues are general for large-scale construction in urban areas
- Pollutant loads (excepting some pathogens) to receiving water will increase 40%

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Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

$193M (Class 5 Cost Estimate: -50%+100%)

$3.8/gal of CSO removed during typical year

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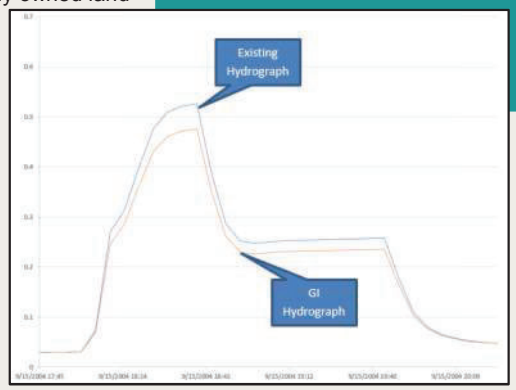
Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

- Bioswales selected as representative GI
  - Anticipated GI would consist largely of bioswales and permeable pavement
- Site suitability was a major issue
  - Land-use, impervious cover, hydrologic soil group (HSG), and publicly owned land
- Maximum of 4% of total impervious area directed to GI
- Minimal institutional/implementation issues



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Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

$2.7-$12 M* (Class 5 Cost Estimate: -50%+100%)

$5.80 - $9.10/gal of CSO removed during typical year

*For controlling 2.5%-10% of Village impervious area with GI, estimated a maximum of 4% could be feasible controlled.

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Performance

CSO Reduction

Table 8-1: Summary of CSO Volumes for Typical Year

Control Program	2015 Baseline (MG)	Level of Control - Overflows during Typical Year (MG)				
		0	4	8	12	20
1. Eliminate CSO-006A	50.3	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	50.3	0.0	5.7	5.8	9.7	21.5
3. Tunnel	50.3	0.0	4.7	4.7	7.9	11.4
4. Consoldiated End of Pipe Treatment	50.3	0.0	0.2	0.2	0.2	3.0
5. Sewer Separation	50.3	0.0	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	50.3	49.9	49.4	48.9	48.3	

Table 8-3: Summary of Frequency of Overflows for Typical Year

Control Program	2015 Baseline	Level of Control - Overflows during Typical Year				
		0	4	8	12	20
1. Eliminate CSO-006A	53	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	53	0	4	4	10	20
3. Tunnel	53	0	4	4	7	10
4. Consoldiated End of Pipe Treatment	53	0	1	1	2	10
5. Sewer Separation	53	0	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	53	53	53	53	53	

Table 8-4: Summary of Percent Capture Achieved by Each Control Program

Control Program	2015 Baseline	Level of Control - Overflows during Typical Year				
		0	4	8	12	20
1. Eliminate CSO-006A	69.5%	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	69.5%	100.0%	96.5%	96.5%	94.1%	86.9%
3. Tunnel	69.5%	100.0%	97.2%	97.2%	95.2%	93.1%
4. Consoldiated End of Pipe Treatment	69.5%	100.0%	99.9%	99.9%	99.9%	98.2%
5. Sewer Separation	69.5%	100.0%	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	69.5%	69.7%	70.0%	70.3%	70.7%	

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Costing

NPW Calculations

Control Program	Cost per Gallon Volume CSO Reduction ($/gal)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$1.7	$1.2	$1.2	$1.1	$1.2
3) Tunnel	$2.4	$2.2	$2.2	$2.2	$2.2
4) Treatment (Consolidated)	$1.7	$1.5	$1.5	$1.5	$1.3
5) Sewer Separation	$3.8	NA	NA	NA	NA
	Volume Reduction for Impervious Area Managed (MG)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$9.1	$7.2	$6.3	$5.8	

Control Program	NPW Summary - Overflows per Year ($M)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$84	$54	$52	$47	$34
3) Tunnel	$118	$99	$99	$92	$86
4) Treatment (Consolidated)	$87	$77	$77	$77	$60
5) Sewer Separation	$193	NA	NA	NA	NA
	NPW Summary - % of Impervious Area Managed ($M)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$2.7	$6	$9	$12	

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Alternatives Rating

Rating Procedure

Control Programs rated 1 (Worst) to 5 (Best) on several categories and a weighted average found

- Cost
  - Normalized by $/gallon
  - Based on 4 overflows per year and 5% GI
  - 25% weight
- CSO Reduction
  - Overall reduction of CSO volume in Typical Year
  - Reduction in CSO Events
  - 15% weight each
- Institutional Issues
  - Ranked according to possibility of permitting delaying project six (6) months or more
  - 15% weight
- Implementability
  - Ranked according to project being delayed by other factors for six (6) or more months
  - 15% weight
- Public acceptance
  - Ranked according to how we think the public would welcome and support the plan
  - 15% weight

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Alternatives Rating

Ranking – **NO SELECTION MADE AT THIS PHASE!**

Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

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Public Participation Comment Letter

Proposed:

- Continue SCSO Team Meetings
- Seek additional SCSO Team Members
- Present to Commissioners – Oct 3rd
- Newsletter Article – Topics?
- Public and Community Group Meetings – Suggestions; groups, dates and content?
- Earth Day 2020

Ridgefield Park Supplemental CSO Team

Long term control plan submission and NJDEP review status

Step 1.

- ✓ System Characterization Report – NJDEP Approval on 3/11/2019
- ✓ Baseline Compliance Monitoring Program Report – NJDEP Approval on 3/1/2019
- ✓ Consideration of Sensitive Areas Report – NJDEP Approval on 4/8/2019
- ✓ Public Participation Process Report – NJDEP Approval Pending

Step 2.

- ✓ Development and Evaluation of Alternatives – Due on 7/1/2019

Step 3.

- Selection and Implementation of Alternatives Report
- Final LTCP – Due on 6/1/2020

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May 28, 2019

BCUA CSO Group Supplemental CSO Team

Upcoming Schedule

Final Questions?

Thank You?

Village of Ridgefield Park Supplemental CSO Team

Meeting Number 10

Commissioner's Conference Room

Village of Ridgefield Park Municipal Building

February 5, 2020 10:00 AM

Attendees – See attached sign in sheet

Presentation slides attached

Group Meeting Minutes

1. Introductions
    a. Meeting began at 10:00 AM with John Dening welcoming new attendees and introductions.
    b. John Dening expressed his appreciation for the SCSO team commitment to addressing CSO issues. He reminded everyone the end of current phase of the Long Term Control Plan (LTCP) is June 1 and noted that most of the Team has been participating for the entire process.
    c. John Dening stated that the revised Development of Alternatives Report which addressed NJDEP comments was submitted to the NJDEP on November 27, 2019.
    d. John Dening opened the meeting with a safety minute presentation on jump starting the car, see attached presentation.
    e. John Dening presented a summary of the topics discussed at the previous meeting. John explained the purpose of this meeting and the role of the SCSO team. John opened for questions on prior meeting, but no questions were asked at this time.
    f. John Dening indicated that meeting minutes are posted on the Ridgefield Park website.

2. Presentation by John Dening on the Preliminary Selection of Alternatives, see attached presentation.

3. Discussion and Questions – The following outlines questions that were asked during the presentation and the discussions that followed:

    a. Question: Will NYC CSO influence on WQ in Hudson River change overtime?

        Answer: The water quality in Hudson River will experience changes as a result of implementation of long-term control projects in both New Jersey and New York as well as from other factors such as stormwater controls. Ridgefield Park CSO program is a part of a larger effort to improve the

WQ.

b. Resident Comment: Costs need to be ranked highly as they will be of great interest to the residents.

c. Resident Comment: We are concerned about the potential impact of future regulations.

d. Resident Comment: It looks like Program #2 is the best candidate.

e. Resident Comment: The Village Master Plan calls for open space along the waterfront, which includes both consolidation sites. The resident recognized potential for belowground CSO storage tanks to be integrated into future Village open space projects.

f. Resident Comment: Maintenance costs should be considered as well as construction costs. Ability to maintain complex equipment is a concern.

   Response: Preliminary alternative cost estimates include 20 years of maintenance costs.

g. Resident Comment: Apache Auto Wreckers along the Hackensack River waterfront and the vacant land along the Overpeck Creek, as identified in the reports, seem to be the most appropriate locations for future CSO.

h. Resident Comment: According to preliminary estimates, complete sewer separation is a costly alternative. It will also require additional measures to address stormwater quality.

i. Question: Will there be an odor issue with End of Line Treatment facilities?

   Answer: Potentially, these facilities would be designed with odor control. Some, such as disinfect may also be covered to mitigate odors.

j. Resident Comment: Agree that green infrastructure could work as supplementary to other alternatives due to its cost and limited impact on CSO volumes. It could be considered in some areas as educational tool to raise public WQ awareness.

k. SCSO Team members proposed different options for CSO material distribution to the Village residents. The following information outlets were discussed:
   - regional newspaper – there is no longer a local paper.
   - church letter – St. Francis church was mentioned.
   - advertising flyer
   - Digital bulleting board in front of the municipal building.
   - Direct mailing.

- Village newsletter

l. John Dening stressed that public participation is an important part of the process and that it is not limited to the SCSO team.

4. The next meeting is planned for late March early April. The intent is to use the meeting to build the presentation for the public meeting on May 5th. John Dening will reach out with some dates.

5. Meeting concluded at 11:20 AM.

Village of Ridgefield Park
Supplemental CSO Team
Meeting Number 10 – Alternatives Analysis
Commissioner's Conference Room
Village of Ridgefield Park Municipal Building
February 5, 2020; 10:00 AM

Initials	Name	Organization	Email
JD	John Dening	Mott MacDonald	John.dening@mottmac.com
	Donna Gregory	Mott MacDonald	donna.gregory@mottmac.com
FM	Flo Muller	Ridgefield Park Shade Tree Commission	flomart@nj.rr.com
	Mark Olson	Chairman, Green Team	mark-olson@verizon.net
	Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com
LQ	Linda Quinn	Ridgefield Park Environmental Commission	linda.quinn125@gmail.com
	John Ponticorvo	Wanda Canoe Club	jponticorvo@aol.com
AOG	Alan O'Grady	Village of Ridgefield Park DPW	aog560@aol.com
MR	Mike Monroe	Village of Ridgefield Park DPW	ed81563@gmail.com
	Dayvonn Jones	NJDEP	dayvonn.jones@dep.nj.gov
	Johnathan Lakhicharran	NJDEP	johnathan.lakhicharran@dep.nj.gov
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MOTT MACDONALD

Preliminary Selection of Alternatives

Village of Ridgefield Park
Supplemental CSO Team

Meeting #10

February 5, 2019

1

Ridgefield Park Supplemental CSO Team

Meeting No. 10 Agenda

- Introduction
- Safety moment
- Review of Last Meeting
- Water Quality Modeling
- Selection of Alternatives
- Input on Alternatives
- Financial Capabilities Analysis
- Selection and Implementation of Alternatives
- Future Public Involvement
- Upcoming Schedule

2

Safety Topic

Jumpstarting a Car

1

Don't let cars touch.

Wear Safety Glasses.

2

Read the Manual.

3

Unless manual says otherwise connect cables: Red to dead and back to black.

4

Start booster car first. Run for a few minutes then start dead car.

5

Remove cables in reverse order.

http://safetytoolboxtopics.com/

3

Ridgefield Park Supplemental CSO Team

Meeting No. 9 Review

In meeting #9 we covered:

- Submissions Status
- Development and Evaluation of Alternatives
  - Control Programs
  - Performance
  - Cost
- Financial Capabilities Analysis
- Selection and Implementation of Alternatives
- Public Participation
- Upcoming Schedule

4

Ridgefield Park Supplemental CSO Team

Long term control plan submission and NJDEP review status

Step 1.

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Step 3.

- Selection and Implementation of Alternatives Report
- Final LTCP – Due on 6/1/2020

Mott MacDonald | Presentation 5 10 February 2020

5

Ridgefield Park Supplemental CSO Team

NJ CSO Group

Water Quality Modeling

Mott MacDonald | Presentation 6 10 February 2020

6

Models

- Hydrodynamic Model (ECOMSED)
  - Water Elevation
  - Currents
  - Temperature
  - Salinity
- WQ Model (RCA)
  - Salinity
  - Tracer
  - E. coli
  - Fecal coliform
  - Enterococci
- Both models are run on the same grid (segmentation)
  - 10 vertical layers

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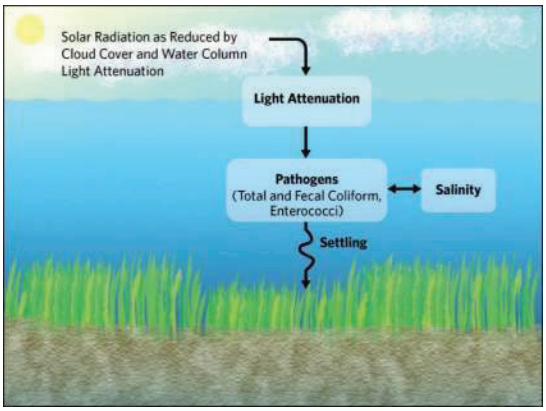
Pathogen Model

Factors that affect bacteria

- Natural die-off
- Temperature
- Solar radiation
- Salinity
- Settling



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Required Hydrodynamic Model Inputs

- Physical Dimensions
  - Shoreline
  - Bathymetry
- Boundary Conditions
  - Tides
  - Temperature
  - Salinity
- Freshwater Sources
  - Rivers
  - CSOs
  - Storm Sewers
  - Direct Drainage
  - WWTPs
- Meteorology

9

Landside Pathogen Concentration Stations

Figure 10 – Ridgefield Park Village (BCUA)

10

WQM Component Analysis

- WQ Component Analysis:
  - E. coli
  - Fecal
  - Enterococci
- Components:
  - NJ CSO
  - NJ SW/Runoff
  - NJ STP
  - NJ/NY/CT Rivers
  - Hudson River
  - Dry-weather
  - NYC CSO+SW
  - NY/CT STP

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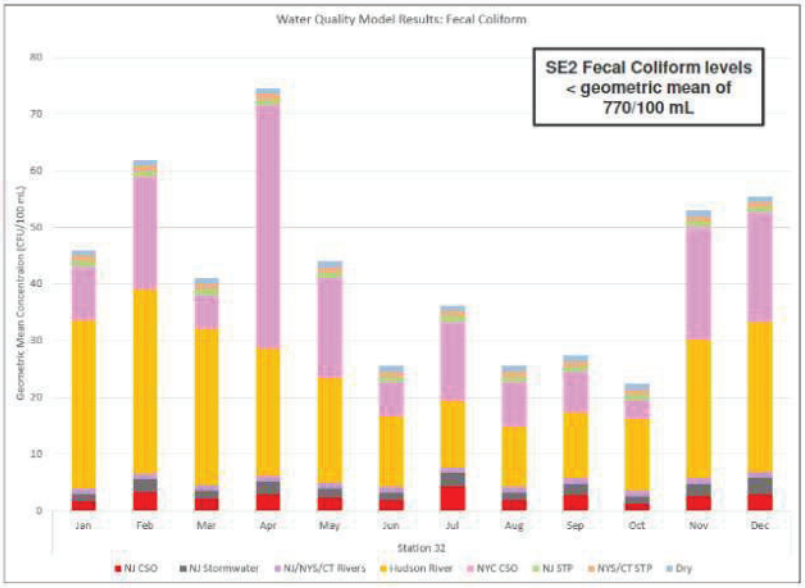
CLEAN WATERWAYS
Healthy Neighborhoods

7

11

WQM Component Analysis – Fecal Coliform-Hudson River



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Healthy Neighborhoods

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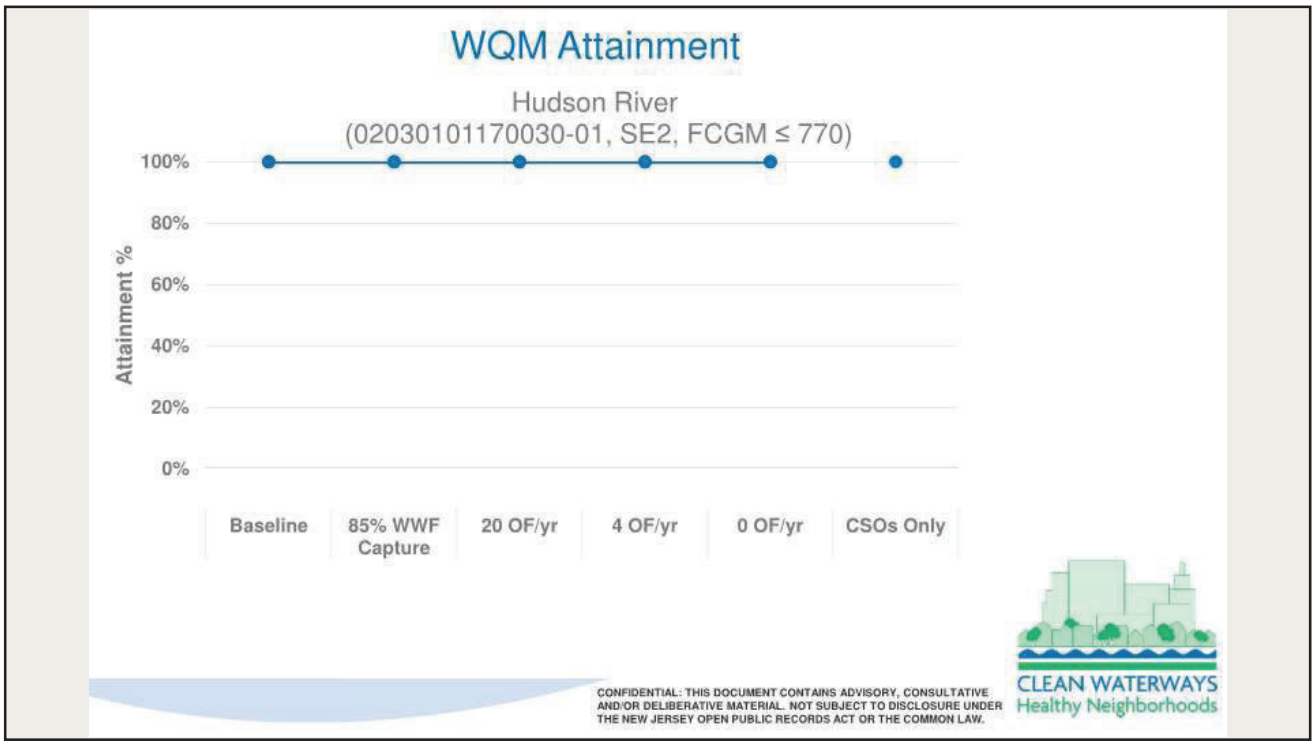
WQM Attainment
Hudson River
(02030101170030-01, SE2, FCGM ≤ 770)
Attainment %
100%
80%
60%
40%
20%
0%
Baseline
85% WWF Capture
20 OF/yr
4 OF/yr
0 OF/yr
CSOs Only
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Healthy Neighborhoods

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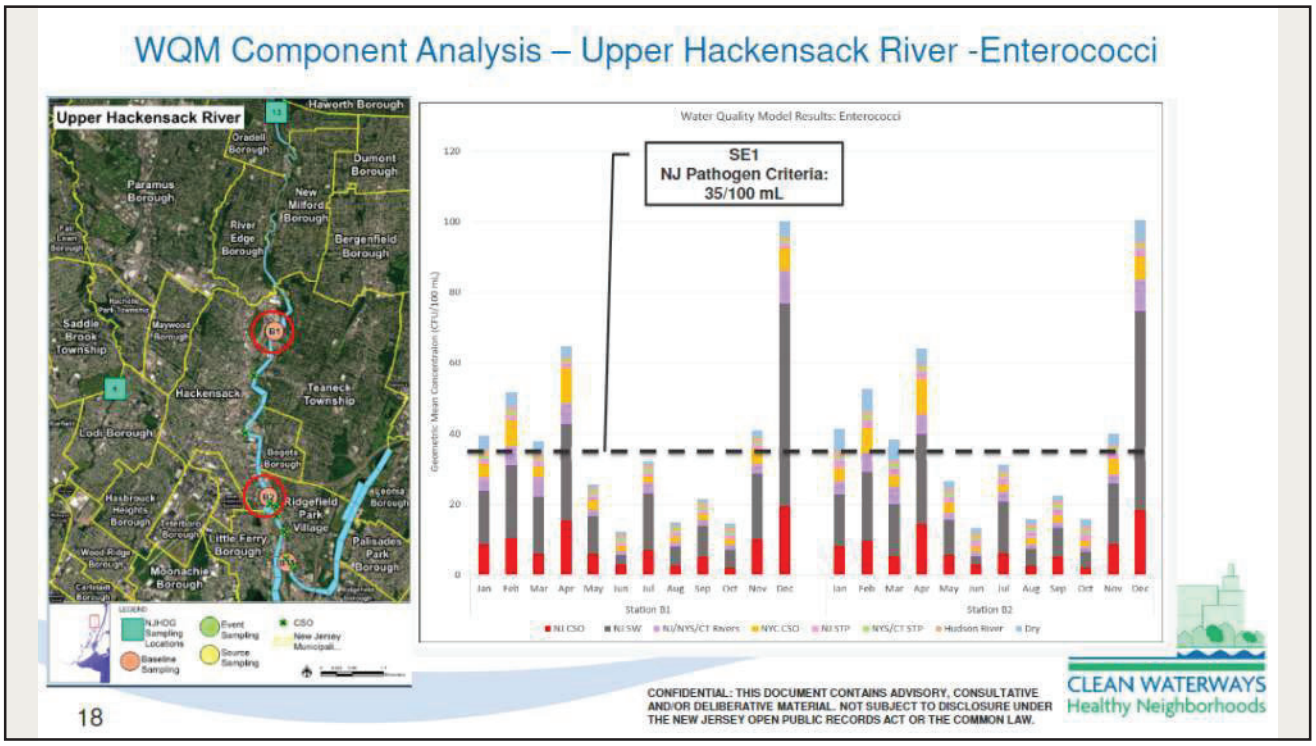
WQM Component Analysis – Upper Hackensack River -Enterococci
Upper Hackensack River
Haworth Borough
Oradell Borough
Dumont Borough
Paramus Borough
New Milford Borough
River Edge Borough
Bergenfield Borough
Saddle Brook Township
Maywood Borough
Hackensack
Teaneck Township
Lodi Borough
Bogota Borough
Hasbrouck Heights Borough
Ridgefield Park Village
Little Ferry Borough
Palisades Park Borough
Moonachie Borough
Water Quality Model Results: Enterococci
SE1
NJ Pathogen Criteria:
35/100 mL
Geometric Mean Concentration (CFU/100 mL)
Station B1
Station B2
NJ CSO
NJ SW
NJ/NYS/CT Rivers
NYC CSO
NJ STP
NYS/CT STP
Hudson River
Dry
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Healthy Neighborhoods
18

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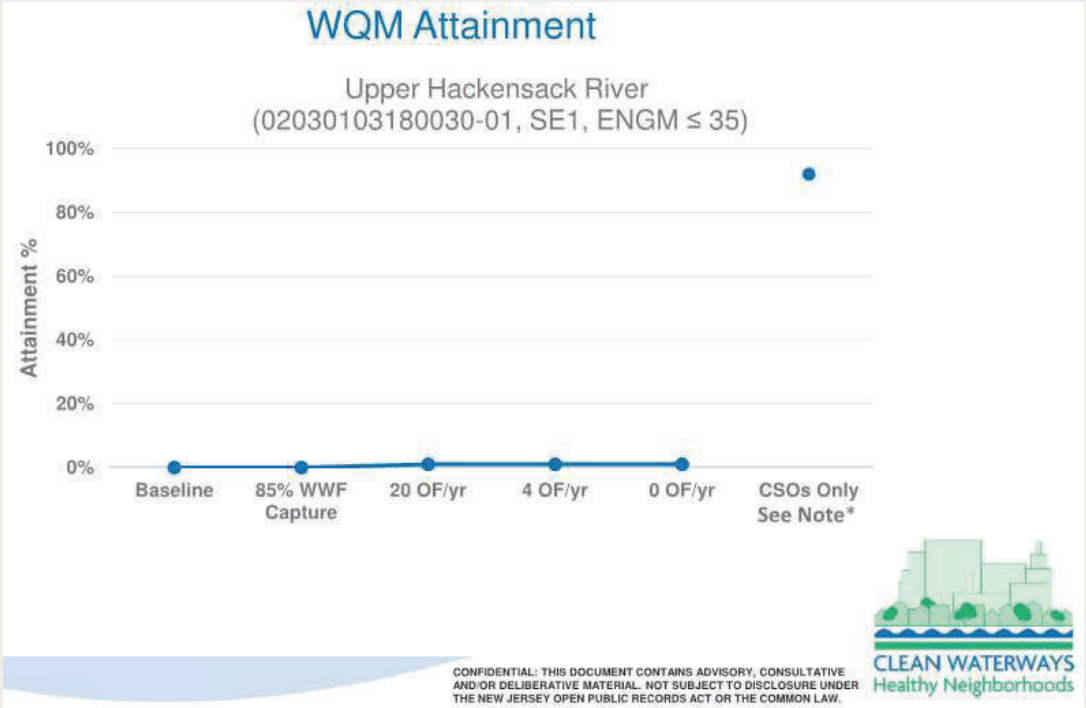

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Ridgefield Park Supplemental CSO Team

Alternatives Recommendations

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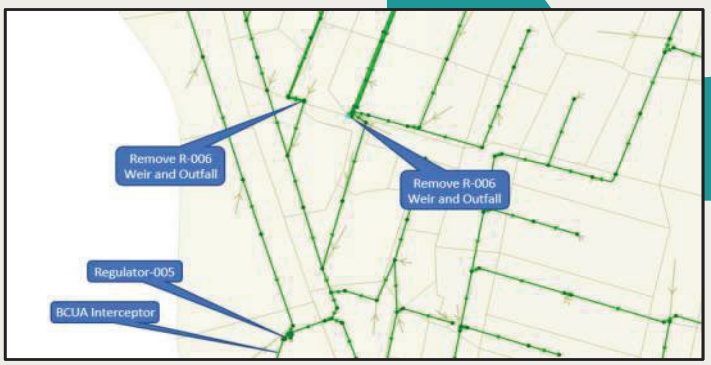
Alternatives Evaluation

Control Program 1 - Elimination of Outfall 006A

Small overflow volume at 006A

- Pros:
  - Work in public right-of-way; no new land needed
  - Opportunity for current system renewal and reconstruction
  - Elimination of outfall
- Cons:
  - Mild disruptive to roads and traffic
  - Minor separation might be required, need for stormwater controls and treatment.



RECOMMEND - RETAIN TO REDUCE CONSOLIDATION COSTS

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Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

- Pros:
  - Relatively simple
  - Elimination of outfalls, 6 reduced to 2
  - Area above tank can be used for other purposes
  - Effective CSO reduction
- Cons:
  - Challenging construction
  - Disruption to streets from consolidation piping

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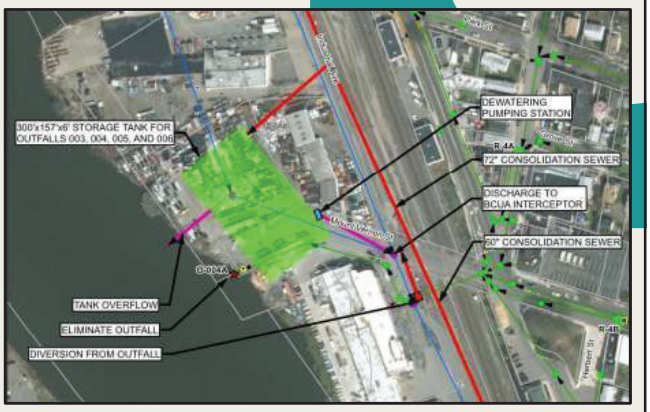
Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.



Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

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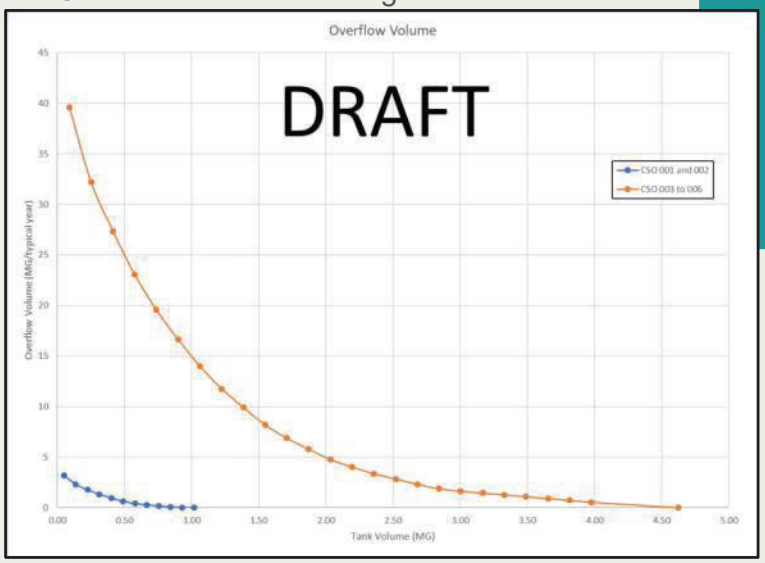
Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

003A-
006A

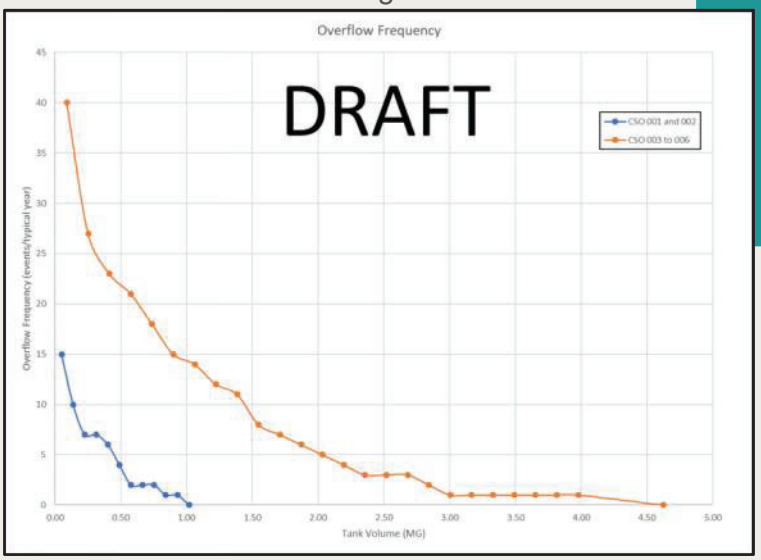
DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage



DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage



Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage

Tanks retain overflows and return them to sewer and WWTP

Control Program 2 - End of Pipe Storage (Consolidated Sites)					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$73.8	$46.6	$45.4	$40.6	$29.1
O&M Cost ($ Million)	$0.7	$0.4	$0.4	$0.4	$0.3
Net Present Worth ($ Million)	$83.9	$53.9	$51.8	$46.6	$34.2

$34-$84 M (Class 5 Cost Estimate: -50%+100%)

$1.1-1.7/gal of CSO removed during typical year.
RECOMMEND – RETAIN, BEST RATING AND LESS COMPLEX

Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one, central tunnel

- Pros:
  - Minimal surface impacts
  - Elimination of outfalls, 6 reduced to 1
- Cons:
  - Challenging construction
  - More complex system, deep pumping station, screenings and grit
  - Higher cost

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Alternatives Evaluation

Control Program 3 – Consolidated Tunnel Storage Contd.

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Alternatives Evaluation

Control Program 3 –
Consolidated Tunnel Storage Contd.

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Alternatives Evaluation

Control Program 3 - Consolidated Tunnel Storage

All outfalls will be consolidated into one, central tunnel

Control Program 3 - Tunnel					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$88.4	$72.3	$72.3	$67.3	$62.3
O&M Cost ($ Million)	$2.0	$1.7	$1.7	$1.7	$1.6
Net Present Worth ($ Million)	$118.5	$98.6	$98.6	$92.5	$86.3

$86-$118 M (Class 5 Cost Estimate: -50%+100%)

$2.20-$2.40/gal of CSO removed during typical year.
RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

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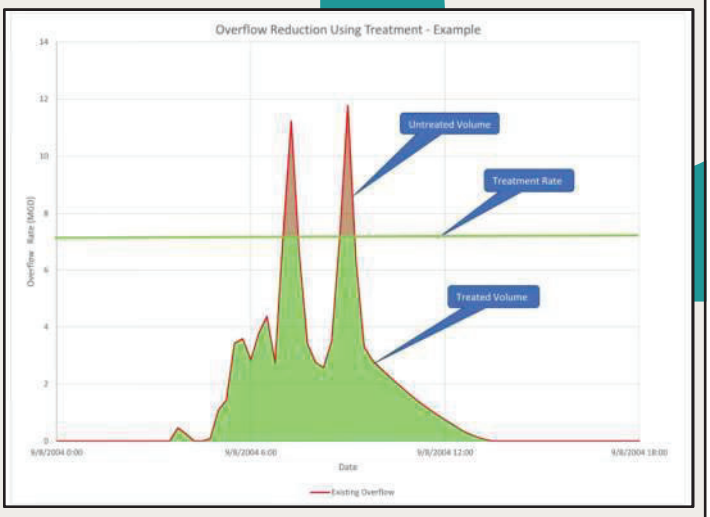
Alternatives Evaluation

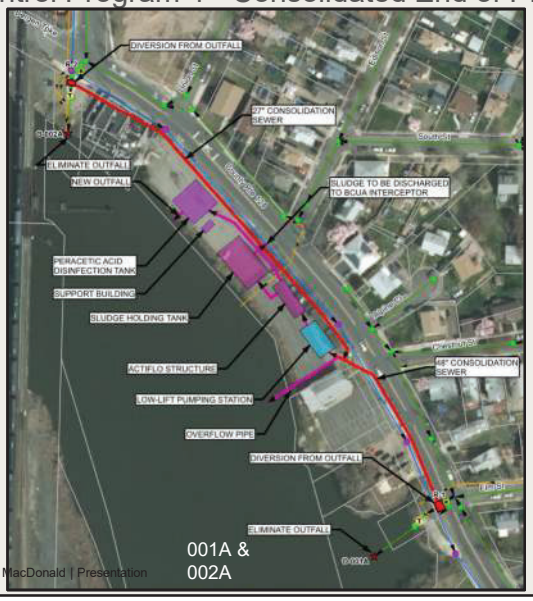
Control Program 4 - Consolidated End of Pipe Treatment Contd.

- Pros:
  - Elimination of outfalls, 6 reduced to 2
  - Provides full or partial treatment at all times
- Cons:
  - Most complex system
  - Surface facilities
  - Higher cost
  - Potential future effluent limits



Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.



001A & 002A

003A-006A

Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.

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Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

Control Program 4 - End of Pipe Treatment (Consolidated Sites)					
Overflows per Year	0	4	8	12	20
Capital Cost ($ Million)	$75.2	$65.8	$65.8	$65.5	$49.7
O&M Cost ($ Million)	$0.8	$0.7	$0.7	$0.7	$0.6
Net Present Worth ($ Million)	$87.3	$77.0	$77.0	$76.7	$59.5

$60-$87 M (Class 5 Cost Estimate: -50%+100%)

$1.30-$1.70/gal of CSO removed during typical year.

RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

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Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

- Pros:
  - Work in public right-of-way; no new land needed
  - Opportunity for current system renewal and reconstruction
  - Elimination of outfalls
- Cons:
  - Highly disruptive to roads and traffic
  - Need to redirect every sanitary service connection on the street
  - Need for stormwater controls and treatment in the future
  - Issues are general for large-scale construction in urban areas
  - Pollutant loads (excepting some pathogens) to receiving water will increase

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Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

$193M (Class 5 Cost Estimate: -50%+100%)

$3.8/gal of CSO removed during typical year

RECOMMEND - ELIMINATE DUE TO COST AND DISRUPTION FUTURE WATER QUALITY CONCERNS

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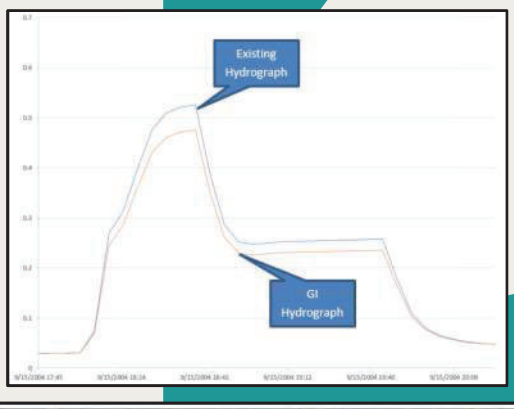
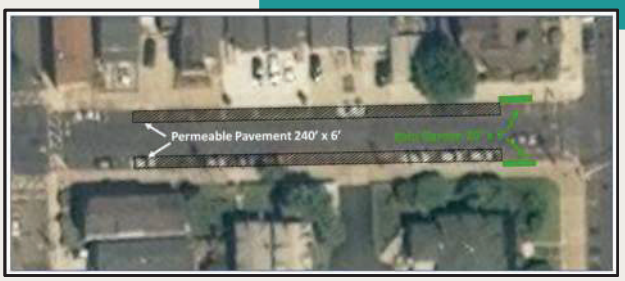
Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

- Pros:
  - Community/Societal benefits
  - Public acceptance
  - Creates public awareness
  - Simple construction
- Cons:
  - Cannot meet permit requirements
  - Long term performance
  - High installation cost and maintenance costs





Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

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uary 2020

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Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

$2.7-$12 M* (Class 5 Cost Estimate: -50%+100%)

$5.80 - $9.10/gal of CSO removed during typical year

*For controlling 2.5%-10% of Village impervious area with GI, estimated a maximum of 4% could be feasibly controlled.

RECOMMEND - POTENTIALLY RETAIN FOR PUBLIC OUTREACH AND EDUCATION

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Costing

NPW Calculations

Control Program	Cost per Gallon Volume CSO Reduction ($/gal)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$1.7	$1.2	$1.2	$1.1	$1.2
3) Tunnel	$2.4	$2.2	$2.2	$2.2	$2.2
4) Treatment (Consolidated)	$1.7	$1.5	$1.5	$1.5	$1.3
5) Sewer Separation	$3.8	NA	NA	NA	NA
	Volume Reduction for Impervious Area Managed (MG)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$9.1	$7.2	$6.3	$5.8	

Control Program	NPW Summary - Overflows per Year ($M)				
Level of Control	0	4	8	12	20
1) Eliminate Outfall 006	NA	NA	NA	NA	NA
2) Storage (Consolidated)	$84	$54	$52	$47	$34
3) Tunnel	$118	$99	$99	$92	$86
4) Treatment (Consolidated)	$87	$77	$77	$77	$60
5) Sewer Separation	$193	NA	NA	NA	NA
	NPW Summary - % of Impervious Area Managed ($M)				
	2.50%	5%	7.50%	10%	
6) Green Infrastructure	$2.7	$6	$9	$12	

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Alternatives Rating

Rating Procedure

Control Programs rated 1 (Worst) to 5 (Best) on several categories and a weighted average found

- Cost
  - Normalized by $/gallon
  - Based on 4 overflows per year and 5% GI
  - 25% weight
- CSO Reduction
  - Overall reduction of CSO volume in Typical Year
  - Reduction in CSO Events
  - 15% weight each
- Institutional Issues
  - Ranked according to possibility of permitting delaying project six (6) months or more
  - 15% weight
- Implementability
  - Ranked according to project being delayed by other factors for six (6) or more months
  - 15% weight
- Public acceptance
  - Ranked according to how we think the public would welcome and support the plan
  - 15% weight

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Alternatives Rating

Ranking – **NO SELECTION MADE AT THIS PHASE!**

Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

Ridgefield Park Supplemental CSO Team

Input on Alternatives

Ridgefield Park Supplemental CSO Team

Public Outreach Opportunities

- Input on the selection process?
  - What is your strongest interest?
    - Cost
    - Environmental benefit
    - Other
  - Are your/community interests being considered?
    - Suggestions
  - Comments on locations of facilities?
  - Comments on types of facilities?
  - Comments on costs?
- Do you have a preference?

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Ridgefield Park Supplemental CSO Team

Financial Capability Assessment

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Ridgefield Park Supplemental CSO Group

Financial Capabilities Assessment

Goal is to determine impact on residential population and to allow the LTCP extent and schedule to incorporate those impacts.

- EPA Methodology
  - Snapshot based on current conditions.
  - Allows for flexibility and additional factors to be considered.
  - Very limited view of affordability.
- "Dynamic" Model
  - Accounts for inflation
  - Accounts for expected project schedule.

COST PER HOUSEHOLD
Worksheet 1

		Line Number
Current WWT Costs		
• Annual Operations and Maintenance Expenses (Excluding Depreciation)	_____	100
• Annual Debt Service (Principal and Interest)	_____	101
Subtotal (Line 100 + Line 101)	_____	102
Projected WWT and CSO Costs (Current Dollars)		
• Estimated Annual Operations and Maintenance Expenses (Excluding Depreciation)	_____	103
• Annual Debt Service (Principal and Interest)	_____	104
Subtotal (Line 103 + Line 104)	_____	105
Total Current and Projected WWT and CSO Costs (Line 102 + Line 105)	_____	106
Residential Share of Total WWT and CSO Costs	_____	107
Total number of Households in Service Area	_____	108
Cost Per Household (Line 107 ÷ Line 108)	_____	109

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment - EPA Indicators

How much CSO Control can the Municipality afford?

- Primarily based on EPA Guidance
  - 2% of Median Household Income (MHI)
- Implications of affordability:
  - Implementation schedule
    - Prioritize projects with highest cost effectiveness
  - Level of control
  - Required annual rate increases

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment - EPA Indicators

Residential Indicator	Current system costs (combined, sanitary, and stormwater)	
	Percent residential share = Typ. 75-85%	
	Cost per residential household – should be less than 2% of MHI	
Financial Indicator	Debt Indicators	Bond Ratings
		Overall Net Debt as % of Full Market Property Value
	Socioeconomic Indicators	Unemployment Rate
		Median Household Income
	Financial Management Indicators	Property Tax Revenues as % of Full Market Property Value
		Property Tax Revenue Collection Rate

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Financial Capabilities Assessment - EPA Indicators

FINANCIAL CAPABILITY MATRIX
Table 3

Permittee Financial Capability Indicators Score (Socioeconomic, Debt and Financial Indicators)	Residential Indicator (Cost Per Household as a % of MHI)		
	Low (Below 1.0 %)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0 %)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

FINANCIAL CAPABILITY GENERAL SCHEDULING BOUNDARIES
Table 4

Financial Capability Matrix Category	Implementation Period
Low Burden	Normal Engineering/Construction
Medium Burden	Up to 10 years
High Burden	Up to 15 Years*
	*(Schedule up to 20 years based on negotiation with EPA and state NPDES authorities)

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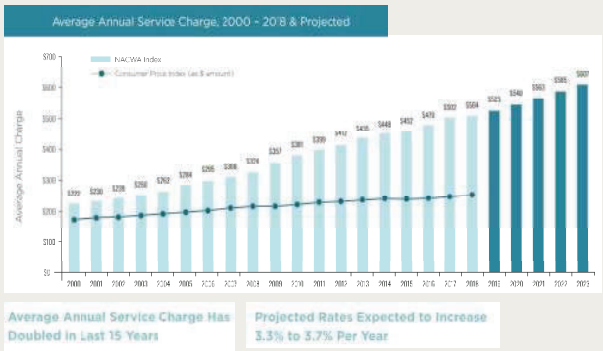
Financial Capabilities Assessment - Additional Items to Consider

- Sewer utility costs likely to rise faster than income growth over next 20-30 years
- Consider future non-CSO costs and obligations
- Income and Cost Considerations
  - Burden by income distribution brackets
  - Poverty rates
  - Unemployment and labor force participation rates



Source: NACWA, 2018 Cost of Clean Water Index, https://www.nacwa.org/docs/default-source/news-publications/pub-5-index-1-web-final.pdf

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Financial Capabilities Assessment

So what is this all about?

- It's like buying a house or car.
  - What are my current expenses?
  - How much money do I make now and in the future?
  - When will I buy it?
  - How expensive is it?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?

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Ridgefield Park Supplemental CSO Team

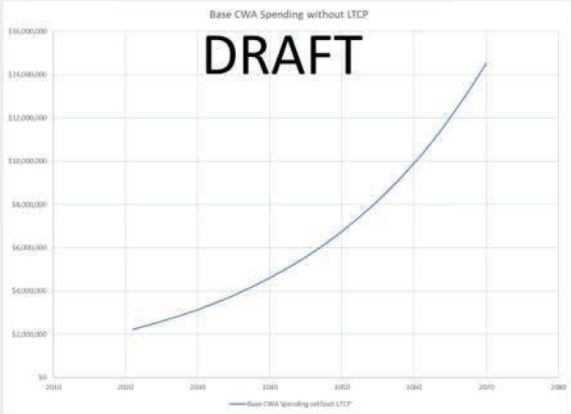
Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a LTCP
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment



So what is this all about?

- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?

Current Expenses

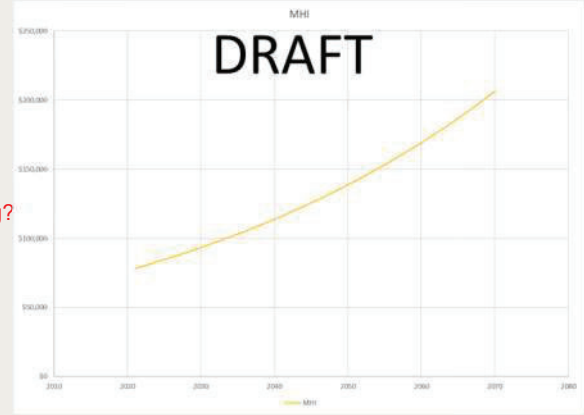
- BCUA $1.4 M
- Estimated other expenses $0.7 M

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?



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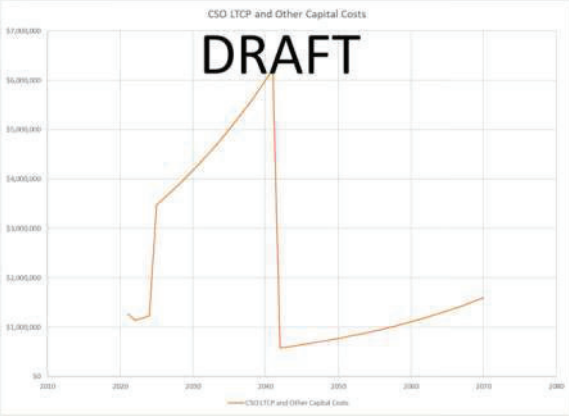
Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?



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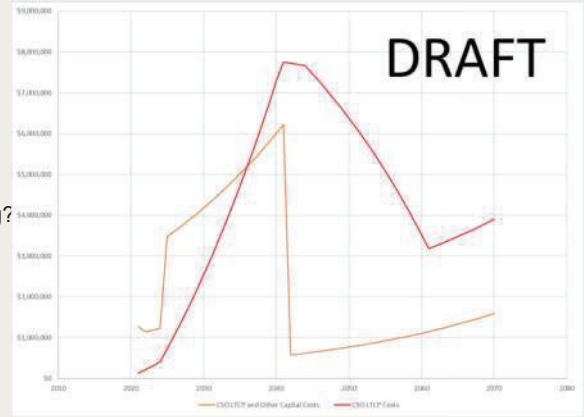
Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment

So what is this all about?

- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is the interest rate?
  - What is the inflation rate?
  - What is my mortgage term?



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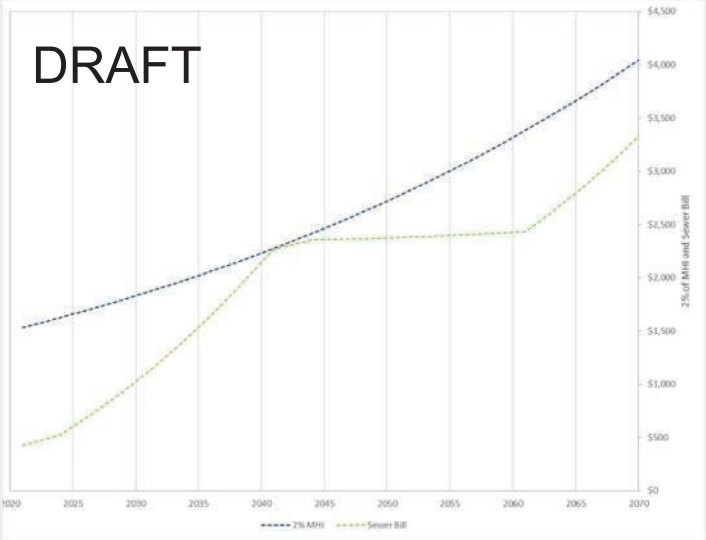
Financial Capabilities Assessment

What is the impact to me?



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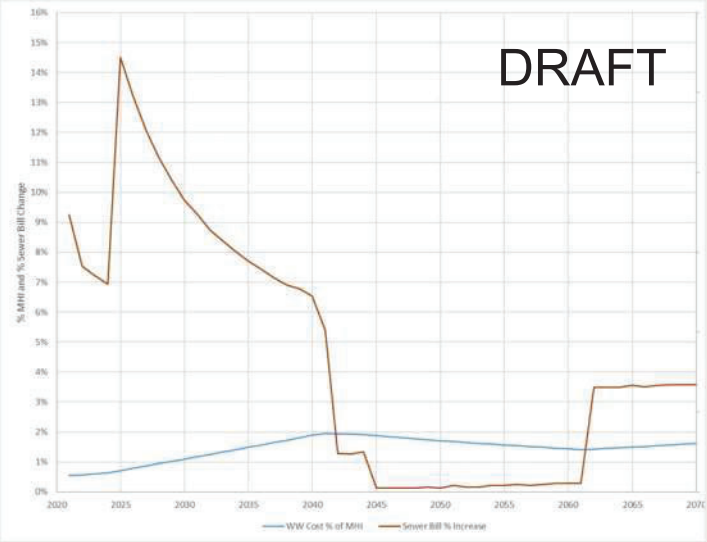
Financial Capabilities Assessment

What is the impact to me?



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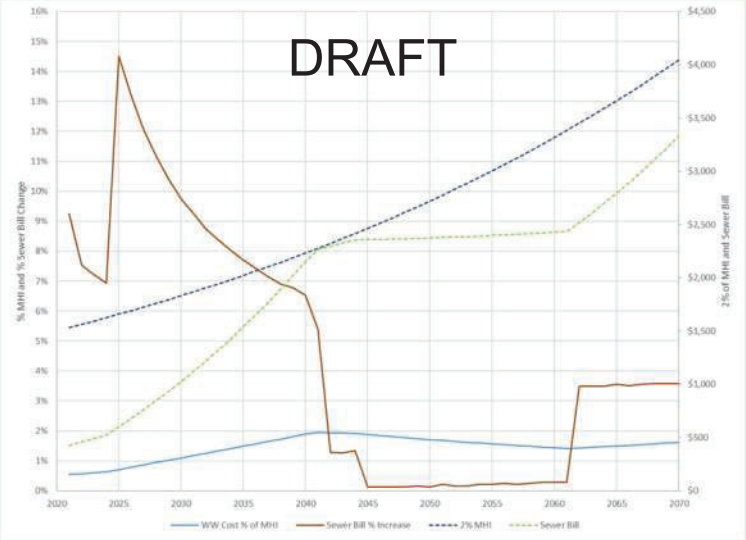
Financial Capabilities Assessment

What is the impact to me?



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Ridgefield Park Supplemental CSO Team

Upcoming Schedule

Late September 2019
DEAR Comment from NJDEP

Fall 2019
Finalize: Approach, Alternatives and FCA

December 2019
Finalize Regional Coordination

March 2020
Approval by Municipalities/ BCUA

June 1, 2020
Selection and Implementation Report due to NJDEP

Supplemental CSO Team Meeting

Supplemental CSO Team Meeting

Public Meeting

Supplemental CSO Team Working Meeting DATES?

Public Meeting (May 5)

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10 February 2020

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Final Questions?

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10 February 2020

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Thank You?

Village of Ridgefield Park Supplemental CSO Team

Meeting Number 11

Virtual Meeting

July 30, 2020 10:00 AM

Attendees:
John Anlian – Mayor, Village of Ridgefield Park
Mark Olson – Commissioner for Public Works, Village of Ridgefield Park
Lewis Goldshore – Special Environmental Counsel, Village of Ridgefield Park
Bob Benecke – Financial Advisor, Village of Ridgefield park
Steve Quinn – Chairman, Ridgefield Park Environmental Commission and member, Planning Board
Linda Quinn – Resident, Ridgefield Park
Flo Muller – Resident, Ridgefield Park
John Dening, Sabina Martyn – Mott MacDonald
Marzooq Alebus, Jennifer Feltis, Dayvonn Jones, Johnathan Lakhicharran – NJDEP

Presentation slides attached.

Group Meeting Minutes

1. Introductions
    a. Meeting began at 10:00 AM with John Dening welcoming attendees, introductions and review of meeting agenda.
    b. John Dening opened the meeting with a safety minute presentation on driving safety, see attached presentation.
    c. John Dening presented the status of submissions to the NJDEP and noted that the end of current phase of the Long Term Control Plan (LTCP) had been extended from June 1 to October 1 due to COVID-19.

2. Presentation by John Dening on the Tentatively Selected LTCP, see attached presentation for details.
    a. Presented the modelled performance of the BCUA combined sewer system and the Ridgefield Park combined sewer system in the typical year.
    b. Presented the list of control programs that had been evaluated and the factors for consideration in selection of the preferred CSO control alternative. He indicated that the short-listed alternatives were consolidated tank storage and consolidated end of pipe treatment.
    c. Presented the draft results of the water quality modelling done by NJ CSO Group indicating that the receiving water, the Hackensack River does not meet water quality criteria both in baseline and 100% CSO control scenarios, and noted that stormwater load is almost equal to CSO load.
    d. Indicated that the presumption approach of 85% capture of annual wet weather volume had been selected as the control approach.

e. Presented a summary of the community input that had been provided at the previous meeting.
f. Presented the tentatively selected plan, a consolidated CSO storage tank, potentially to be sited on the marble.com facility at Mt. Vernon Street and Industrial Avenue. He indicated that a feasibility study would be completed after the submission of the LTCP to confirm the best location for the tank.
g. Presented a drone video taken by the City of Elizabeth Police Department showing a similar tank construction in Elizabeth. Post project images showing the site restored to a rain garden were also shared.
h. Presented the knee of the curve analysis recommending that the tank be sized at 0.7 MGD to meet the control objective, in the interest of cost effectiveness. He then presented the costs of the tentatively selected LTCP.
i. Presented the draft implementation schedule and the cost considerations, including affordability and current tax burden, and potential financial impacts of COVID-19. He then presented projections for potential future sewer bill increases as a result of the LTCP implementation.
j. Presented the modelling results for the typical year, with the tentatively selected LTCP and indicated that it meets the 85% capture requirement.
k. Presented the post-construction compliance monitoring plan. He indicated that "adaptive management" would be included in the report so provide opportunities to reevaluate the plan over the course of implementation.
l. He asked for any input in the tentatively selected alternatives and preferences for implementation (see comments summarized in following section).
m. Presented the proposed approach for the next point of public consultation, suggesting that instead of a meeting, the team would record a presentation and post it to the Village website. The posting would then be advertised, and an email address would be provided for the public to send in comments.
n. Presented the schedule for completion of the LTCP.

3. Discussion and Questions – The following outlines questions that were asked during the presentation and the discussions that followed:
   a. A resident (Flo Muller) asked whether the surface restoration of storage tank in Ridgefield Park would look like the one shown in the City of Elizabeth.

      John Dening responded that this would depend on what the Village decides. He indicated that the is tank is currently proposed for siting on the marble.com property, and could be constructed so that the company would be able to continue using the area. In the long term, if the Village acquired the property and converted it to a park, the restoration above the storage tank could reflect this.

   b. Lewis Goldshore noted that it is very difficult to estimate what the actual acquisition costs would be due to property owners and condemning authorities, differing views on valuation, and whether the property to be acquired would be an easement or a property acquisition. He noted that

properties west of Industrial Avenue may be subject to a State Tidelands claims, and the properties being considered as sites may not in fact be owned by those companies. As such the Village may need to coordinate with the Tidelands Bureau on any property required in this area.

John Dening indicated that he felt a conservative number was used for property acquisition to consider future higher value potential uses of properties. He also indicated that the LTCP report will note that Tidelands will need to be considered in site selection. This is more detailed site analysis including acquiring the Tidelands maps to confirm the location of tanks would be part of the subsequent feasibility study.

c. The Mayor (John Anlian) asked whether it would be possible to extend the implementation over a longer period of time. He noted that there is no appreciable increase in water quality from implementing the CSO controls, thus it would be an unfair burden on the residents and taxpayers of Ridgefield Park, and it would be better if the schedule could be extended. He recommended that an extended schedule be proposed to the NJDEP even if the team thinks they will not accept it. He added that Newark and New York City are still dumping raw sewage into their waters and these pollutants are making their way to the Hackensack River due to the tides and Ridgefield Park should have to implement a CSO control plan before these cities.

   John Dening responded that the currently proposed schedule extending to 2040 is fairly conservative as it is. He indicated that the loan period could potentially be extended to 30 years, and the team would look at whether the overall schedule could also be extended. He invited NJDEP to add any further input.

d. A member of the Planning Board (Steve Quinn) asked why removing CSOs does not achieve water quality standards.

   John Dening responded that this is because the section of the Hackensack River that passes through Ridgefield Park is characterized as a higher quality watercourse, therefore it has lower pathogen concentrations limit.

e. A member of the Planning Board (Steve Quinn) asked, if surface runoff is a contributor to water quality would the tanks also capture surface water. He asked whether the Village was also accountable for controlling surface water.

   John Dening indicated that the tanks would only capture surface runoff that goes to the combined sewer, and that surface runoff (stormwater) is regulated under a separate municipal separate storm sewer system (MS4) permit, which is an independent process. He indicated that there are current requirements for surface runoff but we don’t know what the future requirements will be for capture or treatment of surface runoff.

f. The Major (John Anlian) asked when the major polluters down the river, Newark and New York City, would be required to do what the Village is doing.

John Dening responded that New York City has been working on CSO control for some time, and has built tanks, and been upgrading treatment plants and sewers for many years. He indicated that CSO communities in New Jersey are on the same permit schedule as the Village of Ridgefield Park.

The Major (John Anlian) noted that the actual implementation of these other city's plans may be decades down the line, and suggested that it should be a condition of the Village's plan that these other big contributors should implement their CSO controls first so that the Village is not spending needlessly.

John Dening responded that the Village will likely not be able to make their plan conditional on other communities, and these other communities will have their own implementations schedules for their controls. He offered to set a meeting up with NJDEP to discuss this issue further.

Marzooq Alebus noted that there has been a lot of water quality modelling for the whole harbor, and the impact from downstream sources has been studied. He indicated that NJDEP does have a handle of the relative contribution, and CSO impacts from New York City do not impact the Hackensack River according to current modelling. Ongoing modelling will be completed, and EPA will have a role in managing how to attribute the obligations of the various parties, however, it will be an adaptive management process.

The Major (John Anlian) responded that if the contribution is not from New York City, there must be some pollutants from Jersey City and Newark. He noted that although he is pro-environmental and believes in improving water quality, he does not support spending taxpayer money if the ultimate water quality goal is not achieved, as such he would prefer it was implemented over a longer time period.

g. A member of the Planning Board (Steve Quinn) asked whether the water quality standards for the Village are the same for the Hudson River, lower bay and lower Hackensack River.

John Dening responded that those waterbodies are characterized as SE2, as such they have a higher limit.

The member of the Planning Board (Steve Quinn) responded that if the waterbody near the Village is held to a higher standard, there should be some adjustment for the tidal situation.

John Dening responded that the NJDEP is looking at larger picture for water quality, with surface water MS4 and CSO other programs.

h. A Commissioner (Mark Olson) asked whether the Village would right now meet the water quality standards for the Hudson River if the Hackensack River was measured in the same way.

   Marzooq Alebus responded that the Hudson River has two standards, on the New York City side, there is a higher standard for primary contact. On the New Jersey side, the Hudson River is characterized as secondary contact, as such the water quality standard is lower. According to that standard, the Village would meet it, however it is possible that the EPA would increase the New Jersey standard in the future. He added that the ultimate goal is to eliminate raw sewage in our waterbodies. John Dening noted that even if the Hudson River is meeting the water quality standards, CSO communities that discharge to the Hudson River still need to propose CSO reductions in fulfillment of the LTCP requirements to meet the national CSO policy.

i. The Major (John Anlian) responded that he agreed with the proposed public outreach to record a meeting and post it to the City's website. He added that after the presentation has been posted for 30 days, there should be an opportunity for a live hearing, in which the project team would provide a 10 minute summary of the proposed work and provide the community with the opportunity to ask questions. This would allow those who are not comfortable writing comments to provide input.

j. The member of the Planning Board (Steve Quinn) requested that costs be presented as the increase to sewer bills on a quarterly or annual basis. He also suggested that a reverse 911 message could be sent to Village residents to inform them of the proposed LTCP, and asked for input from the Mayor.

   The Major (John Anlian) indicated that the Village has been regularly putting out messages for COVID-19, and can send a message about the LTCP using the same platform. John Dening indicated that the cost could be presented as the increase to sewer bills, as suggested. He also noted that members of team will be expected to help with publicizing the LTCP presentation and sharing information.

k. John Dening asked for input on how long the live presentation should be. A Commissioner (Mark Olson) suggested that it should be maximum 10 minutes. Jennifer Feltis suggested that there should be multiple venues for the public to provide comments and feedback on the proposed LTCP, such as email, phone, Facebook, etc. John Dening indicated that this could be done, and the presentation would be posted to the Village website, with an email and phone number included for feedback.

l. The Major (John Anlian) indicated that he appreciated that NJDEP was participating on the call. He indicated his understanding of the goal to try to stop raw sewage released into the waterways, and noted that the Village of Ridgefield Park is an older, affordable, blue collar community, and adding another $500-1,000 per year to a tax bill would be a significant burden on the residents. He requested that NJDEP take this into consideration and treat the Village fairly based upon their circumstances.

   Marzooq Alebus responded, indicating that NJDEP does understand the difficulties and complexities of the project, and noted that as they go through the LTCP and costs, they would be interacting more with the Village.

5. The meeting concluded at 11:30 AM.

MOTT MACDONALD

The Village of Ridgefield Park
Settled in 1685

Preliminary Selection and Implementation of Alternatives

Village of Ridgefield Park
Supplemental CSO Team
Meeting #11

Virtual Meeting

July 30, 2020

1

Ridgefield Park Supplemental CSO Team

Meeting No. 11 Agenda

- Safety Minute
- Project Status
- Tentative Selection of CSO Control Alternatives
  - Ridgefield Park
  - Cost and Schedule
  - Post Construction Compliance Monitoring
  - Adaptive Management
- Public Meeting
- Next Steps

Supplemental CSO Team Meeting #11 2 July 30, 2020

2

Safety Topic

Remembering How to Drive

Practice:

1 **Turning radius**

2 **Signal before turning**

3 **Putting on seatbelt**

4 **Parallel parking**

5 **Which side your gas tank is on**

3

Long term control plan submission and NJDEP review status

Step 1.

- System Characterization Report – NJDEP Approval on 1/17/2019
- Baseline Compliance Monitoring Program Report – NJDEP Approval on 3/1/2019
- Consideration of Sensitive Areas Report – NJDEP Approval on 4/8/2019
- Public Participation Process Report – NJDEP Approval on 2/7/2019

Step 2.

- Development and Evaluation of Alternatives – Due on 7/1/2019

Step 3.

- Selection and Implementation of Alternatives
- Final LTCP – Due October 1st

(Extension from June 1 to October 1 due to COVID-19)

4

BCUA Systemwide 2015 Baseline Performance

459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

309
Million gallons per year Total combined sewer overflow volume to Hackensack River Basin

1,620
Million Gallons (MG) of Wet Weather Inflow

150
Million gallons per year Total combined sewer overflow volume to Hudson River

56
Overflows during the Typical Year to the Hackensack River Basin

58
Overflows during the Typical Year to the Hudson River

71.7%
Wet Weather Capture in the Hydraulically Connected System.

74.5%
Wet Weather Capture to the Hudson River

70%
Wet Weather Capture in Hackensack River Basin

Supplemental CSO Team Meeting #11 5 July 30, 2020

5

Ridgefield Park 2015 Baseline Performance

2004
NJDEP approved Typical Hydrologic Year

48.4”
Total rainfall depth in 2004 Typical Year

73
Storm events in 2004 Typical Year with greater than 0.1” of rainfall

459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

53
MG Typical Year Overflow Volume
11.5% of BCUA total

55
Typical Year Overflow Frequency

216
MG Wet Weather Inflow

75.5%
Wet Weather Capture

Supplemental CSO Team Meeting #11 6 July 30, 2020

6

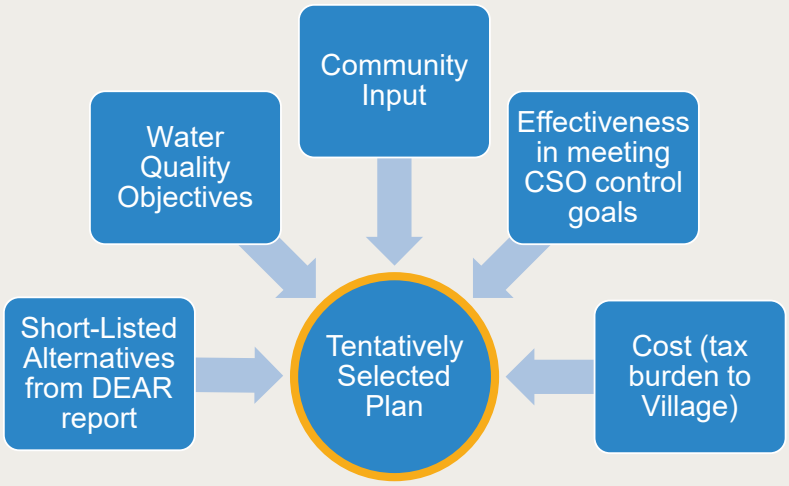
Alternatives Evaluation

Control Programs Evaluated

7

Tentatively Selected Plan

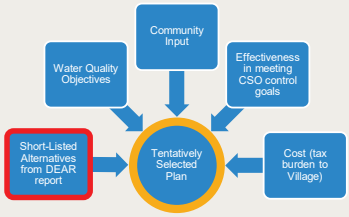
Selection Process



8

Rating of Ridgefield Park Alternatives

From Development and Evaluation of Alternatives Report



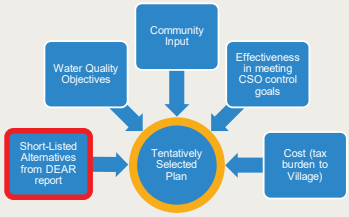
Requested SCSO Team input on rankings

Control Program	Cost	CSO Volume Reduction	CSO Frequency Reduction	Institutional Issues	Implement-ability	Public Acceptance	Weighted Score
1. Eliminate CSO-006A	NA	NA	NA	NA	NA	NA	NA
2. Consolidated Tank Storage	4	5	5	4	3	3	4.0
3. Tunnel	3	5	5	4	2	2	3.5
4. Consoldiated End of Pipe Treatment	4	5	5	2	3	2	3.6
5. Sewer Separation	2	5	5	3	2	2	3.1
6. Green Infrastructure	1	1	1	5	4	5	2.7
Weighting	25%	15%	15%	15%	15%	15%	100%

9

Short-Listed Alternatives

Presumption Approach Targeting 85 Percent Capture



- Control Program 2 - Consolidated Tank Storage
  - Best rating, least complex
- Control Program 4 - Consolidated End of Pipe Treatment
  - 2nd Best rating, higher cost, complexity, and community impact

10

Water Quality Modeling

- Receiving water is the Hackensack River
- A complex water quality model was developed with regional communities (NJ CSO Group) to determine water quality of receiving waters, based on typical year.
- Hackensack River in the vicinity of BCUA is an SE1 water:
  - Entero criterion of 35 cfu/100mL <u>geometric mean</u> is exceeded → water quality criteria is not attained:
    - under dry weather flow conditions; and
    - when CSOs are eliminated.

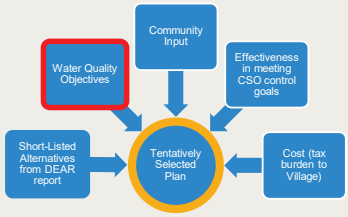
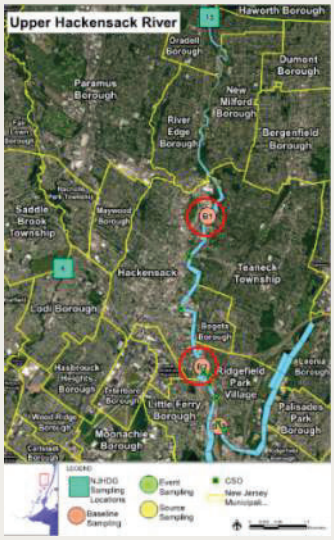


Table 6-2. AU Attainment in SE1 Waterbodies under Baseline and 100% Control Conditions

Assessment Unit Name	Assessment Unit Number	Baseline % Attainment	100% Control % Attainment
Hackensack R (Oradell to Old Tappan gage)	02030103170060-01	100.0	100.0
Hackensack R (Fort Lee Road to Oradell gage)	02030103180030-01	0.0	0.0

Source: Calibration and Validation of Pathogen Water Quality Model" Report (Draft, produced by NJ CSO Group / PVSC in April 2020)

Water Quality Modeling



Stormwater has almost equal contribution to CSOs, significant dry weather sources:

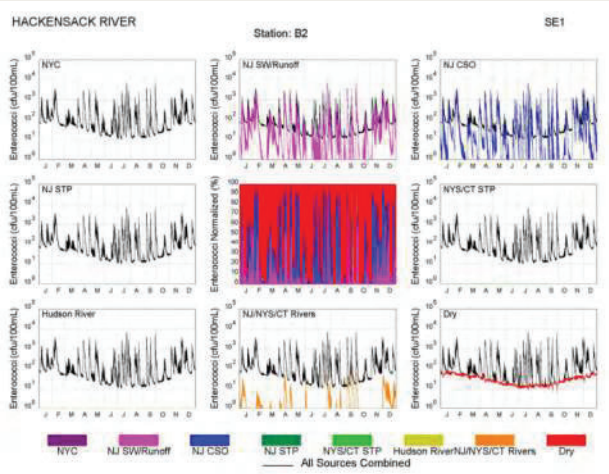


Figure 6-3. Component Analysis for Enterococci at Station B2

Source: Calibration and Validation of Pathogen Water Quality Model" Report (Draft, produced by NJ CSO Group / PVSC in April 2020)

Control Approach Selection

Presumption Approach Targeting 85 Percent Capture

Presumption Approach (performance based)	**Demonstration Approach** (water quality based)
• No less than 85 percent capture of annual overflow volume; • No less than the equivalent mass of the pollutants causing water quality impairment; or • No more than 4 overflows in the typical year	• Use receiving water model to identify control level needed to meet WQ-based requirements
SELECTED as best balance between permit compliance, water quality benefit and allocation of municipal funds.	**NOT SELECTED:** WQ modelling not very insightful in demonstrating WQ improvements in receiving waters.

Supplemental CSO Team Meeting #11 13 July 30, 2020

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Control Approach Selection

Presumption Approach Targeting 85 Percent Capture

- Calculate in conjunction with other permittees.
- Meets requirements of National CSO Policy.
- Evaluate effectiveness of increased level of control (knee of the curve).

Supplemental CSO Team Meeting #11 14 July 30, 2020

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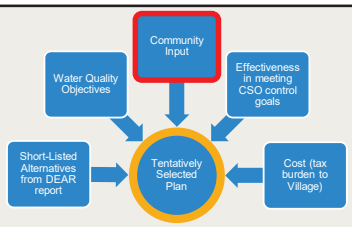
Summary of Community Input

From previous Supplemental CSO Team meetings



1. Cost is a priority for residents (both maintenance and capital)
2. Odor mitigation should be employed
3. Green infrastructure can be used as educational tool to supplement other CSO control alternatives due to cost and limited impact on CSO volumes.
4. Concern about the potential impact of future regulations, including for stormwater quality in sewer separation.
5. Belowground CSO storage tanks can be integrated into future open space projects along waterfront.

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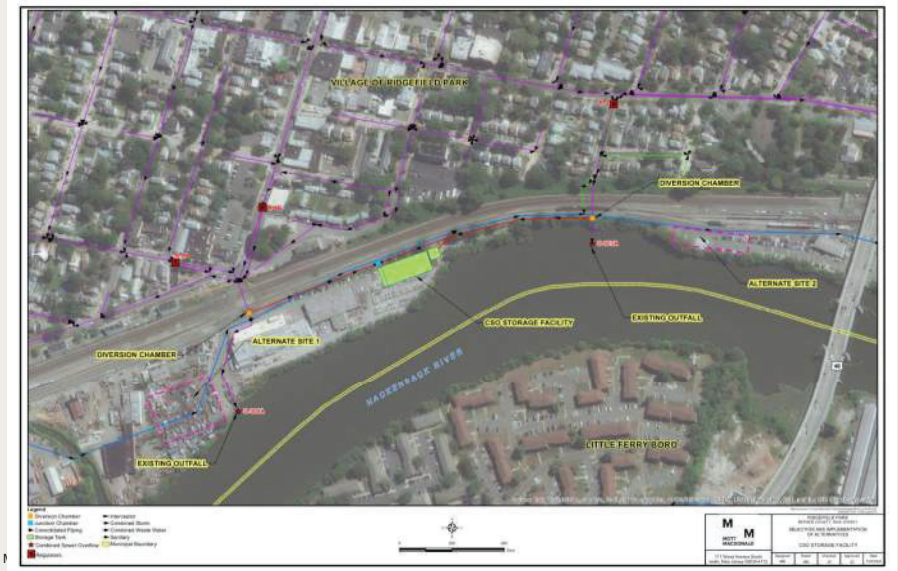
Tentatively Selected Plan – Subject to Change

Presumption Approach Targeting 85 Percent Capture



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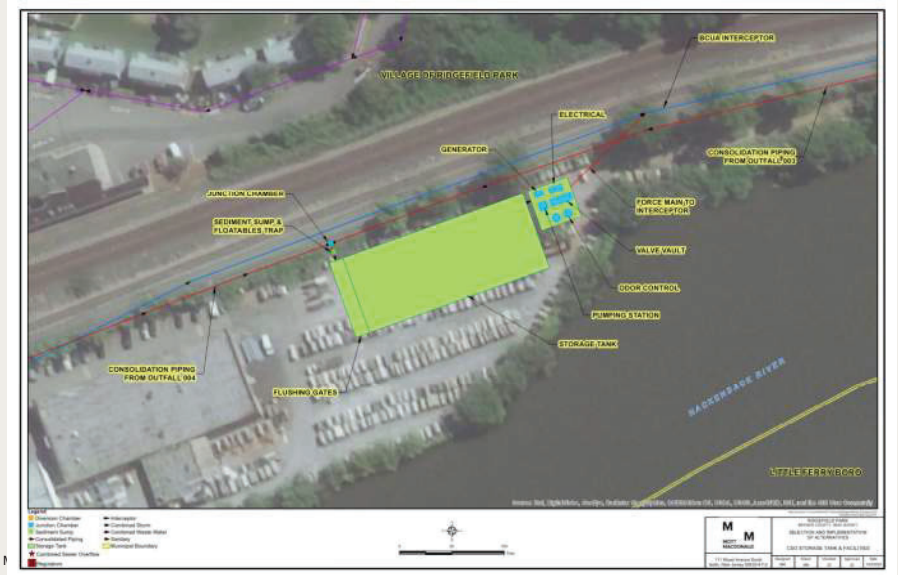
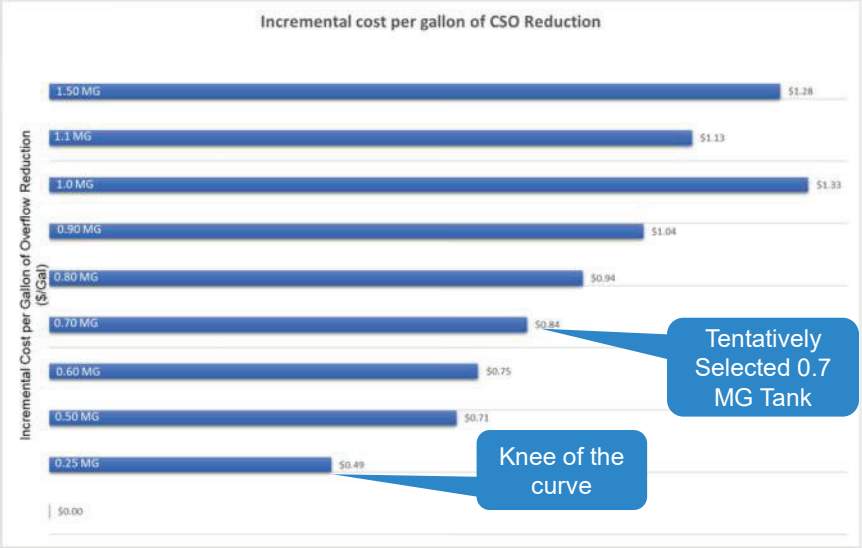
Tentatively Selected Plan – Subject to Change

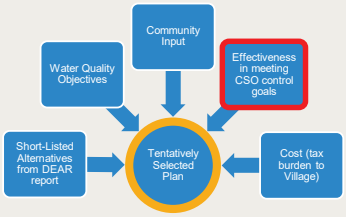
Presumption Approach Targeting 85 Percent Capture



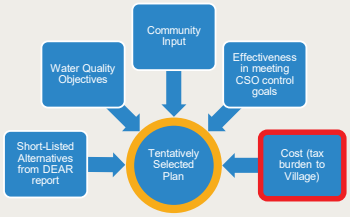
Tentatively Selected Plan

Knee of the curve





Tentatively Selected LTCP Costs



Total Project Cost

- **Capital Costs** $14M
- **Permit Costs** $40k/yr
- **O&M Costs** $105K/yr

19

Implementation Schedule (DRAFT)

Year 1: Feasibility Study

Years 2-3: Acquire Property

Years 4-7: Design – Permitting – Funding

Years 7-12: Construction

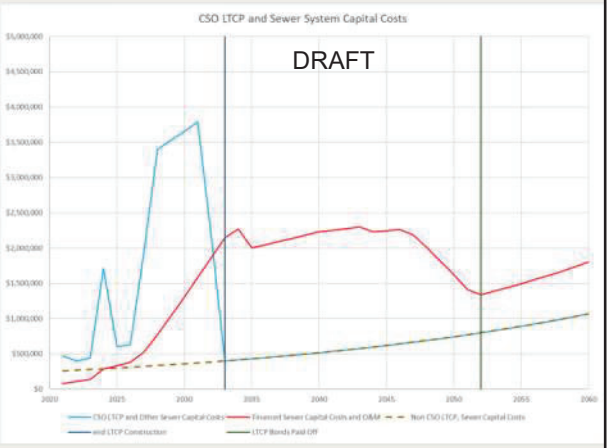
Years 12-14
- Monitoring
- Recalibration
- Performance Verification
- O&M

Years 15+ O&M

20

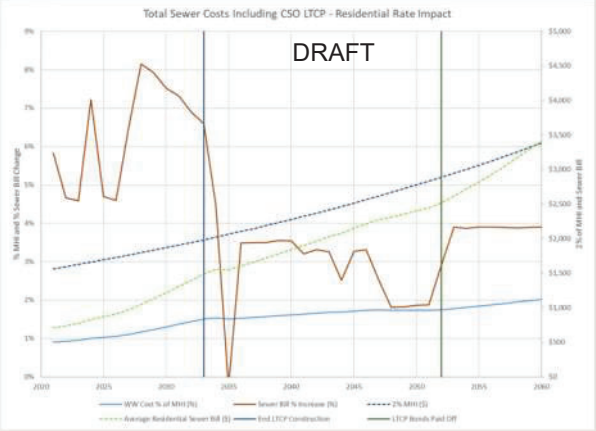
Cost Considerations

- Heavy tax burden, need to control costs.
- Village has many financial constraints, which makes even the recommended affordability consideration of 2% of MHI highly burdensome.
- COVID-19 pandemic may impact affordability and implementation schedule for CSO LTCP projects
  - Potentially reduced household incomes and sewer utility revenues.
  - Affordability analysis done for LTCP may no longer be accurate.



Cost Considerations

- Max Annual sewer bill increases of about 8%
- Total burden remains at less than 2% MHI for project life.



Ridgefield Park Tentative LTCP Performance

2004
NJDEP approved Typical Hydrologic Year

48.4”
Total rainfall depth in 2004 Typical Year

31 (Reduced from 53)
MG Typical Year Overflow Volume

216
MG Wet Weather Inflow

73
Storm events in 2004 Typical Year with greater than 0.1” of rainfall

459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

26 (Reduced from 55)
Typical Year Overflow Frequency

85.6% (Increased from 75.5%)
Wet Weather Capture

Supplemental CSO Team Meeting #11 23 July 30, 2020

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Post-Construction Compliance Monitoring

Receiving water quality conditions

- Will be monitored and modeled by NJ CSO Group in coordination with sampling program from NJ Harbor Dischargers Group routine sampling program.

CSO facilities performance

- Will be monitored and modeled by VRP to characterize performance based on Typical Year modeling of system with CSO facilities in place
- Data will be used to recalibrate/verify the collection system model to determine compliance with the NJPDES permit
- Compliance based on Typical Year conditions, as compared to the baseline model.

Supplemental CSO Team Meeting #11 24 July 30, 2020

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Adaptive Management

- **Adaptive management** to be included in LTCP
  - COVID-19 Impacts
  - Re-assess affordability throughout implementation schedule, based on emergent economic conditions beyond permittees' control
  - Include provisions to re-evaluate, revise and/or reschedule CSO controls as appropriate to reflect new technologies, new conditions and potential new funding sources

Supplemental CSO Group Input

- Input on tentatively selected alternatives?
  - Are your interests being considered?
  - Comments on:
    - Locations of facilities?
    - Types of facilities?
    - Cost?
- Preferences for implementation?
  - Concerns about construction disturbance?
  - Implementation sequence and schedule

Open Public "Meeting"

Tentatively Scheduled for Mid-August

Format / Venue

- Pre-record presentation and post to social media channels and Village website
- Increases accessibility - allows public to view presentation at any time
- Email address for public to provide feedback

Advertising

- Newspaper
- Social Media
- Community Groups
- Other?

Content

- What is a CSO
- Background on CSO LTCP process
- Alternatives considered
- Tentatively selected CSO control program
  - Schedule
  - Cost
  - Location
- Opportunities to provide input

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Tentative CSO LTCP Schedule for Completion

28

Questions?

29

Thank You!

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20. Appendix F – Fort Lee Model Recalibration Report

Sewer System Characterization Report for the Borough of Fort Lee, New Jersey

Borough of Fort Lee
309 Main Street
Fort Lee, New Jersey

June 29, 2018
Revised March 12, 2019
Revised September 27, 2019
Revised July 30, 2020

Fort Lee Sewer System Characterization Report

Submitted on behalf of the following participating Permittee by the

Borough of Fort Lee

NJPDES Number NJ0034517 (Borough of Fort Lee)

NJPDES Certification:

"I certify under penalty of law that this document and all attachments were prepared either: (a) under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted; or (b) as part of a cooperative effort by members of a hydraulically connected system, as is required under the NJPDES Permit, to provide the information requested. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information."

Permittee: _____ 9/27/19

Alfred R. Restaino, Borough Administrator Date

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Issue and Revision Record

Revision	Date	Approver	Description
1	3/12/2019	G. Grey	Response to NJDEP comments
2	9/27/2019	G. Grey	Response to Additional NJDEP comments
3	7/30/2020	G. Grey	Converted model from InfoWorks ICM ti Info Works CS to be compatible with BCUA model

Executive Summary

The Borough of Fort Lee, along with the City of Hackensack and the Village of Ridgefield Park, own and operate combined sewer systems that are tributary to the Bergen County Utilities Authority (BCUA) Water Pollution Control Facility (WPCF) located in Little Ferry. The BCUA WPCP also receives wastewater from 44 other communities that have separate sewer systems.

The New Jersey Department of Environmental Protection issued New Jersey Pollutant Discharge Elimination Permits (NJPDES) to all municipalities/authorities in 2015 that own and/or operate combined sewer systems and authorities that provide wastewater transport and/or treatment services to municipalities with combined sewer systems. The Borough of Fort Lee owns and operates the sewer system that transports combined flows to the BCUA interceptor. The combined portion of the sewer system is composed of threepump stations:

- Palisade Terrace Pumping Station;
- Lower Main Pump Station; and
- Bluff Road Pump Station.

During wet weather flows in excess of the pump stations capacity overflow to two netting systems located at Bluff Road serving the Bluff Road overflow and Palisade Terrace serving the Palisade Terrace and Lower Main overflows under NJPDES Permit No. 0034517 which was issued on July 1, 2015. The permit sets certain requirements and ultimately requires that a Long Term Control Plan be developed by June 1, 2020.

Fort Lee belongs to two cooperative CSO groups, the BCUA CSO Group made up of BCUA, Fort Lee, Hackensack, and Ridgefield Park, and the NJ CSO Group organized by the Passaic Valley Sewerage Commission (PVSC) and made up of 18 CSO permittees. CSO permit requirements are being complied with by Fort Lee individually and with these cooperative groups through work share agreements.

One of the permit requirements for Fort Lee is the preparation and submission of a Sewer System Characterization Report by July 1, 2018 which this report transmits. The permit also requires development and submission of the LTCP and several other supporting documents. To date these documents have been prepared and submitted a by Fort Lee, the BCUA CSO Group and the NJ CSO Group.

While the members of the BCUA CSO Group have agreed to complete a Regional Sewer System Characterization Study and CSO LTCP, most of the work will be completed separately and then coordinated and integrated through group meetings into a regional submission through the BCUA.

Three different consultants were engaged in the development of Regional Report. The Borough of Fort Lee retained HDR to complete its individual report, the City of Hackensack retained Arcadis to complete its individual Report, while the Village of Ridgefield Park and BCUA both retained Mott MacDonald to complete their Reports.

The Borough of Fort Lee, the City of Hackensack, and the Village of Ridgefield Park had all completed and reported upon their Sewer System Characterization Studies under the General CSO NJPDES Permit in April 2007. The 2015 Individual permit requires municipalities with CSO outfalls to again update their previous work and reports to the extent necessary and incorporate changes that would affect the combined sewer system including land use and population changes, sewer system changes, expansion or consolidation of the combined sewer system and any other changes that would affect CSOs. The changes to the Fort Lee model include the following:

1. Population and landuse updates.
2. Increased capacity of the Lower Main Pump Station.
3. Redirection of the Lower Main Pump Station discharge from the Palisade Pump Station directly to the BCUA Interceptor.
4. Incorporation the Hudson Lights 16 acre redevelopment project.
5. Addition of seasonal variability to infiltration and inflow flows.

After these changes were made, the model was recalibrated to flow data collected during October to December 2017 and validated to BCUA flow metering data from March 1, 2017 to August 27, 2017. Once the model was calibrated and validated a one year simulation was performed using the rainfall design year of 2004. The simulation was performed before and after the redirection of the Lower Main Pump Station discharge to the BCUA Interceptor to see the effect of this change. Overflows for both conditions are summarized in Table 1. Before the interceptor was redirected, the simulation resulted in 38 overflows totaling 11.73 MGD at Outfall 002 (Palisade Terrace) netting facility. By redirecting the discharge directly to the interceptor overflows were reduced to 22 and total volume was reduced to 4.17 MGD. This is a 42% reduction in overflows and a 64.5% reduction in overflow volume. This will be discussed further in the Development and Evaluation of Alternatives Report as the CSO LTCP is developed.

Table 1. Summary of Results Before and After Redirection of Flow from Lower Main

Condition	Outfall 001 (Bluff Road)		Outfall 002 (Palisade Terrace)	
	Overflows	**Volume**	**Overflows**	**Volume**
2004 before redirection of Lower Main	58	124.5	35	25.0
2004 after redirection of Lower Main	58	124.5	25	18.6

This model will be used to simulate various CSO controls and determine the effect of these controls on the reduction of CSO frequency and volume.

1 Introduction

The Borough of Fort Lee owns and operates the Combined Sewer System (CSS) and all of its regulator structures. The total area of the Borough is approximately 1,600 acres (2.5 sq. mi.), of which 640 acres (1 sq. mi.) is serviced by the combined sewers. All dry weather and some wet weather flows within the Borough are ultimately transferred to the Bergen County Utility Authority (BCUA) Water Pollution Control Facility (WPCF) located along the Hackensack River in the Town of Little Ferry. The BCUA plant provides wastewater treatment services to residential, commercial, and industrial users located within 47 municipalities in Bergen County with a sewered population of approximately 565,000 people generating a permitted flow of 94 million gallons per day (MGD). Excess wet weather flow from Fort Lee is discharged to the Hudson River under NJPDES permit NJ0034517.

In 2007, a previous Combined Sewer Overflow (CSO) Characterization study was conducted pursuant to permitting requirements of its NJPDES permit NJ0105023, Part V.B., Condition 4a, 4d, 4e, and 4f and through partial funding from a New Jersey Sewage Infrastructure Improvement Act (SIIA) grant. A computer model of the Fort Lee CSS and tributary collection systems was constructed, calibrated, and verified using InfoWorks, a commercial urban watershed modelling software by Innovyze. The purpose of constructing this model was to develop a suitable tool for evaluating current sewer system flow and solids transport capacity, while also enabling the Borough to estimate the CSO pollutant loadings from the Fort Lee CSS area to the Hudson River. Quantification and qualification of these loadings were subsequently used in water quality improvement projects for this waterbody.

Fort Lee has undertaken a new CSO Characterization Study pursuant to its revised NJPDES permit NJ0034517. The InfoWorks model used in the 2007 study has been updated and recalibrated to account changes to the CSO system. These changes include rerouting the underflow from Lower Main pump station directly to BCUA. To aid in the model calibration process, new flow monitoring data (Appendix A) was collected at the underflow and overflow of all three (3) regulators.

The following sections of this report provide information on the update of the computer model of the Fort Lee CSS. Section 2 describes the goals of the project. Section 3 characterizes the project area represented in the model. Section 4 summarizes sewer system updates, precipitation and hydraulic data collection efforts. A description of the model and its various components are provided in Section 5, which is followed by descriptions of the model calibration and verification in Section 6. Section 7 discusses the characterization of CSOs from outfalls as well as the results for the extended period simulation using the typical year of 2004 as established by PVSC.

1.1 Receiving Water Quality

Fort Lee CSS overflows the excess flow during rainfall events to the Hudson River. NJDEP has designated the Hudson River as a Primary Contact, Saline Estuary with a SE2 Class. The water quality standards for such receiving water bodies are set with monthly mean and single sample maximums set at the level of the protected use. For the Hudson River, the Fecal Coliform standard for is 770 colony forming unit per 100 mL (CFU/100mL) for Monthly Mean.

The SE2 water quality classification provided for maintenance, migration, and propagation of the natural and established biota; migration of diadromous fish; maintenance of wildlife; secondary contact recreation; and any other reasonable uses. It should be noted that primary contact is not a designated use for SE2 waters.

As described in the BCUA Sewer Characterization Report, monitoring of the receiving waters was done jointly with numerous permittees through the NJ CSO Group. These results will be presented in a separate report. Location 32 was located immediately adjacent to Fort Lee's discharge and results are shown on the Figure 1. Currently, the water is not impaired compared to the standards.

2 Project Description

2.1 Project Goals

A hydraulic collection system model is a mathematical representation of the combined collection system flows. The model is developed with the goal of realistically representing the physical system flows. The model calculations are compared with measured data under known conditions to calibrate the model parameters and to determine if a good match is made. Then the model can be used to evaluate the system under proposed conditions such as new developments or the typical year conditions. By developing a suitable collection system model, Fort Lee can evaluate system changes to meet operating and regulatory goals. The Fort Lee Sewer System Characterization Report was undertaken with the goal of providing a detailed understanding of the combined sewer system and receiving water.

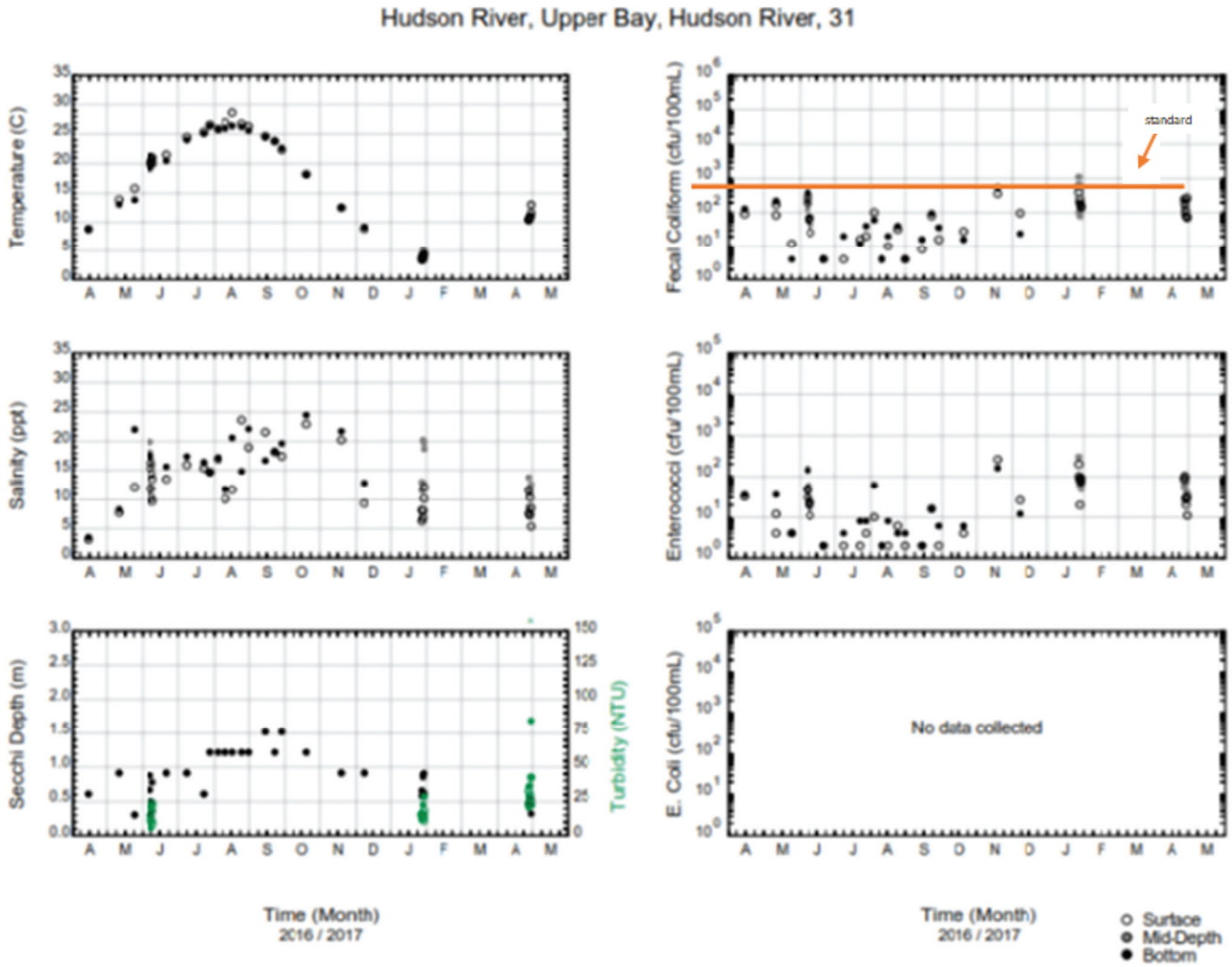


Figure 1. Water Quality Observed Data near Fort Lee Outfalls, Hudson River

3 Sewer System Characterization

Fort Lee is a 1600 acre borough on the Palisades across from New York City. The landside model includes 1505 acres are modeled and 95 acres are that are either unswered or in the Route 80 corridor that bisects Fort Lee. Of the 1505 acres that are sewered and simulated in the model, 639.1 acres are serviced by a combined sewer system (CSS). This was described in our March 2007 report entitled “Interim Combined Sewer System Modeling Report for Borough of Fort Lee.” The service area extends along the Palisade Ridge adjacent to the Hudson River. The Fort Lee CSS includes three (3) pump stations, their regulators, and two (2) discharge points. The three (3) pump stations are Palisade Terrace Pumping Station (PTPS), Lower Main Pumping Station (LMPS), and Bluff Road Pumping Station (BRPM). The size of the combined and separate sewer areas are presented in Table 2 and shown in figures in Appendix B.

Table 2. Combined and Separately Sewered Ares of Fort Lee

Pump Station	Combined	Separated
Bluff Road	319.4	339.5
Palisades Terrace	213.6	399.0
Lower Main	106.1	127.6
Sub-Total	639.1	866.1
Total drainage area	1505.3	

During the 2017 flow metering, flows at these pump stations were metered. The tributaries to these pumping stations are described in the following sections.

3.1 Service Area Land Use Data

The sanitary flow in Fort Lee is primarily residential with some commercial flow. Figure 2 displays the various land use types in Fort Lee. There are no planned changes to land use type in the future. Land use for the separate and combined areas is summarized in Table 1.

Figure 2. Land Use Type in Fort Lee

3.1.1 Palisade Terrace Pumping Station (PTPS)

The PTPS collects dry weather flows from the north-western portion of the Borough that has an area of about 340 acres. The land use in the drainage area is mostly residential. The PTPS drainage area has the population of approximately 9,100 people who contribute on average of 1.23 million gallons per day of dry weather flow.

Most of this area is separately sewered with the exception of McCloud Drive. Additional Inflow and Infiltration (I&I) sources (e.g., sump pumps, groundwater infiltration, etc.) contribute flows to the PS during wet weather periods. The PTPS pumped flows discharge to the BCUA interceptor starting at the intersection of Route 4 and Edwin Avenue.

3.1.2 Lower Main Pumping Station (LMPS)

The LMPS collects flows from the north-eastern portion of the Borough and has a drainage area of about 167 acres. The drainage area is primarily residential. The LMPS has approximately 2,500 people who contribute on average 0.64 million gallons per day of dry weather flow. This drainage area is separately sewered with the exception of English and

Cedar Street. I&I is also prevalent in this drainage area. Before 2016 the LMPS sent pumped flow to a 12 inch pipe on Parking Avenue, from which the flow traveled by gravity to the PTPS. After 2016, the flow from the pump station was rerouted to a 12 inch pipe that discharges to the BCUA interceptor. In addition to the rerouting the flow, the pump station capacity was upgraded from 2 MGD to 5 MGD.

3.1.3 Bluff Road Pumping Station (BRPS)

The BRPS collects dry weather flow from about 493 acres from the southern portion of the Borough. This drainage area is primarily residential. The BRPS has approximately 12,100 people who contribute on average 1.83 dry weather flow.

Unlike the other drainage areas, this area is serviced mostly by combined sewers with the exception of Anderson Avenue and the areas north of the street. The pump station can pump 6 MGD of flow.

3.1.4 Direct Drainage to BCUA Interceptor

Within the Borough of Fort Lee there are two drainage areas that drain directly to the BCUA interceptor Sewer. BCUA-1 combines with the Bluff Road Pumping Station and drains downstream of the Overpeck Valley Sewer. BCUA-1 has an approximate population of 3,500 with an average flow of 0.5 MGD. BCUA-2 directs to the Fort Lee East Interceptor Sewer and combines with both Lower Main and Palisades Pumping Station upstream of the Overpeck Valley Trunk Sewer. BCUA-2 drainage area contains approximately 7,800 people with an average flow of 2 MGD. Both areas are separated and primarily residential.

3.1.5 Flooding History

Flooding has been observed at the Bluff Road regulator and on occasion has resulted in overflows to Route 5, below the regulator. Fort Lee has entered into a consent agreement with the USEPA and is addressing this issue. The frequency of these events was not known until a flood alarm was installed in the Bluff Road regulator in 2018 which alarms an overflow condition and calls in a collection system operator. The operator identifies if the regulator is operating correctly or if a flooding condition exists that overflows to grade level at the regulator and spills onto Route 5 at the pump station. The observed condition is logged into a Bluff Road netting facility overflow log which is shown in Appendix C The log covers overflow events for the first eight months of 2019. Twenty one overflow events occurred during the eight months and two of these events, May 30, 2019 and July 22, 2019, caused an overflow to Route 5. Overflows are communicated by the licensed operator to Christine Blaney of NJDEP as shown in Appendix C. An alternatives analysis for control of the overflows to Route 5 will continue. Two alternatives that are being considered are:

1. Construction of a knee wall around the netting chamber to contain the overflows; or
2. Installation of two additional nets in the netting chamber to increase flow capacity.

There has been no flooding reported for the Palisade Terrace or Lower Main pump stations and netting facility..

Sewer backups and flooding complaints are logged in on the form and summary table shown in Appendix D. The flooding log includes data, address, description of situation, back up location, cause (if known), actions taken and what follow-up action are required.

3.2 Monitoring of Background Conditions

Flow metering was performed in 2006 and in 2017. Future sampling of pathogen concentrations is planned for 2019. These programs are described below.

3.2.1 Previous Monitoring

An overflow water quality sampling program was completed in 2006. The objective of the monitoring program included development of dry- and wet-weather quantity (flow) and quality (pollutant concentration) data to be used for development of loadings to the Hudson River. Then in 2017 flow monitoring was repeated because of the change made at the Lower Main Pump Station and the redevelopment done at Hudson Lights.

3.2.2 Need for Additional Sampling Data

A stormwater sampling program will be performed for the purpose of confirming that the pathogen concentrations of runoff from high density residential areas is consistent with published literature values. Initially the intersection of Myrtle Avenue and Short Street was identified as high density residential but after further review of the location was found to be in the northern edge of the Palisade Terrace combined sewer drainage area just inside the combined area so sampling will not be done at this location. We are considering collecting the sample at Linwood Avenue and Main Street which is an R10, High Rise Apartment zone in the separately sewered area as shown in Appendix E. This will satisfy the sampling of a High Density Residential zone. We plan to sample in October to November.

Sampling will be conducted during October and November 2019. A total of one (1) sampling station will be sampled with sampling to be performed for three (3) wet weather events. Two (2) samples will be collected in the High Density Residential area as noted in Table 3.

Table 3. Fort Lee System Characterization Stormwater Quality Sampling Stations

Designated Land Use	Location
High Density Residential	Linwood Avenue and Main Street

The collected pathogen data will be used for comparison with literature values in order to establish appropriate concentrations to characterize pathogen loadings from discharges of CSO and stormwater. Literature values for pathogen concentrations will be used for open space.

4 Combined Sewer System Characteristics

Figure 3 shows how the regulators were operated prior to 2017. As shown, the combined sewer area was served by 3 regulators. Flow from Lower Main Pump Station is pumped to the Palisades Pump Station, which then pumps to the BCUA Interceptor. Flow from Bluff Road is pumped to the BCUA Interceptor.

4.1 Sewer System Updates or Modifications

Figure 4 shows the operation of the system beginning in 2017, after completion of several modifications. In 2016, the Lower Main Pump Station was upsized and a new 10” line was installed to connect it directly to the BCUA Interceptor rather than routing through the Palisade Pump Station. The overflow from the Lower Main Pump Station is still combined with the overflow from the Palisades Pump Station and discharges to Outfall 2. The new pumps at Lower Main include two pumps at 1,000 gpm and one at 2,000 gpm to handle flows from new housing developments in the Lower Main area.

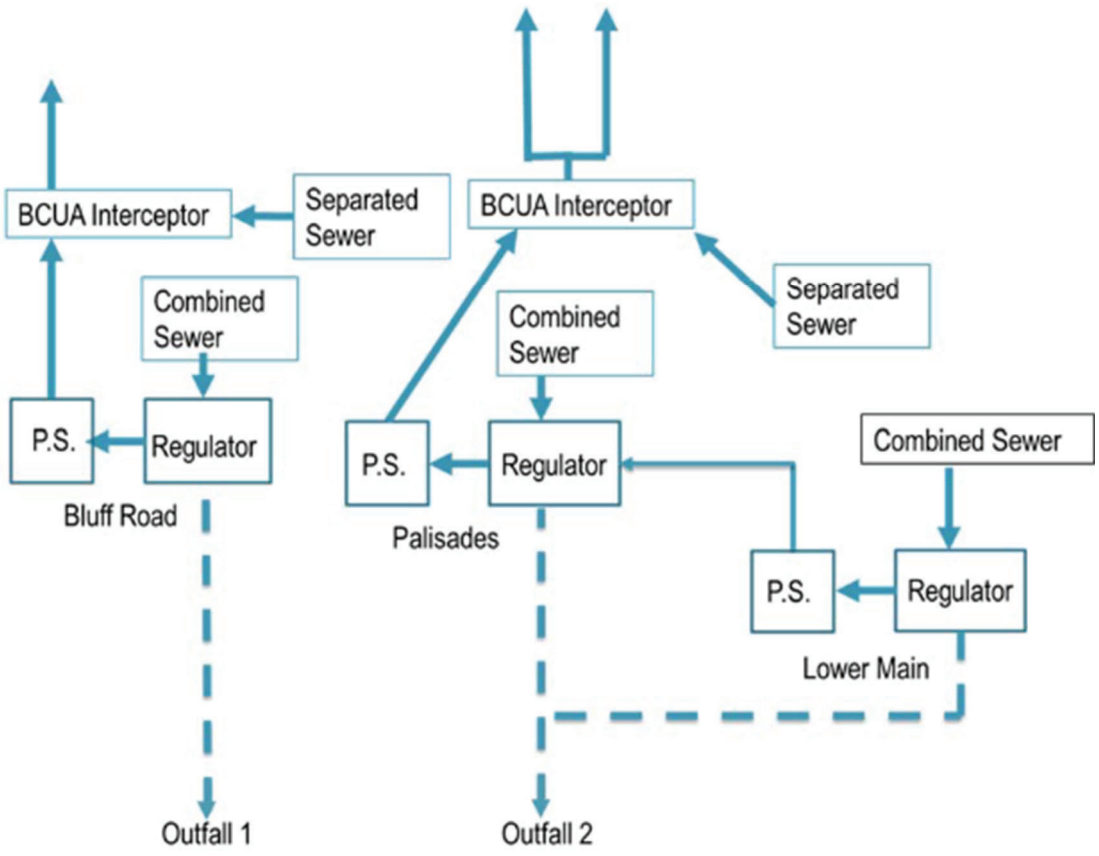


Figure 3. Historic Configuration of Fort Lee Collection System

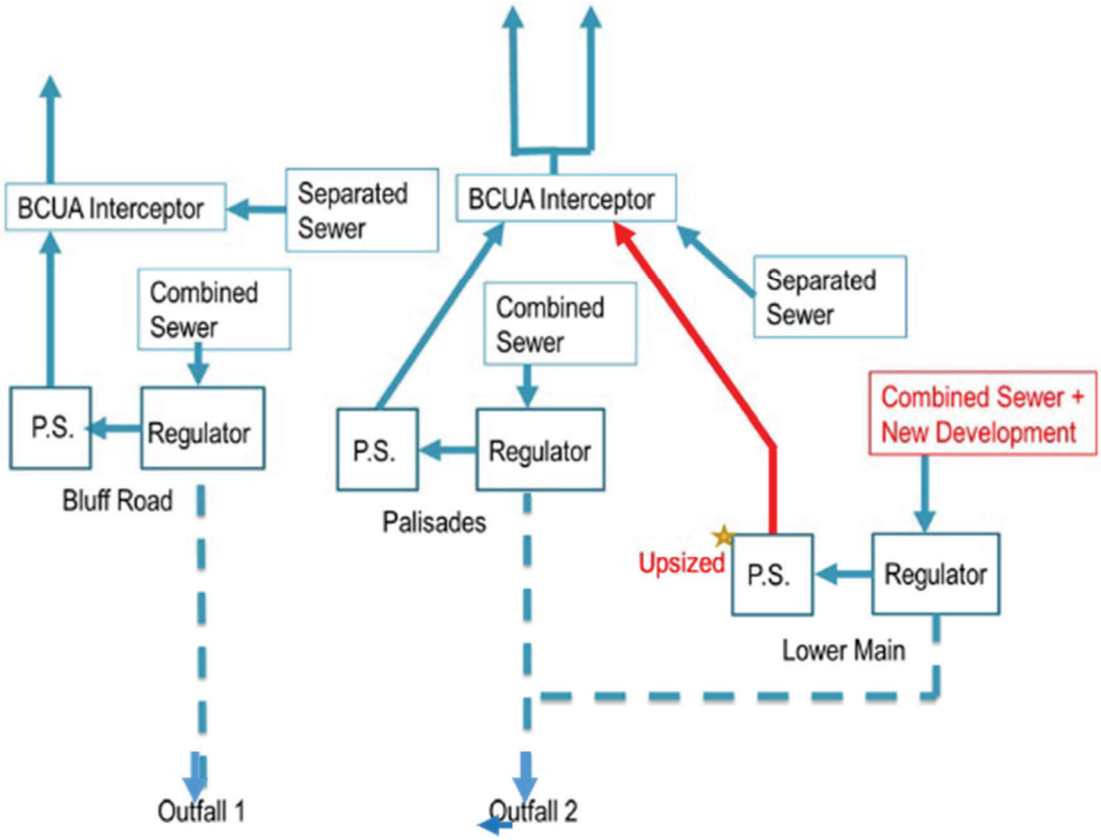


Figure 4. Present Configuration of Fort Lee Collection System

4.2 CSO Regulators and Control Facilities

Fort Lee utilizes netting systems to remove floatables from the CSOs and meet USEPA "Nine Minimum Controls" and the Long Term Control Plan requirements. The netting systems were installed in 1995. DPW personnel inspect the netting systems on a regular basis, both prior to anticipated storm events and after significant storm events.

The netting systems are in-line TrashTrap systems manufactured by Fresh Creek Technologies, Inc. (currently owned by Storm Trap). Each netting facility contains two nets. The netting units are installed in in-line chambers and are installed in line with the combined sewer system pipe. A fixed hydraulic relief screen located upstream of the nets assures screening of the flow under all conditions and provides additional system capacity. The screen is inclined in the direction of flow so that any debris caught on this screen falls into the nets as the water level in the chamber recedes. The screen will also work as a weighted relief valve, if required, to reduce back pressure. Grating under the nets allows them to drain dry. Debris is captures and contained in disposable nets. The disposable nets and support frame are housed in a rack assembly installed in the chamber.

Net maintenance and change outs are scheduled based on periodic visual inspection. The system is maintained through ground-level lockable access doors on the top of the netting chamber. There is no confined-space entry required during routine service because the disposable nets are held net frames which are lifted from the chamber to perform the net change-out above ground. A hoist truck for changing the nets and a container for holding the full nets are used for maintenance. A crew of two typically accomplishes the net change-out. The full nets are disposed of approved facility.

4.3 Recent Reports or Plans

The 2004 NJPDES permit for Fort Lee required the Borough to develop a Long Term Control Plan (LTCP) in accordance with the National CSO Control Policy. This phase of the CSO program requires development and evaluation of the feasibility of a range of control alternatives to reduce CSO frequency and pollutant loadings pursuant to the Federal Clean Water Act (CWA) goals. It resulted in the following reports:

- Interim Service Area and Land Use Report for Fort Lee, March 2007;
- Rainfall Monitoring Study Report for Borough of Fort Lee, March 2007;
- Interim System Inventory and Assessment Report for Borough of Fort Lee, March 2007;
- Interim Combined Sewer System Modeling Report for Borough of Fort Lee, March 2007;
- Combined Sewer Overflow Interim Monitoring Report for Fort Lee, March 2007; and
- Cost and Performance Analysis Report for Borough of Fort Lee, March 2007.

The reports above represent the development of the 2007 Long Term Control Plan.

Two later reports were used to define the reconfiguration for the combined sewer system:

- Engineer's Design Report For Lower Main Pumping Station and Force Main, March 2013; and
- Calculations Report for Flow Reduction to Lower Main Pump Station Due to Sewer-Storm Separation at Fort Lee Redevelopment Projects, April 2013.

The 2015 NJPDES permit for Fort Lee required a System Characterization and Landside Modeling Program Quality Assurance Project Plan. This was submitted in December 2015. That document provided guidance for the preparation of this report.

5 Model Development

The sewer system model was originally developed in 2006 for the previous LTCP. The model was constructed using sewer system data compiled in a GIS database by Boswell McClave. The information included manhole inverts, ground elevations, and pipe dimensions. The model extents included all significant combined sewers over 8 inches within each regulator drainage area. Conduits in the system were primarily modeled from manhole to manhole where changes in pipe characteristics occur. The regulator structures were simulated by modeling conduits upstream of a regulator, the weir/orifice controlling flow within a regulator chamber included float controls if any, its overflow discharge conduit, and its connection to the pump station. The model included the drainage areas for the three (3) pump stations.

5.1 Modeling Framework

During the 2006 LTCP, a sewer system model was developed using Infoworks software. Infoworks is a dynamic rainfall-runoff hydraulic model primarily used for collection system modeling in urban areas. It is capable of simulating the response to single and long term rainfall events. The model can characterize the entire urban water cycle, from rainfall to runoff to flow routing through the sewer system. It is a time-variable model capable of calculating the flow and hydraulic grade lines (HGL). Infoworks provides friendly graphical user interfaces, database management tools, post-processing utilities, GIS integration, and other enhancements.

Infoworks solves the complete St. Venant (dynamic flow) equations for hydraulic calculations. It can characterize the backwater effects, flow reversal, surcharging, looped connections, pressure flow, tidal outfalls, and real time control operations within a sewer network. The model post processing tools can generate summary tables and graphs for review and analysis of model results.

Surface characteristics of each subcatchment are required to calculate and route runoff flows. These characteristics include infiltration, evaporation, depression storage, and percent impervious. Drainage area and characteristic parameters such as, land slope, width of overland flow, and Manning's surface roughness coefficients are used to calculate the movement of overland runoff flow. These characteristics are included in Appendix F.

5.2 Model Updates

In 2007, a previous Combined Sewer Overflow (CSO) Characterization study was conducted pursuant to permitting requirements of its NJPDES permit NJ0105023 A computer model of the Fort Lee CSS and tributary collection systems was constructed, calibrated, and verified using InfoWorks CS, a commercial urban watershed modelling software by Innovyze. The purpose of constructing this model was to develop a suitable tool for evaluating current sewer system flow and solids transport capacity, while also

enabling the Borough to estimate the CSO pollutant loadings from the Fort Lee CSS area to the Hudson River.

Fort Lee has undertaken a new CSO Characterization Study pursuant to its revised NJPDES permit NJ0034517. The InfoWorks CS model used in the 2007 study was converted to InfoWorks ICM model (Version 9.0). The ICM model was updated and recalibrated to account changes to the CSS and CSO systems. These changes include rerouting the underflow from Lower Main pump station directly to the BCUA interceptor and separating the collection system in the Hudson Lights project area. Flow metering at the all three (3) regulators was done for three months, from 9/14/2017 to 12/18/2017, to provide data for model recalibration..

The map in Figure 2 shows the location of the flow meters installed in the regulators by Flow Assessment. The Deter Site Information Log Sheets from Flow Assessment are also presented in Appendix D. The area/velocity meters were ISCO 2150 Area Velocity Flow Module and ultrasonic depth sensors were down-looking and up-looking ultrasonic depth sensors connected to a Telog data logger are shown in Appendix H

6 Model Calibration

Model calibration describes the process of modifying model parameters so that, given measured inputs such as rainfall, the model simulations produce outputs of in-sewer flows and volumes that achieve acceptable agreement with measured flows and volumes. Examples of model parameters that are often modified to bring model results into agreement with measurements are initial “depression storage” losses, roughness coefficients, and catchment width height ratios.

The remainder of this Section presents a summary of the rainfall and flow-metering data collected to support the calibration process, the calibration to dry-weather flows, and the calibration to wet-weather flows.

6.1 Calibration Data

Data collected to support model calibration included rainfall and flow metering. These parameters were collected for a period of three months, from September 14 through December 18, 2017.

6.1.1 Sewer Flow Monitoring

To provide data to support model recalibration, flow metering was performed at all three (3) regulators – PTPS, LMPS, and BRPS -- from September 14, 2017 to December 18, 2017, a period of about three months. Overflows were metered at all three (3) locations; in addition, inflows were metered at PTPS and LMPS. Due to difficult hydraulic conditions at BRPS, underflow was metered (in lieu of metering inflow and overflow). Flow metering locations and instrumentation at each regulator are summarized on Figure 2 and in Appendix G

Flow metering was accomplished using continuous monitoring devices, including a velocity sensor combined with a depth sensor, and a continuous depth recording for weirs. Level monitoring was performed with a down-looking ultrasonic meters mounted at a location above the maximum high-water mark, or with a submerged pressure sensor. Flows were recorded at each location at 15-minute time increments.

6.1.2 Precipitation Data Collection

During Fort Lee's 2017 flow-monitoring period, rainfall data from Teterboro (TET) Airport rain gauge was used for model calibration purposes. Data at this rain gauge is collected at 5-minuteintervals. As shown in Table 4, thirty (30) storm events occurred during flowmonitoring period. Seventeen (17) of these storms did not cause CSO events (indicated with gray highlighting in Table 4), while the remaining thirteen (13) storms did cause CSO events in Fort Lee.

Table 4. Rainfall Events and Statistics During Monitoring Period (non-CSO Events Grayed Out)

NO	Start Time	End Time	Duration (hrs)	Dry Time Before Storm (hrs)	Rainfall (in)	Ave Intensity (in/hr)	Max Hourly Intensity (in/hr)
1	9/19/2017 15:00	9/19/2017 19:00	4	299	0.23	0.06	0.19
2	10/5/2017 21:00	10/5/2017 22:00	1	386	0.01	0.01	0.01
3	10/8/2017 7:00	10/8/2017 11:00	4	57	0.09	0.02	0.06
4	10/9/2017 3:00	10/9/2017 5:00	2	16	0.02	0.01	0.01
5	10/9/2017 10:00	10/9/2017 15:00	5	5	0.15	0.03	0.09
6	10/11/2017 17:00	10/11/2017 18:00	1	50	0.02	0.02	0.02
7	10/12/2017 1:00	10/12/2017 8:00	7	7	0.13	0.02	0.03
8	10/14/2017 2:00	10/14/2017 6:00	4	42	0.04	0.01	0.02
9	10/24/2017 12:00	10/24/2017 16:00	4	246	0.39	0.1	0.28
10	10/26/2017 10:00	10/26/2017 11:00	1	42	0.01	0.01	0.01
11	10/29/2017 2:00	10/29/2017 23:00	21	63	2.77	0.13	0.57
12	10/30/2017 3:00	10/30/2017 8:00	5	4	0.1	0.02	0.03
13	11/5/2017 2:00	11/5/2017 3:00	1	138	0.01	0.01	0.01
14	11/5/2017 13:00	11/5/2017 17:00	4	10	0.04	0.01	0.02
15	11/7/2017 15:00	11/7/2017 23:00	8	46	0.58	0.07	0.13
16	11/13/2017 7:00	11/13/2017 11:00	4	128	0.07	0.02	0.02
17	11/16/2017 3:00	11/16/2017 9:00	6	64	0.13	0.02	0.06

Table 4. Rainfall Events and Statistics During Monitoring Period (non-CSO Events Grayed Out)

NO	Start Time	End Time	Duration (hrs)	Dry Time Before Storm (hrs)	Rainfall (in)	Ave Intensity (in/hr)	Max Hourly Intensity (in/hr)
18	11/16/2017 14:00	11/16/2017 15:00	1	5	0.01	0.01	0.01
19	11/18/2017 15:00	11/18/2017 19:00	4	48	0.11	0.03	0.05
20	11/19/2017 1:00	11/19/2017 8:00	7	6	0.17	0.02	0.07
21	11/19/2017 22:00	11/19/2017 23:00	1	14	0.02	0.02	0.02
22	11/22/2017 8:00	11/22/2017 10:00	2	57	0.05	0.03	0.04
23	11/30/2017 22:00	12/1/2017 0:00	2	204	0.03	0.02	0.02
24	12/5/2017 14:00	12/5/2017 15:00	1	110	0.01	0.01	0.01
25	12/5/2017 19:00	12/5/2017 23:00	4	4	0.3	0.08	0.11
26	12/9/2017 10:00	12/9/2017 22:00	12	83	0.32	0.03	0.06
27	12/12/2017 13:00	12/12/2017 14:00	1	63	0.01	0.01	0.01
28	12/14/2017 1:00	12/14/2017 8:00	7	35	0.07	0.01	0.02
29	12/15/2017 15:00	12/15/2017 19:00	4	31	0.1	0.03	0.04
30	12/18/2017 3:00	12/18/2017 4:00	1	56	0.01	0.01	0.01

6.1.3 Selection of Calibration Storms

For purposes of model calibration, three wet-weather events were selected to be representative of both typical and extreme rainfall events. Three storm events (10/29/2017, 11/7/2017 and 12/5/2017) were selected for model calibration based on their size, intensity characteristics, and duration; these storms are highlighted in orange in Table 4. As shown in Table 5, the three events selected for calibration (highlighted in yellow) represent a range of rainfall statistics, while generally ranking in the top four of the thirteen CSO-causing storms for each statistical parameter rainfall depth, average intensity, and maximum intensity.

Table 5. Ranked Statistics for Monitoring-Period Storms (Calibration Events Highlighted)

Rank by Parameter	Duration (hrs)	Rainfall Depth (in)	Average Intensity (in/hr)	Max Intensity (in/hr)
1	21	2.77	0.13	0.57
2	8	0.58	0.10	0.28
3	7	0.39	0.08	0.19
4	6	0.30	0.07	0.13
5	5	0.23	0.06	0.11
6	5	0.17	0.03	0.09
7	4	0.15	0.03	0.07
8	4	0.13	0.03	0.06
9	4	0.10	0.02	0.04
10	4	0.10	0.02	0.04
11	4	0.05	0.02	0.03
12	2	0.04	0.01	0.02
13	2	0.02	0.01	0.01

6.1.4 Calibration-Period Precipitation Compared to Typical Year

The Typical Rainfall Year was selected by PVSC as the 5-minute record from 2004 at Newark International Airport (EWR) which is located 20 miles south west of Fort Lee.

The distribution of Typical Year (2004) rainfall totals are displayed in Figure 5 as blue circles. The distribution of 2017 rainfall totals during the flow monitoring period, are presented as black circles. The figure shows that the wet-weather events selected for calibration (red circles) did capture the range of event statistics from the 2004 Typical Year rainfall record.

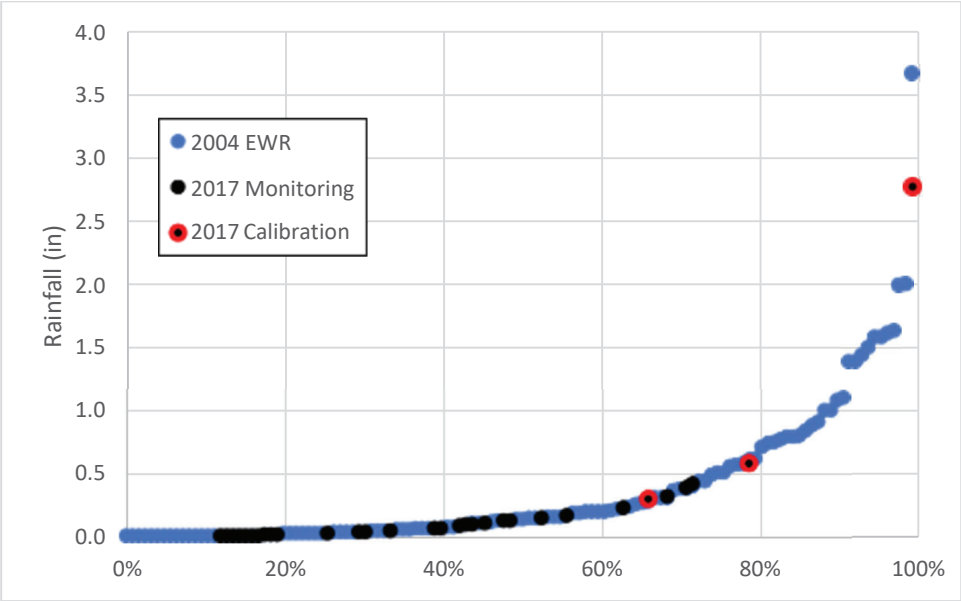


Figure 5. Rainfall Total Comparison during Typical Year

6.2 Dry-Weather Flow Calibration

6.2.1 Average Sanitary Flow and Ground Water Infiltration (GWI)

Dry weather flow (or sanitary flow) was calculated on a per-subcatchment basis. Dry weather flow was modeled as time-variable flow, simulating the typical diurnal nature of sanitary flow. Diurnal variations in sanitary flow were estimated using the monitoring data. For each monitored Pump Station drainage area, a diurnal curve was established by averaging the hourly flows of all recorded dry weather weekdays and dividing by the total average daily dry weather flows. Dry weather days were defined as 2 days (48 hours) after rainfall ended. Because one of the calibrated storm events occurred on a weekend, a weekend curve was also calculated. Daily patterns and calibration results can be found in Appendix H.

Each monitored drainage area was assigned a per-capita wastewater flow based on the population. Each person was assigned 100 gallons per day. The remaining flow was dry weather ground water infiltration (GWI). Population data from 2010 was downloaded from NJ Census dataset and population was added to account for the new Hudson Lights development. This data is summarized in Table 7.

Even during dry weather, the Fort Lee collection system collects GWI from the influent sewer system. On average, less than half of total flow is GWI.

Table 6. Regulator Drainage Area Properties

Regulator	Population	Average Dry Weather Flow (MGD)	Assumed Sanitary Flow (MGD)	Average GWI (MGD)
Lower Main	2,532	0.64	0.25	0.39
Palisades	9,101	1.23	0.91	0.32
Bluff Rd	12,094	1.83	1.21	0.62
BCUA-1	3,471	0.52	0.35	0.18
BCUA-2	7,757	2.01	0.78	1.23
Total[1]	34,955	6.23	3.5	2.73

[1]https://www.census.gov/quickfacts/fact/table/fortleeboroughnewjersey/POP010210#POP010210

Average dry-weather patterns were developed for both weekdays and weekends. BCUA-1 was assigned the same pattern as Bluff Road, while BCUA-2 was assigned the average pattern as Palisades and Lower Main.

During the 2017 flow monitoring period, the total average flow at Bluff Roads decreased by 0.75 MGD from the previous 2006 calibration. The flow monitoring firm that performed the metering stated:

"*The original flows recorded from the Bluff Road Pump Station monitoring site in 2006 were increased 60% to accommodate what was believed to be upstream contributing flows from meters deployed on the same project. It was suspected that the flow recorded was faulty, either by the monitoring location or the recording meter itself. The closed pipe meter used in 2006 is no longer in use with our company.*

The flow monitoring performed in 2017 at the Bluff Road Pump Station utilized the same type of meter but different manufacturer of meter to record flows passing through the closed pipe pump discharge line. The original flows recorded in 2006 appear to be close to the same flows recorded in 2017. The flows from 2006 should not have been increased from what was originally recorded."

Thus the new flow-metering data is correct. The model was adjusted accordingly.

6.2.2 Monthly Variation of Dry-Weather Flow

BCUA flow-metering data collected between March and August 2017 indicated a seasonal variation in the total flow. Because the sanitary flow remains a constant 100 gallons per day per capita, the seasonal variation is attributable to ground water infiltration (GWI) into the sewer system. Figure 6 presents the monthly variation of the total flow, together with the sanitary and GWI components. These monthly variations are based upon measured flow data at the Lower Main PS, the Palisades PS, the Bluff Road PS, at BCUA-1, and at BCUA-2.

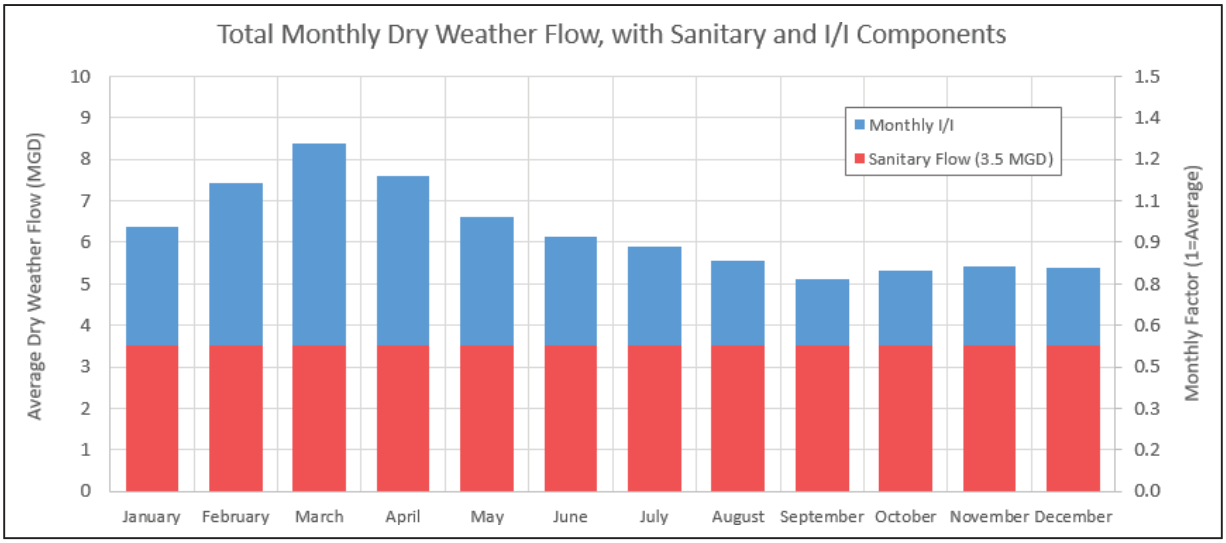
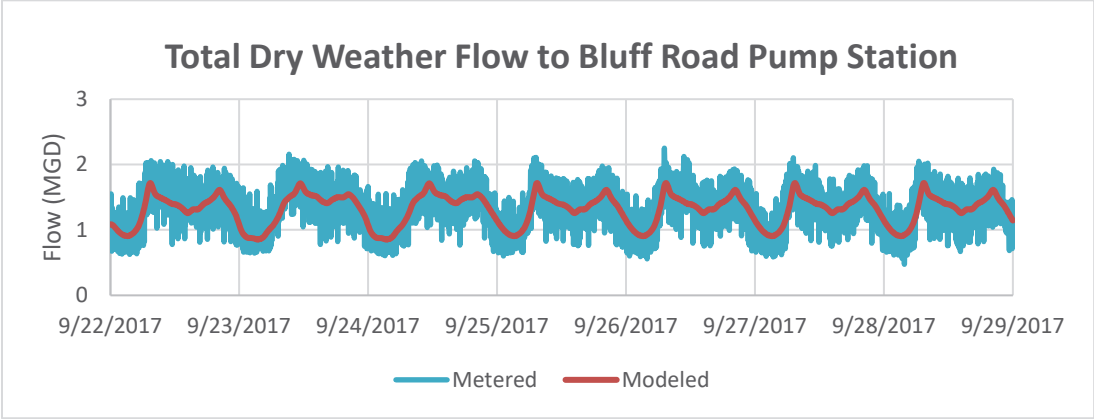
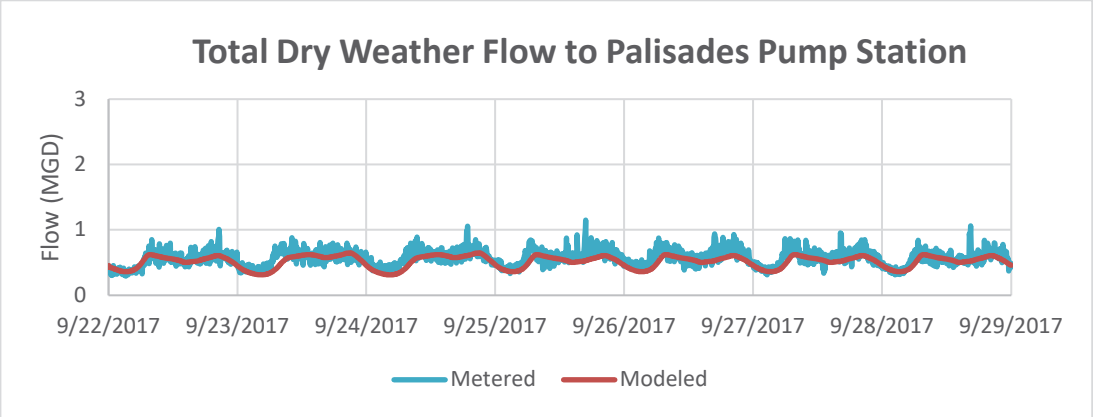


Figure 6. Monthly Variation in Total Dry Weather Flow, with Sanitary and GWI Components

6.2.3 Dry-Weather Flow Calibration Results

The Fort Lee model was calibrated to seven days dry weather period from September 22 to September 29, 2017 including weekday and weekend. Figure 7 presents a comparison of the measured and modeled dry-weather flow at the Bluff Road, Palisades and Lower Main flow-metering locations. As shown in Figure 7, the model accurately represents the dry-weather flows at each location. In addition to compare flow metering data, the model was also verified by the BCUA meters. Validation results indicate that there is a good match between measured and modeled sanitary flow as well. Additional time series plots for validation are presented in Appendix H.





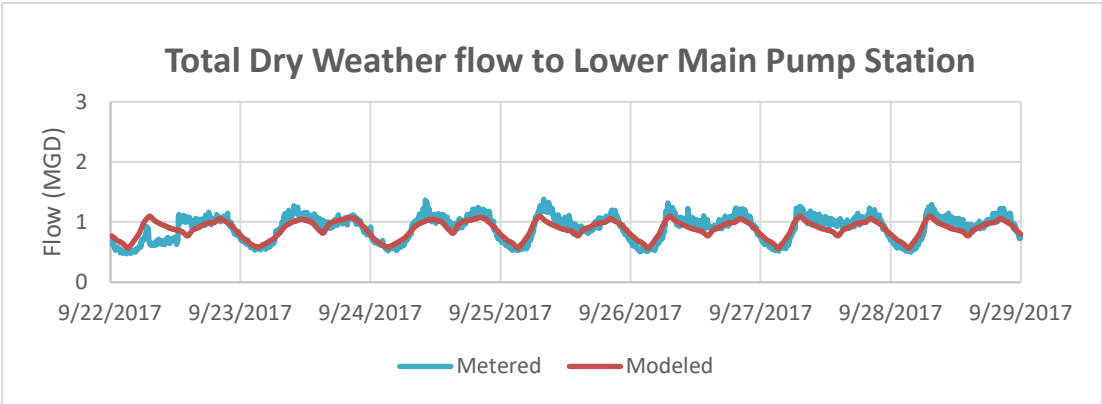


Figure 7. Dry-Weather Flow Calibration Results

6.3 Wet-Weather Calibration

The accuracy and performance of a hydraulic model is measured by its ability to reproduce the actual systems response to rainfall performance it is simulating. A calibration and verification process involves a selection of simulation events. Events were selected that were representative of both typical and extreme rainfall events.

The model calculations of overflow occurrence were compared with the observed overflow data. If an overflow occurred the volume and peak flow of the overflow was compared.

6.3.1 Modification of Model Parameters for Wet-Weather Calibration

Appendix F provides, for each modeled subcatchment, the as-modeled characteristics such as area (acres), effective basin width, imperviousness, slope, Manning's n roughness, initial abstraction loss (a.k.a. "depression storage" required for runoff), and Horton parameters for pervious-area infiltration. Modification of model parameters involved adjustment of some catchments for slope (based on available topographic information) and effective basin width (a dimensional parameter varying by catchment that represents how quickly runoff from the catchment reaches the sewer system; where the catchment contains unmodeled drainage features, the value has more to do with matching observed flows than with the actual catchment dimensions).

In addition, some catchments were adjusted for initial abstraction loss (a.k.a, “depression storage”), which represents the depth of rainfall required to “wet” the surface before runoff can occur. Literature values* for this parameter vary considerably, but generally indicate values of 0.05 to 0.15 inches for impervious surfaces, and values of up to 0.5 inches for lawn/grassy surfaces. Table 8 presents, for the runoff surfaces modeled, the initial model values and the adjusted model values; as shown, the adjusted values are much closer to the literature values cited.

*https://udfcd.org/wp-content/uploads/uploads/vol1%20criteria%20manual/06_Runoff.pdf

Table 7. Adjusted Model Values Related to Model Calibration

Runoff Surface ID	Description	Initial Loss Value (inch) Before Re-Calibration	Initial Loss Value (inch) After Re-Calibration
1	Impervious	0.003	0.01
10	Impervious_nolosses	0.00	0.01
11	Imperv_LM	0.05	0.10
12	Imperv_LM_noloss	0.05	0.10
2	Pervious	0.05	0.10
22	Pervious_LM	0.05	0.10
33	I&I	0.51	1.02
44	I&I_BR	0.05	0.10
55	I&I_BR06	0.05	0.10

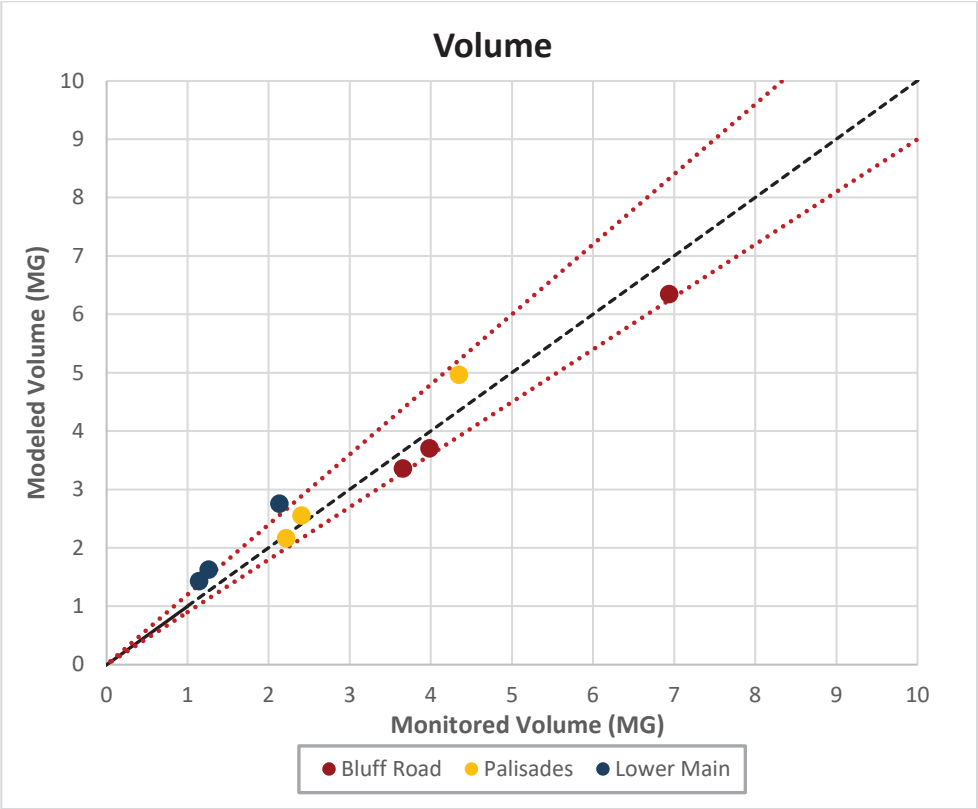
6.3.2 Wet-Weather Calibration Criteria

The model was evaluated through the application of individual storms. The primary criteria was correctly matching the occurrence of overflows. Next, Fort Lee used the standard Wastewater Planning Users Group (WaPUG) Code of Practice for the Hydraulic Modeling of Sewer Systems which was applied for Volume (+20% to -10%) and Peak Flow (+25% to -15%).

6.3.3 Wet-Weather Calibration Results

Precipitation measured at Teterboro Airport was used in wet weather calibration. As described in section 6.1.3, three storm events were selected as calibration events. The largest event of three happened on October 29, 2017 was a 2.77 inches storm with a duration of 21 hours, the remaining events were less than one inch. Since the weather was dry during flow monitoring period, the model was not validated with additional events. Instead, model was validated with other storm events during different time period as discussed in Section 6.4. Observed data and model results for wet weather calibration are compared in two ways: time series plot of observed and modeled data, and scattered one to one plot per WaPUG calibration guidelines. Time series plots for calibration/validation at all meters are provided in Appendix H.

One to one plots for modeled versus observed volume and peak flow at upstream of each pump station are shown in Figure 9 and 10, respectively. As shown in the figures, the model predicted volumes are within or very close to the calibration guidelines. The overall agreement between observed and modeled is good at all meter locations for all calibration events. For the peak flow comparison, modeled peak flows are out of the range for one event at Palisades and Lower Main, but the overall agreement is good for other events.



Figre 9. Observed vs. Modeled Volume at Upstream of Each Pump Station

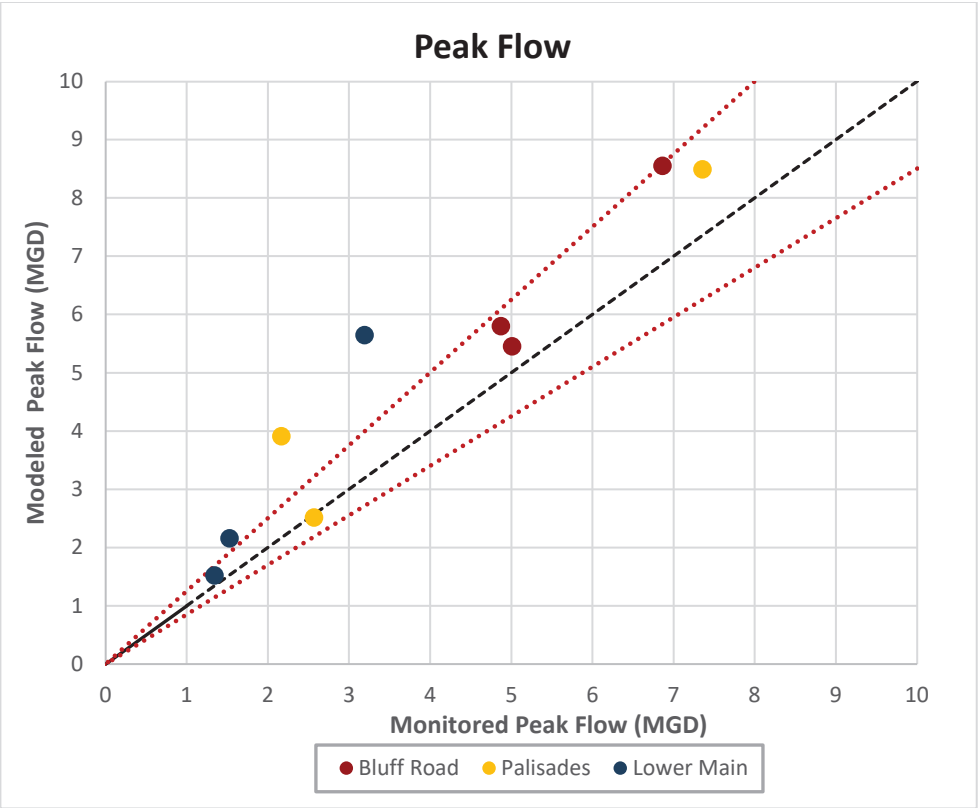


Figure 10. Observed vs. Modeled Peak Flow at Upstream of Each Pump Station

Figure 11 and Figure 12presents comparisons of the observed and model predicted CSO volumes and peak flow rates during each of the three calibration events at each of overflow structures.As shown in Figure 11, the model accurately predicts the total volume of CSO for each overflow event at each location during the calibration period. For the one large storm that occurred during the calibration period, the model matches the observed volume very closely at all locations. For the smaller CSO events less than 1 MG, small differences do exist between the model prediction and the observed data but they are not significant next to the other events. Figure 12 presents a similar analysis for overflow peak rates. The model predicted peak flow rates are slightly outside of the acceptable range when the CSO volumes are small, but the peak flow is well predicted for the large CSO event at Bluff Road.

In order to accurately predict the flow metering observations, the local precipitation data is important especially in CSO areas where overflow and runoff maybe sensitive and localized. The local rainfall pattern, in some instances, was likely different from the precipitation distribution used in the calibration from the rain gauge data. This could be improved if radar rainfall was applied in calibration/validation. Radar rainfall data has

higher resolution spatially and temperately in comparison with the rain gauge data. Other possible reasons for the differences of volume and peak flow between observed and modeled data could be due to inaccurate flow meter data, lack of detailed modeling of complex sewer system, and difficulties both in metering and modeling short term parameters such as peak flow rate. . In general, the calibration/validation results indicate that the overall agreement between modeled and observed data is satisfactory.

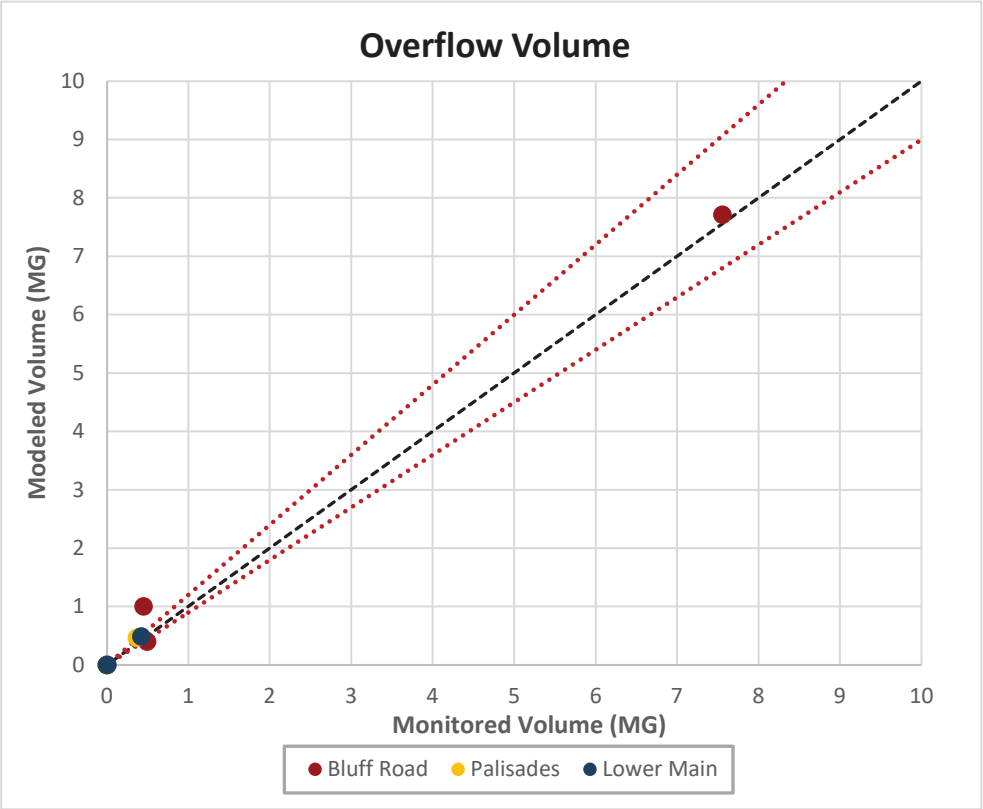


Figure 11. Observed vs. Modeled Overflow Volume

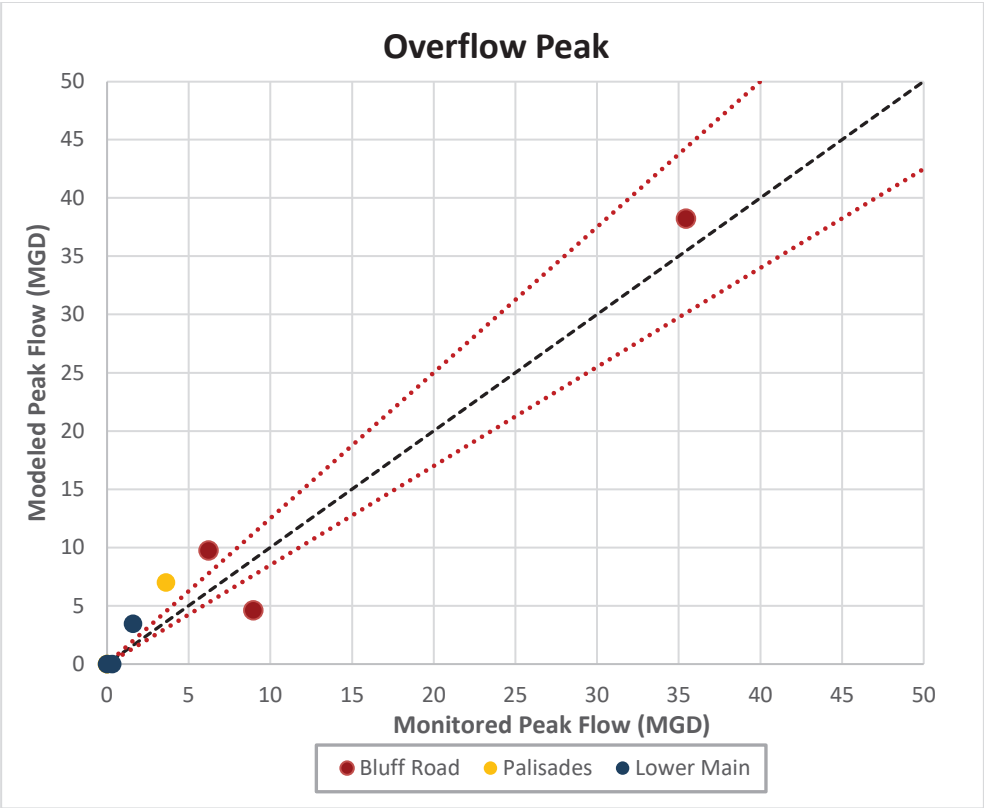


Figure 12. Observed vs. Modeled Overflow Peak Rate

6.4 Extended-Period Model Validation

Flow-metering data from BCUA, which was available from March through August 2017, reflects the overall contribution of flow from Fort Lee. This BCUA flow-metering dataset provides an independent model validation of the calibrated Fort Lee sewer-system model. Therefore, the Fort Lee sewer-system model was run for the extended period of March through August to enable a comparison of the model predictions to the BCUA flow-metering data. Because overflows do not occur in the BCUA interceptor, calculating the peaks of events and total volume is important. Due to the lack of sizable storm events available for calibration during flow monitoring period, the model was validated with extensive storm events at BCUA metering sites where flows exit Fort Lee to BCUA interceptor. Six storm events were selected from Teterboro Airport rain gauge data during 2017 for model validation. These events are different from calibration events and they covers various rainfall volume, intensity and duration. Detailed information about validation events are shown in Table 8. To summarize model validation results, modeled and observed total volumes and peak flows are compared using one to one plots shown in the Figure 13 and 14, respectively. The May 5, 2017 event for Meter 21 is not included in the validation because of missing data, Time series plots can be found in Appendix H. The figures show that in general there is a good agreement between the modeled and the metered volume, and peak flow rates are accurately predicted by the model for all validation events. The validation results indicate that the model has a good representation of Fort Lee's sewer system and it can be served as a basis to evaluate CSO reduction alternatives on planning level.

Table 8. Model Validation Storm Events

Event Start Time	Event End Time	Volume (in)	Duration (hr)	Max Intensity (in/hr)	Average Intensity (in/hr)
5/5/2017 3:00	5/5/2017 14:00	3.21	11	1.22	0.29
5/13/2017 1:00	5/13/2017 23:00	1.58	22	0.18	0.07
8/18/2017 0:00	8/18/2017 2:00	1.52	2	0.79	0.76
7/14/17 5:00	7/14/17 16:00	1.12	11	0.53	0.10
8/7/17 9:00	8/7/17 20:00	0.82	11	0.24	0.07
8/2/2017 0:00	8/2/2017 2:00	0.60	2	0.45	0.30

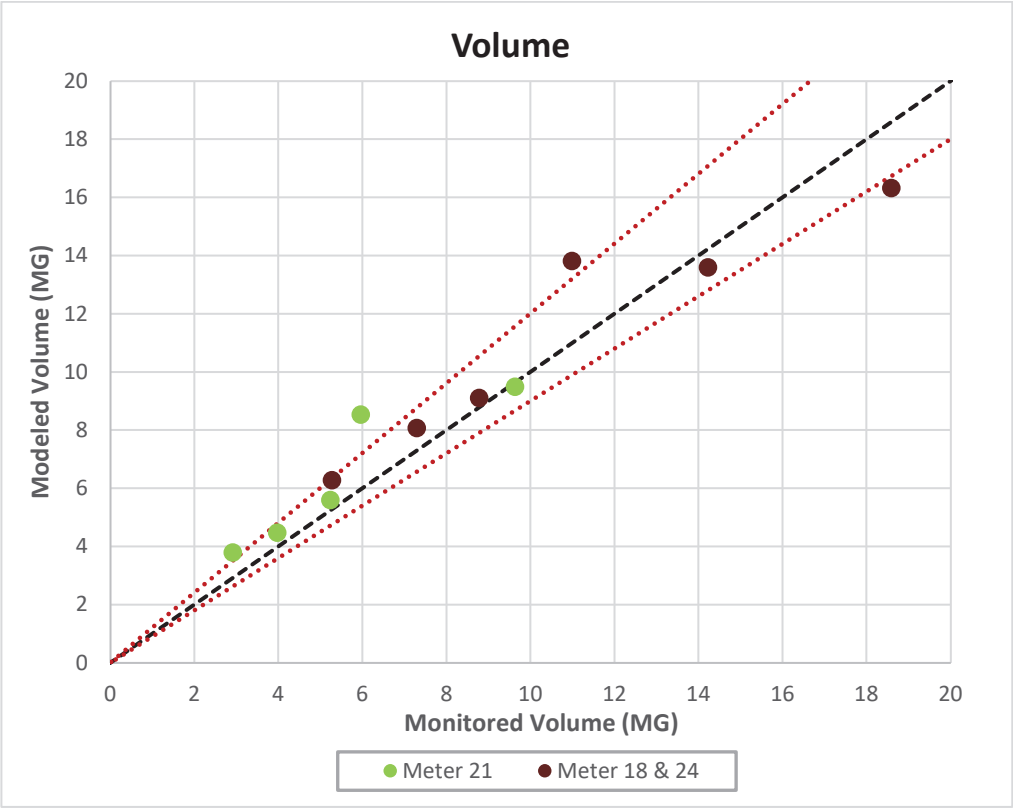


Figure 13. Observed vs. Modeled Volume for BCUA Meters

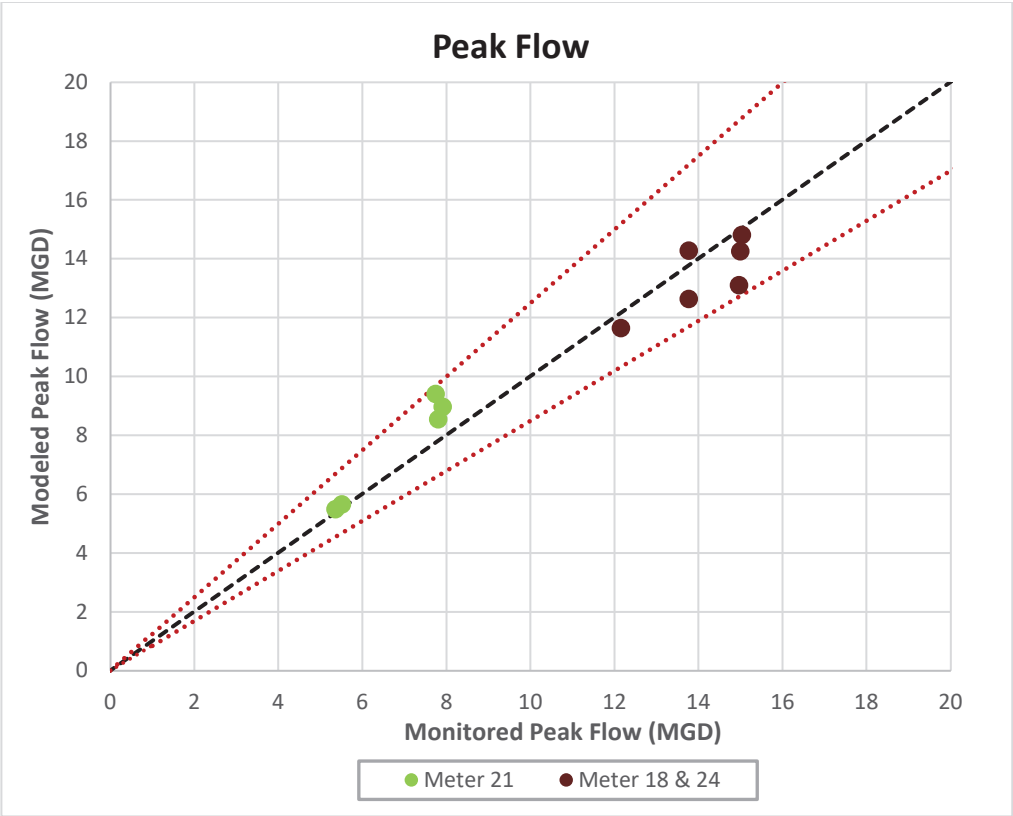


Figure 14. Observed vs. Modeled Peak Flow Rate for BCUA Meters

7 Sensitive Areas Review

The report entitled “Identification of Sensitive Areas” prepared by the Passaic Valley Sewerage Commission on behalf of the New Jersey CSO Group presents the Sensitive Area review for members of that group including Fort Lee. This will serve as a summary of the finding of that report as they relate to Fort Lee.

The USEAP CSO Policy “expects a permittee’s long-term CSO control plan to give the highest priority to controlling overflows to sensitive areas.” The CSO Control Policy states the following six criteria for defining an area as a “Sensitive Area” include:

1. Designated Outstanding National Resource Waters;
2. National Marine Sanctuaries;
3. Waters with threatened or endangered species and their habitat;
4. Waters with primary contact recreation;
5. Public drinking water intakes or their designated protected areas; and
6. Shellfish beds.

The CSO Control Policy states that if Sensitive Areas are present and impacted, the LTCP should include provisions to:

- Prohibit new or significantly increased overflows;
- Eliminate or relocate overflows wherever physically possible and economically achievable;
- Treat overflows where necessary; and
- Where elimination or treatment is not achievable, reassess impacts each permit cycle.

Sensitive Areas should be considered prior to the evaluation of CSO control alternatives. This allows a CSO community to identify and estimate costs for controls that could eliminate or relocate CSOs from Sensitive Areas where pollutant loadings pose a high environmental or public health risk and where control efforts should be focused. The cost of these controls can then be considered, along with the community's financial capability, to evaluate cost-effective controls for all of the receiving waters.

7.1 Requirements of the NJPDES Permits

The NJPDES permits indicate that the permittee's LTCP shall give the highest priority to controlling overflows to sensitive areas. The NJPDES Permit further states that "Sensitive areas include designated Outstanding National Resource Waters, National Marine Sanctuaries, waters with threatened or endangered species and their habitat, waters used for primary contact recreation (including but not limited to bathing beaches), public drinking water intakes or their designated protection areas, and shellfish beds."

The NJPDES Permits indicate that if Sensitive Areas are present and impacted, the following requirements will apply:

- Prohibit new or significantly increased CSOs.
- Eliminate or relocate CSOs that discharge to sensitive areas wherever physically possible and economically achievable, except where elimination or relocation would provide less environmental protection than additional treatment.

- Where elimination or relocation is not physically possible and economically achievable, or would provide less environmental protection than additional treatment, the permittee shall provide the level of treatment for remaining CSOs deemed necessary to meet WQS for full protection of existing and designated uses.

7.2 Assessment of Sensitive Areas

The six criteria for Sensitive Areas identified in the CSO policy were evaluated for the waterbodies affected by Fort Lee's CSO's in the Study Area including reaches upstream of the CSOs. Special consideration was given to areas downstream and within the tidal influence of the CSOs, as any potential Sensitive Areas within hydraulic proximity to outfalls may be impacted by their discharge.

7.3 Methodology

In order to develop a comprehensive understanding of the presence of designated Sensitive Areas within the Study Area, multiple strategies were used to complete these investigations including searching online data resources, sending letters to regulatory agencies and environmental organizations, and conducting an observation survey. The outcome of this effort is discussed in PVSC's report. The goal of this multi-faceted approach was to gain a thorough understanding of the presence of factors that may be considered for the determination of potential Sensitive Areas to support the development of future CSO control alternatives.

7.4 Online Database Searches

An abundance of information is available online regarding the waterbodies in the Study Area. The following entities and on-line databases were searched for information related to Sensitive Areas within the Study Area boundary:

- National Oceanic and Atmospheric Administration (NOAA)
  - NOAA 2017 Environmental Sensitivity Index Maps
- United States Environmental Protection Agency
  - Anti-degradation Policy - Outstanding Natural Resource Water
- United States Fish and Wildlife Service (USFWS)
- New Jersey Department of Environmental Protection (NJDEP)
- Office of National Marine Sanctuaries

7.5 Summary of Sensitive Areas

A comprehensive review of online databases, correspondence with regulatory agencies, direct observations, and local environmental organizations was conducted to identify potential Sensitive Areas impacted by CSO's within the Study Area. There are no Outstanding Natural Resource Waters, National Marine Sanctuaries, Drinking Water intake areas or Shellfish Beds in the Fort Lee affected area of the Hudson River. There were also no sensitive areas identified as it is related to waters with threatened or endangered species and their habitats. The Atlantic and Shortnose sturgeon populations in the Hudson River have both been successfully recovering since the species have been listed as endangered, and the coinciding improvements in water quality since the 1970s have had a positive impact. The current level of CSO discharge is not preventing the recovery of a healthy adult sturgeon population for either species.

For the Hudson River the Atlantic and Shortnose Sturgeon critical habitats extend throughout the river including the area of Fort Lee. Both species are susceptible to environmental contamination due to their benthic foraging behavior and long life span. A total of 15 CSO outfalls, including Fort Lee's two outfalls, discharge to the Hudson River and were further reviewed to determine if there are any impacts on the Sturgeon. Three documents were reviewed to assess the status of the sturgeon on the Hudson River:

- Appendix B in the PVSC report presents a Status Review of Atlantic Sturgeon by NOAA. This study concluded that commercial bycatch and decades of prior environmental degradation are the biggest threats to Atlantic sturgeon recovery in the New York Bight. The water quality in the Hudson River and New York Bight has improved in recent decades, and no longer appears to present a significant threat to Atlantic Sturgeon recovery.
- Appendix D of the PVSC report presents a separate review of the available published scientific articles, reports, and data by GLEC specifically examining the impact of human enteric pathogens to find any specific effects on Atlantic sturgeon. The study concludes that Atlantic sturgeon survival and recovery is likely not affected by exposure to human pathogens.
- Appendix E of the PVSC report says that the adult population of Shortnose sturgeon in the Hudson River has also been increasing at rates higher than those expected by recovery criteria according to the population research study "Recovery of a US Endangered Fish" by Cornell University. Shortnose sturgeon population estimated in the late 1990s had increased more than 400% from the 1970s estimates, and mainly in the adult segment of the population. The estimate's results suggest the current level of habitat protection is adequate toward growing and maintaining healthy sturgeon population.

From these studies and conclusions, these areas are not considered sensitive areas as they relate to the Sturgeon.

In addition, the NJDEP issued a letter on September 20, 2018 identifying Fort Lee's outfalls discharging either directly or indirectly to the Hudson River which is potential habitat for the Atlantic and Shortnose Sturgeon.

8 CSO Analysis and Extended Period Simulation

Newark rainfall gauge record was used for the Baseline simulation. System improvements will be evaluated based on these results. Table 9 displays the number of overflow events and volume for each outfall. Bluff Road regulator which discharges to Outfall 001 is the main contributor to CSO in Fort Lee with 20 more overflow events and 6 times more CSO discharge. Every event that Outfall 002 discharges, Outfall 001 discharges.

Table 9. 2004 Baseline without System Improvements

Outfall	FL-001		FL-002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	1.2	0	0.0
February	2	7.0	2	1.7
March	6	1.7	7	0.5
April	4	9.9	3	2.3
May	9	9.8	3	1.4
June	6	7.6	2	1.3
July	7	28.0	7	5.9
August	6	8.5	3	0.9
September	4	34.4	3	8.9
October	2	0.5	0	0.0
November	5	10.0	3	1.7
December	4	5.8	2	0.4
Total	58	124.5	35	25.0

The 2004 Baseline was run with the re-routing and upgrade of the Lower Main Pump Station which was done in 2017. The Lower Main Pump Station was upgraded and an extension was added to the existing force main to reroute flows directly to the BCUA Interceptor. In the original configuration flow from the Lower Main was routed to the Palisades Terrace Pump Station and then to the BCUA Interceptor. Due to two large developments requesting to tie into the municipal sanitary system in the Lower Main Pump Station drainage area and a lack of capacity at the Palisades Terrace Pump Station, it was

determined that the Lower Main Pump Station needed to be upgraded. The Lower Main Pump Station now has three sewage pumps (with one in a standby service) each having a capacity of 1,500 gpm for single operation and 866 GPM for two-pump operation. It was also determined that an extension had to be added to route flows from the LMPS directly to the BCUA Interceptor. A 10'' ductile iron extension was added starting at the existing 12'' force main on Old Palisades Avenue and running to the point of discharge at the BCUA Interceptor on Lewis Street. The new pipe route is shown on Figure 11. The total length of the new force main is 4,700 feet.

With the new pump station Outfall 002 discharges are reduced by 16 events and about 7 MG. Table 10 displays the results of the Baseline results with the system improvements.

Table 10. 2004 Baseline with System Improvements

Outfall	FL-001		FL-002	
Month	Number of Overflows	Overflow Volume (MG)	Number of Overflows	Overflow Volume (MG)
January	3	1.2	0	0.0
February	2	7.0	2	0.6
March	6	1.7	0	0.0
April	4	9.9	3	0.5
May	9	9.8	3	1.6
June	6	7.6	2	1.4
July	7	28.0	5	4.0
August	6	8.5	3	1.1
September	4	34.4	3	7.4
October	2	0.5	0	0.0
November	5	10.0	2	1.7
December	4	5.8	2	0.2
Total	58	124.5	25	18.6

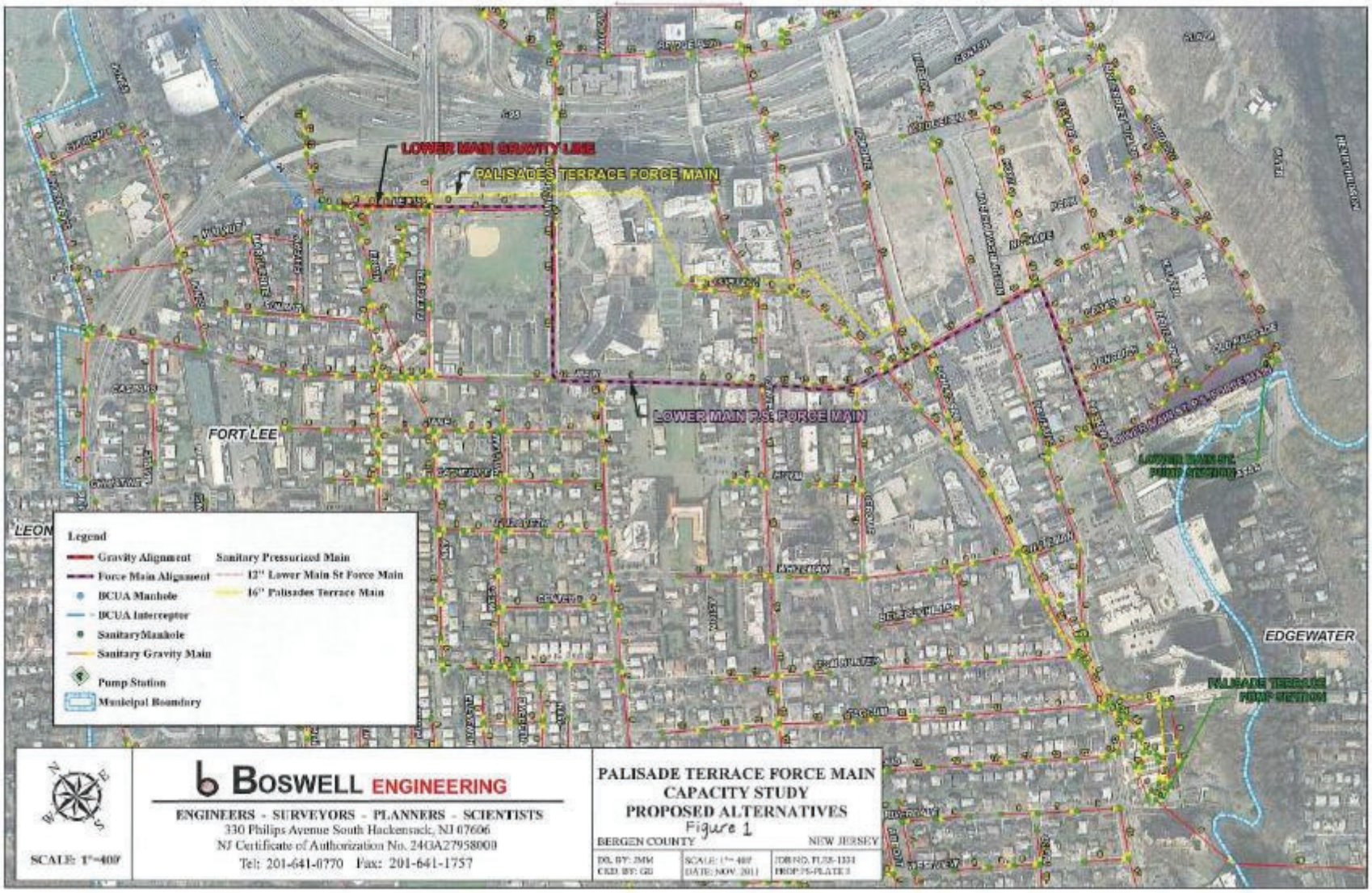


Figure 11. Revised Pipe Route for the Lower Main Pump Station

In the combined sewer area of Fort Lee approximately 57 MG of rain water is collected in the combined sewers and is discharged to the Hudson River at the CSO outfalls, Approximately 258 MG is either infiltrated to the ground or is transpired back to the atmosphere as water vapor. In the separated area approximately 390 MG is discharged as stormwater and 944 MG is infiltrated or transpired. This water budget is provided in Figure 12.

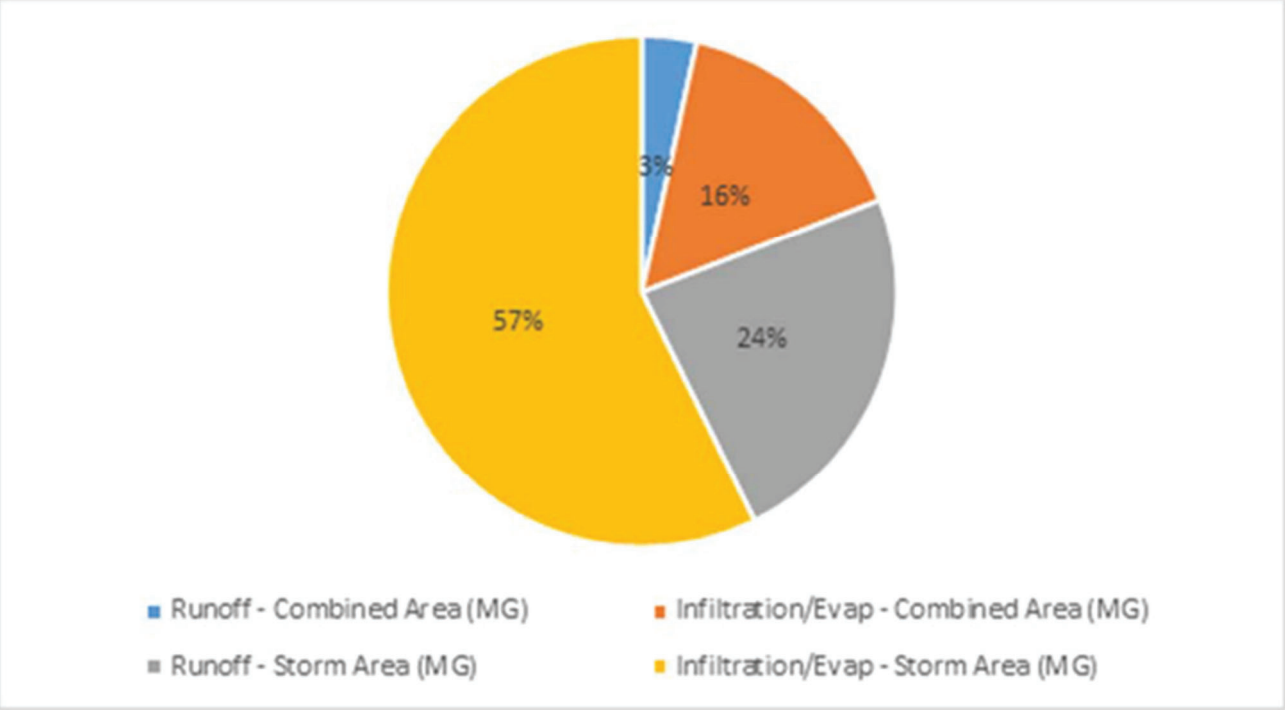


Figure 12. Water Budget from the 2004 CSO Simulation

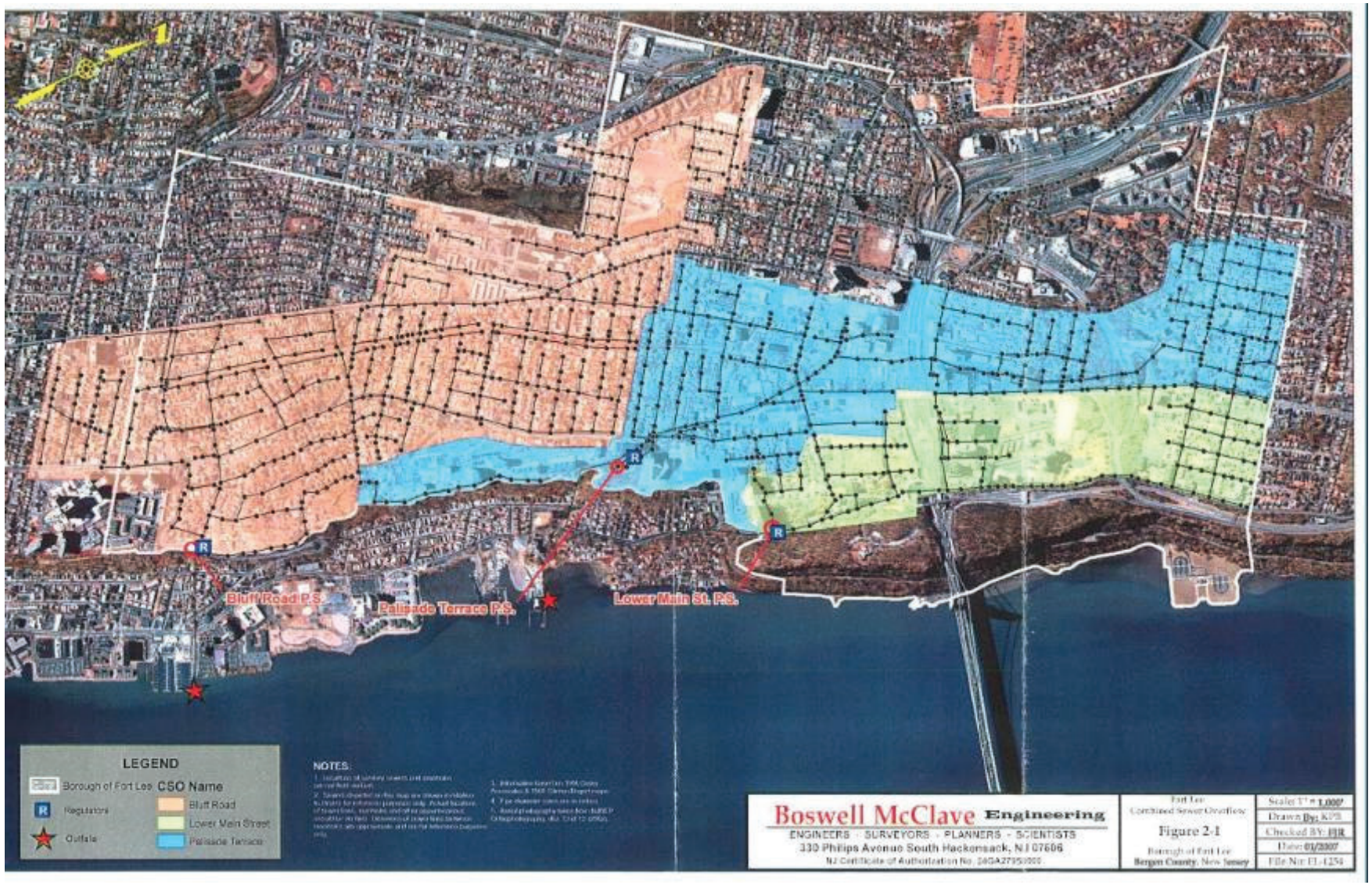
Appendix A

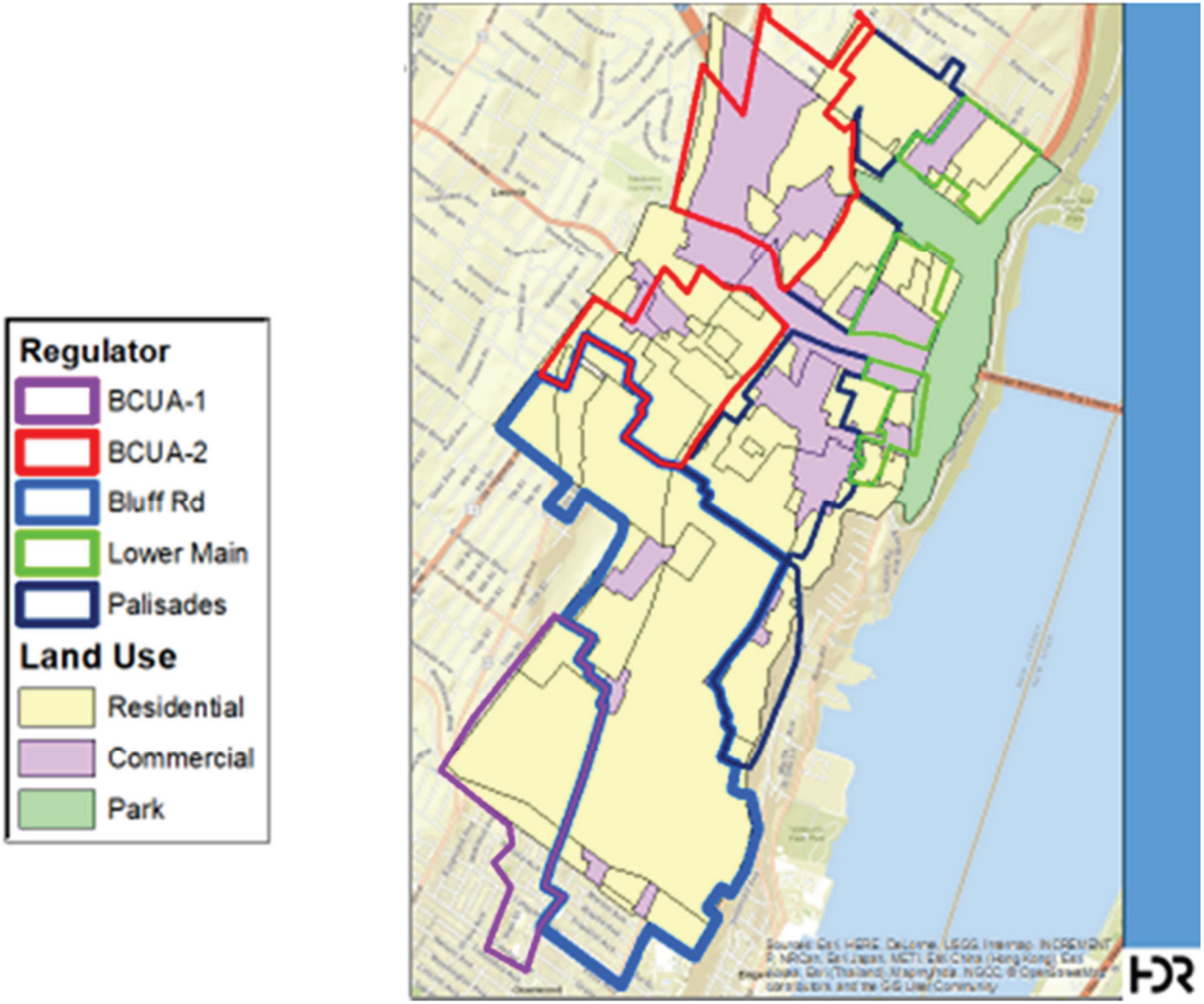
Summary of 2017 Flow Monitoring Data

NO	Start Time	End Time	Inter Event Time (hrs)	Volume (in)	Ave Intensity (in/hr)	Max Intensity (in/hr)	Bluff Rd Overflow Volume (MG)	Main Rd Overflow Volume (MG)	Palisades PS Overflow Volume (MG)	Bluff Rd Peak Flow (MGD)	Lower Main Peak Flow (MGD)	Palisades Peak Flow (MGD)	Bluff Rd Duration (hour)	Lower Main Duration (hour)	Palisades Duration (hour)
0	9/6/2017 4:00	9/7/2017 4:00	-	0.42	0.02	0.13	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
1	9/19/2017 15:00	9/19/2017 19:00	299	0.23	0.06	0.19	0.15	0.00	0.00	11.684	0.000	0.000	4.0	0.0	0.0
2	10/5/2017 21:00	10/5/2017 22:00	386	0.01	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
3	10/8/2017 7:00	10/8/2017 11:00	57	0.09	0.02	0.06	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
4	10/9/2017 3:00	10/9/2017 5:00	16	0.02	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
5	10/9/2017 10:00	10/9/2017 15:00	5	0.15	0.03	0.09	0.03	0.00	0.00	1.627	0.000	0.000	1.4	0.0	0.0
6	10/11/2017 17:00	10/11/2017 18:00	50	0.02	0.02	0.02	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
7	10/12/2017 1:00	10/12/2017 8:00	7	0.13	0.02	0.03	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
8	10/14/2017 2:00	10/14/2017 6:00	42	0.04	0.01	0.02	0.13	0.00	0.00	8.346	0.000	0.000	1.0	0.0	0.0
9	10/24/2017 12:00	10/24/2017 16:00	246	0.39	0.10	0.28	0.25	0.00	0.00	12.822	0.000	0.000	4.9	0.0	0.0
										0.000			0.0	0.0	0.0
10	10/26/2017 10:00	10/26/2017 11:00	42	0.01	0.01	0.01	0.00	0.00	0.00	0.493	0.000	0.000	0.8	0.0	0.0
11	10/29/2017 2:00	10/29/2017 23:00	63	2.77	0.13	0.57	7.17	0.41	0.37	35.436	1.597	3.616	21.8	11.8	10.2
12	10/30/2017 3:00	10/30/2017 8:00	4	0.10	0.02	0.03	0.38	0.01	0.00	6.249	0.234	0.000	0.3	0.0	0.0
13	11/5/2017 2:00	11/5/2017 3:00	138	0.01	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
14	11/5/2017 13:00	11/5/2017 17:00	10	0.04	0.01	0.02	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
15	11/7/2017 15:00	11/7/2017 23:00	46	0.58	0.07	0.13	0.45	0.00	0.00	6.216	0.000	0.000	7.1	0.0	0.0
16	11/13/2017 7:00	11/13/2017 11:00	128	0.07	0.02	0.02	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
17	11/16/2017 3:00	11/16/2017 9:00	64	0.13	0.02	0.06	0.07	0.00	0.00	4.853	0.000	0.000	3.4	0.0	0.0
18	11/16/2017 14:00	11/16/2017 15:00	5	0.01	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
19	11/18/2017 15:00	11/18/2017 19:00	48	0.11	0.03	0.05	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
20	11/19/2017 1:00	11/19/2017 8:00	6	0.17	0.02	0.07	0.03	0.00	0.00	2.107	0.000	0.000	4.2	0.0	0.0
21	11/19/2017 22:00	11/19/2017 23:00	14	0.02	0.02	0.02	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
22	11/22/2017 8:00	11/22/2017 10:00	57	0.05	0.03	0.04	0.00	0.00	0.00	0.380	0.000	0.000	2.8	0.0	0.0
23	11/30/2017 22:00	12/1/2017 0:00	204	0.03	0.02	0.02	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
24	12/5/2017 14:00	12/5/2017 15:00	110	0.01	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
25	12/5/2017 19:00	12/5/2017 23:00	4	0.30	0.08	0.11	0.50	0.01	0.00	8.957	0.314	0.000	7.3	7.3	0.0
26	12/9/2017 10:00	12/9/2017 22:00	83	0.32	0.03	0.06	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
27	12/12/2017 13:00	12/12/2017 14:00	63	0.01	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
28	12/14/2017 1:00	12/14/2017 8:00	35	0.07	0.01	0.02	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0
29	12/15/2017 15:00	12/15/2017 19:00	31	0.10	0.03	0.04	0.17	0.00	0.00	1.171	0.000	0.000	5.9	0.0	0.0
30	12/18/2017 3:00	12/18/2017 4:00	56	0.01	0.01	0.01	0.00	0.00	0.00	0.000	0.000	0.000	0.0	0.0	0.0

Appendix B

CSO Drainage Areas in Fort Lee


Bluff Road P.S.
Palisade Terrace P.S.
Lower Main St. P.S.
LEGEND
Borough of Fort Lee
CSO Name
Regulators
Outfalls
Bluff Road
Lower Main Street
Palisade Terrace
NOTES
Boswell McClave Engineering
ENGINEERS · SURVEYORS · PLANNERS · SCIENTISTS
330 Philips Avenue South Hackensack, NJ 07606
Figure 2-1


Regulator
BCUA-1
BCUA-2
Bluff Rd
Lower Main
Palisades
Land Use
Residential
Commercial
Park

Appendix C

Bluff Road Overflow Log

Borough of Fort Lee Resident Sewer Complaint

Date of Sewer Back up: 8/18/19 Time: 3:27 PM
Date of Notification: 8/18/19
Address of Back – up: 440 WESTVIEW PLACE unit B

Resident's Name:
Address:
Phone:
Describe Damage: NO DAMAGE
Cause of Back Up: not our problem
Is the back up in the main line? ___YES ✓ NO
Was there previous knowledge of a problem in this line? ___YES ✓NO
If Yes, where and when did the problem occur?
What has been done to rectify the problem?

Is the line regularly checked or maintained? ___YES ✓ NO
If Yes, how often?
Municipal officials notified of this loss: ✓ DPW ___POLICE ___FIRE
Did municipal representative(s) go to the scene of this loss? ✓ YES ___NO
If Yes, who went? Ricky Figueroa (Sewer Supervisor)
What action was taken? WE HAD NO PROBLEM IN THE MAIN LINE.

Comments: Pedro from drian doctor(201-274-3674)called about a back up in the house.

✓ No Further Action ____ Follow – up required (see below)
Signature: Date: 8/20/19
Follow – up required:
____ Action Taken Date Completed

If no further action: -------- Problem Resolved
_____ Problem Homeowner Responding
_____ Was Homeowner Notified as Responsible Party

Bluff Road Pump Station Overflow Events

Date	Time	Description
1/19/2019	11:49pm	
1/24/2019	10:58am	
3/10/2019	10:12am	
3/15/2019	08:52pm	
3/21/2019	02:30am	
4/20/2019	07:15am	
5/12/2019	02:43pm	
5/13/2019	05:04pm	
5/23/2019	06:12am	
5/29/2019	06:48pm	
5/30/2019	08;15PM	Overflow onto Rt.5 reported to licensed operator
6/11/2019	05:22am	
6/25/2019	07:31am	
6/29/2019	01:30pm	
7/11/2019	04:09pm	
7/11/2019	09:50pm	
7/17/2019	08:35pm	
7/17/2019	10:14pm	
7/18/2019	08:33am	
7/22/2019	05:49pm	
7/22/2019	06:39pm	Overflow onto Rt.5 reported to licensed operator
7/22/2019	07:49pm	
7/23/2019	04:34am	
7/23/2019	05:32am	
7/23/2019	06:30am	
8/7/2019	03:00pm	
8/22/2019	08:41pm	

Grey, Gary

From:	tuvelcivil@aol.com
Sent:	Monday, September 23, 2019 9:53 AM
To:	Grey, Gary
Subject:	Fwd: INCIDENT REPORT - BLUFF RD. PS OVERFLOW

Harry N. Tuvel, P.E., P.P.
Professional Engineer and Planner
TUVEL CIVIL ENGINEERING SERVICES
629 Ridge Court | Ridgefield, NJ 07657
phone: 201.941.2696 | fax: 201.840.0811 | mobile: 201.310.4579

-----Original Message-----
From: tuvelcivil <tuvelcivil@aol.com>
To: christine.blaney <christine.blaney@dep.nj.gov>
Cc: j-mattessich <j-mattessich@fortleenj.org>; E-Mignone <E-Mignone@fortleenj.org>
Sent: Wed, Jun 12, 2019 6:43 pm
Subject: INCIDENT REPORT - BLUFF RD. PS OVERFLOW

Christine,

On Thursday, 5/30/19 at approximately 8:00 PM due to a heavy rainfall event, the Bluff Road PS experienced an overflow which resulted in a discharge onto Rt. 5. According to DPW personnel the rainfall generated flow exceeded the capacity of the wet well.

The duration of the overflow was about 15 minutes.

The incident was reported to the NJDEP Hotline & assigned Case No. 19-05-30-2115-50, Op. 15

Harry N. Tuvel, P.E., P.P.
Professional Engineer and Planner
TUVEL CIVIL ENGINEERING SERVICES
629 Ridge Court | Ridgefield, NJ 07657
phone: 201.941.2696 | fax: 201.840.0811 | mobile: 201.310.4579

Appendix D

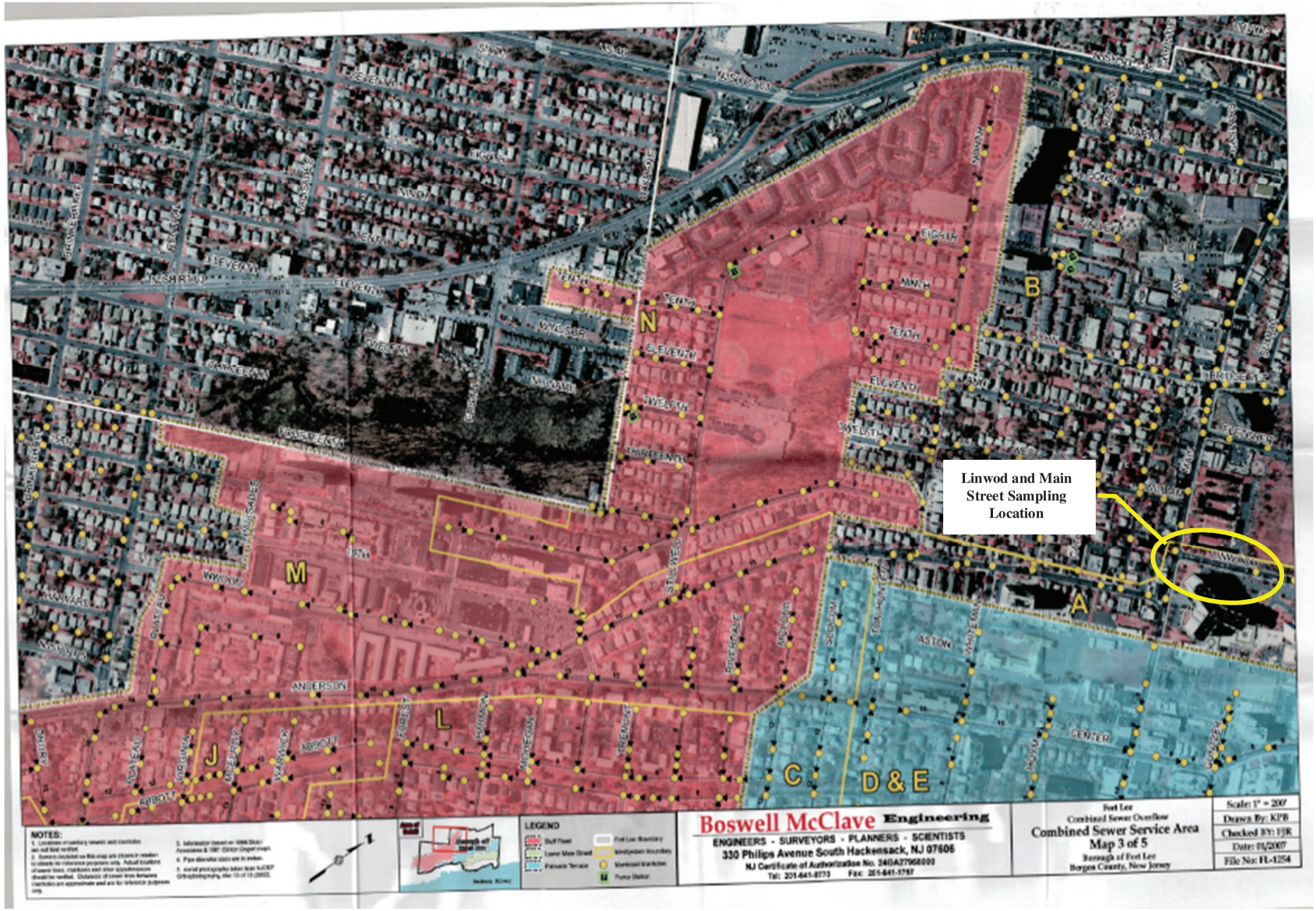
Summary of Reported Sewer Back-Ups / Odor Complaints

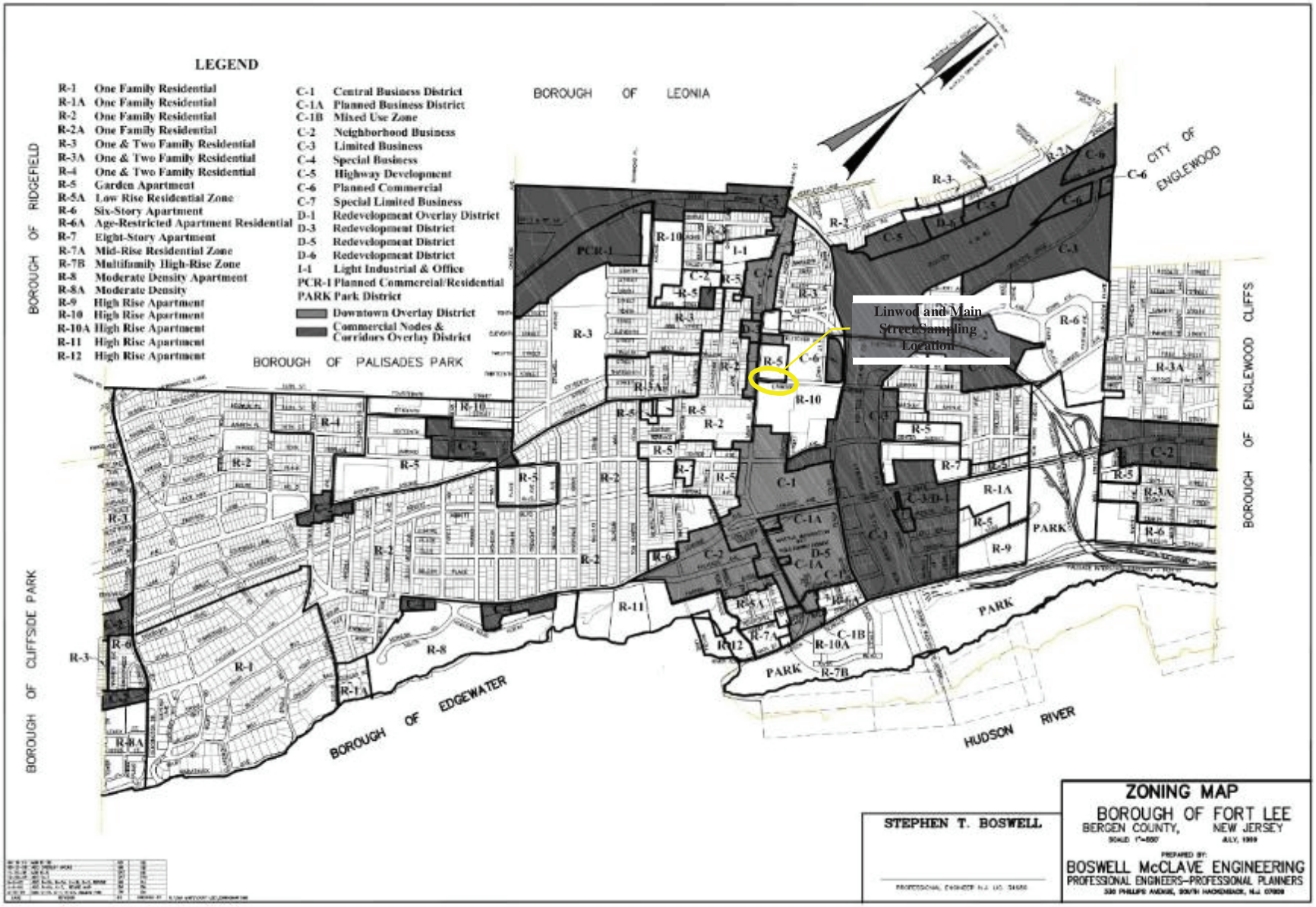
TABLE 1 - SUMMARY OF REPORTED SEWER BACK-UPS/ODOR COMPLAINTS
BOROUGH OF FORT LEE
January 1, 2019 - March 31,2019

Date of Notification	Date of Back-up	Address	Describe Situation/Damage	Back-up Location Identified	Cause of Back-up	Action(s) Taken	Follow-up Required?	Follow-up Action(s)	Incident Closed?
3/10/2019	3/10/2019	2020 Center Avenue	Backup	Service lateral		No action	No		Yes
3/3/2019	3/3/2019	2020 Center Avenue	Outside MH surcharge	Main line	Grease	Line jetted	Yes	Main on routine monitoring program	No
2/26/2019	2/26/2019	2161 Jones Road	Backup	Main line	Roots	Line jetted	No		Yes
2/24/2019	2/24/2019	2191 Fletcher Avenue (Restaurant)	Outside MH surcharge	Main line	Grease	Line jetted/degreaser	Yes	Main on routine monitoring program	No
2/16/2019	2/16/2019	460 Hillcrest Avenue	Backup	Main line	Not determined	Line jetted	No		Yes
2/10/2019	2/10/2019	1640 Maple Street	Backup	Service lateral	Not determined	No action	No		Yes
2/6/2019	2/6/2019	237 Myrtle Avenue	Backup	Service lateral	Not determined	No action	No		Yes
1/24/2019	1/24/2019	20741 Lemoinse Avenue (Bank)	Backup	Main line	Paper products	Line jetted	No		Yes
1/22/2019	1/22/2019	2446 Third Street	Backup	Main line	Paper products	Line jetted	No		Yes
1/14/2019	1/14/2019	2027 Center Avenue	Backup	Service lateral	Unknown	Line jetted	No		Yes
1/12/2019	1/12/2019	1235 Sixteenth Street	Backup	Main line	Paper products	Line jetted	No		Yes
1/4/2019	1/4/2019	200 Old Palisade Road (Hi-Rise Residential)	Backup	Main line	Paper products	Line jetted	No		Yes
1/2/2019	1/2/2019	292 Tremont Avenue	Backup	Main line	Paper products	Line jetted	No		Yes
1/1/2019	1/1/2019	Intersection of Hoelly's Lane/Casper's Lane	Backup	Main line (Boro of Leonia)	Not determined	Line jetted by Borough of Leonia DPW	No		Yes

Appendix E

Sewer Service Area of Proposed Sampling Location at Linwood Avenue and Main Street


Linwod and Main Street Sampling Location
N
B
M
A
J
L
C
D&E
Boswell McClave Engineering
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
330 Philips Avenue South Hackensack, NJ 07606
Combined Sewer Service Area
Map 3 of 5
Scale: 1" = 200'
Drawn By: KPB
Checked BY: FJR
Date: 01/2007
File No: FL-1254


LEGEND
R-1 One Family Residential
R-1A One Family Residential
R-2 One Family Residential
R-2A One Family Residential
R-3 One & Two Family Residential
R-3A One & Two Family Residential
R-4 One & Two Family Residential
R-5 Garden Apartment
R-5A Low Rise Residential Zone
R-6 Six-Story Apartment
R-6A Age-Restricted Apartment Residential
R-7 Eight-Story Apartment
R-7A Mid-Rise Residential Zone
R-7B Multifamily High-Rise Zone
R-8 Moderate Density Apartment
R-8A Moderate Density
R-9 High Rise Apartment
R-10 High Rise Apartment
R-10A High Rise Apartment
R-11 High Rise Apartment
R-12 High Rise Apartment
C-1 Central Business District
C-1A Planned Business District
C-1B Mixed Use Zone
C-2 Neighborhood Business
C-3 Limited Business
C-4 Special Business
C-5 Highway Development
C-6 Planned Commercial
C-7 Special Limited Business
D-1 Redevelopment Overlay District
D-3 Redevelopment District
D-5 Redevelopment District
D-6 Redevelopment District
I-1 Light Industrial & Office
PCR-1 Planned Commercial/Residential
PARK Park District
Downtown Overlay District
Commercial Nodes & Corridors Overlay District
BOROUGH OF LEONIA
BOROUGH OF PALISADES PARK
BOROUGH OF RIDGEFIELD
BOROUGH OF CLIFFSIDE PARK
BOROUGH OF EDGEWATER
BOROUGH OF ENGLEWOOD CLIFFS
CITY OF ENGLEWOOD
HUDSON RIVER
Linwood and Main Street Sampling Location
STEPHEN T. BOSWELL
ZONING MAP
BOROUGH OF FORT LEE
BERGEN COUNTY, NEW JERSEY
BOSWELL McCLAVE ENGINEERING
PROFESSIONAL ENGINEERS–PROFESSIONAL PLANNERS

Appendix F

Subcatchment Surface Characteristics and Regulator Subcatchment Properties

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depressio n Storage Impervious (in)	Surface 2 Depressio n Storage Impervious (in)	% of Imperviousne ss without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
2	7.138	1237.2	53	10	63	0	0.5	0.015	0.015	0.051	0.000	0.003	53	6.50	0.50	0.50	Bluff Road
2_II	7.138	1237.2	0	0	0	0	0.1	0	0	0.051	0.000	0.000	0	8.00	0.10	0.10	Bluff Road
A12	1.435	14.1	54	10	64	4.3	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
A26	5.085	26.6	74	10	84	0.4	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
A30	3.010	204.3	0	0	0	3.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
A32	2.010	166.9	0	0	0	0.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
A33	4.056	237.2	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
A43	2.438	183.8	0	0	0	4.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
A47	0.518	84.8	0	0	0	4.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
A48	2.819	197.7	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
Addt_D141	3.821	23.0	85	10	95	1.1	0.5	0.015	0.015	0.051	0.000	0.003	85	6.50	0.50	0.50	Bluff Road
Addt_L135	2.316	44.8	35	10	45	0.5	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Addt_L135_II	2.316	44.8	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Addt_M410	2.494	46.5	76	10	86	0.3	0.5	0.015	0.015	0.051	0.000	0.003	76	6.50	0.50	0.50	Bluff Road
Addt_M410_II	2.494	46.5	0	0	0	0.3	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Addt_M420	1.978	41.4	77	10	87	0.8	0.5	0.015	0.015	0.051	0.000	0.003	77	6.50	0.50	0.50	Bluff Road
Addt_M420_II	1.978	41.4	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
BR_strm1	18.499	126.6	44	10	54	0.1	0.5	0.015	0.015	0.051	0.000	0.003	44	6.50	0.50	0.50	Bluff Road
BR_strm2	12.084	102.3	40	10	50	0.6	0.5	0.015	0.015	0.051	0.000	0.003	40	6.50	0.50	0.50	Bluff Road
BR_strm3	4.523	62.6	24	11	35	0.7	0.5	0.015	0.015	0.051	0.000	0.003	24	6.50	0.50	0.50	Bluff Road
C1	2.095	170.4	0	0	0	2.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
C10	2.745	195.1	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
C17	3.192	210.4	0	0	0	3.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
C20	1.459	142.2	0	0	0	1.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
C25	3.106	207.5	0	0	0	8.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
C27	1.599	148.9	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
C6	4.235	242.3	0	0	0	4.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
Construction	10.238	47.1	17	10	27	1.9	0.5	0.1	0.015	0.051	0.051	0.003	0	7.87	0.50	0.50	Lower Main
Construction_II	10.238	94.4	0	0	0	1.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Lower Main
D110	2.974	203.1	0	0	0	3.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D119	6.985	311.2	0	0	0	1.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D12	3.525	221.1	0	0	0	5.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D123	5.169	267.7	0	0	0	7.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D137A	4.772	257.2	0	0	0	2.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D14	1.906	162.6	0	0	0	5.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D141	8.016	333.4	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D142	7.554	323.6	0	0	0	1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D149	2.183	174.0	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D16	4.314	244.6	0	0	0	1.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D18	3.946	233.9	0	0	0	7.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D184	5.141	267.0	0	0	0	2.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D20	3.498	220.2	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D24	3.020	204.6	0	0	0	2.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D32	4.597	252.5	0	0	0	1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D37	3.878	231.9	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D41	3.845	230.9	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D44	2.060	169.0	0	0	0	1.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depressio n Storage Impervious (in)	Surface 2 Depressio n Storage Impervious (in)	% of Imperviousne ss without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
D47	6.602	302.5	0	0	0	2.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D5	3.741	227.7	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D6	5.268	270.3	0	0	0	4.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D83	4.246	242.6	0	0	0	4.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
D94	5.884	285.6	0	0	0	6.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
DD_1	75.231	1021.3	10	7	17	2.1	0.5	0.015	0.015	0.051	0.000	0.003	10	6.50	0.50	0.50	Stormwater
F104	1.878	161.4	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F107	1.784	157.3	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F110	1.010	118.3	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F111	1.657	151.6	0	0	0	1.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F114	0.812	106.1	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F116	1.391	138.9	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F119	3.676	225.8	0	0	0	2.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F12	3.939	233.7	0	0	0	6.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F120	2.353	180.6	47	10	57	9	0.5	0.015	0.015	0.051	0.000	0.003	47	6.50	0.50	0.50	Palisades
F126	1.157	126.6	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F128	0.810	106.0	35	10	45	2.5	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Palisades
F130	1.735	155.1	0	0	0	2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F19	4.000	235.5	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F1A	7.006	311.7	0	0	0	5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F21	1.122	124.7	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F23	0.706	98.9	0	0	0	0.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F26	3.754	228.1	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F34	1.743	155.4	0	0	0	2.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F38	1.398	139.2	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F53	1.772	156.7	0	0	0	1.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F58	3.176	209.9	42	10	52	2.3	0.5	0.015	0.015	0.051	0.000	0.003	42	6.50	0.50	0.50	Palisades
F5A	3.370	216.2	0	0	0	3.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F61	3.003	204.0	0	0	0	4.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F64	1.391	138.9	0	0	0	4.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F68	2.204	174.8	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F7	2.019	167.3	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F71	2.622	190.7	0	0	0	1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F76	1.460	142.3	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F78	3.044	205.4	42	10	52	1.5	0.5	0.015	0.015	0.051	0.000	0.003	42	6.50	0.50	0.50	Palisades
F84	2.023	167.5	0	0	0	0.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F85	2.398	182.4	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F9	1.557	146.9	0	0	0	0.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F91	5.294	270.9	0	0	0	1.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F94	1.045	120.4	0	0	0	5.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F95	1.993	166.2	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
F97	0.748	101.8	0	0	0	1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
G10	5.390	273.4	0	0	0	4.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G14	7.396	320.2	0	0	0	4.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G38	3.657	225.2	0	0	0	3.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G50	4.518	250.3	0	0	0	4.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G52	2.284	178.0	0	0	0	15.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depressio n Storage Impervious (in)	Surface 2 Depressio n Storage Impervious (in)	% of Imperviousne ss without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
G56B	7.514	322.8	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G6	2.693	193.2	0	0	0	6.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G63	8.201	337.2	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G71	1.359	137.3	0	0	0	2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G72	5.322	271.6	0	0	0	5.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G76	5.375	273.0	0	0	0	1.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G78	3.285	213.4	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
G81	3.549	221.8	0	0	0	2.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H12	4.265	243.2	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H20	2.088	170.1	0	0	0	2.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H29	2.910	200.9	0	0	0	1.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H52	2.073	169.5	0	0	0	9.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H54	9.647	365.7	0	0	0	2.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H55	2.522	187.0	0	0	0	2.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H58	0.572	89.1	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H60	2.585	189.3	0	0	0	0.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H62	2.424	183.3	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H64	0.548	87.2	0	0	0	3.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H66	4.241	242.5	0	0	0	2.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H68	2.354	180.7	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H70	0.612	92.1	0	0	0	1.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H73	2.409	182.8	0	0	0	0.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H75	2.279	177.8	0	0	0	2.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H77	0.786	104.4	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H79	2.757	195.5	0	0	0	0.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H80	2.605	190.0	0	0	0	1.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H84	2.215	175.2	0	0	0	1.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H87	2.328	179.7	0	0	0	1.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Lower Main
H_strm1	51.816	847.6	46	10	56	2.3	0.5	0.015	0.015	0.051	0.000	0.003	46	6.50	0.50	0.50	Lower Main
HD_complex	16.586	479.6	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I-95	43.024	772.4	74	10	84	0.4	0.5	0.015	0.015	0.051	0.000	0.003	74	6.50	0.50	0.50	Stormwater
I100	15.109	457.7	41	10	51	0	0.5	0.015	0.015	0.051	0.000	0.003	41	6.50	0.50	0.50	Palisades
I120	15.135	458.1	38	10	48	6.6	0.5	0.015	0.015	0.051	0.000	0.003	38	6.50	0.50	0.50	Palisades
I170	18.138	501.5	36	10	46	1.7	0.5	0.015	0.015	0.051	0.000	0.003	36	6.50	0.50	0.50	Palisades
I210	4.857	259.5	0	0	0	8.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
I220	1.755	156.0	0	0	0	5.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I240	4.815	258.4	0	0	0	2.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I290	2.971	203.0	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I301	2.883	199.9	0	0	0	0.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I305	2.404	182.6	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I310	3.806	229.7	0	0	0	10.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I312	3.400	217.1	0	0	0	4.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I330	1.053	120.8	0	0	0	2.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I350	5.735	282.0	0	0	0	2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I352	2.543	187.8	0	0	0	2.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I360	4.798	257.9	0	0	0	4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
I364	4.097	238.4	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depressio n Storage Impervious (in)	Surface 2 Depressio n Storage Impervious (in)	% of Imperviousne ss without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
J131	1.891	161.9	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J141a	3.700	226.5	0	0	0	20.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J170	4.196	241.2	0	0	0	0.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J190	3.069	206.3	0	0	0	0.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J191	4.986	262.9	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J220	2.929	201.5	0	0	0	4.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J221A	2.232	175.9	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J230	3.135	208.5	0	0	0	2.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J240	28.233	39.1	44	10	54	0.4	0.5	0.015	0.015	0.051	0.000	0.003	44	6.50	0.50	0.50	Bluff Road
J240_II	28.233	39.1	0	0	0	0.4	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
J240B	4.189	241.0	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J270	1.408	139.7	0	0	0	1.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J280	1.452	141.9	0	0	0	3.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J283	2.848	198.7	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J290	1.658	151.6	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J292	1.424	140.5	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J295	1.266	132.5	0	0	0	2.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J310	3.358	215.8	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J350	1.020	118.9	0	0	0	7.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J363	2.230	175.8	0	0	0	2.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J380	1.868	160.9	0	0	0	2.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J400	3.845	230.9	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J401	0.879	110.4	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J410a	1.203	129.2	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J410b	0.791	104.7	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J430	2.717	194.1	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J460	1.892	162.0	0	0	0	5.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J462	1.134	125.4	0	0	0	1.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J470	1.717	154.3	0	0	0	1.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J475	1.621	149.9	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J478	1.420	140.3	0	0	0	1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J483	3.667	225.5	0	0	0	2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J490	3.886	232.1	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J500	1.935	163.8	0	0	0	6.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J510	3.436	218.3	0	0	0	1.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J560	2.877	199.7	0	0	0	0.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J563	2.926	201.4	0	0	0	0.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J570	2.905	200.7	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J600	0.720	99.9	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J601	4.294	244.0	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J610	3.085	206.8	0	0	0	2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J620	4.137	239.5	0	0	0	1.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J640	5.466	275.3	0	0	0	0.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
J641	5.423	274.2	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K101	4.097	238.3	0	0	0	2.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K102	1.996	166.4	0	0	0	2.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K105	3.613	223.8	0	0	0	1.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depressio n Storage Impervious (in)	Surface 2 Depressio n Storage Impervious (in)	% of Imperviousne ss without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
K110	2.772	196.0	0	0	0	1.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K112	2.012	167.0	0	0	0	1.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K115	3.581	222.8	0	0	0	3.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K121	3.787	229.2	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K125	1.353	136.9	0	0	0	2.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K125!	1.353	34.2	48	10	58	2.9	0.5	0.015	0.015	0.051	0.000	0.003	48	6.50	0.50	0.50	Bluff Road
K200	4.035	236.5	0	0	0	1.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K210	3.820	230.2	0	0	0	3.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K215	4.175	240.6	0	0	0	2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K240	3.434	218.2	0	0	0	1.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K241	2.679	192.7	0	0	0	1.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K242	0.634	93.8	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
K7	5.301	271.1	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L110	1.835	159.5	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L120	0.856	108.9	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L130	3.192	210.4	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L135	1.796	157.8	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L135a	1.204	129.2	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L150	2.048	42.1	43	10	53	3.3	0.5	0.015	0.015	0.051	0.000	0.003	43	6.50	0.50	0.50	Bluff Road
L150_II	2.048	42.1	0	0	0	3.3	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L170	2.331	45.0	41	10	51	2.7	0.5	0.015	0.015	0.051	0.000	0.003	41	6.50	0.50	0.50	Bluff Road
L170_II	2.331	45.0	0	0	0	2.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L180	2.796	49.2	36	10	46	1.8	0.5	0.015	0.015	0.051	0.000	0.003	36	6.50	0.50	0.50	Bluff Road
L180_II	2.796	49.2	0	0	0	1.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L190	0.845	27.1	38	10	48	0.5	0.5	0.015	0.015	0.051	0.000	0.003	38	6.50	0.50	0.50	Bluff Road
L190_II	0.845	27.1	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L192	2.029	41.9	35	10	45	2.9	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L192_II	2.029	41.9	0	0	0	2.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L200	2.643	47.9	38	10	48	1	0.5	0.015	0.015	0.051	0.000	0.003	38	6.50	0.50	0.50	Bluff Road
L200_II	2.643	47.9	0	0	0	1	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L210	2.613	47.6	37	10	47	1.8	0.5	0.015	0.015	0.051	0.000	0.003	37	6.50	0.50	0.50	Bluff Road
L210_II	2.613	47.6	0	0	0	1.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L220	2.206	43.7	36	10	46	2	0.5	0.015	0.015	0.051	0.000	0.003	36	6.50	0.50	0.50	Bluff Road
L220_II	2.206	43.7	0	0	0	2	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L222	1.065	30.4	35	10	45	3.5	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L222_II	1.065	30.4	0	0	0	3.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L235	1.529	36.4	35	10	45	0.8	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L235_II	1.529	36.4	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L250	2.287	178.1	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L280	3.449	54.7	31	10	41	6	0.5	0.015	0.015	0.051	0.000	0.003	31	6.50	0.50	0.50	Bluff Road
L280_II	3.449	54.7	0	0	0	6	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L400	1.221	32.5	10	5	15	1.9	0.5	0.015	0.015	0.051	0.000	0.003	10	6.50	0.50	0.50	Bluff Road
L400_II	1.221	32.5	0	0	0	1.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L403	0.888	27.7	22	11	33	0.7	0.5	0.015	0.015	0.051	0.000	0.003	22	6.50	0.50	0.50	Bluff Road
L403_II	0.888	27.7	0	0	0	0.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L404	1.849	40.0	20	10	30	1	0.5	0.015	0.015	0.051	0.000	0.003	20	6.50	0.50	0.50	Bluff Road
L404_II	1.849	40.0	0	0	0	1	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road

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L406	0.560	22.0	21	11	32	0.7	0.5	0.015	0.015	0.051	0.000	0.003	21	6.50	0.50	0.50	Bluff Road
L406_II	0.560	22.0	0	0	0	0.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L408	2.154	43.2	35	10	45	0.7	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L408_II	2.154	43.2	0	0	0	0.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L420	3.093	51.8	35	10	45	0.5	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L420_II	3.093	51.8	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L430	3.232	52.9	35	10	45	1	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L430_II	3.232	52.9	0	0	0	1	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L450	2.979	50.8	35	10	45	3.5	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L450_II	2.979	50.8	0	0	0	3.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L460	3.049	51.4	35	10	45	0.9	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
L460_II	3.049	51.4	0	0	0	0.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L490	2.850	198.8	0	0	0	4.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L500	1.781	157.1	0	0	0	12.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L520	2.018	167.3	0	0	0	4.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L540	1.973	165.4	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L550	2.384	181.8	0	0	0	1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L560	1.997	166.4	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
L570	2.683	48.2	26	11	37	0.8	0.5	0.015	0.015	0.051	0.000	0.003	26	6.50	0.50	0.50	Bluff Road
L570_II	2.683	48.2	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L590	2.002	41.6	29	10	39	0.8	0.5	0.015	0.015	0.051	0.000	0.003	29	6.50	0.50	0.50	Bluff Road
L590_II	2.002	41.6	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
L600	2.113	42.8	33	10	43	0.7	0.5	0.015	0.015	0.051	0.000	0.003	33	6.50	0.50	0.50	Bluff Road
L600_II	2.113	42.8	0	0	0	0.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
M120	3.095	207.2	0	0	0	6.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M124	7.053	312.7	0	0	0	7.7	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M124!	7.053	78.2	37	10	47	7.7	0.5	0.015	0.015	0.051	0.000	0.003	37	6.50	0.50	0.50	Bluff Road
M124!_II	7.053	78.2	0	0	0	7.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
M150	4.661	254.2	0	0	0	2.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M151	2.070	169.4	0	0	0	2.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M350	2.478	185.4	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M360	1.052	120.8	0	0	0	0.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M370	1.587	148.3	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M380	2.136	172.1	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M390	2.557	188.3	0	0	0	3.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M394	3.445	218.6	0	0	0	3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M420	2.811	197.4	0	0	0	0.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M450	3.486	219.9	0	0	0	2.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
M500	2.599	189.8	0	0	0	2.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
N_area	110.166	1235.9	0	0	0	1.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
NJSH_Rte9	52.396	852.4	22	11	33	0.4	0.5	0.015	0.015	0.051	0.000	0.003	22	6.50	0.50	0.50	BCUA
San_A14_toBCUA	37.055	716.8	0	0	0	1.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	BCUA
San_A40_toBCUA	155.783	1469.7	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	BCUA
San_A_toBCUA	93.062	1135.9	0	0	0	7.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	BCUA
San_B1_toBCUA	27.243	614.6	0	0	0	0.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	BCUA
San_B3_toBCUA	99.279	1173.3	0	0	0	0	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	BCUA
San_BCUA_27	46.068	799.2	0	0	0	0.6	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	BCUA

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San_D56	8.212	337.4	0	0	0	0.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
SAN_F104	1.354	137.0	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
San_F107	2.138	172.2	0	0	0	1.1	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
San_F112	4.763	257.0	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
San_F98	1.790	157.5	0	0	0	0.9	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Palisades
SAN_J120	6.408	298.1	0	0	0	5.3	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
SAN_J140	5.479	275.6	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
SAN_J160	2.540	187.7	0	0	0	0.2	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
San_J240	2.192	174.3	0	0	0	0.4	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
SAN_J270	2.289	178.1	0	0	0	1.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
SAN_K201	4.838	259.0	0	0	0	1.5	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
San_to_M200	27.804	620.9	0	0	0	1.8	0.5	0	0	0.051	0.000	0.000	0	6.50	0.50	0.50	Bluff Road
STORM_150A	15.621	116.3	23	11	34	0	0.5	0.015	0.015	0.051	0.000	0.003	23	6.50	0.50	0.50	Bluff Road
Storm_J250	5.298	67.8	28	10	38	0.5	0.5	0.015	0.015	0.051	0.000	0.003	28	6.50	0.50	0.50	Bluff Road
Storm_J250_II	5.298	67.8	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_220	6.382	74.4	28	10	38	4.3	0.5	0.015	0.015	0.051	0.000	0.003	28	6.50	0.50	0.50	Bluff Road
Strm_A30	4.267	24.3	73	10	83	3.7	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_A37	7.424	32.1	67	10	77	0.7	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_C1	7.481	32.2	34	10	44	2.1	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_C15A	7.069	31.3	38	10	48	2.7	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_C15A_II	7.069	31.3	0	0	0	2.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Palisades
Strm_C1_II	7.481	32.2	0	0	0	2.1	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Palisades
Strm_C27	11.562	40.0	35	10	45	0.5	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_C27_II	11.562	40.0	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Palisades
Strm_D105	9.590	364.6	84	10	94	1.3	0.5	0.015	0.015	0.051	0.000	0.003	84	6.50	0.50	0.50	Palisades
Strm_D123	6.880	308.9	79	10	89	7.3	0.5	0.015	0.015	0.051	0.000	0.003	79	6.50	0.50	0.50	Palisades
Strm_D134	12.274	412.5	55	10	65	1.6	0.5	0.015	0.015	0.051	0.000	0.003	55	6.50	0.50	0.50	Palisades
Strm_D141	15.655	46.5	51	10	61	1.1	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_D141_II	15.655	46.5	0	0	0	1.1	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Palisades
Strm_D147	7.371	319.7	47	10	57	0.8	0.5	0.015	0.015	0.051	0.000	0.003	47	6.50	0.50	0.50	Palisades
Strm_D16	6.772	30.6	46	10	56	1.2	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_D16_II	6.772	30.6	0	0	0	1.2	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Palisades
Strm_D32	8.533	344.0	51	10	61	1	0.5	0.015	0.015	0.051	0.000	0.003	51	6.50	0.50	0.50	Palisades
Strm_D37	7.375	319.8	64	10	74	0.8	0.5	0.015	0.015	0.051	0.000	0.003	64	6.50	0.50	0.50	Palisades
Strm_D41	9.191	357.0	55	10	65	0	0.5	0.015	0.015	0.051	0.000	0.003	55	6.50	0.50	0.50	Palisades
Strm_D5	6.490	30.0	39	10	49	0.8	0.5	0.1	0.015	0.051	0.051	0.003	0	6.50	0.50	0.50	Palisades
Strm_D56	8.775	348.8	74	10	84	0.5	0.5	0.015	0.015	0.051	0.000	0.003	74	6.50	0.50	0.50	Palisades
Strm_D5_II	6.490	30.0	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Palisades
Strm_D64	5.432	274.4	74	10	84	0.4	0.5	0.015	0.015	0.051	0.000	0.003	74	6.50	0.50	0.50	Palisades
Strm_D94	4.492	249.6	77	10	87	6.4	0.5	0.015	0.015	0.051	0.000	0.003	77	6.50	0.50	0.50	Palisades
Strm_F114	4.193	241.1	29	10	39	0.9	0.5	0.015	0.015	0.051	0.000	0.003	29	6.50	0.50	0.50	Palisades
Strm_F119	7.964	332.3	39	10	49	2.7	0.5	0.015	0.015	0.051	0.000	0.003	39	6.50	0.50	0.50	Palisades
Strm_F1A	7.006	311.7	82	10	92	5	0.5	0.015	0.015	0.051	0.000	0.003	82	6.50	0.50	0.50	Palisades
Strm_F21	8.998	353.2	35	10	45	0.9	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Palisades
Strm_F37	3.507	220.5	28	10	38	0	0.5	0.015	0.015	0.051	0.000	0.003	28	6.50	0.50	0.50	Palisades
Strm_F61	5.024	263.9	36	10	46	4.7	0.5	0.015	0.015	0.051	0.000	0.003	36	6.50	0.50	0.50	Palisades
Strm_F68	1.724	154.6	57	10	67	0.8	0.5	0.015	0.015	0.051	0.000	0.003	57	6.50	0.50	0.50	Palisades

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depression Storage Impervious (in)	Surface 2 Depression Storage Impervious (in)	% of Imperviousness without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
Strm_F7	11.222	394.5	47	10	57	0.8	0.5	0.015	0.015	0.051	0.000	0.003	47	6.50	0.50	0.50	Palisades
Strm_F71	2.919	201.2	35	10	45	1	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Palisades
Strm_F75	1.469	142.7	35	10	45	2.4	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Palisades
Strm_F84	20.259	530.0	37	10	47	0.6	0.5	0.015	0.015	0.051	0.000	0.003	37	6.50	0.50	0.50	Palisades
Strm_G12	8.702	43.4	45	10	55	0.3	0.5	0.1	0.015	0.051	0.051	0.003	0	7.87	0.50	0.50	Lower Main
Strm_G38	4.588	31.5	40	10	50	3.4	0.5	0.1	0.015	0.051	0.051	0.003	0	7.87	0.50	0.50	Lower Main
Strm_G38_II	4.588	63.2	0	0	0	3.4	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Lower Main
Strm_G50	7.895	41.4	46	10	56	4.5	0.5	0.1	0.015	0.051	0.051	0.003	0	7.87	0.50	0.50	Lower Main
Strm_G50_II	7.895	83.2	0	0	0	4.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Lower Main
Strm_G53	4.061	29.7	43	10	53	7.8	0.5	0.1	0.015	0.051	0.051	0.003	0	7.87	0.50	0.50	Lower Main
Strm_G53_II	4.061	29.7	0	0	0	7.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Lower Main
Strm_G56B	12.292	412.8	65	10	75	0.3	0.5	0.015	0.015	0.051	0.000	0.003	65	6.50	0.50	0.50	Lower Main
Strm_G6	7.505	40.3	20	10	30	6.5	0.5	0.1	0.015	0.051	0.051	0.003	0	7.87	0.50	0.50	Lower Main
Strm_G76	9.945	371.3	64	10	74	1.5	0.5	0.015	0.015	0.051	0.000	0.003	64	6.50	0.50	0.50	Lower Main
Strm_G78	3.909	232.8	80	10	90	0.9	0.5	0.015	0.015	0.051	0.000	0.003	80	6.50	0.50	0.50	Lower Main
Strm_H48	8.071	334.5	73	10	83	3.8	0.5	0.015	0.015	0.051	0.000	0.003	73	6.50	0.50	0.50	Lower Main
STRM_H54	9.658	365.9	51	10	61	2.6	0.5	0.015	0.015	0.051	0.000	0.003	51	6.50	0.50	0.50	Lower Main
Strm_I303	6.140	291.8	15	11	26	2.6	0.5	0.015	0.015	0.051	0.000	0.003	15	6.50	0.50	0.50	Bluff Road
Strm_I312	2.289	178.2	22	11	33	4.1	0.5	0.015	0.015	0.051	0.000	0.003	22	6.50	0.50	0.50	Bluff Road
Strm_I330	1.617	149.7	15	10	25	2.3	0.5	0.015	0.015	0.051	0.000	0.003	15	6.50	0.50	0.50	Bluff Road
Strm_I350	13.908	439.1	22	11	33	2	0.5	0.015	0.015	0.051	0.000	0.003	22	6.50	0.50	0.50	Bluff Road
Strm_I364	2.879	199.8	24	11	35	0.5	0.5	0.015	0.015	0.051	0.000	0.003	24	6.50	0.50	0.50	Bluff Road
Strm_J160B	6.934	77.5	24	11	35	0.8	0.5	0.015	0.015	0.051	0.000	0.003	24	6.50	0.50	0.50	Bluff Road
Strm_J190	1.938	41.0	25	11	36	0.1	0.5	0.015	0.015	0.051	0.000	0.003	25	6.50	0.50	0.50	Bluff Road
Strm_J210	2.146	43.1	20	11	31	1.8	0.5	0.015	0.015	0.051	0.000	0.003	20	6.50	0.50	0.50	Bluff Road
Strm_J240B	3.246	212.2	24	11	35	0.8	0.5	0.015	0.015	0.051	0.000	0.003	24	6.50	0.50	0.50	Bluff Road
Strm_J240B_II	3.246	212.2	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J283	2.354	45.2	24	11	35	0.4	0.5	0.015	0.015	0.051	0.000	0.003	24	6.50	0.50	0.50	Bluff Road
Strm_J283_II	2.354	45.2	0	0	0	0.4	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J290	8.075	83.7	34	10	44	0.5	0.5	0.015	0.015	0.051	0.000	0.003	34	6.50	0.50	0.50	Bluff Road
Strm_J290_II	8.075	83.7	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J363	2.171	43.4	31	10	41	2.5	0.5	0.015	0.015	0.051	0.000	0.003	31	6.50	0.50	0.50	Bluff Road
Strm_J363_II	2.171	43.4	0	0	0	2.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J380	2.118	42.9	35	10	45	2.4	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Strm_J380_II	2.118	42.9	0	0	0	2.4	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J400	2.497	46.5	35	10	45	0.3	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Strm_J400_II	2.497	46.5	0	0	0	0.3	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J404A	2.014	41.8	33	10	43	0.3	0.5	0.015	0.015	0.051	0.000	0.003	33	6.50	0.50	0.50	Bluff Road
Strm_J404A_II	2.014	41.8	0	0	0	0.3	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J410a	1.416	35.0	35	10	45	0	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Strm_J410a_II	1.416	35.0	0	0	0	0	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J410b	4.566	62.9	30	10	40	0	0.5	0.015	0.015	0.051	0.000	0.003	30	6.50	0.50	0.50	Bluff Road
Strm_J410b_II	4.566	62.9	0	0	0	0	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J430	4.043	59.2	35	10	45	0.8	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Strm_J430_II	4.043	59.2	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J460	0.889	27.8	20	11	31	5.9	0.5	0.015	0.015	0.051	0.000	0.003	20	6.50	0.50	0.50	Bluff Road
Strm_J460_II	0.889	27.8	0	0	0	5.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road

Subcatchment ID	Total Area (acre)	Basin Width (ft)	Surface 1 Percent Impervious (%)	Surface 2 Percent Impervious (%)	Effective Impervious (%)	Slope (%)	Manning's N Pervious	Surface 1 Manning's N Impervious	Surface 2 Manning's N Impervious	Despression Storage Pervious (in)	Surface 1 Depression Storage Impervious (in)	Surface 2 Depression Storage Impervious (in)	% of Imperviousness without Depression Storage	Horton initial (in/hr)	Horton Limiting (in/hr)	Horton decay (1/hr)	Regulator
Strm_J461	0.659	23.9	20	10	30	0.9	0.5	0.015	0.015	0.051	0.000	0.003	20	6.50	0.50	0.50	Bluff Road
Strm_J461_II	0.659	23.9	0	0	0	0.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J462	1.268	33.1	21	11	32	1.3	0.5	0.015	0.015	0.051	0.000	0.003	21	6.50	0.50	0.50	Bluff Road
Strm_J462_II	1.268	33.1	0	0	0	1.3	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
STRM_J470	1.753	39.0	29	10	39	1.9	0.5	0.015	0.015	0.051	0.000	0.003	29	6.50	0.50	0.50	Bluff Road
STRM_J470_II	1.753	39.0	0	0	0	1.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J475	2.934	50.4	28	10	38	0.5	0.5	0.015	0.015	0.051	0.000	0.003	28	6.50	0.50	0.50	Bluff Road
Strm_J475_II	2.934	50.4	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J490	4.047	59.2	37	10	47	0.2	0.5	0.015	0.015	0.051	0.000	0.003	37	6.50	0.50	0.50	Bluff Road
Strm_J490_II	4.047	59.2	0	0	0	0.2	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J492	3.676	56.5	35	10	45	0.7	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Strm_J492_II	3.676	56.5	0	0	0	0.7	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_J500	6.233	73.5	23	11	34	6.4	0.5	0.015	0.015	0.051	0.000	0.003	23	6.50	0.50	0.50	Bluff Road
Strm_J510	4.245	60.7	49	10	59	1.7	0.5	0.015	0.015	0.051	0.000	0.003	49	6.50	0.50	0.50	Bluff Road
Strm_J560	7.113	78.5	57	10	67	0.6	0.5	0.015	0.015	0.051	0.000	0.003	57	6.50	0.50	0.50	Bluff Road
Strm_J570	4.856	1038.0	73	10	83	0.5	0.5	0.015	0.015	0.051	0.000	0.003	73	6.50	0.50	0.50	Bluff Road
Strm_J570_II	4.856	1038.0	0	0	0	0.5	0.1	0	0	0.051	0.000	0.000	0	8.00	0.10	0.10	Bluff Road
Strm_J600	2.714	776.0	40	10	50	0.3	0.5	0.015	0.015	0.051	0.000	0.003	40	6.50	0.50	0.50	Bluff Road
Strm_J600_II	2.714	776.0	0	0	0	0.3	0.1	0	0	0.051	0.000	0.000	0	8.00	0.10	0.10	Bluff Road
Strm_J620	5.235	1077.6	46	10	56	1.5	0.5	0.015	0.015	0.051	0.000	0.003	46	6.50	0.50	0.50	Bluff Road
Strm_J620_II	5.235	1077.6	0	0	0	1.5	0.1	0	0	0.051	0.000	0.000	0	8.00	0.10	0.10	Bluff Road
Strm_J624	3.590	892.4	45	10	55	0.9	0.5	0.015	0.015	0.051	0.000	0.003	45	6.50	0.50	0.50	Bluff Road
Strm_J624_II	3.590	892.4	0	0	0	0.9	0.1	0	0	0.051	0.000	0.000	0	8.00	0.10	0.10	Bluff Road
Strm_J640	9.123	1422.8	51	10	61	0.7	0.5	0.015	0.015	0.051	0.000	0.003	51	6.50	0.50	0.50	Bluff Road
Strm_J640_II	9.123	1422.8	0	0	0	0.7	0.1	0	0	0.051	0.000	0.000	0	8.00	0.10	0.10	Bluff Road
Strm_K1	1.052	30.2	81	10	91	0.9	0.5	0.015	0.015	0.051	0.000	0.003	81	6.50	0.50	0.50	Bluff Road
Strm_K241	8.965	88.2	24	11	35	1.6	0.5	0.015	0.015	0.051	0.000	0.003	24	6.50	0.50	0.50	Bluff Road
Strm_K7	4.319	61.2	52	10	62	0.4	0.5	0.015	0.015	0.051	0.000	0.003	52	6.50	0.50	0.50	Bluff Road
Strm_K9	4.709	63.9	28	10	38	0.5	0.5	0.015	0.015	0.051	0.000	0.003	28	6.50	0.50	0.50	Bluff Road
Strm_L130	2.172	43.4	35	10	45	0.5	0.5	0.015	0.015	0.051	0.000	0.003	35	6.50	0.50	0.50	Bluff Road
Strm_L130_II	2.172	43.4	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L135	11.876	101.5	32	10	42	0.5	0.5	0.015	0.015	0.051	0.000	0.003	32	6.50	0.50	0.50	Bluff Road
Strm_L135_II	11.876	101.5	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L250	2.334	45.0	32	10	42	0	0.5	0.015	0.015	0.051	0.000	0.003	32	6.50	0.50	0.50	Bluff Road
Strm_L250_II	2.334	45.0	0	0	0	0	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L400	0.422	19.1	10	5	15	1.9	0.5	0.015	0.015	0.051	0.000	0.003	10	6.50	0.50	0.50	Bluff Road
Strm_L400_II	0.422	19.1	0	0	0	1.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L470	1.570	36.9	25	11	36	0.8	0.5	0.015	0.015	0.051	0.000	0.003	25	6.50	0.50	0.50	Bluff Road
Strm_L470_II	1.570	36.9	0	0	0	0.8	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L490	3.344	53.8	30	10	40	4.2	0.5	0.015	0.015	0.051	0.000	0.003	30	6.50	0.50	0.50	Bluff Road
Strm_L490_II	3.344	53.8	0	0	0	4.2	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L510	0.681	24.3	10	4	14	0.5	0.5	0.015	0.015	0.051	0.000	0.003	10	6.50	0.50	0.50	Bluff Road
Strm_L510_II	0.681	24.3	0	0	0	0.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L520	2.123	42.9	29	10	39	4.9	0.5	0.015	0.015	0.051	0.000	0.003	29	6.50	0.50	0.50	Bluff Road
Strm_L520_II	2.123	42.9	0	0	0	4.9	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_L540	1.637	37.7	31	10	41	0.4	0.5	0.015	0.015	0.051	0.000	0.003	31	6.50	0.50	0.50	Bluff Road
Strm_L540_II	1.637	37.7	0	0	0	0.4	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road
Strm_M151	2.199	43.6	39	10	49	2.5	0.5	0.015	0.015	0.051	0.000	0.003	39	6.50	0.50	0.50	Bluff Road
Strm_M151_II	2.199	43.6	0	0	0	2.5	0.01	0	0	0.051	0.000	0.000	0	15.00	0.01	0.01	Bluff Road

Appendix G

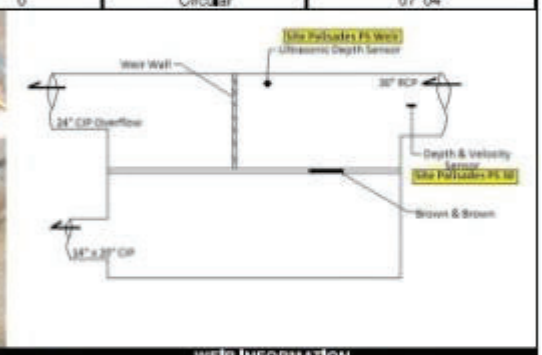
Meter Site Information Log Sheets

FLOW ASSESSMENT SERVICES

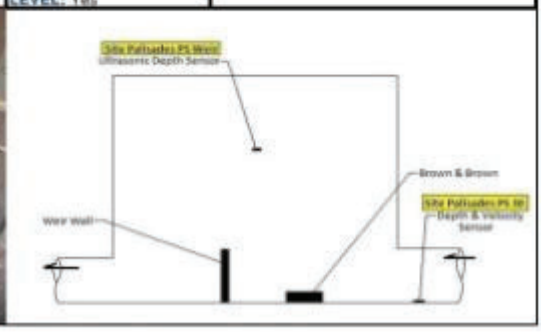
METER SITE INFORMATION FIELD LOG

PROJECT: Fort Lee, NJ	DATE: September 14, 2017	JOB#: 17090
LOCATION: Palisades Avenue R.O.W.	MH#:	METER SITE: Palisades PS Weir
GPS COMMENTS: 40.844982, -73.970929		

	Size (")	Material	Flow Depth (")	Debris	Shape	MH Depth
Incoming	30	RCP	6.5	0	Circular	07' 03"
Incoming						
Outgoing	14 x 20	CIP	14	0	Rectangular	07' 04"
Overflow	24	CIP	0	0	Circular	07' 04"



SURCHARGE INFORMATION	WEIR INFORMATION	
SURCHARGE NONE EVIDENT:	LENGTH: 48.3"	HEIGHT ABOVE WEIR: 59.7
SURCHARGED MARKS TO: 2'	BREADTH: 0.25	OVERFLOW OCCURS AT:
SURCHARGE CURRENTLY TO:	LEVEL: Yes	



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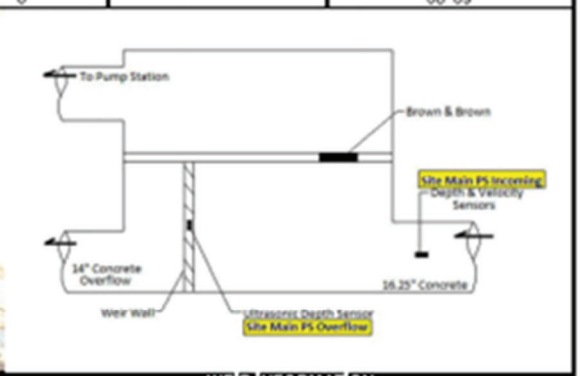
FLOW ASSESSMENT SERVICES

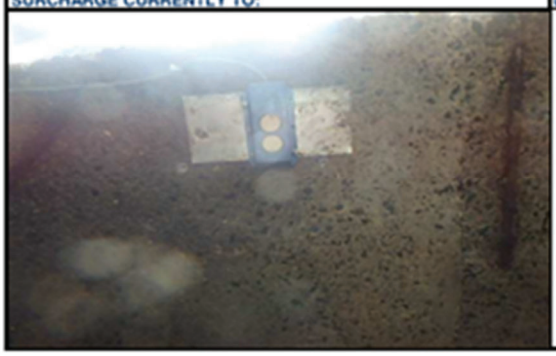
METER SITE INFORMATION FIELD LOG

PROJECT: Fort Lee, NJ	**DATE:** September 18, 2017	**JOB#:** 17090
LOCATION: River Road Pump Station	**MH#:**	**METER SITE:** Main PS Overflow
GPS/COMMENTS: 40.848414, -73.965147		

	Size (")	Material	Flow Depth (")	Debris	Shape	MH Depth
Incoming	16.25	Concrete	6	0	Circular	08' 08"
Incoming						
Outgoing			6	0	Circular	08' 09"
Overflow	14	Concrete		0		08' 09"



SURCHARGE INFORMATION	WEIR INFORMATION	
SURCHARGE NONE EVIDENT: X	**LENGTH:**	**HEIGHT ABOVE WEIR:**
SURCHARGED MARKS TO:	**BREADTH:**	**OVERFLOW OCCURS AT:**
SURCHARGE CURRENTLY TO:	**LEVEL:**	



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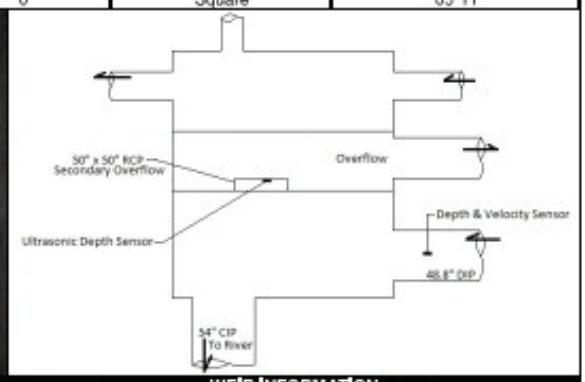
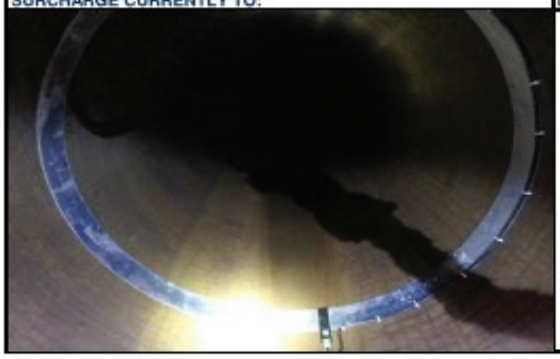
METER SITE INFORMATION FIELD LOG

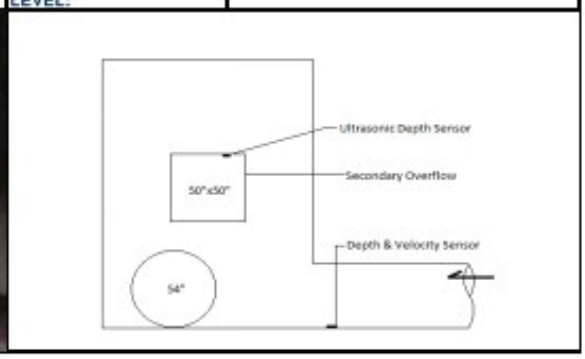
PROJECT: Fort Lee, NJ	**DATE:** September 14, 2017	**JOB#:** 17090
LOCATION: Bluff Road R.O.W.	**MH#:**	**METER SITE:** Bluff Rd Overflow
GPS/COMMENTS: 40.830675, -73.975269		

	Size (")	Material	Flow Depth (")	Debris	Shape	MH Depth
Incoming	48.8	DIP	10	0	Circular	14' 02"
Incoming						
Outgoing	54	CIP		0	Circular	14' 11"
Overflow	50 x 50	RCP	0	0	Square	05"11



SURCHARGE INFORMATION	WEIR INFORMATION	
SURCHARGE NONE EVIDENT: X	LENGTH:	HEIGHT ABOVE WEIR:
SURCHARGED MARKS TO:	BREADTH:	OVERFLOW OCCURS AT:
SURCHARGE CURRENTLY TO:	LEVEL:	





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Model 2150 ISCO Flow Meter

Isco Product Data

Isco 2150 Area Velocity Flow Module

The 2150 Flow Module uses continuous wave Doppler technology to measure mean velocity. The sensor transmits a continuous ultrasonic wave, then measures the frequency shift of returned echoes reflected by air bubbles or particles in the flow.

The 2150's "smart" area velocity probe is built on digital electronics, so the analog level is digitized in the sensor itself to overcome electromagnetic interference. The probe is also factory-calibrated for 10-foot (3 meter) span at different temperatures. This built-in calibration eliminates drift in the level signal, providing long-term level stability that reduces recalibration frequency and completely eliminates span recalibration.

In field use, the 2150 is typically powered either by two alkaline, or Isco Rechargeable Lead-acid batteries, within a 2191 Battery Module. Highly efficient power management extends battery life up to 15 months at 15-minute data storage intervals. Other power options (including solar) are available.

Applications

- Portable and permanent-site AV flow monitoring for inflow and infiltration, capacity assessment, sewer overflow, and other sewer studies.
- Measuring shallow flows in small pipes. Our low-profile area velocity sensor minimizes flow stream obstruction and senses velocity in flows down to 1 inch (25 mm) in depth.

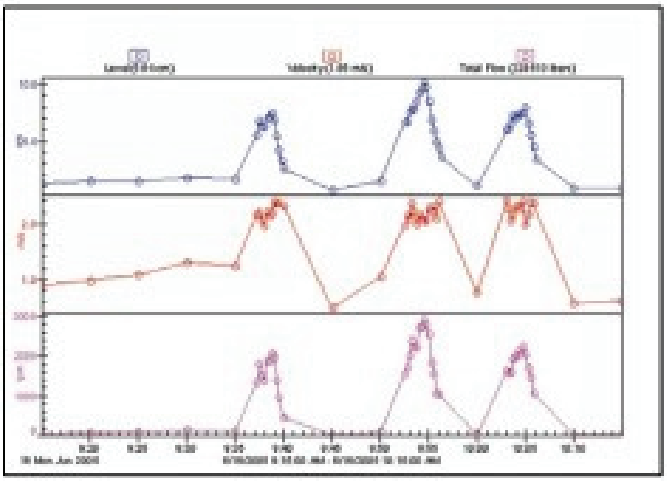
Standard Features

- Rugged, submersible enclosure meets NEMA 4X, 6P (IP68) environmental specs.
- Chemically resistant epoxy-encapsulated sensor withstands abuse, resists oil and grease fouling, and eliminates the need for frequent cleaning.
- Replaceable high-capacity internal desiccant cartridge and hydrophobic filter protect sensor reference from water entry and internal moisture.
- Pressure transducer vent system automatically compensates for atmospheric pressure changes to maintain accuracy.
- The quick-connect sensor can be easily removed and interchanged in the field without requiring recalibration.
- Up to four 2100 Series flow modules can be networked by stacking and/or extension cables.

Above left: Additional modules can be added for redundant or multi-stream measuring (Isco 2110 Ultrasonic Module shown).
Right: Optional mounting rings provide quick, secure sensor installation in round pipes from 6 to 80 inches (150 to 2000 mm).

Software Features

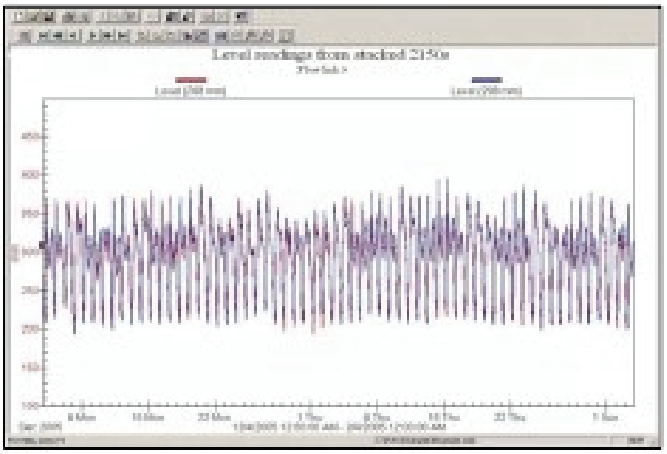
- Secure data storage. All data are continuously stored in flash memory to protect against loss in case of power failure
- Easy to upgrade. New operating software can be downloaded into non-volatile flash memory, without affecting stored program and data.
- Records and stores input voltage and temperature data.
- Variable rate data storage lets you change the data storage interval when programmed conditions occur. This feature assures maximum information about an exceptional event – such as an overflow – while conserving power and data capacity during normal conditions.
- 38,400 bps communication provides speedy setup and data retrieval.



Variable rate data storage

The 2150 flow module has the ability to automatically switch data storage rates based on varying conditions.

In the example at left, the 5-minute data storage rate automatically changed to 30 seconds when the flow rose above a programmed level.



Level stability

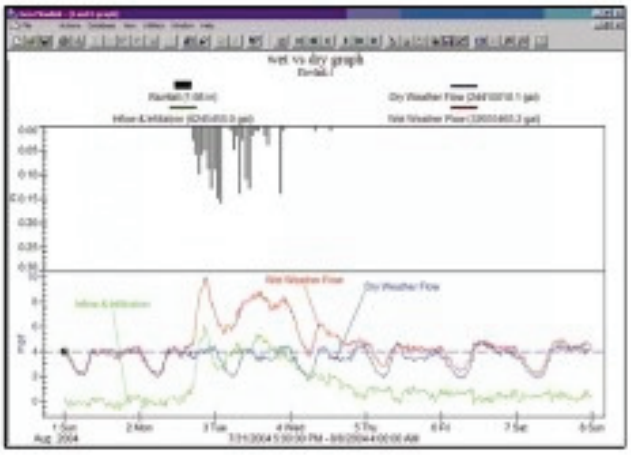
Frequent multipoint level recalibration is a requirement with other area velocity flow meters. Isco's exclusive "smart" sensor design in the area velocity probe yields exceptionally low drift in the level signal.

The 2150's factory-calibrated 3-meter span totally eliminates the need for cumbersome span recalibration in the field.

In the example at left, two area velocity probes were installed at the same site. The level readings from both sensors track closely without any drift, over an 8-week period.

Flowlink® Data Analysis

Isco Flowlink® Software is a powerful tool for analyzing flow and water quality data. It provides site setup, data retrieval, and comprehensive data analysis, as well as advanced reporting and graphing. See separate datasheets for details on Flowlink and Flowlink Pro software.



The Flowlink screen shown above gives a comparison of dry and wet weather flows, plus rainfall typical of an inflow & infiltration study

Information Delivery

Isco 2100 Series Flow Modules offer a wide variety of communication and retrieval options, to minimize the need for expensive on-site visits and confined space entry. These include:

Isco 2103 Land-line Modem Module
Reliable two-way dial-up communication between down-hole 2100 Flow Modules and your desktop computer, equipped with Isco Flowlink Software. A dial-out feature enables the system to transmit a text message alarm to your digital cell phone or pager.

Isco 2103c Cellular Modem Module
All the features of the 2103 Modem with the convenience of cell phone access. And the 2103c can automatically send data via the Internet to a designated server running Flowlink Pro software, using economical 1xRTT packet-switched data transmission.

Isco 2108 Analog Output Module
Provides current outputs for use with Isco 2100 Series Area Velocity and Ultrasonic Flow Modules. It allows easy interface with SCADA/DCS or other secondary instrument systems.

Modbus
2100 Series Flow Modules provide digital RS 232 Modbus output that can be used to interface with external communication modules, SCADA systems, or other devices.

On-site Data Retrieval

Isco Flowlink Software
Download and process data on-site. Enjoy unmatched data management capability, advanced data editing and analysis, powerful reporting and presentation choices, and a variety of downloading and data handling options.

Isco 2101 Field Wizard
A durable, weatherproof module for on-site data retrieval. Don't risk damage to your fragile notebook PC. The 2101 Field Wizard provides on-site display of current readings, information about stored data, diagnostics, and more.

Interrogate all 2100 Series Flow Modules in the stack at one time, and store more than 14 days' data from up to 20 modules!

Isco 2102 Communication Module
Connect with your Isco 2100 Series Flow Modules from the safety and convenience of your vehicle.

Digital spread-spectrum radio signals enable "drive-up" data retrieval, system configuration, and level calibration, with minimum power consumption. "Plug and Play" setup – no interfacing needed.

Specifications

2150 Flow Module	
Size (HxWxD):	2.9 x 11.3 x 7.5 in (74 x 287 x 191 mm)
Weight:	2.0 lb (0.9 kg)
Materials of construction:	High-impact polystyrene, stainless steel
Enclosure (self-certified):	NEMA 4X, 6P (IP68)
Temperature Range:	-40° to 140° F (-40° to 60° C) operating and storage
Power Required:	12 VDC nominal (7.0 to 16.6 VDC), 100 mA typical, 1 mA standby
Power Source:	Typically, an Isco 2191 Battery Module, containing 2 alkaline or 2 rechargeable lead-acid batteries. (Other power options are available; ask for details.)
Typical Battery Life:	Using 15-minute data storage interval Energizer® Model 529 alkaline - 15 months Isco rechargeable lead-acid - 2.5 months
Program Memory:	Non-volatile programmable flash; can be updated using PC without opening enclosure; retains user program after updating.
Built-in Conversions	
Flow Rate Conversions:	Up to 2 independent level-to-area conversions and/or level-to-flow rate conversions.
Level-to-Area Conversions:	Channel Shapes - round, U-shaped, rectangular, trapezoidal, elliptical, with silt correction; Data Points - Up to 50 level-area points.
Level-to-Flow Conversions:	Most common weirs and flumes; Manning Formula; Data Points (up to 50 level-flow points); 2-term polynomial equation
Total Flow Calculations:	Up to 2 independent, net, positive or negative, based on either flow rate conversion
Data Handling and Communications	
Data Storage:	Non-volatile flash; retains stored data during program updates. Capacity 395,000 bytes (up to 79,000 readings, equal to over 270 days of level and velocity readings at 15-minute intervals, plus total flow and input voltage readings at 24-hour intervals)
Data Types:	Level, velocity, flow rate 1, flow rate 2, total flow 1, total flow 2, input voltage, temperature
Storage Mode:	Rollover; 5 bytes per reading.
Storage Interval:	15 or 30 seconds; 1, 2, 5, 15, or 30 minutes; or 1, 2, 4, 12, or 24 hours Storage rate variable based on level, velocity, flow rate, total flow, or input voltage
Data Retrieval:	Serial connection to PC or optional 2101 Field Wizard module; optional modules for spread spectrum radio; land-line or cellular modem; 1xRTT, Modbus and 4-20 mA analog available.
Software:	Isco Flowlink for setup, data retrieval, editing, analysis, and reporting
Multi-module networking:	Up to four 2100 Series Flow Modules, stacked and/or remotely connected. Max distance between modules 3300 ft (1000 m).
Serial Communication Speed:	38,400 bps

2150 Area Velocity Sensor	
Size (HxWxD):	0.75 x 1.3 x 6.0 in (19 x 33 x 152 mm)
Cable (Length x Diameter):	25 ft x 0.37 in (7.6 m x 9 mm) standard. Custom lengths available on request.
Weight (including cable):	2.2 lbs (1 kg)
Materials of construction:	Sensor - Epoxy, chlorinated polyvinyl chloride (CPVC), stainless steel Cable - Polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC)
Operating Temperature:	32° to 140° F (0° to 60° C)
Level Measurement:	Method - Submerged pressure transducer mounted in the flow stream Transducer Type - Differential linear integrated circuit pressure transducer Range (standard) 0.033 to 10 ft (0.010 to 3.05 m); (optional) up to 30 ft (9.15 m). Maximum Allowable Level 34 ft (10.5 m) Accuracy ±0.01 ft from 0.033 to 10 ft (±0.003 m from 0.01 to 3.05 m.) Long-Term Stability ±0.023 ft/yr (±0.007 m/yr) Compensated Range 32° to 122°F (0° to 50°C)
Velocity Measurement:	Method - Doppler ultrasonic, frequency 500 kHz Typical Minimum Depth 0.08 ft (25 mm) Range -5 to +20 ft/s (-1.5 to +6.1 m/s) Accuracy (in water with uniform velocity profile, speed of sound = 4850 ft/s, for indicated velocity range) ±0.1 ft/s from -5 to 5 ft/s (±0.03 m/s from -1.5 to +1.5 m/s) ±2% of reading from 5 to 20 ft/s (1.5 to 6.1 m/s)
Temperature Measurement:	Accuracy ±3.6° F (±2° C)
2191 Battery Module	
Size (HxWxD):	6.0 x 9.6 x 7.6 in (152 x 244 x 193 mm)
Weight (without batteries):	3.2 lb (1.4 kg)
Materials of construction:	High-impact polystyrene, stainless steel
Enclosure (self certified):	NEMA 4X, 6P, (IP68)
Batteries:	Two 6-volt Energizer Model 529* alkaline (25 Ahrs capacity) or Isco Rechargeable Lead-acid (5 Ahrs capacity) recommended. *Note – Energizer 529 ER does not give specified life.

2150 Ordering Information

Contact your Teledyne Isco representative for complete ordering details and information on other 2100 Series Modules.

Description	Part No.
2150 with AV sensor, 2191 Battery Module, and Handle	68-2050-002
2150 Module with AV sensor (only)	68-2050-001
Isco Flowlink® 5 Software	68-2540-200
Energizer® Model 529 Alkaline Lantern Battery (2 required)	340-2006-02
Isco Rechargeable Lead-acid Battery (2 required)	60-2004-041
Charger for Lead-acid Batteries (holds 2 batteries)	60-2004-040

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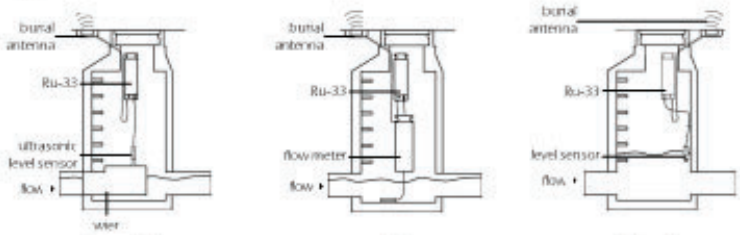
Telog RU 33

Ru-33 Recording Telemetry Unit

Wireless RTU for underground monitoring

Ru-33 pictured with the Telog ultrasonic sensor

Applications



Telog's Ru-33 **R**ecording **T**elemetry **U**nit, (RTU), provides real-time monitoring and alarming of instruments and sensors found in the harsh environment of sewers and underground water vaults.

The Ru-33 has low power requirements and automatically monitors level, flow, pressure and water quality sensors. Data is forwarded wirelessly to a host computer operating Telog host application software, Telogers for Windows or Telog Enterprise. Data communication may be scheduled frequently (e.g. daily, hourly, every five minutes, etc.) and/or immediately in response to site alarm conditions.

The Ru-33 supports multiple sensor interface options including RS-232, RS-485, analog and digital inputs. For example, when connected to an open-channel flowmeter via RS-232, the RTU can interrogate the meter for it's most recent level, flow velocity and battery voltage measurements.

Telog also provides optional sensors that may be directly attached to the Ru-33 including ultrasonic and pressure level, water quality Sondes, pH and conductivity, temperature, level switches and a rain gauge.

Wireless communication is supported via packet switched (e.g. 1xRTT) or circuit switched (e.g. CDMA) cellular. An optional burial antenna may be embedded in the street pavement producing a complete underground wireless monitoring solution.

The RTU is powered from a single, 6-volt lantern battery providing an operating life of six months to two years depending on sensor interface and call schedule.

telog

Directly Monitor:
- **Popular Open-channel Wastewater Flowmeters**
- **Pressure Level Sensors**
- **Ultrasonic Level Sensors**
- **Water Quality Sensors and Sondes**

Communicate Via:
- **Local Connection**
- **Cellular**
- **Land-line Telephone**

Powered by:
- **6V Lantern Battery**
- **External DC**

Alarm Notification

Two Year Battery Life

Burial Antenna Option

Submersible Enclosure

Web Application Software

Ru-33 Specifications

(for more detailed specification information refer to Telog's Ru-33 Product Specification Paper, document #PS-33u)

Recorder

Model	Telog Ru-33
Type	Multi- channel underground RTU (Recording Telemetry Unit)
Recording	
Sample rate	Programmable from 1/sec up to 8 hours; each channel
Data interval	Programmable from 1/sec up to 8 hours; each channel
Memory	
Size:	512 Kbytes
Storage Method	Wrap around (first-in; first-out).
Data Capacity	Dynamically allocated to active channels, any combination of:
Analog Input	270,000 values
Pulse Input	200,000 values
Event Input	67,000 values
ComSensor Input	100,000 values
Communication:	
Standard:	Local RS-232 4 pin circular connector rated IP-67 Auto-selected baud rate to 19.2K
Optional	Land line telephone Telog M-324 2400 baud modem Auto-dial/Auto-answer FCC and CSA approved Cellular data modem Provides both 1xRTT packet switched and CDMA circuit switched data.
Inputs	Limited to one ComSensor + one analog + one digital
ComSensor/Meter	Selectable RS-232 or RS-485 to 19.2 Kbaud. Protocol determined by meter or sensor
Analog	
Selectable ranges	0-1 VDC, 0-5 VDC, 4-20 ma
Excitation	Pulsed +5 or +12 VDC, (selectable duration)
Resolution	0.025%; 12 bits
Accuracy	±0.1% of full range at 25□C ±50 ppm
Digital (one channel)	
Type	Selectable pulse counter or event recorder
Input	Contact closure or logic driven input
Excitation	5 VDC at 20µAmps (max)
Pulse Width	10 mS minimum
Battery	
Factory Installed	Single 6V alkaline lantern battery Eveready Energizer model 529
Battery Life Example:	
Input ComSensor	Sigma 900 Flowmeter
Sample Rate	five minutes
Communication	Wireless 1xRTT
Call Schedule	
5 minutes	Battery life = 1 month
15 minutes	Battery life = 3 months
2 hours	Battery life = 1 year
24 hours	Battery life = 2 years
External Power Input	9 to 15 VDC @ 1 amp max
Enclosure	
Size	Cylindrical 4.5" x 15.4"
Weight	7 lbs.
Material	PVC
Environmental	
Temperature	0 to 70□ C -30 to +70□ C powered externally
Submersible	IP67 (NEMA 6)
Support Software	
S-3PC	Telogers for Windows
S-3EP	Telogers Enterprise
Data Transfer Unit	IP-67 rated PDA running Palm OS and Telog application program

Supported Sensors

Pressure Level Sensor	Submersible Pressure Sensor
Model	Telog PMP-1030
Ranges	0-5 PSI thru 0-300 PSI
Accuracy	±0.25% of full scale
Construction	316 stainless steel
Vent	In-line dry box with user replaceable desiccant
Ultrasonic Level Sensor	Ultrasonic transmitter (ComSensor)
Model	Massa M5000/95
Frequency	95 KHz
Range	one foot to 13 feet
Beam Angle	8□ Conical
Accuracy	±0.25% over any range segment exceeding 12 inches (homogeneous environment)
Temperature Sensor	
Model	AT-3u ambient temperature sensor
Range	-20 to +70° C
Accuracy	±0.2° C
Size	Stainless Steel probe (4" x ½") with three meters of cable
pH Sensor	
Model	ISI pHS-M11tc
Type	Double junction reference cell (KCl/AgCl and KNO3)
Range	0-14 pH
Output	±59.16 mV/pH unit @ 25° C Pre-amplified and temperature compensated. Includes internal lithium battery

Ru-33 Telog Supplied Options

Burial Antenna

Ultrasonic sensor

pH-31 sensor

Pressure sensor

Temperature sensor

Ru-33 Supported Meters & Sensors

Flowmeters

Via RS-232 or RS-485	Hach Sigma 900 Series
Interface to meter	ISCO 2150
Serial interface port	Marsh McBirney Flo-Dar & Flo-Tote3 Meters MGD ADFM & accOmin ADS Flow Shark

Sensors

Hydrolab Sondes
Hach WMD Pipe Sonde

Water Quality

Hach Hydrolab Multiparameter Sondes
DataSonde 4a, MiniSonde 4a
DS5X, DS5, MS5
Hach WDM Pipe Sonde

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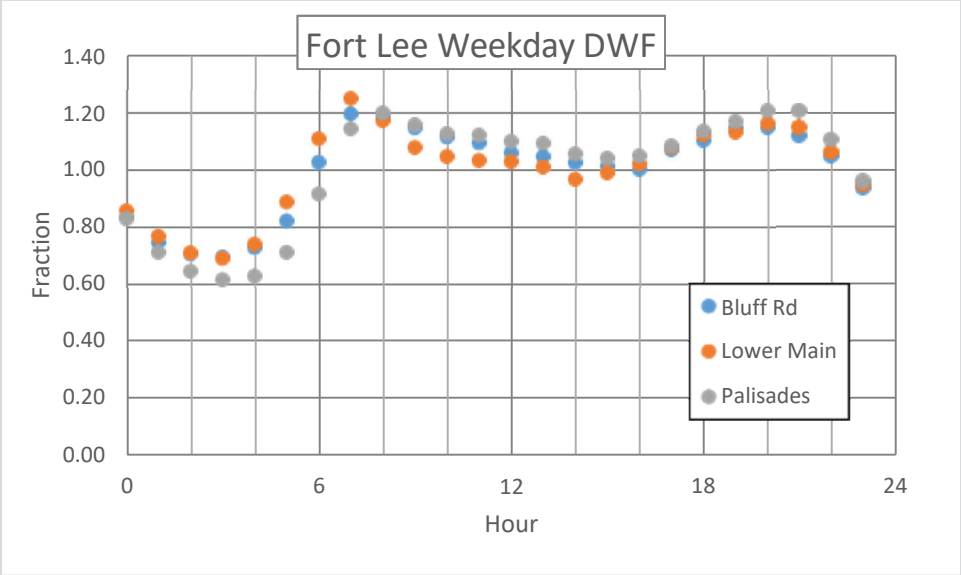
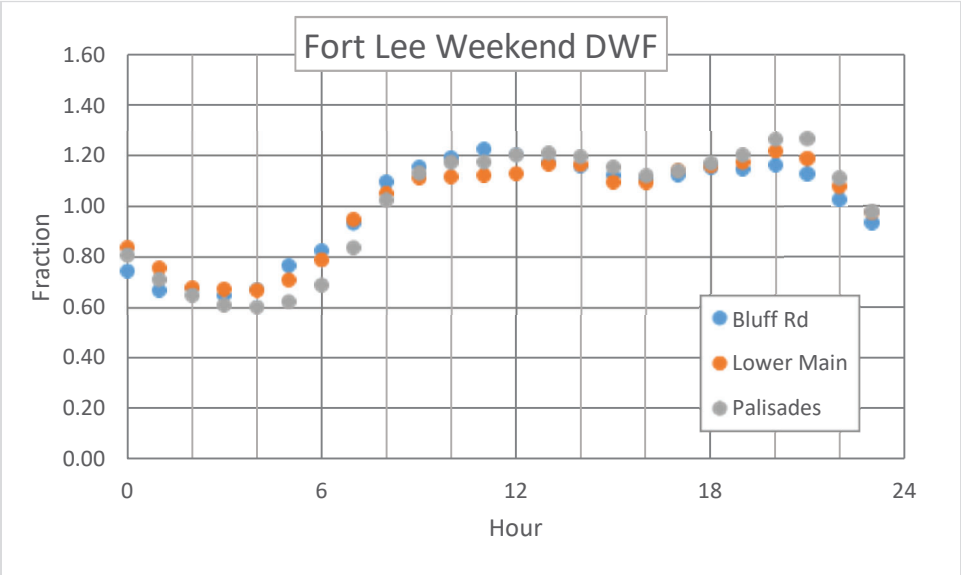
8/05

Appendix H

Model Calibration Results

Average Diurnal Patterns: Weekday vs Weeken

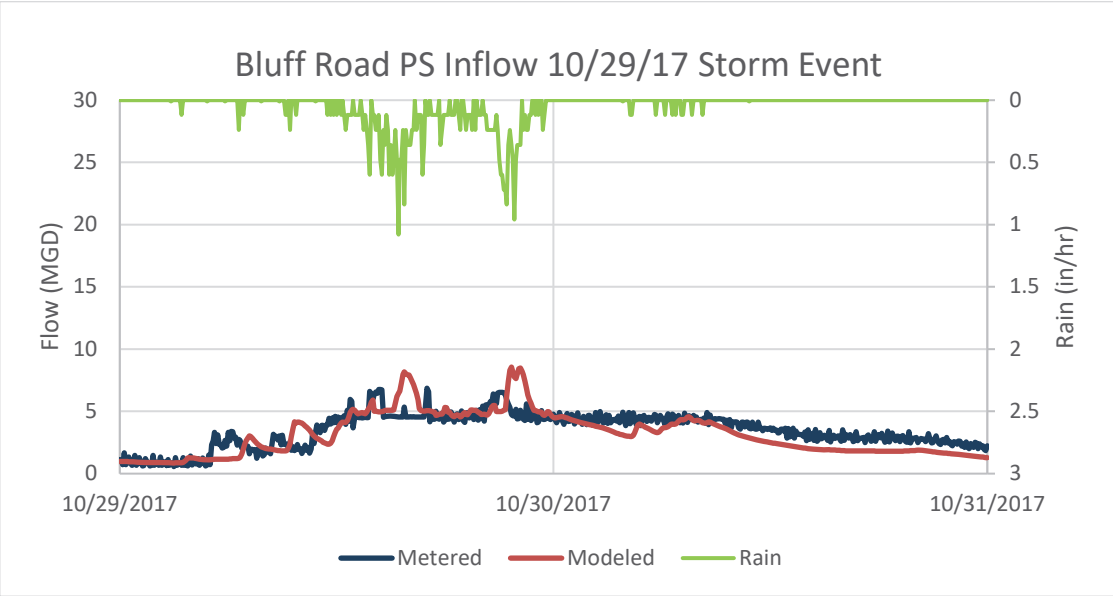


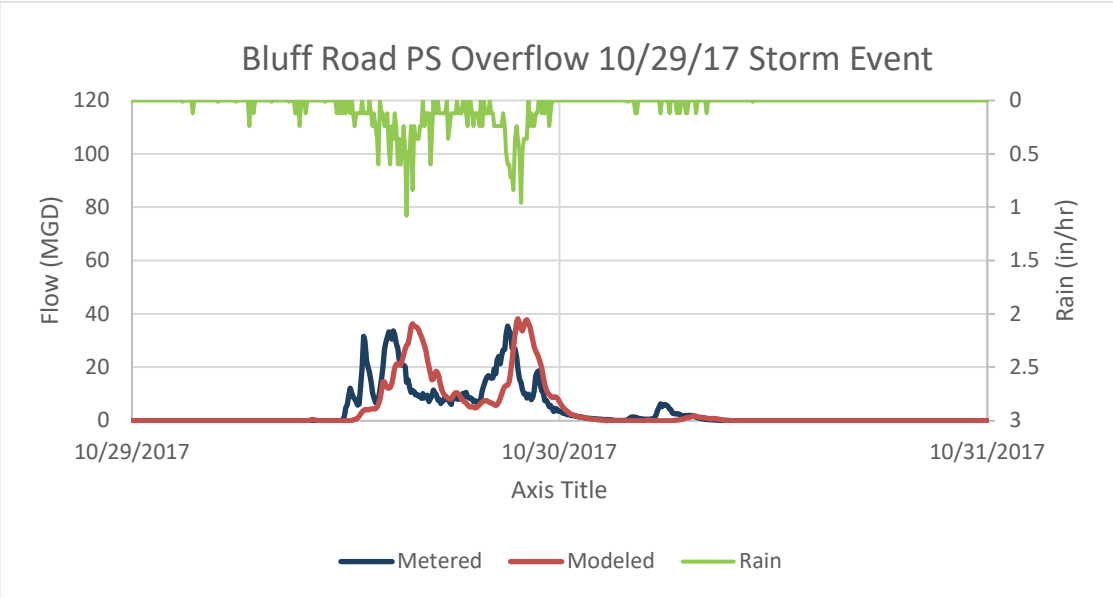


Part 1. Model Calibration Results

Event 11- 2.77 in on 10/29/2017

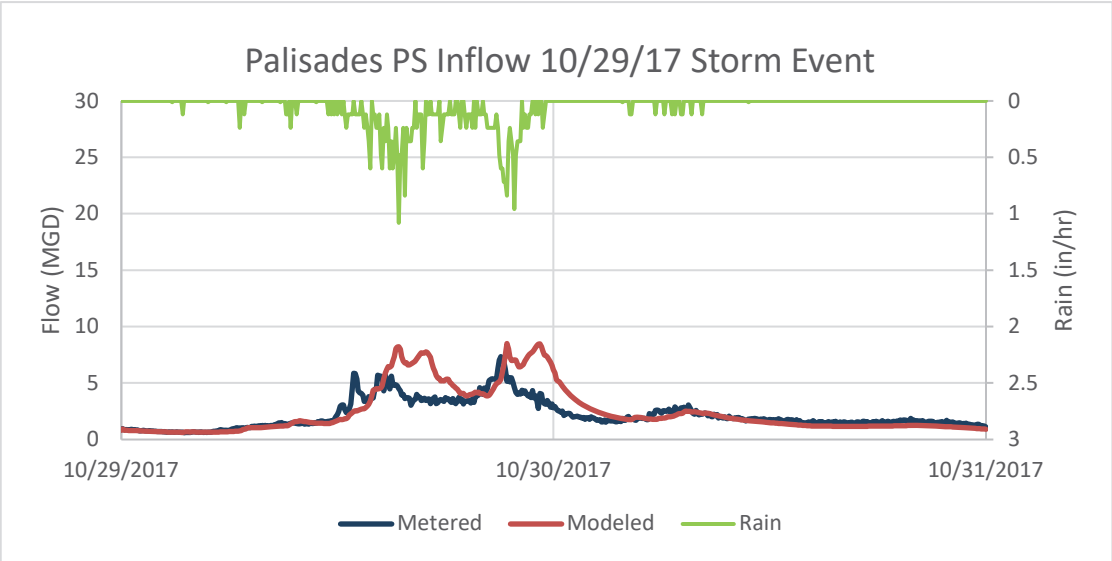
Bluff Road

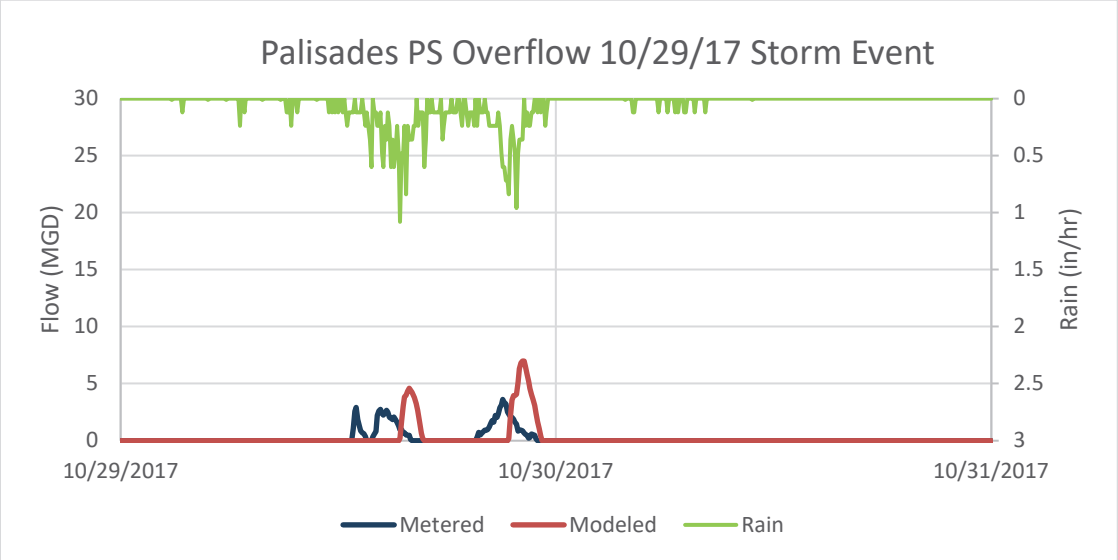




Event 11- 2.77 in on 10/29/2017

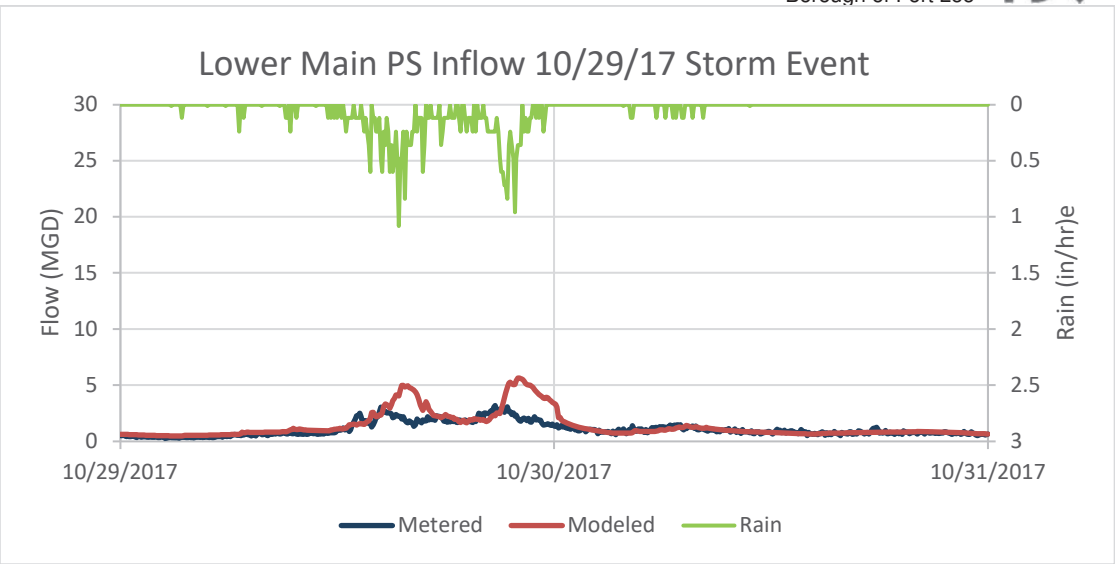
Palisades

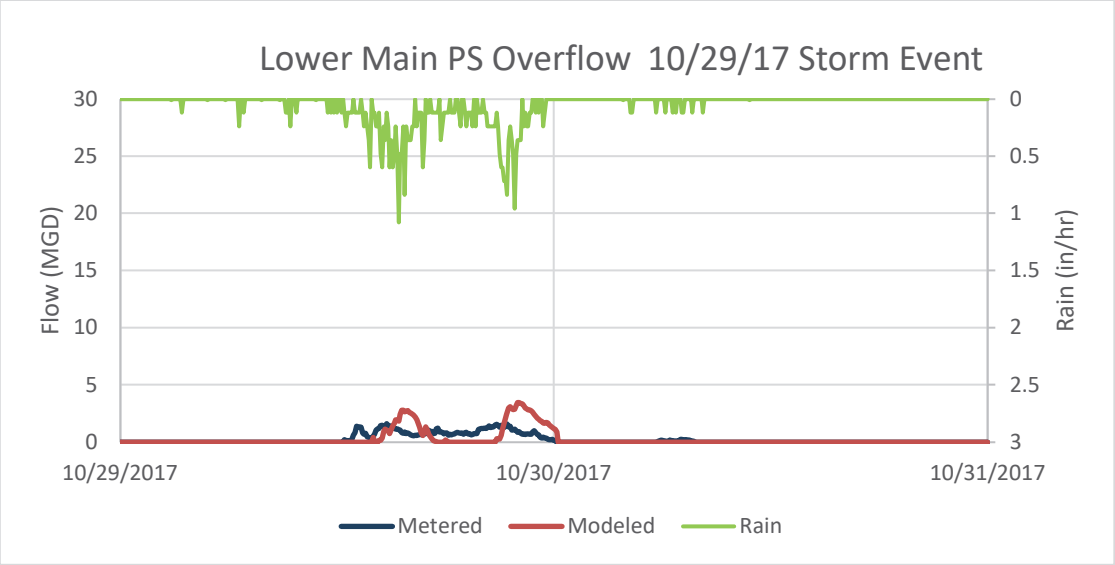




Event 11- 2.77 in on 10/29/2017

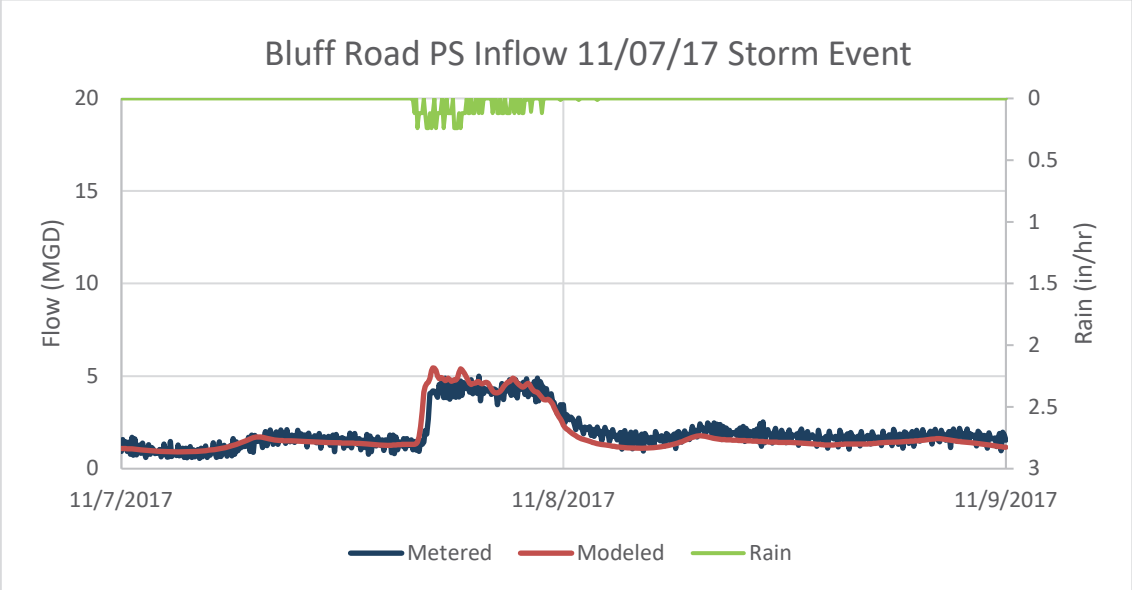
Lower Main

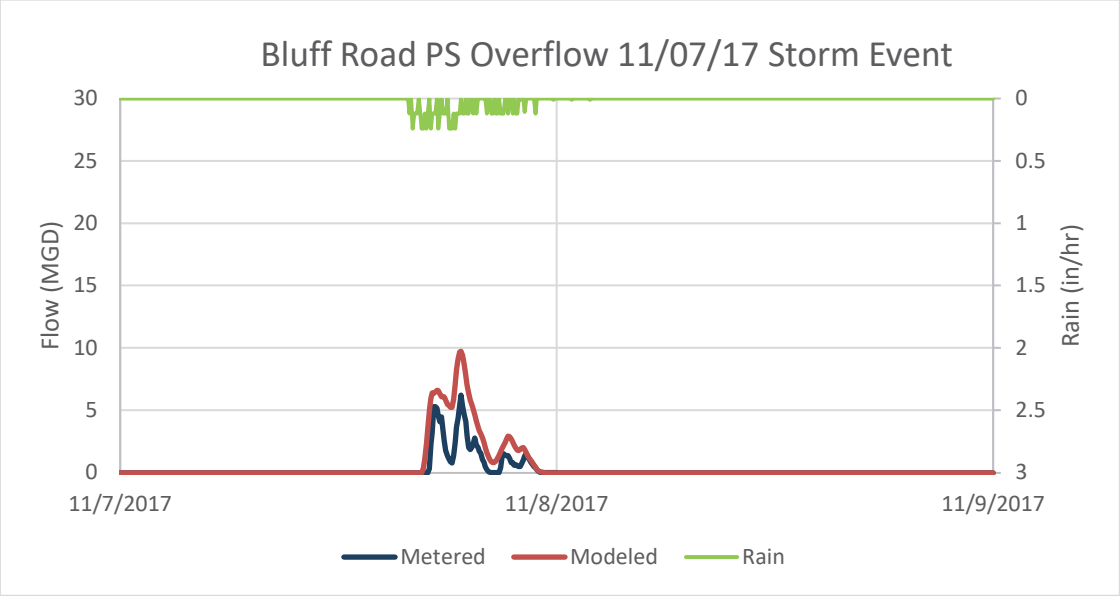

Lower Main PS Inflow 10/29/17 Storm Event
Flow (MGD)
Rain (in/hr)e
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
10/29/2017
10/30/2017
10/31/2017
Metered
Modeled
Rain


Lower Main PS Overflow 10/29/17 Storm Event
Flow (MGD)
Rain (in/hr)
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
10/29/2017
10/30/2017
10/31/2017
Metered
Modeled
Rain

Event 11- 0.58 in on 11/07/2017

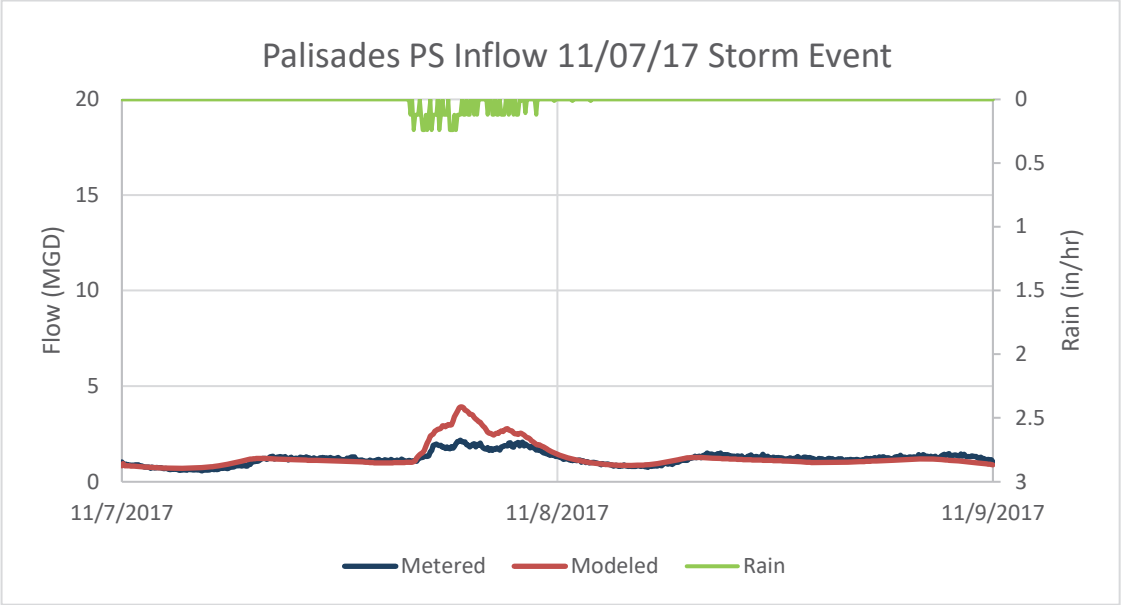
Bluff Road

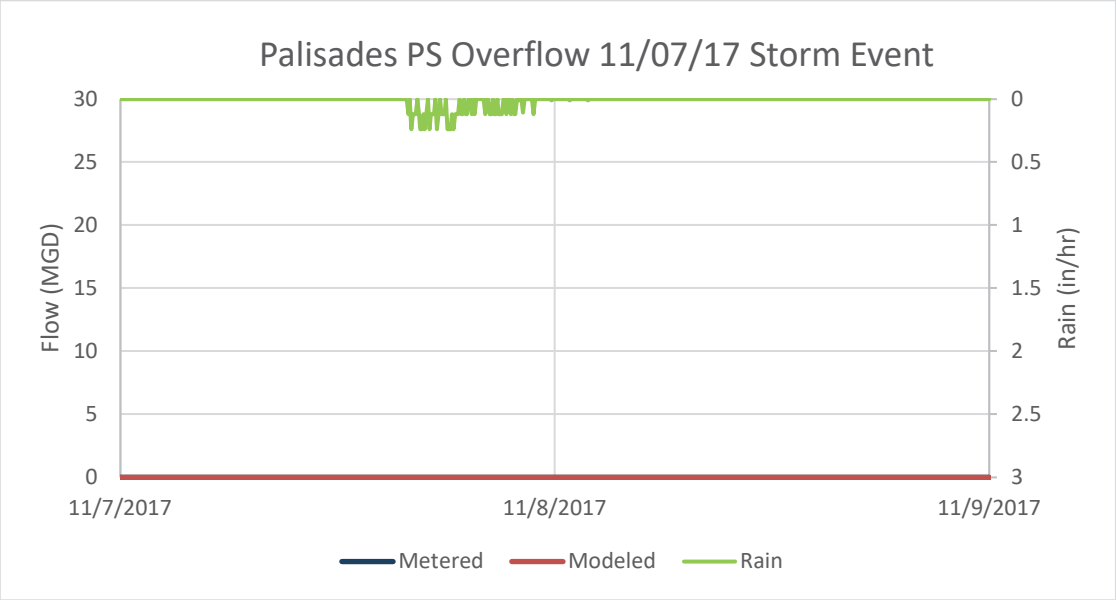




Event 11- 0.58 in on 11/07/2017

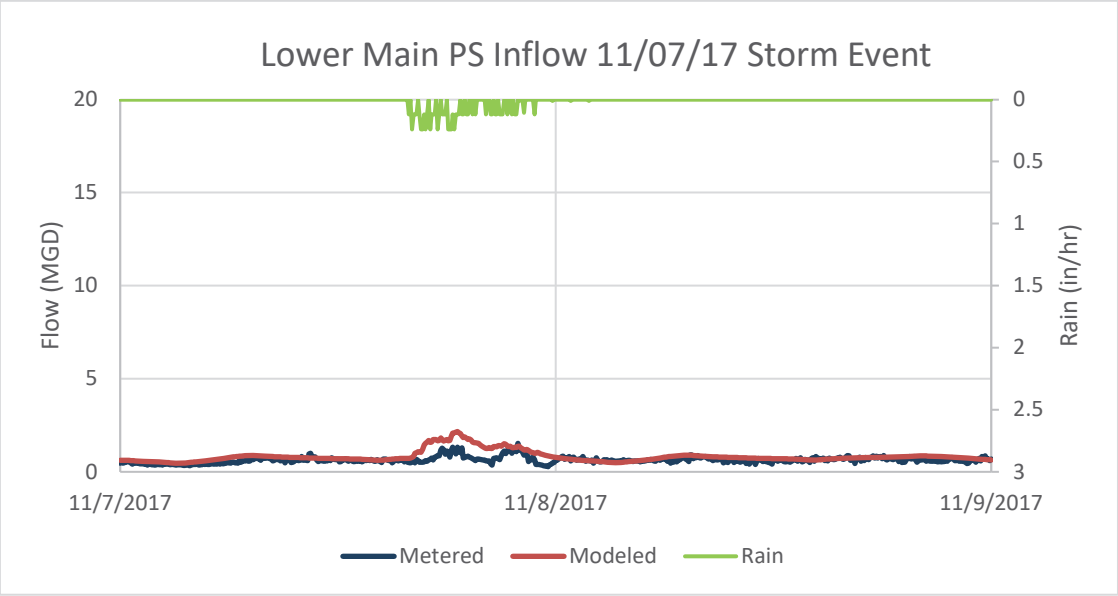
Palisades

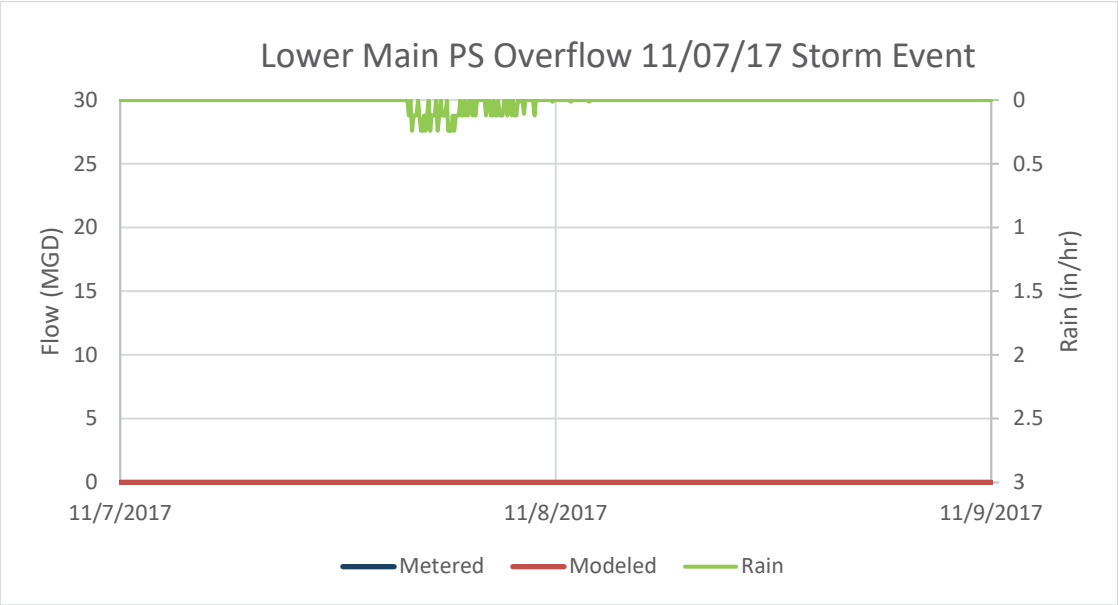




Event 11- 0.58 in on 11/07/2017

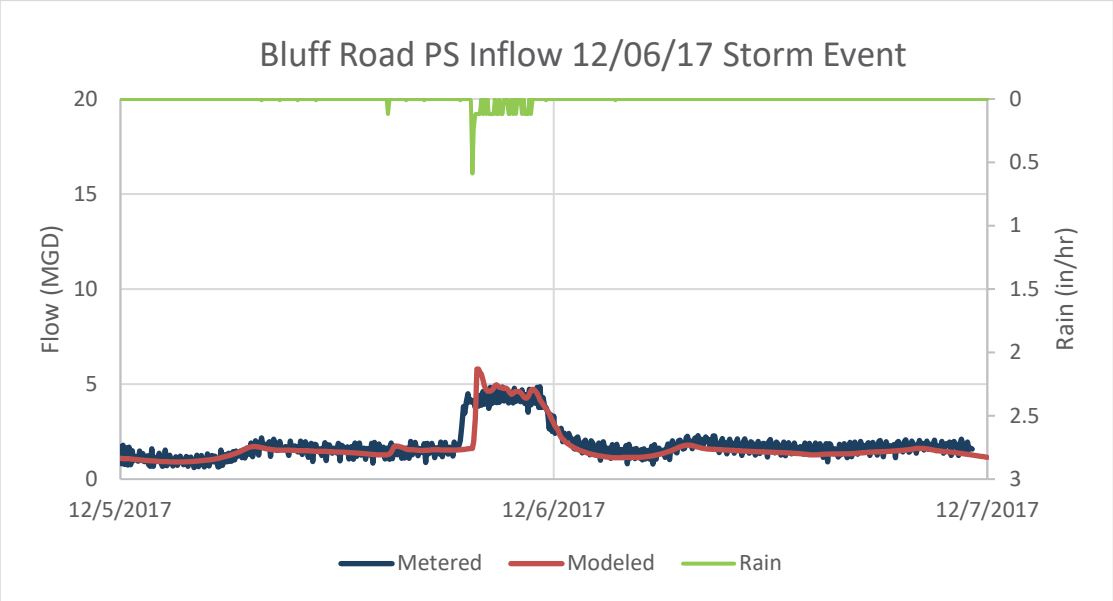
Lower Main

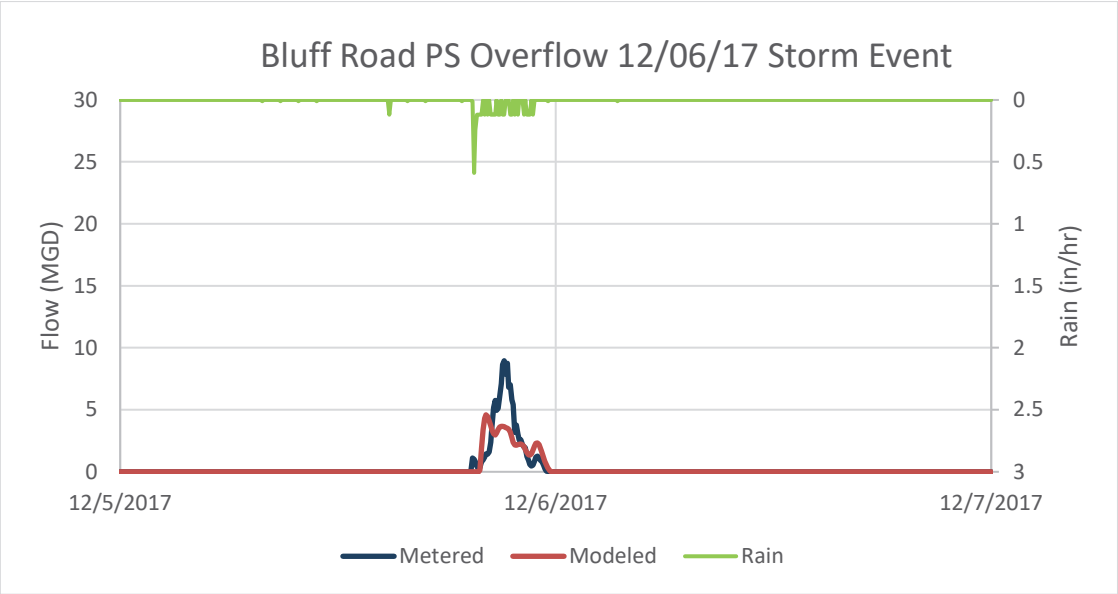




Event 25- 0.58 in on 12/06/2017

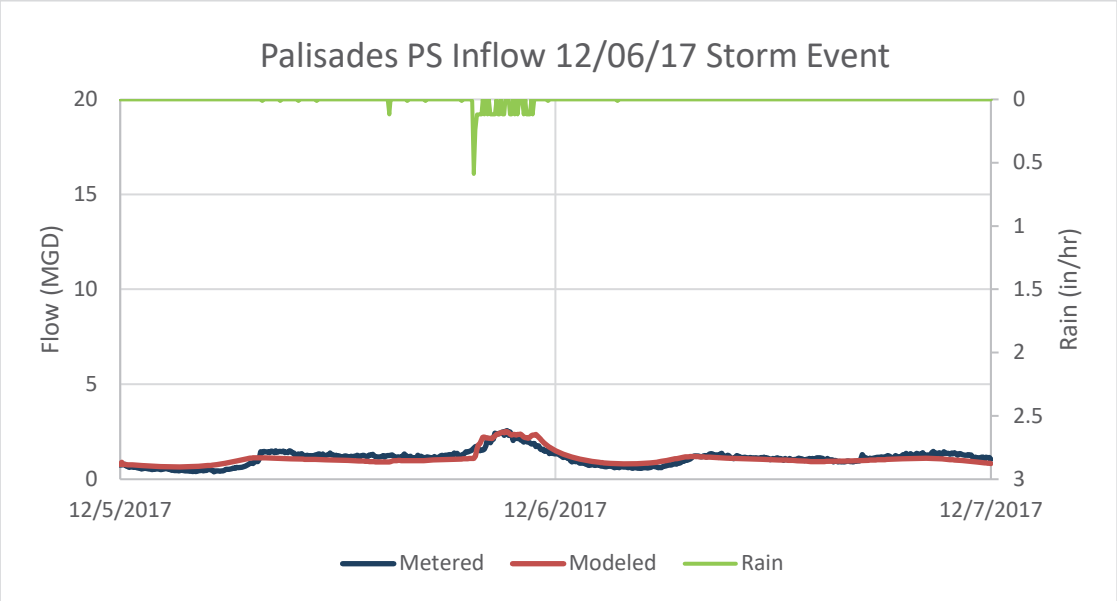
Bluff Road

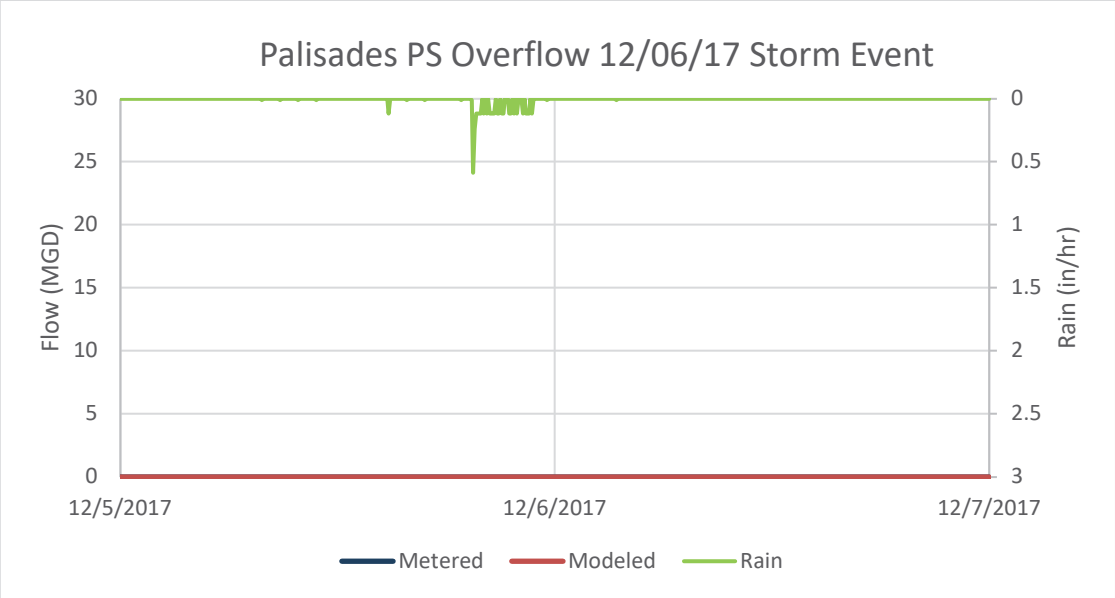




Event 25- 0.58 in on 12/06/2017

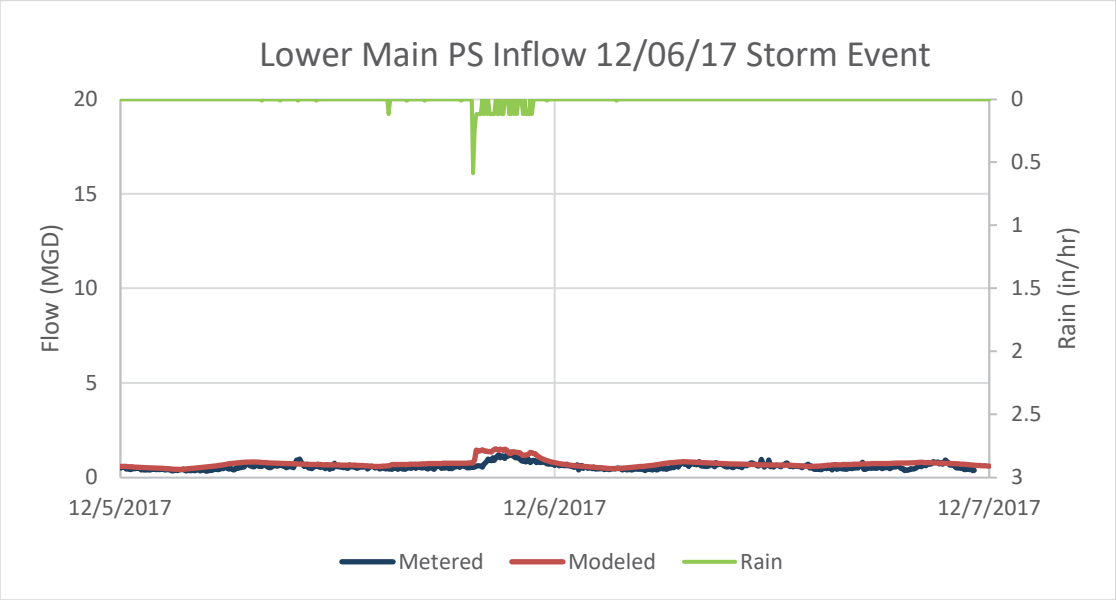
Palisades

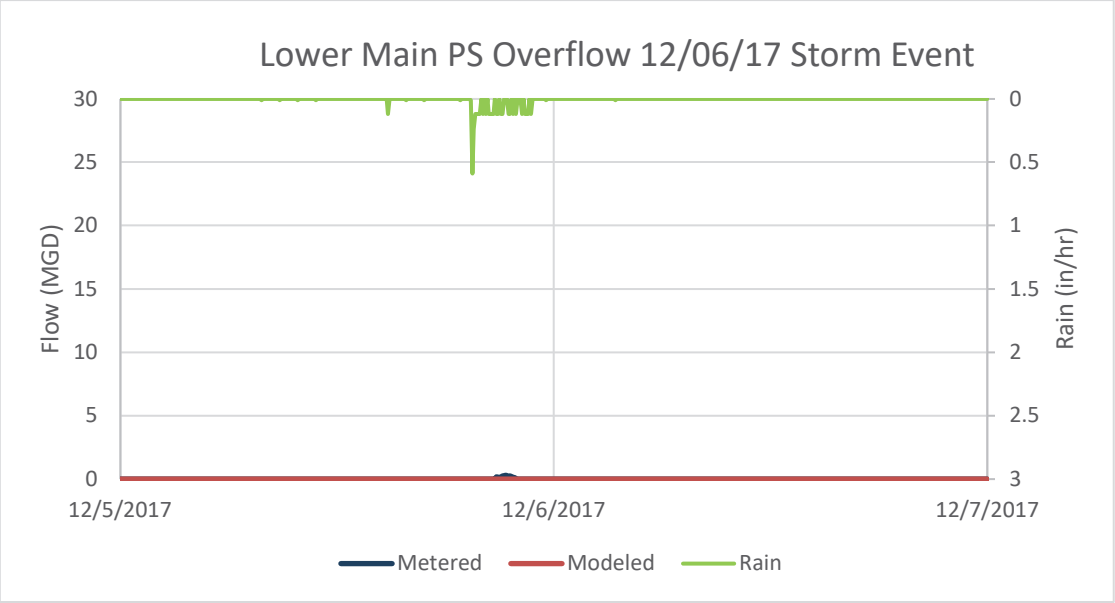




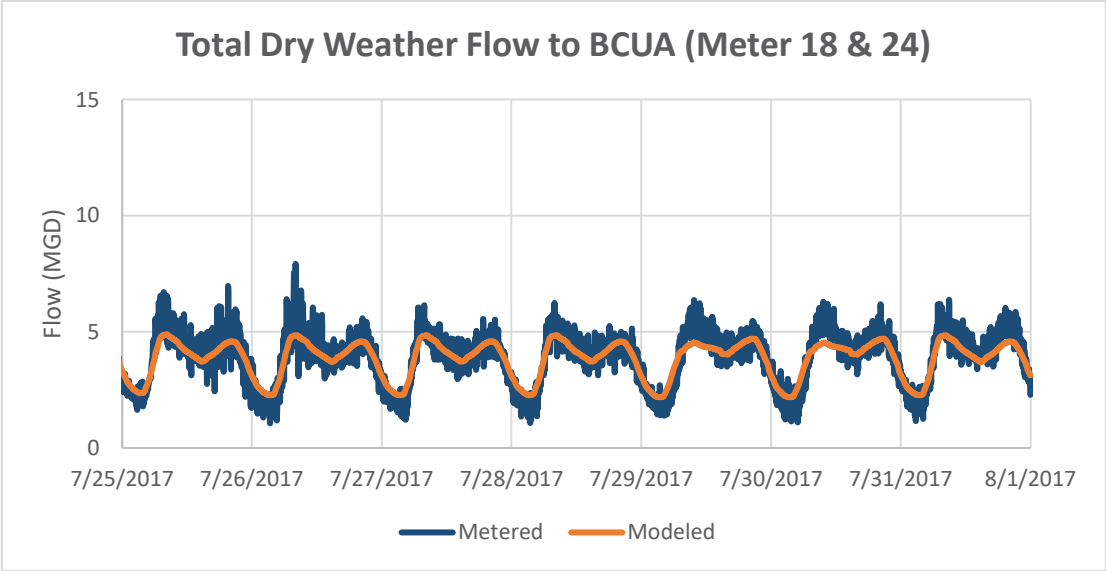
Event 25- 0.58 in on 12/06/2017

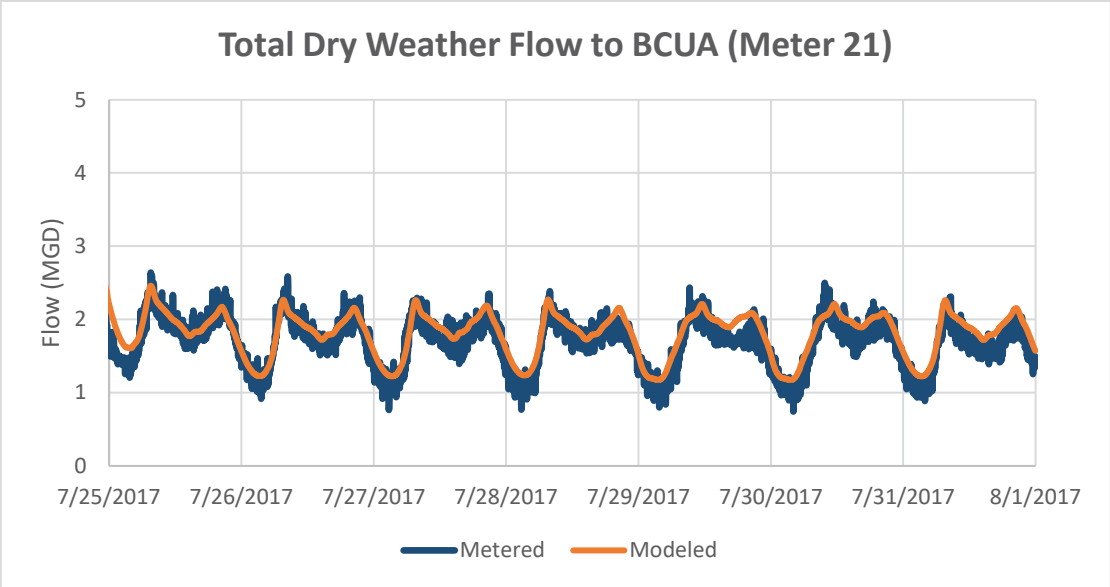
Lower Main

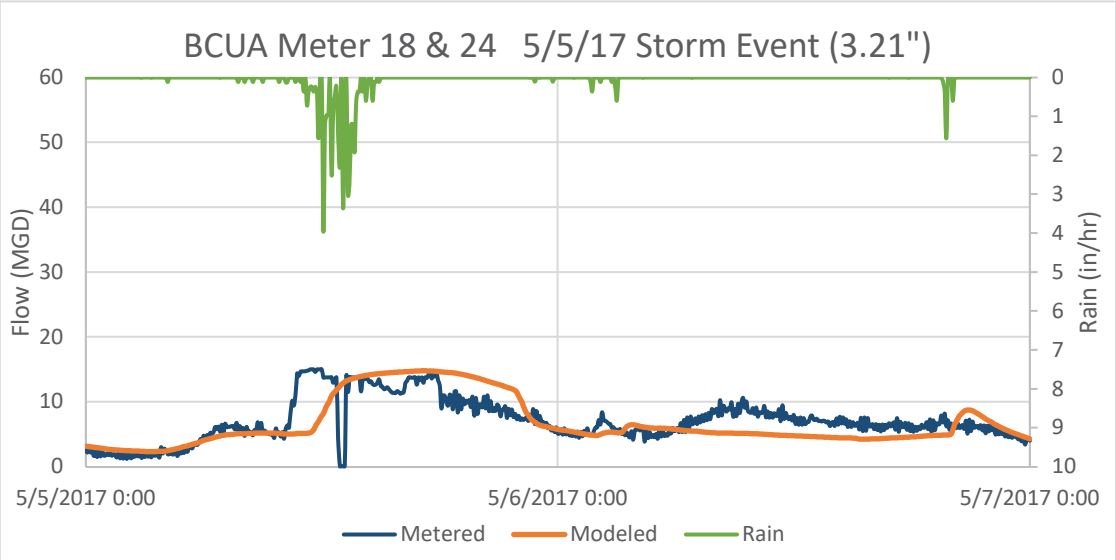


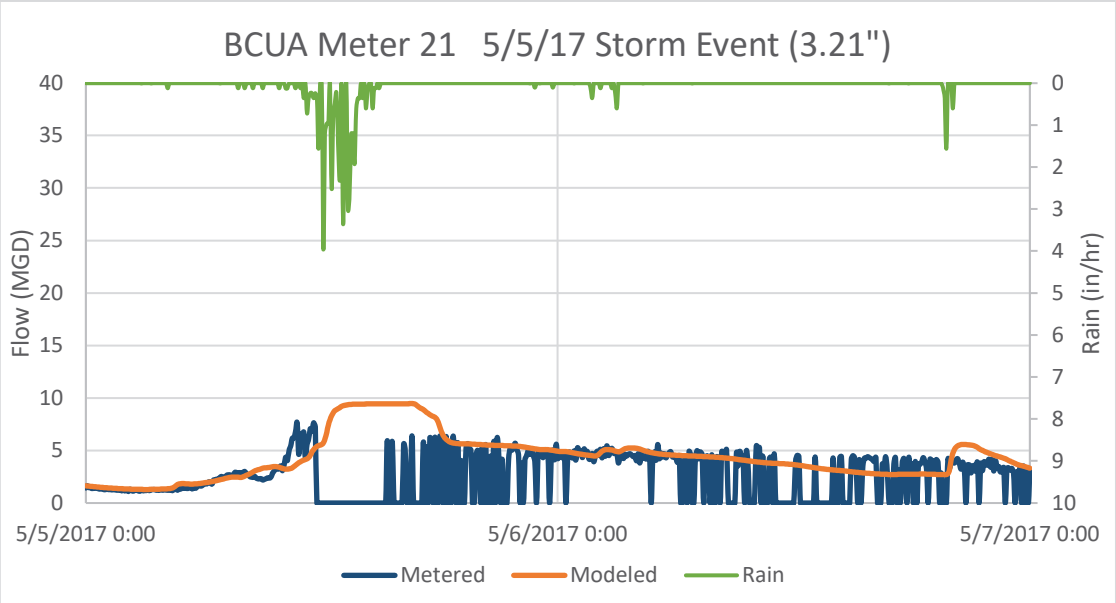


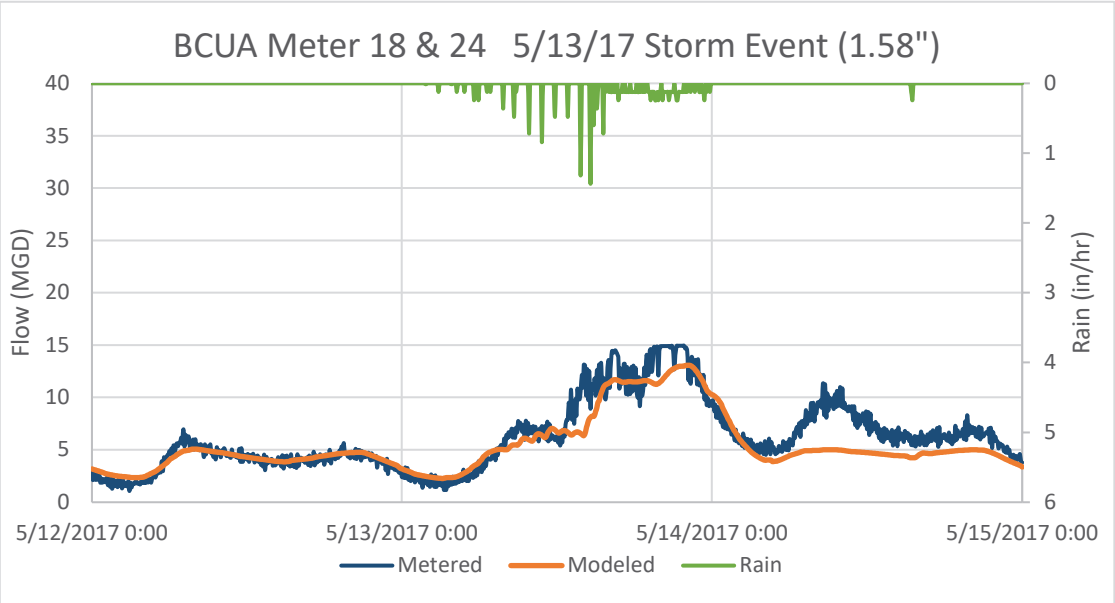
Part 2. Model Validation Plots

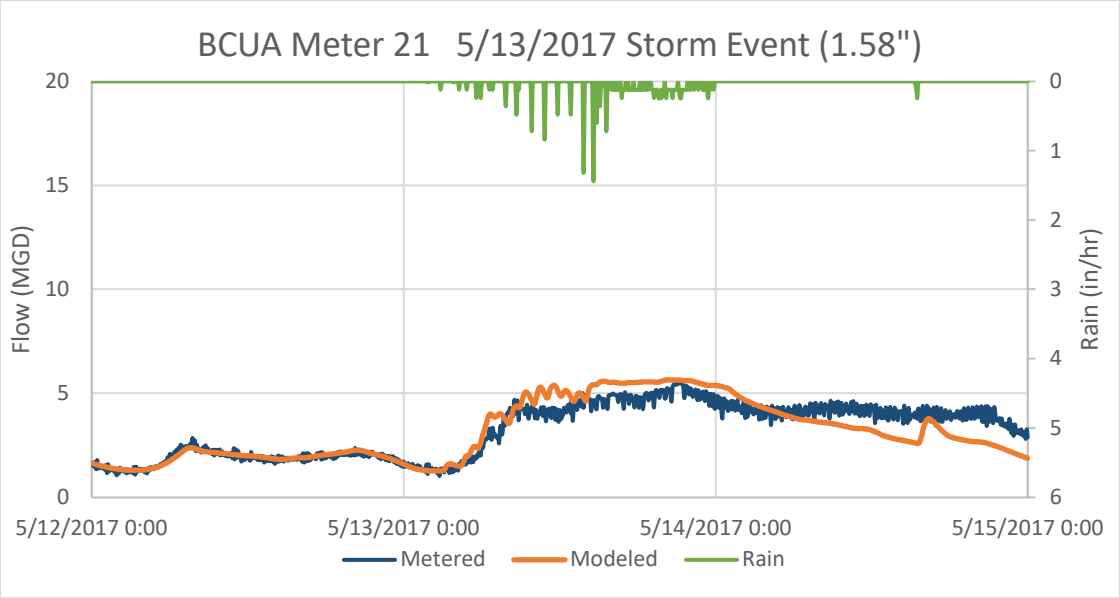


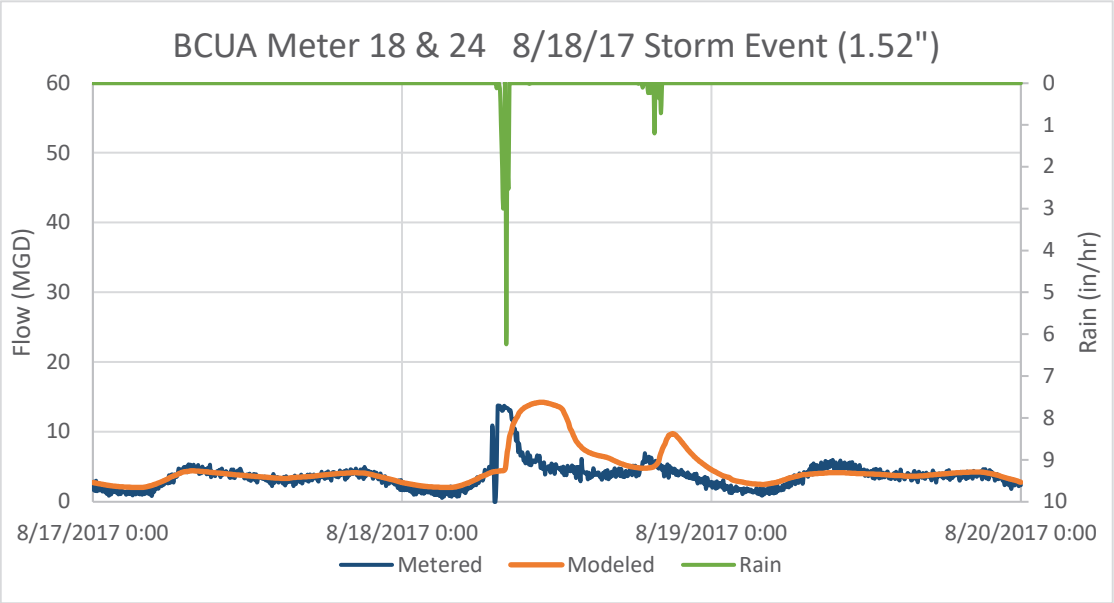


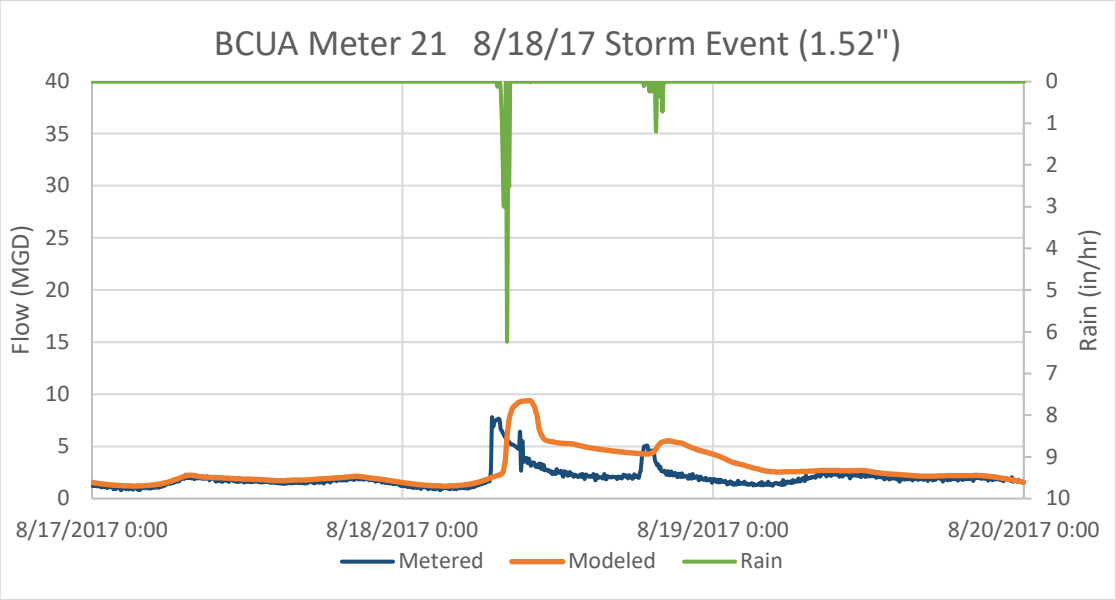

BCUA Meter 18 & 24 5/5/17 Storm Event (3.21")
Flow (MGD)
Rain (in/hr)
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
5/5/2017 0:00
5/6/2017 0:00
5/7/2017 0:00
Metered
Modeled
Rain

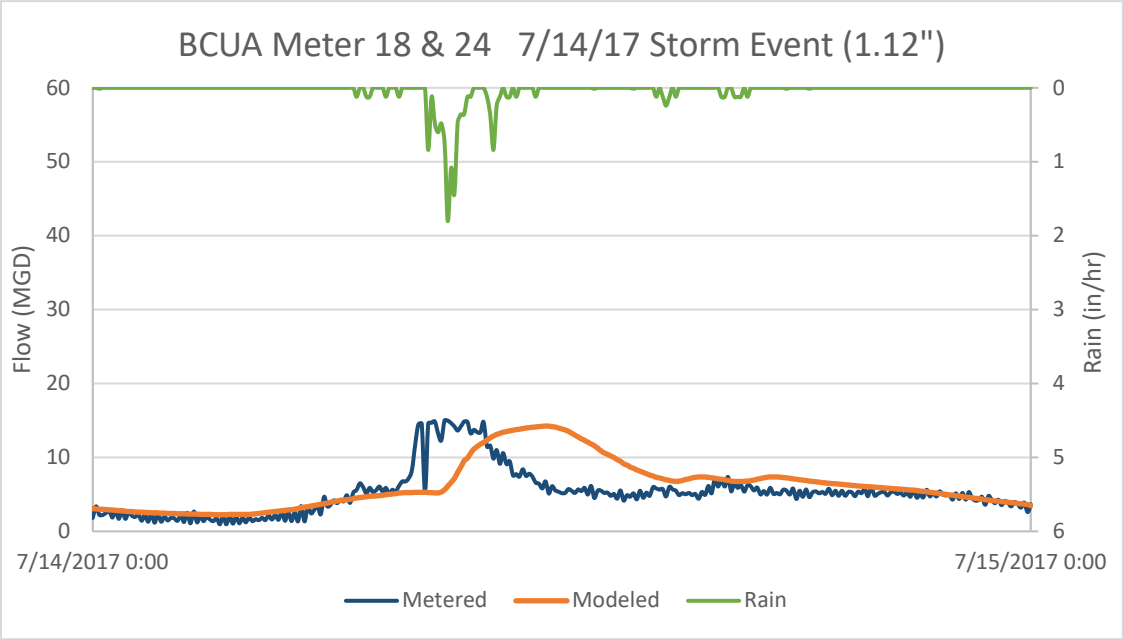

BCUA Meter 21 5/5/17 Storm Event (3.21")
Flow (MGD)
Rain (in/hr)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
5/5/2017 0:00
5/6/2017 0:00
5/7/2017 0:00
Metered
Modeled
Rain

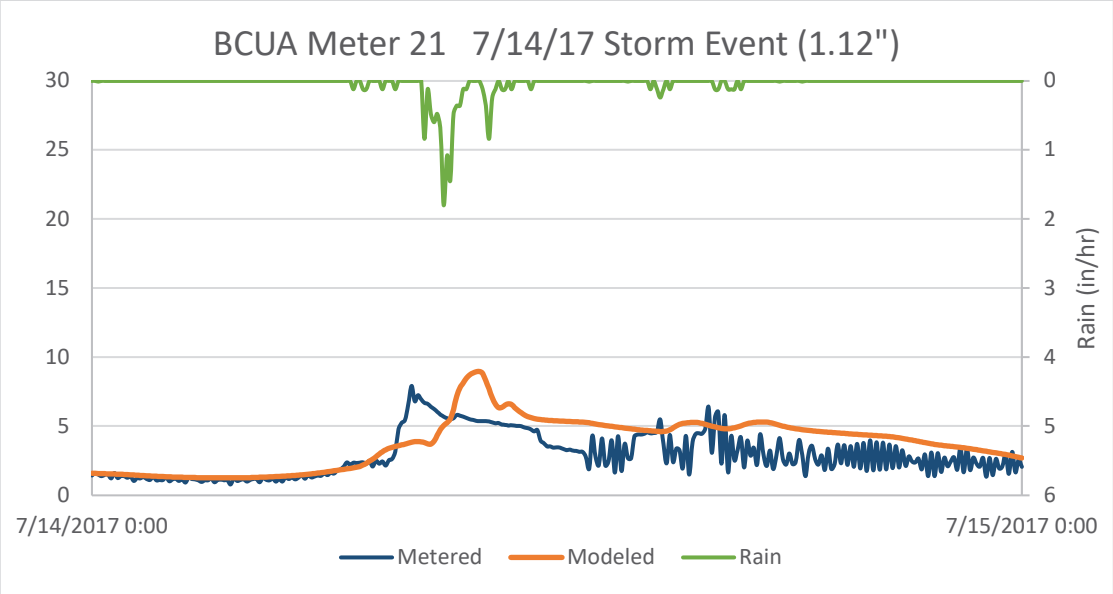

BCUA Meter 18 & 24 5/13/17 Storm Event (1.58")
Flow (MGD)
Rain (in/hr)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
5/12/2017 0:00
5/13/2017 0:00
5/14/2017 0:00
5/15/2017 0:00
Metered
Modeled
Rain

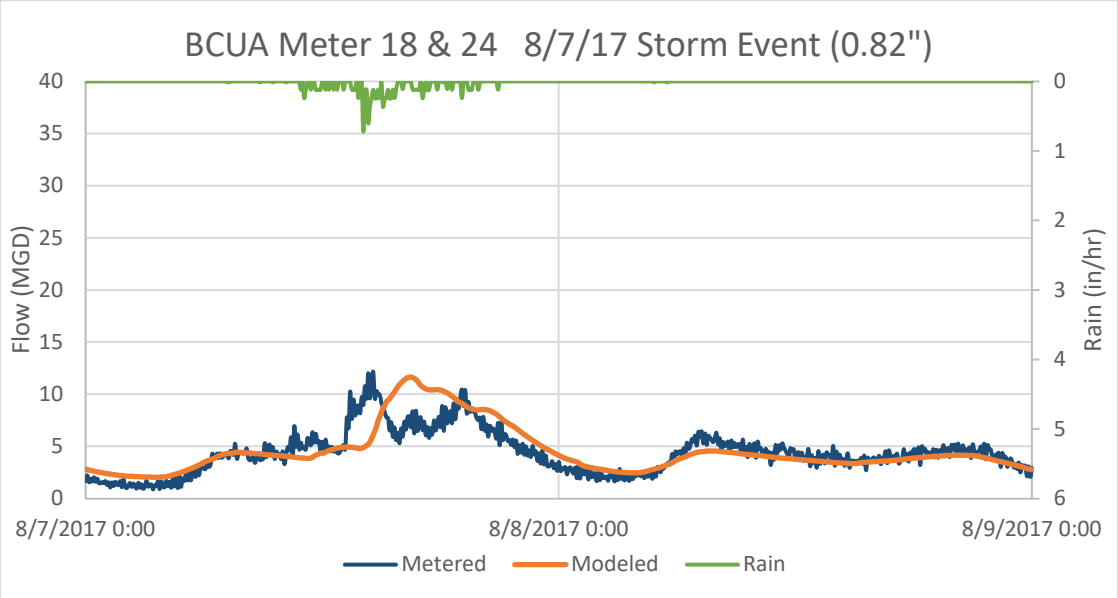

BCUA Meter 21 5/13/2017 Storm Event (1.58")
Flow (MGD)
Rain (in/hr)
20
15
10
5
0
0
1
2
3
4
5
6
5/12/2017 0:00
5/13/2017 0:00
5/14/2017 0:00
5/15/2017 0:00
Metered
Modeled
Rain

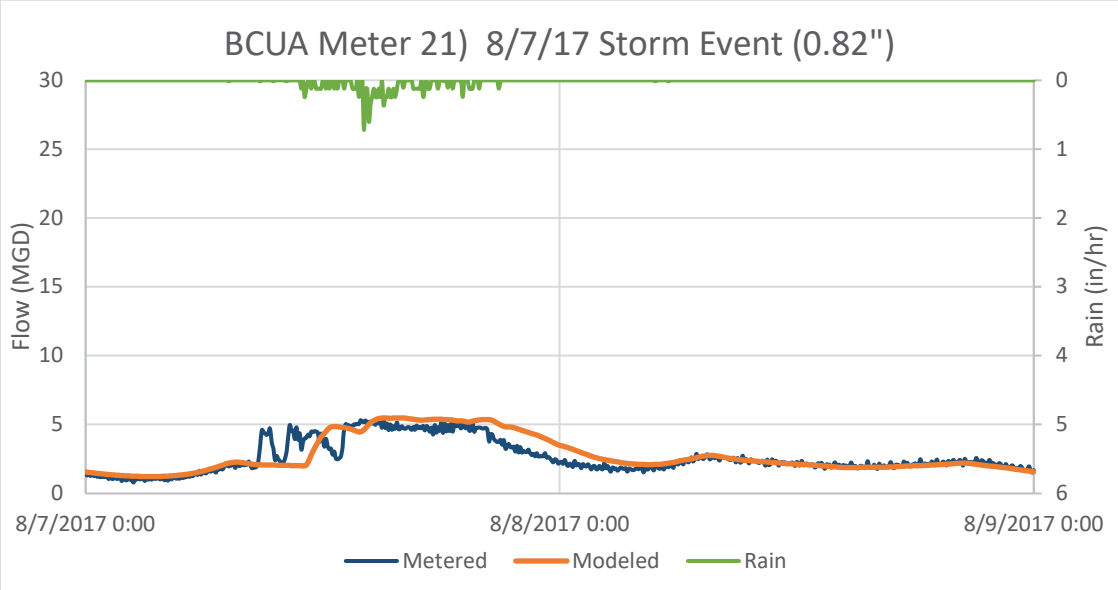

BCUA Meter 18 & 24 8/18/17 Storm Event (1.52")
Flow (MGD)
Rain (in/hr)
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
8/17/2017 0:00
8/18/2017 0:00
8/19/2017 0:00
8/20/2017 0:00
Metered
Modeled
Rain

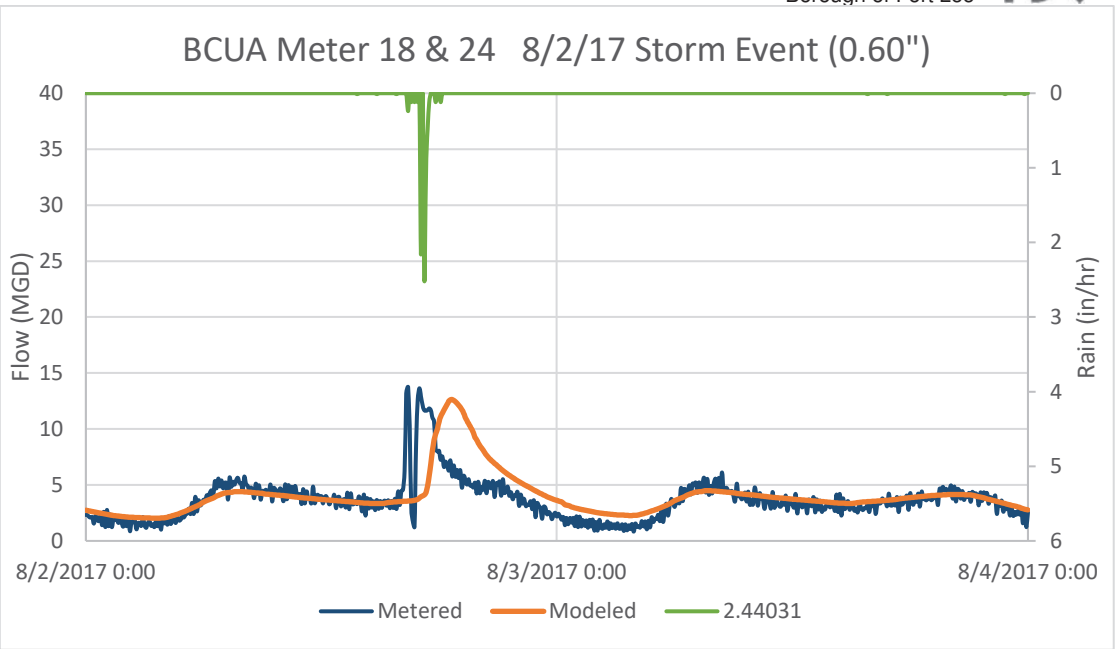

BCUA Meter 21 8/18/17 Storm Event (1.52")
Flow (MGD)
Rain (in/hr)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
8/17/2017 0:00
8/18/2017 0:00
8/19/2017 0:00
8/20/2017 0:00
Metered
Modeled
Rain

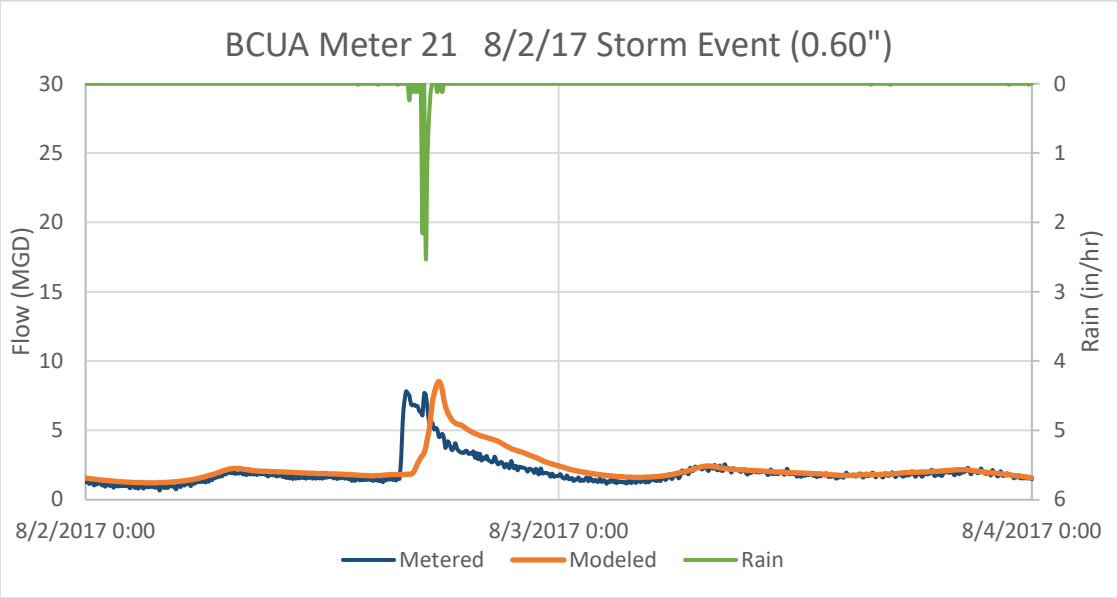

BCUA Meter 18 & 24 7/14/17 Storm Event (1.12")
Flow (MGD)
Rain (in/hr)
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7/14/2017 0:00
7/15/2017 0:00
Metered
Modeled
Rain


BCUA Meter 21 7/14/17 Storm Event (1.12")
Rain (in/hr)
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7/14/2017 0:00
7/15/2017 0:00
Metered
Modeled
Rain


BCUA Meter 18 & 24 8/7/17 Storm Event (0.82")
Flow (MGD)
Rain (in/hr)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
8/7/2017 0:00
8/8/2017 0:00
8/9/2017 0:00
Metered
Modeled
Rain


BCUA Meter 21) 8/7/17 Storm Event (0.82")
Flow (MGD)
Rain (in/hr)
30
25
20
15
10
5
0
0
1
2
3
4
5
6
8/7/2017 0:00
8/8/2017 0:00
8/9/2017 0:00
Metered
Modeled
Rain


BCUA Meter 18 & 24 8/2/17 Storm Event (0.60")
Flow (MGD)
Rain (in/hr)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
8/2/2017 0:00
8/3/2017 0:00
8/4/2017 0:00
Metered
Modeled
2.44031


BCUA Meter 21 8/2/17 Storm Event (0.60")
Flow (MGD)
Rain (in/hr)
30
25
20
15
10
5
0
0
1
2
3
4
5
6
8/2/2017 0:00
8/3/2017 0:00
8/4/2017 0:00
Metered
Modeled
Rain

21. Appendix G – Fort Lee Financial Capabilities Assessment

Financial Capabilities Assessment for the Borough of Fort Lee New Jersey

1.0 Purpose

The Environmental Protection Agency (EPA) has implemented a series of Combined Sewer Overflow (CSO) policies. One such policy is the Guidance for Financial Capability Assessment and Schedule Development. The goals of this policy is to provide a planning tool for evaluating the financial resources a permitee (the Borough) has available in the form of affordability and financial capability to implement the CSO controls. The second goal is to assist the permitee and other responsible agencies in developing CSO control implementation schedules. The approach developed by the EPA was designed to reflect and incorporate a similar approach used by bond ratings agencies.

2.0 Approach

The EPA approach is a two phase approach with each phase utilizing available financial, economic and socioeconomic information. Phase 1, the Residential Indicator involves breaking down the cost of the CSO control program into a cost per household. The results of Phase 1 calculate a low, mid or high financial impact on households. Phase 2 of the assessment evaluates the impact on debt, socioeconomic and financial conditions that may impact the permittee's capability to implement the CSO controls.

The estimated cost for the CSO control program is $24,370,000 with annual operation and maintenance costs of $128,670.

2.1 Phase 1

Phase 1 begins with a breakdown of current wastewater treatment costs. Using 2019 cost data, the Borough provided the annual operations and maintenance costs of $7.5 million and debt totaling $3.2 million for a total of $10.7 million for 2019. Next annualized operations and maintenance and debt service for CSOs was estimated at $2.6 million per year . Combining the existing wastewater treatment cost with CSO costs total gives us $13.3 million per year. This total was then multiplied by the estimated percent residential flow of 37.5% to equal $5 million. Percent residential flow was estimated to be 3.15 Million Gallons per Day (MGD) compared to total flow of 8.39 MGD which was provided by the Borough. This value is then divided by the number of households in the service area of 17,004 provides the cost per household of $294 per year. Table 1 provides breakdown of the cost per household.

Table 1 - Phase 1 Step 1 Cost per Household Calculation

Description	Value
Wastewater Treatment Costs	$10,692,111
CSO Annual Costs (debt service and operations & maintenance)	+ $2,610,809
Total Wastewater Cost including CSO	= $13,302,919
% Residential Flow (3.15 MGD residential / 8.39 MGD total flow)	X 37.5%
Residential Wastewater Treatment Costs	= $4,990,731
Households in Wastewater Treatment Service area	/ 17,004
Cost per Household	= $294 per year

The next step of the Phase 1 calculation establishes the percent wastewater treatment costs including CSO by the median household income. The 2018 Median Household Income (MHI) was taken from the 2018 American Community Survey which equaled $78,093 then was multiplied by 1.0368 which is 1 plus the 5 year average Consumer Price Index (CPI) 1.82% squared. Table 2 provides the calculation of annual wastewater treatment including CSO as a percent of median household income.

Table 2- Phase 1 Step 2 Residential Indicator Calculation

Description	Value
Median Household Income (2018)	$78,093
MHI Adjustment Factor (1+ 5 year average CPI ^2)	X 1.0368
Adjusted Median Household Income (2020)	= $80,964
Wastewater Treatment Cost per Household	$294 per year
Adjusted Median Household Income (2020)	/ $80,964
Annual Wastewater and CSO cost as % of Median household income	= 0.36%

The end result of the Phase 1 FCA is that the cost of sewer service with the proposed CSO improvements represent 0.36% of a median household within the Borough which is $80,964 per year. This is a relatively low figure when you consider a high burden on a household is assumed to be above 2.0%.

2.2 Phase 2

Phase 2 to establish 6 economic indicators that combine to equal the overall phase 2 score. These economic indicators are:

1. City's bond rating - The bond rating is the first indicator and is simply the Boroughs bond rating. The Borough's last bond rating was done by Moody's in 2012 and was an AA2 at that time.
2. Debt as a percent of market value – debt from the Borough and any other overlapping jurisdiction equaling $118 million and divided by the market value of the property within the Borough which was $6.5 Billion. The result of this calculation was 1.80.
3. Unemployment rate – the unemployment rate is simply the unemployment rate of the Borough which was 2.3% and was sourced from the Bureau of Labor Statistics.
4. Median household income – This calculation uses the adjusted median household income of $80,964 calculated in phase 1 and compares it to the national average which was $60,293.
5. property tax as a percent of full market property value – The Borough's property tax revenue $65 million divided by Market value of property in the Borough of $6.5 billion
6. Property tax revenue collection rate – Property tax collected of $6.5 million divided by property tax levied of $66 million equaling 99%.

Each of the above economic factors are assigned a corresponding score between 1 and 3, where 1 is the weakest and 3 is the strongest. Table 3 below provides the score for each of the 6 factors.

Table 3 – Phase 2 Score Ranges for Indicators

Indicator	Strong	Mid-Range	Weak
Score	3	2	1
Bond Rating	AAA-A (S&P) or Aaa-A (Moody's)	BBB (S&P) Baa (Moody's)	BB-D (S&P) Ba-C (Moody's)
Overall Net Debt as a Percent of Full Market Property Value	Below 2%	2% - 5%	Above 5%
Unemployment Rate	More than 1 Percentage Point Below the National Average	± 1 Percentage Point of National Average	More than 1 Percentage Point Above the National Average
Median Household Income	Morethan 25% Above Adjusted National MHI	± 25% of Adjusted National MHI	More than 25% Below Adjusted National Average MHI
Property Tax Revenue as a Percent of Full Market Property Value	Below 2%	2% - 4%	Above 4%
Property Tax Collection Rate	Above 98%	94% - 98%	Below 94%

The results of the phase 2 indictor calculations now complete are given a numerical score based on the criteria provide in table 3. Table 4 provides the scores for the individual criteria as well as the overall phase 2 score of 2.8 out of a possible 3.

Table 4 – Result of the Borough's Phase 2 Financial Condition Assessment

Indicator	Calculated Value	Score
Bond Rating	AA2	3
Overall Net Debt as a Percent of Full Market Property Value	1.80	3
Unemployment Rate	2.3	3
Median Household Income	$80,964	2
Property Tax Revenue as a Percent of Full Market Property Value	0.99	3
Property Tax Revenue Collection Rate	98.63	3
Permittee Indicator Score (Sum of Column B / Number of Entries)		2.8

The results of the second phase of the FCA show that the Borough has a good economic and financial position. The Borough government is not overly burdened with debt and the residents are not overly burdened with taxes. Overall phase 2 shows that the Borough is well positioned if they were to have to issue debt to fund the CSO improvements.

3.0 Results

The final step in this calculation is to combined phase 1 and phase 2 calculations to provide the Borough's total FCA score. Table 5 shows the scoring matrix for the overall result of the financial condition assessment.

Table 5 – Overall Scoring Matrix Ranges

Permittee Financial Capability Indicator Score (Socioeconomic, Debt, and Financial Indicators)	Residential Indicator (Cost Per Household as a % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

When bringing the phase 1 and 2 results together shows that the Borough CSO improvements is estimated be a low burden on the community. Table 6 provides the results of the financial condition assessment.

Table 6 – Overall Phase 1&2 Financial Condition Assessment Score

Residential Indicator Score (horizontal axis from Table 5)	0.4
Permittee Financial Capability Indicators Score (vertical from Table 5)	2.8
Financial Capability Matrix Category	Low Burden

The result of Low Burden for the financial condition assessment indicate that the Borough residents have the capacity to pay for the debt necessary for the CSO improvements. The Guidance for Financial Capability Assessment and Schedule Development states that a permittee in the low burden category such as the Borough would be expected to implement the CSO control projects based on normal engineering and construction schedule and should be considered a high priority for the permittee. As the level of burden increases the amount of time to complete the CSO controls, such as a medium burden score might have as much as 10 years to complete the controls. The actual time frame for implementing the CSO controls is to be negotiated by the permittee and the EPA. The EPA might also consider other factors when negotiating a schedule for completion of the CSO controls such as the time to complete engineering and construction, impact on sensitive areas and financing availability.

4.0 Potential Impacts of the COVID-19 Pandemic on Affordability

The projections and conclusions concerning the affordability of the CSO control program proposed in this SIAR by the Fort Lee's financial capability to finance the CSO control program are premised on the baseline financial conditions of Fort Lee as well as the economic conditions in New Jersey and the United States generally at the time that work on this SIAR commenced. While the impacts of the pandemic on the long-term affordability of the CSO LTCP are obviously still unknown, it is reasonable to expect that there will be impacts, potentially significant impacts. There are several dimensions to these potential impacts, including both potentially reduced utility revenues, and potentially reduced household incomes.

4.1 Potential Wastewater Utility Revenue Impacts

This Financial Capability Assessment cannot reflect the currently unknowable impacts on wastewater utility revenues stemming from the national economic upheaval resulting from the COVID-19 pandemic. It is however extremely likely that Fort lee and municipal wastewater utilities in general across the United States will face significant and potentially permanent declines in revenues from households unable to pay their water and sewer bills and the sudden decline in industrial and commercial demands for potable water and wastewater treatment.

On March 20, 2020 the National Association of Clean Water Agencies (NACWA) issued a press release stating that:

> **"NACWA conservatively estimates the impact to clean water utilities nationwide of lost revenues due to coronavirus at $12.5 Billion.** This isa low-end estimate, assuming an average loss of revenue of 20% which is well within the range of what individual utilities are already projecting. Some utilities are anticipating closer to a 30% or 40% loss in revenue. This estimate is based on the substantial historical utility financial data NACWA has on file through its Financial Survey and recent reports from NACWA

members on the decrease in usage they are observing in their systems over the last few weeks."[1]

The impact of a 20% to 40% revenue loss, along with increased costs that have been and will continue to be experienced by water and wastewater utilities such as overtime and the writing off of customer accounts receivable could have a profound impact on the affordability of the proposed CSO controls and Fort Lee's ability to finance them.

Most of the costs of a municipal wastewater system are relatively fixed within broad operating ranges. Debt service and other capital costs are fixed once incurred. Some operating costs are somewhat variable with wastewater flows, e.g. chemical and electrical power usage but this variability is lessened by the reality that inflow, infiltration and stormwater flow in a combined system are not affected by billed water consumption. Labor costs are not directly variable, e.g. a twenty percent reduction in billed flow would not result in a need for twenty percent less labor. Maintenance costs might go down somewhat as equipment operating times may be reduced.

As costs do not decline proportionately to billed flow, it can be expected that user charge rates must be raised to generate sufficient revenue to sustain current operations. The relationship between changes in costs and revenues and the resultant changes in user charge rates is complex and has not yet been fully analyzed. At this point it can be assumed that user rate increases may be necessary to simply maintain current operations, and these rate increases will likely erode the financial capability of Fort Lee to fund the CSO LTCP.

4.2 Potential Median Household Income Impacts

The impacts of the pandemic on median household incomes in Fort Lee cannot be determined at this point. Historical analogies may provide some useful, albeit disturbing, context but are not presented as predictive:

- U.S. median household income fell by 6.2% from $53,000 in 2007 to $49,000 in 2010. In New Jersey, the MHI decreased by around 4.0% for the same period.[2]
- The U.S. unemployment rates rose from 5.0% in December of 2007 to 9.9% in December of 2009.[3]
- Data on impacts of the Great Depression on median household income are not available. As a proxy, the personal income per capita data are available. For 1929 this was $700. By 1933 this figure bottomed out at $376, a decline of 46%. Unemployment for the same period rose from around 3.0% to 25%.[4]

While a quantifiable assessment of the impact of the pandemic on median household income is not feasible at this time, reduction in base year MHI can be expected. This will further exacerbate the impacts of the revenue reductions described above on LTCP affordability, as higher base user charge rates will absorb an increased portion of lower MHI.

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1 NACWA press release: Coronavirus Impacting Clean Water Agencies; Local Utilities and Ratepayers Need Assistance March 20, 2020

2 Source: Fact Sheet: Income and Poverty Across the States, 2010 Joint Economic Committee, United States Congress, Senator Robert P. Casey, Jr. Chairman.

3 Source: Bureau of Labor Statistics data series LNS1400000

4 Source: Federal Reserve Economic Data (FRED) data series: A792RC0A052NBEA

4.3 Implications for the Long Term CSO Control Program

Fort Lee anticipates that the financial implications of the COVID-19 pandemic will be discussed with NJDEP during the review of the SAIR and as the 2021 – 2025 NJPDES permit is developed. Based on the October 1, 2020 revised due date for the SIAR, additional revenue data should be available to support a more specific refinement of this analysis in the SIAR.

Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, Fort Lee will be reticent to commit to long term capital expenditures for CSO controls without the incorporation of adaptive management provisions, including provisions to revise and reschedule the long term CSO controls proposed in this SIAR based on emergent economic conditions beyond Fort Lee's control. As detailed in Section F of Fort Lee's SIAR these provisions could include scheduling the implementation of specific CSO control measures to occur during the five year NJPDES permit cycles. A revised affordability assessment should occur be performed during review of the next NJPDES permit to identify controls that are financially feasible during that next permit period.

22. Appendix H – Hackensack Financial Capabilities Assessment

ARCADIS Design & Consultancy for natural and built assets

City of Hackensack, New Jersey

FINANCIAL CAPABILITY ASSESSMENT

September 25, 2020

FINANCIAL CAPABILITY ASSESSMENT

FINANCIAL CAPABILITY ASSESSMENT

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September 25, 2020

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ACRONYMS AND ABBREVIATIONS

Arcadis	Arcadis U.S., Inc.
BCUA	Bergen County Utilities Authority
CBO	Congressional Budget Office
City	City of Hackensack, New Jersey
CSO	Combined Sewer Overflow
CPI	Consumer Price Index
CPH	Costs per Household
ECI	Employment Cost Index
FY	Fiscal Year
GPD	Gallons per Day
HBI	Household Burden Indicator
LTCP	Long-Term Control Plan
MHI	Median Household Income
MG	Million Gallons
NJIB	New Jersey Infrastructure Bank
NJPDES	New Jersey Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PPI	Poverty Prevalence Indicator
USEPA	United States Environmental Protection Agency

FINANCIAL CAPABILITY ASSESSMENT

EXECUTIVE SUMMARY

This Report was prepared by Arcadis U.S., Inc. (Arcadis) for the City of Hackensack (City) in accordance with New Jersey Pollutant Discharge Elimination System (NJPDES) Permit NJ0108766 sections D.3.b.vi and G.8.c. for the Report on Selection and Implementation of Alternatives for the Long-term Control Plan and focuses on the financial capability assessment.

The specific objectives of this Report included 1) developing annual wastewater costs per household, 2) developing the residential indicator, 3) completing a financial assessment of permittee financial indicators, 4) developing a financial plan to project sewer-related impacts on the City's customers, and 5) completing a household affordability assessment.

A financial capability assessment was completed in accordance with the February 1997 United States Environmental Protection Agency (USEPA) guidance document – "CSO Guidance for Financial Capability Assessment and Schedule Development". The USEPA recognizes that the implementation and scheduling of a combined sewer overflow (CSO) long-term control plan (LTCP) directly influences a community's ability to afford any proposed improvements. The financial capability assessment measures the capability of the utility and community to pay for a proposed LTCP in addition to other operation and maintenance (O&M) costs and any existing or planned capital improvements.

The USEPA guidance document outlines a two-phased process for assessing the financial capability to fund a LTCP. Phase I of the analysis assesses residential customer financial capability as measured by the Residential Indicator. The Residential Indicator is calculated by dividing the total projected residential cost by the median household income (MHI). If the costs are at or above one percent of the MHI, a Phase II analysis is completed. The Phase II analysis assesses the community's financial capacity (i.e., financial strength and financing capacity) to implement the LTCP.

Based on the Phase I analysis, the Residential Indicator was calculated to be 1.1 percent.

Based on the Phase II analysis, the City has an overall financial capability indicator score of 2.5 which corresponds to a "Mid-Range" financial capability indicator rating based on the USEPA methodology.

The results of the Residential Indicator from Phase I and the financial capability indicators assessments from Phase II were combined into a Financial Capability Matrix to evaluate the level of financial burden that sewer, stormwater and LTCP costs may impose on the City. The Financial Capability Matrix is shown in Table 1.

Table 1. Financial Capability Matrix Score

Financial Capability Indicators Score (Socioeconomic, Debt and Financial Indicators)	Residential Indicator		
	Low (Less than 1.0%)	Mid-Range (1.0% - 2.0%)	High (Greater than 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (1.5 – 2.5)	Low Burden	**Medium Burden**	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

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The EPA's Guidance for Financial Capability Assessment and Schedule Development provides the ability to present "any additional documentation that would create a more accurate and complete picture of their financial capability." Therefore, it is relevant and appropriate to examine and present other criteria that provides a more complete assessment of the City's ability to afford the LTCP and documentation to understand the impact of a 30-year implementation period of the LTCP. Arcadis incorporated analyses that are included in the "Developing a New Framework for Household Affordability and Financial Capability Assessment in the Water Sector" prepared for the American Water Works Association, National Association of Clean Water Agencies and Water Environment Federation.

The average annual residential water and sewer-related expenses were added together for the total water sector costs and used for the household affordability assessment. To analyze the impact of increasing total water sector costs, total water sector costs as a percentage of the lowest quintile income distribution for the City were calculated. A quintile is considered twenty percent or 1/5th of a range of data divided into five equal parts. The costs as a percentage of the lowest quintile income distribution is the household burden indicator (HBI) and varies between 3.9 and 5.7 percent for the City.

Another pertinent socio-economic indicator are poverty levels within a community. The poverty prevalence indicator (PPI) is calculated by dividing the household designated as 200 percent of the poverty level with the population for whom poverty status is determined. The City's PPI was calculated to be 32 percent.

The results of the HBI and PPI were combined into a Household Affordability Matrix to assess the level of impact total water sector costs have on residential customers within the City. The Household Affordability Matrix for the City is shown in Table 2.

Table 2. Household Affordability Matrix Score

HBI - (Total Water and Sewer Costs as a Percent of Income at Lowest Quintile)	**PPI** – Percent of Households Below 200% of PL		
	Greater than or equal to 35%	20% to 35%	Less than 20%
Greater than or equal to 10%	Very High Burden	High Burden	Moderate - High Burden
7% to 10%	High Burden	Moderate - High Burden	Moderate - Low Burden
Less than 7%	Moderate - High Burden	**Moderate - Low Burden**	Low Burden

The results of the financial capability and housing affordability assessment indicate the following:

1. Based on a "Mid-Range" financial impact Residential Indicator of 1.1 percent and a "Mid-Range" Financial Capability Indicator score of 2.5, the City's financial capability matrix score is estimated as "Medium Burden". This indicates that the proposed LTCP implemented over a 30-year period to control CSOs would be a medium burden on the City and its customers.

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2. Based on a HBI score of less than 7 percent and a PPI score of 32 percent, the City's household affordability matrix score is estimated as "Moderate - Low Burden". This indicates that the proposed LTCP implemented over a 30-year period to control CSOs would be a moderate - low burden on the City and its customers.
3. A revenue requirement forecast was created to model the cash flow impact due to the City's sewer-related expenses as the LTCP is implemented over a 30-year forecast period. The projected percentage increases were applied to the estimated sewer-related expense for a residential customer. The residential sewer-related expense as a percentage of MHI shows a medium burden, and the residential sewer-related expense as a percentage of the lowest quintile income shows a high burden for these customers beginning in 2032.

FINANCIAL CAPABILITY ASSESSMENT

1 INTRODUCTION

1.1 Objectives and Scope

This Report was prepared by Arcadis for the City in accordance with NJPDES Permit NJ0108766 sections D.3.b.vi and G.8.c. for the Report on Selection and Implementation of Alternatives for the Long-term Control Plan and focuses on the financial capability assessment.

The specific objectives of this Report included 1) developing annual wastewater costs per household, 2) developing the residential indicator, 3) completing a financial assessment of permittee financial indicators, 4) developing a financial plan to project sewer-related impacts on the City's customers, and 5) completing a household affordability assessment.

The objectives were completed using data provided by the City. Several assumptions were made when completing the financial capability assessment and building the financial plan based on the experience and input of City staff, and Arcadis' experience with performing financial capability assessments.

1.2 Background

The NJPDES Permit for Combined Sewer Management requires a report on the development and evaluation of alternatives for long-term control of combined sewer overflow. The final selection of recommended alternatives will be a collaborative effort between the City, Ridgefield Park, Fort Lee, New Jersey Department of Environmental Protection, Bergen County Utilities Authority (BCUA) and Passaic Valley Sewerage Commission. The financial capability assessment contained herein is provided as a component of the report on selection.

2 USEPA FINANCIAL CAPABILITY ASSESSMENT

A financial capability assessment was completed in accordance with the February 1997 USEPA guidance document – "CSO Guidance for Financial Capability Assessment and Schedule Development". The USEPA recognizes that the implementation and scheduling of a CSO LTCP directly influences a community's ability to afford any proposed remediation activities. The financial capability assessment measures the capability of the utility and community to pay for a proposed LTCP in addition to other O&M costs and any existing or planned capital improvements.

The USEPA guidance document outlines a two-phased process for assessing the financial capability to fund a LTCP. Phase I of the analysis assesses residential customer financial capability as measured by the Residential Indicator. The Residential Indicator is calculated by dividing the total projected residential cost by the MHI. If the costs are at or above one percent of the MHI, a Phase II analysis is completed. The Phase II analysis assesses the community's financial capacity (i.e., financial strength and financing capacity) to implement the LTCP.

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2.1 USEPA Phase I – The Residential Indicator

The Residential Indicator (residential customer cost as a percentage of MHI) was calculated by first determining the total cost for the City sewer system. A portion of the total cost was then allocated to residential customers based on the percentage of estimated total flow generated from these customers. Finally, the total residential cost was allocated among the total number of households in the community to determine the sewer and stormwater costs per household (CPH) including LTCP costs. Once the CPH was estimated, the Residential Indicator was calculated by dividing the CPH by the MHI of the community. The Residential Indicator was then compared to the USEPA defined criteria for classifying the financial impacts as "Low," "Mid-range" or "High" as shown in Table 3.

Table 3. USEPA Residential Indicator Financial Impacts

Financial Impact	Residential Indicators (Costs as a Percentage of MHI)
Low	Less than 1.0 percent
Mid-Range	1.0 percent – 2.0 percent
High	Greater than 2.0 percent

2.1.1 Current and Projected Sewer Treatment Costs

The USEPA defines current sewer treatment costs as the current annual O&M expenses (excluding depreciation) plus current annual debt service payments (principal and interest) and capital expenditures. These costs are intended to represent the cash expenditures of current sewer collection and treatment operations. Capital expenses, including debt service and capital outlay, are considered in the assessment since they represent a cash cost associated with designing and constructing capital improvements for the sewer system.

The projected capital costs consist of sewer system and storm water capital projects as well as the LTCP capital costs. Proposed sewer system and storm water capital projects are estimated to be approximately $7M. The LTCP capital costs are estimated to be approximately $101M for the wastewater utility and CSO control-related projects. Total capital costs consist of approximately $108M for the sewer and storm water system over 30 years.

Total current and projected annual wastewater treatment and LTCP costs are summarized in Table 4. Lines 1 through 3 reflect the current sewer system and storm water costs. Lines 4 through 7 reflect the projected additional sewer system and storm water costs. The total current and projected costs are shown on Line 8.

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Table 4. Current and Projected Annual Sewer Treatment and LTCP Costs

Line No.	Description	Amount
	Fiscal Year (FY) 2020 Projected Sewer Costs:	
1	O&M Expenses	$7,456,080
2	Debt Service	285,392
3	Subtotal (Lines 1 through 2)	$7,741,472
	Projected Sewer Costs:	
4	Incremental O&M Expenses	$1,690,000
5	Other Capital Costs – Estimated Cash Capital	332,677
6	Debt Service	7,142,659
7	Subtotal (Lines 4 through 6)	$9,165,336
8	Total Current and Projected Sewer and LTCP Costs	$16,906,808

Annual incremental O&M expenses associated with future capital improvements are shown on Line 4. The projected other capital costs are reflected on Line 5. This represents cash that can be used for future capital projects and was estimated based on the twenty-year average of sewer and storm water capital project cost not included in the LTCP. The projected annual debt service amount is reflected on Line 6. This annual amount was estimated by amortizing future capital improvement costs of $108M over a 20-year period with a 2.85 percent annual interest rate. It should be noted that because of the COVID-19 pandemic, the financing options may be altered. There is a lot of uncertainty and unknowns regarding the opportunities for available funding at the time of this Report. Therefore, the local bond rate of 2.85 percent was utilized as provided by the City.

2.1.2 Annual Residential Cost per Household

The current and projected sewer system and storm water costs were proportioned to residential customers in order to estimate the residential share of these costs. Water billing data was not available to Arcadis, therefore, we developed an estimate of customer class water usage using population estimates and average, per capita water usage estimates. The estimated residential usage, compared to estimated usage for commercial and industrial classes was determined and used to proportion the residential share of costs.

The residential usage was estimated by multiplying 18,817 households (U.S. Census Bureau) by an average number of persons per household, which was estimated to be 2.3 persons. This results in approximately 43,000 persons. Arcadis used an estimate of 70 gallons per day (gpd) for the typical person to derive an estimate of annual residential usage of approximately 1.1 billion gallons per year. A 70 percent (residential) to 30 percent (commercial and industrial) usage split was used to estimate the total water usage and associated usage for commercial and industrial customers. Arcadis' also incorporated an estimate of infiltration and inflow applicable to residential, commercial, and industrial

customers to approximate the annual, total wastewater flow to BCUA from the City, which as seen below in Table 5 is consistent with a review of sewer-related expenses from BCUA to the City. Table 5 reflects the FY 2020 resulting estimated percentage of costs applicable to the City's residential customers.

Table 5. Sewer Flow Characteristics and Percent Flow Calculation

Customer Class	Annual Flow Including I/I (MG)	Percentage
Residential	1,947	76%
Commercial and Industrial	622	24%
Total to BCUA	2,569	100%

For the purpose of this financial capability analysis, 76 percent of total sewer system and storm water costs were allocated to the residential customer class. The number of households in the City are 18,817. The estimated residential cost share and the cost per household are shown in Table 6.

Table 6. Sewer Annual Residential Cost per Household

Total Annual Cost	Residential Cost	Households	Residential CPH
$16,906,808	$12,815,360	18,817	$681.05

2.1.3 Median Household Income

The U.S. Census Bureau 2017 5-year estimate was used for MHI. Based on the available data, the estimated MHI value for 2017 was approximately $57,562. This value was escalated to a 2020 value of $62,215 using an inflation rate of 1.6 percent. The inflation rate was based on a 10-year historical average of the consumer price index (CPI) for the New York/New Jersey region of the U.S.

2.1.4 Residential Indicator

The Residential Indicator (residential cost as a percentage of MHI) was calculated by first determining the total cost of the sewer and storm water system. A portion of the total cost was then allocated to residential customers based on the percentage of total flow generated from these customers. Finally, the total residential cost was allocated among the total number of households in the community to determine the sewer system and storm water CPH, which is shown in the previous table. Once the CPH was estimated, the Residential Indicator was calculated by dividing the CPH by the MHI of the community. The Residential Indicator was calculated to be 1.21 percent as shown in Table 7.

Table 7. Calculation of Residential Indicator

Description	Amount
Adjusted MHI	$62,215
Annual CPH	$681.05

Description	Amount
Residential Indicator (CPH as a Percentage of MHI)	1.1%

The Residential Indicator was compared to the USEPA defined criteria for classifying the financial impacts as "Low," "Mid-Range" or "High" as shown above in Table 3. This indicates the financial impact that the sewer and storm water system and LTCP costs may have on the City's residential customers and indicates a financial impact in the "Mid-Range" category.

2.2 USEPA Phase II – Permittee Financial Indicators

The USEPA guidance document states that if the Residential Indicator is greater than one percent (1 percent), Phase 2 of the analysis should be completed. Considering the City's Residential Indicator results of 1.21 percent of MHI, this subsection provides an analysis of community financial capability indicators for the City. These indicators characterize the permittee's debt burden, socioeconomic conditions, financial operations, and the ability to secure the funding necessary to implement the LTCP. Under this phase of the assessment, a financial capability index was developed based on six individual indicators. These six indicators are as follows:

- Debt Indicators
  - Bond rating
  - Overall net debt as a percentage of full market value of taxable property
- Socioeconomic Indicators
  - Unemployment rate
  - Median household income
- Financial Management Indicators
  - Property tax revenues as a percentage of full market property value
  - Property tax revenue collection rate

The USEPA has established guidelines for interpreting these indicators and their associated impact on the overall financial capability, and these guidelines are provided below.

2.2.1 Debt Indicators

Debt indicators assess the current debt burden of the community and their ability to issue additional debt to finance the proposed sewer system and storm water capital costs and LTCP projects. The indicators include bond rating and the overall net debt as a percentage of full market property value, which are discussed below.

2.2.1.1 Bond Rating

Bond credit ratings measure a community's credit worthiness and are determined by any of the three major rating agencies. The City received the credit rating of AA from Standard & Poor's (S&P) Global Ratings for a general obligation bond issue of $39.867 M in 2018.

The City's credit ratings of AA place them in the "Strong" category of USEPA's indicator ranges, as shown in Table 8.

Table 8. Bond Rating Indicator Results

Rating	S&P Global Ratings
Weak	BB+, BB-, B+, B-
Mid-Range	BBB+, BBB, BBB-
Strong	AAA, AA+, AA, AA-

2.2.1.2 Net Debt as a Percentage of Full Market Value of Taxable Property

The USEPA defines overall net debt as debt repaid by property taxes. It excludes debt that is repaid by special user fees (e.g., revenue debt). This indicator provides a measure of the debt burden on residents within the service area and provides an indication of the City's ability to issue additional debt. Net debt includes the debt issued directly by the City, as well as debt of associated or overlapping entities such as school districts. This indicator compares the level of debt owed by the City with the full market value of the real property used to support that debt and serves as a measure of financial capability.

Overall Net Debt

The overall net debt including debt for the City was $72,624,999 as of FY 2018. The overall net debt includes general obligation bonds and notes, and infrastructure and green trust loans. Debt from overlapping entities funded by tax revenues is included in the overall net debt calculation as the debt burden is carried by residents of the service area, thus reducing the availability of funds for system improvements.

Full Market Value of Taxable Property

The 2019 property tax information from the State of New Jersey Department of Community Affairs was used for the source of the City's full market value of taxable property. The property tax information was published March 4, 2020. Table 9 shows the overall net debt as a percent of full market property value for the City.

Table 9. Overall Net Debt as a Percentage of Full Market Property Value

Description	Value
Overall Net Debt	$72,624,999
Market Value of Property	$5,544,092,400
Ratio	1.3%

The City's overall net debt as a percentage of full market property value of 1.3 percent places the City in the "Strong" category, based on USEPA indictor ranges shown in Table 10.

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Table 10. Overall Net Debt as a Percentage of Full Market Property Value Benchmarks

Rating	Ratio
Weak	Above 5 percent
Mid-Range	2 percent – 5 percent
Strong	Below 2 percent

2.2.2 Socioeconomic Indicators

Socioeconomic indicators are indicators of the economic well-being of residential customers. They offer additional insight into the economic conditions of the City's service area. According to the USEPA guidance document, two socioeconomic indicators to be considered are the unemployment rate and the MHI.

2.2.2.1 Unemployment Rate

Unemployment rate (percent of service area residents who are on the unemployment rolls) for the service area was compared to the U.S. national average unemployment rate, as shown in Table 11. A ten-year average was used for both the City and U.S. unemployment rate statistics.

Table 11. Unemployment Rates

Description	Percentage
City of Hackensack	6.5%
Average U.S. National	6.3%
Difference from National	0.2%

The unemployment rate statistics show that the City's unemployment rate is similar to the national average. A comparison of the City's unemployment rate with the national average places the City in the "Mid-Range" category on this measure with its unemployment rate 0.2 percent higher than the U.S. national average, based on the USEPA indicator ranges shown in Table 12.

Table 12. Service Area Difference from National Average

Rating	Ratio
Weak	More than 1 percent above National Average
Mid-Range	+/- 1 percent of National Average
Strong	More than 1 percent below National Average

2.2.2.2 Median Household Income

The MHI is the median annual income per household. The MHI for the service area was compared to the national average MHI as a measure of community earning capacity as shown in Table 13.

Table 13. Median Household Income

Description	Amount
MHI, Service Area	$59,277
Adjusted MHI, Service Area	$62,215
Average National MHI	$57,562
Adjusted National MHI	$60,676
Percentage of Adjusted National Average	102.5%

The USEPA has established the following benchmarks for variation between national and service area MHI in the financial capability assessment. The City's service area's adjusted MHI is 102.5 percent of the adjusted U.S. MHI, which is within 25 percent of the Adjusted National Average. As shown in Table 14, the City's service area falls in the "Mid-Range" category.

Table 14. Area Difference from National Average

Rating	Ratio
Weak	More than 25 percent below National Average
Mid-Range	Within 25 percent of National Average
Strong	More than 25 percent above National Average

2.2.3 Financial Management Indicators

Two indicators are required by the USEPA to estimate overall ability to manage financial operations: property tax revenues as a percent of full market property value and property tax revenue collection rate.

2.2.3.1 Property Tax Revenues as a Percentage of Full Market Property Value

This indicator is referred to as the "property tax burden" since it indicates the funding capacity available to support debt based on the value of the service area. Property tax revenues as a percent of full market property value measures the capacity to support additional debt by the community. This figure estimates the ability of the local government to levy additional property taxes for the funding of debt service.

Note that the full market value of real property figure used in this analysis, and shown in Table 15, is the same as the one shown in Table 9.

FINANCIAL CAPABILITY ASSESSMENT

Table 15. Property Tax Revenues as a Percentage of Full Market Property Value

Description	Amount
Full Market Value of Real Property	$5,544,092,400
Property Tax Revenues	$183,167,560
Ratio	3.3%

The USEPA has established the following benchmarks for property tax revenues as a percentage of full market property value in the financial capability assessment. As shown in Table 16, the City's service area falls in the "Mid-Range" category

Table 16. Property Tax Revenues as a Percentage of Full Market Property Value Benchmarks

Rating	Ratio
Weak	Above 4 percent
Mid-Range	2 percent – 4 percent
Strong	Below 2 percent

2.2.3.2 Property Tax Revenue Collection Rate

The property tax revenue collection rate reveals inefficiencies in the tax collection system by reporting the difference between the levied tax amount and the collected tax amount. Taxes collected for previous years' assessments were included in the current year's collections. Table 17 lists FY 2018 collections.

Table 17. Property Tax Revenue Collection Rate

Description	Amount
Property Tax Revenue Collected	$183,167,560
Property Tax Levied	$183,255,295
Property Tax Collection Rate	99.952%

The USEPA has established the following benchmarks for the property tax revenue collection rate in the financial capability assessment. As shown in Table 18, the City's service area falls in the "Strong" category.

Table 18. Property Tax Revenue Collection Rate Benchmarks

Rating	Ratio
Weak	Below 94 percent
Mid-Range	94 percent – 98 percent

Rating	Ratio
Strong	Greater than 98 percent

2.2.4 Summary of Results of Financial Capability Indicators

Based on this analysis, the City has an overall Financial Capability Indicator score of 2.5 which corresponds to a "Mid-Range" financial capability indicator rating based on the USEPA methodology. The following table summarizes the financial indicators, the scores associated with each indicator and the average score for all indicators. The average score is used to determine the overall indicator score. It should be noted that USEPA's methodology assigns equal weights to each category.

Table 19. Financial Capability Indicator Score

Indicator	Actual Value	Indicator Range	Score
Bond Rating	AA	Strong	3
Overall Net Debt as a Percentage of Full Market Property Value	1.3%	Strong	3
Unemployment Rate	6.5%	Mid-Range	2
Adjusted MHI	$62,215	Mid-Range	2
Property Tax Revenues as a Percentage of Full Market Property Value	3.3%	Mid-Range	2
Property Tax Collection Rate	99.952%	Strong	3
Overall Financial Capability Indicator Score		**Mid-Range**	**2.5**

2.3 Financial Capability Matrix

Using the USEPA methodology, the results of the Residential Indicator and the Financial Capability Indicators assessments were combined into a Financial Capability Matrix to evaluate the level of financial burden that sewer and LTCP costs may impose on the City. The original purpose of the matrix in the 1997 CSO Guidance Document was to assist the utility and regulatory agencies in establishing a CSO control implementation schedule. The Financial Capability Matrix determined for the City is shown in Table 20.

Table 20. Financial Capability Matrix Score

Financial Capability Indicators Score (Socioeconomic, Debt and Financial Indicators)	Residential Indicator		
	Low (Less than 1.0%)	Mid-Range (1.0% - 2.0%)	High (Greater than 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden

FINANCIAL CAPABILITY ASSESSMENT

Financial Capability Indicators Score (Socioeconomic, Debt and Financial Indicators)	Residential Indicator		
	Low (Less than 1.0%)	Mid-Range (1.0% - 2.0%)	High (Greater than 2.0%)
Mid-Range (1.5 – 2.5)	Low Burden	**Medium Burden**	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

Based on a "Mid-Range" financial impact Residential Indicator of 1.1 percent and a "Mid-Range" Financial Capability Indicator score of 2.5, the City's financial capability matrix score is estimated as "**Medium Burden**". This indicates that the LTCP proposed to control CSOs implemented over a 30-year period would be a medium burden on the City and its customers.

3 HOUSEHOLD AFFORDABILITY ASSESSMENT

The EPA's Guidance for Financial Capability Assessment and Schedule Development provides the ability to present "any additional documentation that would create a more accurate and complete picture of their financial capability." Therefore, it is relevant and appropriate to examine and present other criteria that provides a more complete assessment of the City's ability to afford the LTCP and documentation to understand the impact of a 30-year implementation period of the LTCP. Arcadis incorporated analyses that are included in the recently released document "Developing a New Framework for Household Affordability and Financial Capability Assessment in the Water Sector" prepared for the American Water Works Association, National Association of Clean Water Agencies and Water Environment Federation. This document outlines the use of alternative analyses and metrics to gauge affordability, which includes:

1. Estimating total water sector (drinking water, wastewater, and stormwater) costs for a typical household,
2. Determining the upper boundary of the lowest quintile income,
3. Calculating the household burden indicator,
4. Calculating the poverty prevalence indicator, and
5. Developing a cash flow forecast of the revenue requirements to evaluate the impact to the residential indicator over time.

3.1 Total Water Sector Costs

The average annual residential water and sewer-related expenses were considered for the household affordability assessment. The estimated sewer-related expense is based on the costs identified in Section 2.1.2 using only capital costs proposed for 2020 instead of the entire forecast period. The estimated water-related expense is based on the typical water bill for a residential customer of SUEZ Water New Jersey. The total water sector costs are shown in Table 21.

Table 21. Annual Estimated Water Sector Costs for 2020

Description	Cost
Estimated Water-Related Expense	$622.15
Estimated Sewer-Related Expense	$346.36
Total Water Sector Cost	$968.51

3.2 Upper Boundary of Lowest Quintile Income

MHI does not represent a complete picture of financial impact amongst different populations because income levels are spread across a range of income distribution. Therefore, if the analysis of the Residential Indicator is limited to just the MHI, it only represents a limited context leaving out households in the lower income distribution. The affordability analysis using quintile distributions first compares the City's quintile distribution of income to the State of New Jersey and the United States. A quintile is considered twenty percent or 1/5th of a range of data divided into five equal parts. The comparison is shown in Table 22. The City's income distribution is lower than the State of New Jersey but is similar to the United States.

Table 22. Comparison of Income Quintile Distributions

Income Quintile	Hackensack, NJ	State of NJ	United States
Lowest Quintile	23,215	29,597	23,584
Second Quintile	46,481	59,319	45,167
Third Quintile	74,631	96,501	72,659
Fourth Quintile	117,283	154,675	116,540
Lower Limit of Top 5%	196,923	250,000	218,714

To analyze the impact of increasing total water sector costs, total current and projected water sector costs as a percentage of the quintile income distribution for the City were calculated for 2020, 2029, 2039 and 2049. The projected water sector costs as a percentage of quintile income distribution is the HBI and is shown in Table 23. The USEPA's view on the threshold of affordability for a potable water bill as percentage of income is 2.5 percent. Therefore, combined water and sewer-related expenses as a percentage of household income of 4.5 percent would be considered a high burden for a residential household.

Table 23. Total Water Sector Costs as Percentage of Quintile Income for the City

Income Quintile	2020	2029	2039	2049
Lowest Quintile	3.9%	4.3%	4.9%	5.7%
Second Quintile	2.0%	2.1%	2.5%	2.9%

Income Quintile	2020	2029	2039	2049
Third Quintile	1.2%	1.3%	1.5%	1.8%
Fourth Quintile	0.8%	0.8%	1.0%	1.1%
Lower Limit of Top 5%	0.5%	0.5%	0.6%	0.7%

HBI for the lowest quintile of income of 4.3 percent is close to the combined water and sewer threshold in 2029 and exceeds the threshold in 2039 and 2049. The households in the lowest quintile would experience a high burden in the future due to rising water and sewer-related expenses.

3.3 Poverty Prevalence Indicator

Another pertinent socio-economic indicator are poverty levels within a community. However, it should be noted that other households above the poverty level could experience similar conditions. The Affordability Assessment Tool for Federal Water Mandates states, "Indeed, various studies have emphasized that households with incomes that are significantly higher than the poverty level often experience severe hardships, including hunger, lack of needed heating and cooling, and the inability to afford medical care." The PPI is calculated by dividing the household designated as 200 percent of the poverty level with the population for whom poverty status is determined. The PPI is shown in Table 24.

Table 24. Poverty Prevalence Indicator

Poverty Information	Hackensack	State of NJ	United States
200% of Poverty Level	13,827	2,117,764	102,523,670
Population for whom Poverty Status is Determined	43,519	8,783,989	313,048,563
PPI	32%	24%	33%

In comparison to the State of New Jersey, Hackensack has a higher PPI and is similar to the PPI for the United States.

3.4 Household Affordability Matrix

Using the Developing New Framework for Affordability, the results of the HBI and PPI were combined into a Household Affordability Matrix to assess the level of impact the total water sector costs have on residential customers within the City. The Household Affordability Matrix for the City is shown in Table 25.

FINANCIAL CAPABILITY ASSESSMENT

Table 25. Household Affordability Matrix Score

HBI - (Total Water and Sewer Costs as a Percent of Income at Lowest Quintile)	PPI – Percent of Households Below 200% of PL		
	Greater than or equal to 35%	20% to 35%	Less than 20%
Greater than or equal to 10%	Very High Burden	High Burden	Moderate - High Burden
7% to 10%	High Burden	Moderate - High Burden	Moderate - Low Burden
Less than 7%	Moderate - High Burden	Moderate - Low Burden	Low Burden

Based on a HBI score of less than 7 percent and a PPI score of 32 percent, the City's household affordability matrix score is estimated as "**Moderate - Low Burden**". This indicates that the proposed LTCP implemented over a 30-year period to control CSOs would be a moderate - low burden on the City and its customers.

3.5 Cash Flow Impact to Residential Indicator for Sewer

3.5.1 Revenue Requirement Forecast

A revenue requirement forecast was created to model the cash flow impact due to the City's sewer-related expenses as the LTCP is implemented over a 30-year forecast period. Revenue requirements include the City's O&M expenses related to sewer and storm water, existing New Jersey Infrastructure Bank (NJIB) loans for the sewer and storm water system, cash capital in the form of coverage requirements, capital projects for sewer and storm water, and capital costs associated with the LTCP.

O&M expenses were escalated annually in the forecast periods by the rates shown in Table 26.

Table 26. O&M Expense Escalation Rates

Category	Rate	Source
Benefits	5.0%	Industry experience with other Cities
Labor	3.6%	ECI provided by the CBO
Other Expenses	2.1%	Average Inflation for City over 10-year period

Future capital costs were escalated at the rate of inflation shown in the previous table.

A total debt service coverage test was calculated by dividing net operating revenues by total annual debt service. For this calculation, operating revenues were set equal to the total revenue requirements each year. The target for this test was 100%, which is considered a key indicator of financial health by credit rating agencies. A good ratio means the City has adequate revenue to cash-fund some of its capital needs.

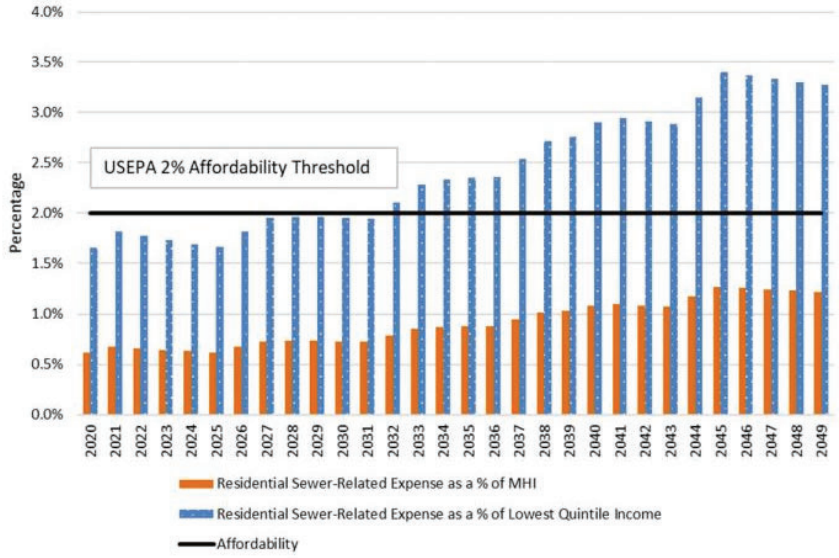
Debt service to finance capital projects was assumed to be funds from NJIB with the following finance terms: no issuance cost, 2.00 percent fee for services of New Jersey Department of Environmental Protection, 2.85 percent interest rate, and a twenty-year term. See Section 2.1.1 for discussion on uncertainty of financial funding due to COVID-19 pandemic.

3.5.2 Residential Indicator Forecast

Annual increases required for sewer revenue were applied to the estimated residential sewer-related expenses over the 30-year forecast period. The City's MHI and lowest quintile income was increased according to the Congressional Budget Offices' forecast for the CPI for the first ten years, and then increased by 1 percent annually for the remaining years of the forecasts. The estimated sewer-related expense as a percentage of MHI and the estimated sewer-related expense as a percentage of lower quintile income were calculated for each year of the forecast period and are shown in Figure 1.

Figure 1 illustrates that households with median income have a medium burden as discussed in the results for the USEPA's financial capability assessment and the household affordability assessment. However, households with the lowest quintile income begin to consistently exceed the threshold of affordability in 2032.

Figure 1. Estimated Annual Residential Sewer-Related Expense as Percentage of MHI for 30-Years



4 CONCLUSIONS

The conclusions for the financial capability assessment and housing affordability assessment are as follows:

1. Based on a "Mid-Range" financial impact Residential Indicator of 1.2 percent and a "Mid-Range" Financial Capability Indicator score of 2.5, the City's financial capability matrix score is estimated as "Medium Burden". This indicates that the proposed LTCP implemented over a 30-year period to control CSOs would be a medium burden on the City and its customers.
2. Based on a HBI score of less than 7 percent and a PPI score of 32 percent, the City's household affordability matrix score is estimated as "Moderate - Low Burden". This indicates that the proposed LTCP implemented over a 30-year period to control CSOs would be a moderate - low burden on the City and its customers.
3. A revenue requirement forecast was created to model the cash flow impact due to the City's sewer-related expenses as the LTCP is implemented over a 30-year forecast period. The projected percentage increases were applied to the estimated sewer-related expense for a residential customer. The residential sewer-related expense as a percentage of MHI shows a medium burden, and the residential sewer-related expense as a percentage of the lowest quintile income shows a high burden for these customers beginning in 2032.

In preparation of this Report and the conclusions contained herein, Arcadis has relied on assumptions and information provided by the City with respect to conditions which may exist or events which may occur in the future. Arcadis has not independently verified the accuracy of the information provided by the City and others. While we believe such sources are reliable and the information obtained to be accurate and appropriate for the analysis undertaken and the conclusions reached herein, as is often the case, there may be differences between actual and projected results, some of the estimates used in this Report will not be realized, and unanticipated events and circumstances may occur. Therefore, there are likely to be differences between the data and results projected in this Report and actual results achieved, and those differences may be material.

In the completion of this Report for the City, Arcadis is (a) not recommending any action regarding municipal financial products or the issuance of municipal securities; (b) is not acting as a registered municipal advisor to CRW and does not owe a fiduciary duty to the City pursuant to Section 15B of the Securities Exchange Act of 1934, as amended by the Dodd-Frank Wall Street Reform and Consumer Protection Act, with respect to the information and material contained in this report. The City should discuss any information and material prepared in connection with this Report with any and all internal or external registered municipal advisors that it deems appropriate before acting on this information and material.

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23. Appendix I – Village of Ridgefield Park Financial Capabilities Assessment

The Village of Ridgefield Park
2020 CSO Fiscal Impact Analysis
June 30, 2020

To: Commissioner of Revenue and Finance-Adam MacNeill
From: Benecke Economics-Robert Benecke

The CSO issue and its Fiscal Impact on Ridgefield Park.

The Village of Ridgefield Park has a combined sewer system ("CSS") which collects rainwater runoff, domestic sewage, and other water drainage into a single pipe. This single pipe transports this water to the processing plant (in this case at the Bergen County Utilities Authority- "BCUA"). During heavy rainfall or other water generating events such as snowmelt, the combined water flows backs up and flows into rivers and streams. This is termed combined sewer overflows ("CSO").

The Village is required to develop a plan to address the CSO issues. Our assignment is to develop a structure for financing the CSO improvements and the measure the tolerance (impact) on the Ridgefield Park property taxpayer to pay for the CSO upgrades.

The EPA indicates in their CSO Guidance that "The CSO Control Policy recognizes the financial capability is a significant factor in schedule development." The following analysis indicates the financial burden of a CSO project on the Village, resulting in a determination based on a matrix using the EPA Guidance.

The Village of Ridgefield Park has a Medium Burden as defined by the 1997 EPA Guidance. This means that the CSO project has an implementation period of up to 10 years. While the EPA stresses that grants should be explored, there is a dearth of grants.

The Village of Ridgefield Park has a distressed property tax base and a high property tax burden as evidenced in the following analysis, where we show that the property tax is ~15% of median household income. We conclude that the Village has a higher burden than the EPA Guidance suggests. This burden is being worsened by the State of New Jersey eliminating the Skymark redevelopment project through eminent domain which will wipe out one of the most significant project in the development pipeline in New Jersey.

A final consideration is the crowding out effect of spending virtually the entire remaining debt capacity on a CSO project, thereby jeopardizing other public capital improvements.

The Village of Ridgefield Park has a population of 12,729 as of the 2010 Census, down 144 from the 2000 Census. The Village has 2,852 residential properties, excluding multi-family apartments.

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The United States Environmental Protection Agency ("EPA"), in February 1997, issued "Combined Sewer Overflows-Guidance for Financial Capability Assessment and Schedule Development". While somewhat stale dated, this document is used to guide the financial capability and impact on the local jurisdiction arising from compliance with the EPA CSO Guidelines.

1-Data Profile. The following Figure 1 provides the baseline income, property value and property tax data.

Figure 1. Baseline Date.

Data Point	New Jersey	Bergen County	Ridgefield Park
Median HH Income[1]	$76,475	$112,099	$72,191
Average HH Income[1]	$105,917	$147,057	$94,142
Family Inc. less than $35,000[1]	18.5%	14.8%	20.3%
Family Inc. $35,000 to $100,000[1]	37.6%	34.6%	40.1%
Family Inc. above $100,000[1]	38.6%	46.2%	35.8%
Average Residential Value[2]	$323,180	$479,934	$269,399
% of Residence built before 1939[1]	18.2%	20.4%	47.5%
% of Residences built before 1970[1]	54.4%	69.4%	84.3%
Equalized Tax Rate[2]	$2.276	$2.19	$3.00
Average Residential Property Tax[2]	$8,953	$12,009	$10,611
Property Tax as % of Median HH INC	11.7%	10.7%	14.8%

Sources: 1- U.S. Census Bureau American Community Survey, 2017.
2-New Jersey Department of Community Affairs Annual Property Tax Information Data.
Note: HH and Family income does not register until $10,000 annually and excludes government subsidies. U.S. Median HH income is $57,652 and Mean HH income $81,283.

2. Statutory Debt Limitation. The New Jersey Bond Law, N.J.S.A. 40A:2-6 stipulates that all municipalities must have a net debt (generally, municipal debt exclusive of school debt) of less than 3.5% of the average of the past three years equalized (true/market) valuation (2017, 2018, 2019). The average of the past three years equalized property valuation is $1,505,601,549 as published by the State of New Jersey, Department of Community Affairs. The Village had a debt limit of $52,696,054 at year end 2019. The Village had $7,867,886 in outstanding debt at year end 2019. This means the Village had a remaining debt capacity of $44,828,368 at year end 2019.

Although the State of New Jersey estimates, for debt limit calculation purposes, the Village's equalized valuation purposes the aforementioned $1.505 + billion, the revaluation of property shows an assessed (equalized) property value reduction to $1.481 billion in 2020.

The Village has a public safety capital improvement need of $7,500,000. In addition, certain infrastructure and land acquisition needs will be required. These capital needs must fit within the statutory debt limitation.

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For illustration purposes, we will assume a remaining debt capacity of $35,000,000 to finance CSO debt.

If the Village were to issue this debt a statutory down payment of 5%, $1,750,000, would be required to be appropriated in the annual operating budget. This means that $33,250,000 in debt would actually be issued by the Village.

3. Annual Debt Impact. The following Figure 2 shows the tax rate broken down by taxing jurisdiction.

Figure 2. Tax Rate Breakdown-Taxing District-NJDCA.

Component	2019 Equalized Tax Rate-$
Municipal	1.078
County	.25
School	1.674
Total	3.002

Note: the tax rate is per $100 of assessed/equalized value.

The following maturity schedule, Figure 3, shows the annual cost of issuing a bond in the amount of $33,250,000. On average this bond issue would cost the Village of Ridgefield Park $2,274,854 annually. This is sixteen (16) tax points, after the new revaluation tax assessments.

By adding 16 tax points annually to the residential tax bill the municipal component of the tax rate would increase to ~$1.24.

The total tax rate would increase to $3.16. The average residential tax bill would increase to $11,142; up from $10,611 in 2019. The percent of median household income would increase from 14.8% to 15.4%.

{See next page.}

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Ridgefield Park		Figure 3.	Illustration-Maturity Schedule			
		CSO Debt Service Schedule Statutory				
6/4/2020	Bonds	$33,250,000		Max Principal	$2,216,667	
Average	Interest Rate	3.25%		Min Principal	$1,108,333	
	Bond Term	20		Increment	$58,333	
	Financing	Debt	Annual	Annual	Annual	
	Year	Current Balance	Total Payment	Principal	Interest	
Program Yr.		$33,250,000				
						2022
						2023
						2024
						2025
						2026
						2027
1	1	$33,250,000	$2,188,958	$1,108,333	$1,080,625	2028
2	2	$32,083,333	$2,209,375	$1,166,667	$1,042,708	2029
3	3	$30,858,333	$2,227,896	$1,225,000	$1,002,896	2030
4	4	$29,575,000	$2,244,521	$1,283,333	$961,188	2031
5	5	$28,233,333	$2,259,250	$1,341,667	$917,583	2032
6	6	$26,833,333	$2,272,083	$1,400,000	$872,083	2033
7	7	$25,375,000	$2,283,021	$1,458,333	$824,688	2034
8	8	$23,858,333	$2,292,063	$1,516,667	$775,396	2035
9	9	$22,283,333	$2,299,208	$1,575,000	$724,208	2036
10	10	$20,650,000	$2,304,458	$1,633,333	$671,125	2037
11	11	$18,958,333	$2,307,813	$1,691,667	$616,146	2038
12	12	$17,208,333	$2,309,271	$1,750,000	$559,271	2039
13	13	$15,400,000	$2,308,833	$1,808,333	$500,500	2040
14	14	$13,533,333	$2,306,500	$1,866,667	$439,833	2041
15	15	$11,608,333	$2,302,271	$1,925,000	$377,271	2042
16	16	$9,625,000	$2,296,146	$1,983,333	$312,813	2043
17	17	$7,583,333	$2,288,125	$2,041,667	$246,458	2044
18	18	$5,483,333	$2,278,208	$2,100,000	$178,208	2045
19	19	$3,325,000	$2,266,396	$2,158,333	$108,063	2046
20	20	$1,108,333	$2,252,688	$2,216,667	$36,021	2047
						2048
	Total		$45,497,083	$33,250,000	$12,247,083	2049
	Average		$2,274,854	$1,662,500	$612,354	2050

4

The Village of Ridgefield Park
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June 30, 2020

4. CSO Financial Capability Worksheet and Evaluation.

CSO Project Financing: The EPA Guidance is used to determine the annual burden of a CSO project, using percent of median household income. The next step is to determine the overall health of the local economy.

Total Project Costs	$35,000,000-$33,250,000	Using the Debt Limitation.
Annual O&M 6%	$ 2,100,000-	Excludes Depreciation.

The following are the financial worksheet results from the EPA Financial Capability Guidelines.

CSO Worksheet "1"

Cost Per HH-Residence Category	Result	Worksheet Line Number
Estimated Annual O&M	$2,100,000	100-103
Annual DS-P&I	$2,274,854	101-104
Total Annual Costs	$4,374,854	102-105 and 106
Residential Share of CSO-64%[3]	$2,799,907	107
Total Number of HH	2,852	108
Cost Per HH-Residence-Annual	$982	109-204
Median HH Income	$72,191	203-604
Annual CSO Control as a % of Inc.	1.4%	205

3-Bergen County Board of Taxation-2020 Published Table of Aggregates.

{Note: EPA Worksheets 2 through 8 help the applicant calculate the following worksheets. Below we provide the actual values.}

CSO Worksheet "9"

Financial Capability Indicator	Actual Value	Score	Worksheet Line No.
Bond Rating	Aa3	3	901
Overall Net Debt	~.60	3	902
Unemployment Rate	TBD	1	903
Median HH (Family) Income	~24% Higher	2	904
Property Tax Revenue	3%	2	905
Property Tax Collection Rate	98%	2	906
Indicators Score		2.2	907

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CSO Worksheet "10" Matrix to determine overall CSO project burden.

Financial Capability	Matrix Score	WS Line Number
Residential Score Line 205	1.4	1001
Financial Indicators Score	2.2	1002
Financial Capability Matrix	Medium Burden	1003

The EPA Financial Capability score for the Village of Ridgefield Park results in a Medium Burden as defined in the EPA Guidance. Because of the distressed nature of the property tax burden and the high cost of living in the metro New York City area we believe that the burden is higher. However, only three Financial Capability classifications are given by the EPA (low, medium, high burden).

Further, an additional burden has been placed on the Village by the State of New Jersey which is contemplating construction of a bus depot in the Village, thereby eliminating $1,200,000 in annual property tax payments and with it eliminate an approved town center project which could generate nearly $6,000,000 in future annual tax payments. Instead, the Village will be the home to a State agency operated bus depot.

Finally, the COVID-19 pandemic impacting the unemployment picture and the economic fallout which will affect the Village, is an additional stressor.

Our recommendation is that the Village not authorize a significant CSO project unless the following three conditions are met:

1-the State proposed bus depot project is modified so as to not eliminate the Skymark project, and

2-a federal or state grant or loan program is offered, and,

3-no greater than 50% of the remaining debt capacity be pledged to the CSO project. This is approximately $17,500,000 in debt being issued.

These recommendations will allow for the CSO project to be smoothly implemented.

* * * * *

BENECKE ECONOMICS
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