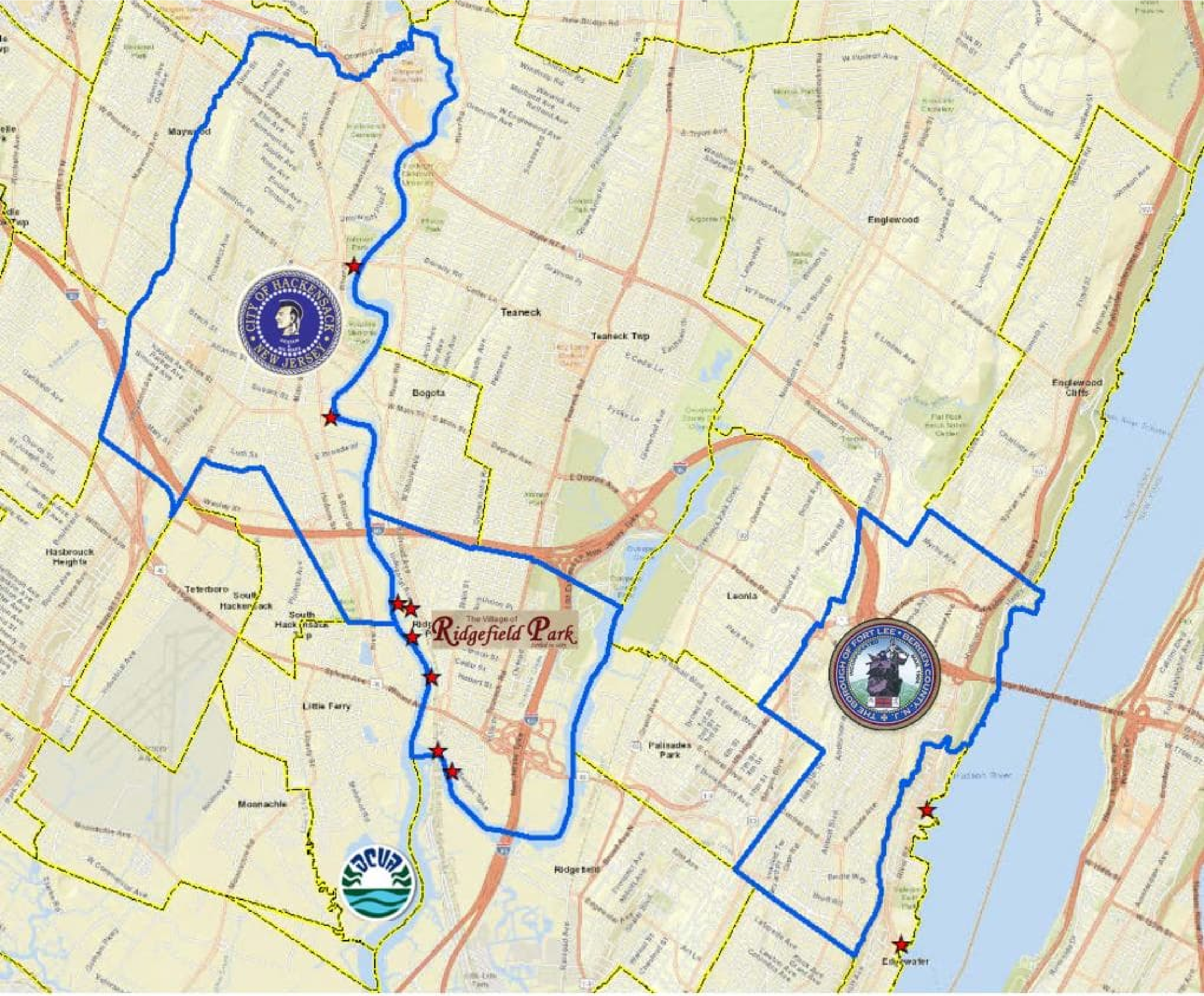


BCUA CSO Group

CSO LTCP
Selection and Implementation of Alternatives Report

Borough of Fort Lee - NJPDES Number NJ0034517
City of Hackensack - NJPDES Number NJ0108766
Village of Ridgefield Park - NJPDES Number NJ0109118
Bergen County Utilities Authority - NJPDES Number NJ0020028

October 1, 2020
Final August 30, 2024

ARCADIS MOTT MACDONALD HDR

BCUA CSO Group

CSO LTCP
Selection and Implementation of Alternatives Report

Borough of Fort Lee - NJPDES Number NJ0034517
City of Hackensack - NJPDES Number NJ0108766
Village of Ridgefield Park - NJPDES Number NJ0109118
Bergen County Utilities Authority - NJPDES Number NJ0020028

October 1, 2020
Final August 30, 2024

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
0	10/1/2020	JD, GG,FB	JD, GG,FB	JD, GG,FB	NJDEP Submission
1	7/23/2021	JD, FB, FB	JD, FB, FB	JD, FB, FB	Revised per NJDEP Comments
2	7/12/2024	JD, FB, SL	JD, FB, SL	JD, FB, SL	Municipal Plan Updates
3	8/30/2024	JD, FB, SL	JD, FB, SL	JD, FB, SL	Final Submission

Document reference: 507366372 |

Information class: Standard

Contents

Tables

Figures

List of Abbreviations and Acronyms

AU	Assessment Unit
BCMP	Baseline Compliance Monitoring program
BF	Ballasted Flocculation
BCUA	Bergen County Utilities Authority
BRPS	Bluff Road Pumping Station
CCI	Construction Cost Index
CEPT	Chemically Enhanced Primary Treatment
CIWEM	Chartered Institute of Water and Environmental Management
CMP	Compliance Monitoring Program
CoW	Committee of the Whole
CREAT	Climate Resilience Evaluation and Awareness Tool
CSM	Combined Sewer Management
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
CWA	Clean Water Act
DEAR	Development and Evaluation of Alternatives Report
DPW	Department of Public Works
DWF	Dry Weather Flow
EDP	Effective Date of Permit
ENR	Engineering News Record
EPA	Environmental Protection Agency
FIB	Fecal Indicator Bacteria
FST	Final Settling Tanks
FW	Freshwater
GLEC	Great Lakes Environmental Center
GWI	Ground Water Infiltration
HEP	Harbor Estuary Program
HUC	Hydrologic Unit Code
I/I	Inflow/Infiltration
JC	Junction Chamber
LF WPCF	Little Ferry Water Pollution Control Facility
LMPS	Lower Main Pumping Station
LTCP	Long Term Control Plan
MGD	Million Gallons per Day
MHW	Mean High Water
NACWA	National Association of Clean Water Agencies
NJDEP	New Jersey Department of Environmental Protection
NJHDG	New Jersey Harbor Dischargers Group
NJPDES	New Jersey Pollution Discharge Elimination System
MSL	Mean Sea Level
NMS	National Marine Sanctuaries
NOAA	National Oceanic and Atmospheric Administration
NPW	Net Present Worth
NT	Non-Trout
ONRW	Outstanding National Resource Waters
OVRS	Overpeck Valley Relief Sewer
OVTS	Overpeck Valley Trunk Sewer
PAA	Peracetic Acid
PCCMP	Post Construction Compliance Monitoring Plan
POTW	Publicly Owned Treatment Works
PPP	Public Participation Process

PTPS	Palisade Terrace Pumping Station
PVSC	Passaic Valley Sewerage Commission
PWQM	Pathogen Water Quality Model
QAPP	Quality Assurance Project Plan
RDII	Rainfall Derived Infiltration and Inflow
RTC	Real Time Control
RTK	Initials of hydrograph parameters for RDII unit hydrographs
SCADA	Supervisory Control and Data Acquisition
SCD	Soil Conservation District
SE	Saline Estuary
SIAR	Selection and Implementation of Alternatives Report
SSOAP	Sanitary Sewer Overflow Analysis and Planning
STP	Sewage Treatment Plant
TGM	Technical Guidance Manual
TMDL	Total Maximum Daily Load
T/S	Temperature/Salinity
TWA	Treatment Works Approval
USACE	United States Army Corps of Engineers
WMP	Wastewater Management Plan
WPCF	Water Pollution Control Facility
WQS	Water Quality Standards
WRRF	Water Resource Recovery Facility
WWF	Wet Weather Flow

1. Certification

Selection and Implementation of Alternatives Report
Submitted Bergen County Utilities Authority (BCUA) on behalf of the BCUA CSO Group

Approval of Report and **NJPDES Certification:**

"I certify under penalty of law that this document relating to the treatment and collection system owned and operated by the permittee and all attachments related thereto were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system owned and operated by the permittee, 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."

________________________________ **Date** 8/13/2024

Bergen County Utilities Authority NJPDES Number NJ0020028
Robert E. Laux, Executive Director, Bergen County Utilities Authority

Selection and Implementation of Alternatives Report
Submitted on behalf of the following participating Permittee by
Bergen County Utilities Authority (BCUA) on behalf of the BCUA CSO Group

Approval of Report and NJPDES Certification:

"I certify under penalty of law that this document relating to the treatment and collection system owned and operated by the permittee and all attachments related thereto were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system owned and operated by the permittee, 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."

_______________________ **Date** 8/15/24

Borough of Fort Lee - NJPDES Number NJ0034517
Alfred R. Restaino, Borough Administrator, Fort Lee

Selection and Implementation of Alternatives Report
Submitted on behalf of the following participating Permittee by
Bergen County Utilities Authority (BCUA) on behalf of the BCUA CSO Group

Approval of Report and **NJPDES Certification:**

"I certify under penalty of law that this document relating to the treatment and collection system owned and operated by the permittee and all attachments related thereto were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system owned and operated by the permittee, 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."

__________________________________ **Date** 08/26/2024

City of Hackensack - NJPDES Number NJ0108766
Vincent J. Caruso, MAS, CPM, City Manager, City of Hackensack

Selection and Implementation of Alternatives Report
Submitted on behalf of the following participating Permittees by
Bergen County Utilities Authority (BCUA) on behalf of the BCUA CSO Group

Approval of Report and **NJPDES Certification**:

"I certify under penalty of law that this document relating to the treatment and collection system owned and operated by the permittee and all attachments related thereto were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system owned and operated by the permittee, 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."

______________________ Date 8/26/2024

Village of Ridgefield Park - NJPDES Number NJ0109118
William Gerken, Commissioner of Village of Ridgefield Park, on behalf of Village

2. Executive Summary

The Bergen County Utilities Authority (BCUA) currently owns and operates the Water Pollution Control Facility (WPCF) located in Little Ferry, New Jersey and provides wastewater transportation and treatment services for forty-seven municipalities, serving a population of about 565,000 people. The Authority's service district covers approximately 135 square miles, and extends approximately five miles south and fifteen miles north of the Little Ferry WPCF and is bounded by the Hudson River on the east, by New York State to the north, by the remainder of Bergen County to the west, and by Hudson County to the south. The BCUA services municipalities that are primarily located in the Hackensack River and Overpeck Creek drainage areas including three municipalities with combined sewer systems: Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park.

The New Jersey Department of Environmental Protection (NJDEP) issued New Jersey Pollutant Discharge Elimination Permits (NJPDES) to all municipalities/authorities that own or operate combined sewer systems and authorities that provide wastewater transport and/or treatment services to municipalities with combined sewer systems. The BCUA owns and operates the trunk/intercepting sewer system that transports flows to the WPCF, including wastewater flows from combined sewer systems. The collection and conveyance of wastewater (both dry and wet weather) from municipal combined sewer systems into the BCUA trunk/intercepting sewer system, including the Combined Sewer Overflow (CSO) discharge pipes, are owned and operated by the individual municipalities. These facilities are permitted under Individual NJPDES Permits provided to the BCUA and each combined sewer municipality with an effective date of July 1, 2015 as follows:

- Bergen County Utilities Authority – NJPDES Permit No. 0020028
- Borough of Fort Lee – NJPDES Permit No. 0034517
- City of Hackensack – NJPDES Permit No. 0108766
- Village of Ridgefield Park – NJPDES Permit No. 0109118

These permits require that the permittees prepare and submit a CSO Long Term Control Plan (LTCP) of which this Selection and Implementation of Alternatives Report (SIAR) is a component. The permit provided the option for these LTCPs to be undertaken on a regional basis for all hydraulically connected municipalities that discharge to the BCUA. The BCUA, Fort Lee, Hackensack, and Ridgefield Park agreed to undertake a Regional approach to the required reports and the CSO LTCP. Work undertaken together is being completed by the BCUA CSO Group, which is made up of all four individual combined sewer management permittees within the District.

While the members of the BCUA CSO Group have agreed to work cooperatively, most of the work for the Selection and Implementation of Alternatives Report was completed separately and then coordinated and integrated through group meetings into a regional submission through the BCUA. The BCUA CSO Group has met monthly throughout the LTCP process, and biweekly in the periods preceding major submission. Additional meetings and communications occurred on an as needed basis. Four 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 and later Suburban Engineering to complete revisions, while the Village of Ridgefield Park and BCUA both retained Mott MacDonald to complete their Reports.

As part of the Regional Sewer System Characterization Report (June 2018), Mott MacDonald developed a comprehensive model of the entire BCUA District using the InfoWorks ICM modeling software covering the forty-four separately sewered municipalities. The models for the combined sewer areas were developed by the respective municipal permittees and imported into the overall BCUA model.

2.1. BCUA LTCP Summary

The BCUA does not own or operate any CSO outfalls. As the authority providing treatment to the CSO municipalities BCUA has taken a leadership role in the BCUA CSO Group. Under the Permit requirements BCUA examined opportunities for regional CSO solutions, including those providing additional conveyance and storage and treatment at the LF WPCF. The information regarding costs and effectiveness of such alternatives was made available to the municipalities for their consideration and use. Responsibility for the costs of any alternative requiring expansion BCUA facilities would be borne by the respective municipalities wishing to implement those alternatives. The municipalities, neither individually, nor as a group, included any alternatives that require expansion of BCA facilities in their respective plans. The BCUA will continue to work collaboratively with the municipalities but will not take on responsibility for the construction or maintenance of any of their facilities.

A key factor in making use of opportunities to treat more flow at the LF WPCF is the current permit, which was modified in June of 2019, and limits the plant flow and effluent loads. Accepting additional flow at the existing WPCF is possible under low flow conditions, but under high flow condition (flow rates in excess of 120 MGD) the plant cannot accept additional flow. BCUA is currently preparing a Capacity Analysis Report that outlines a plan on how the facility could be modified to achieve the revised permit requirements at future higher influent flows. The anticipated load conditions will include dewatering flows from the alternate CSO storage facilities should they be required to supplement the planned were separations. BCUA has agreed to accept such flow under specified conditions at the WPCF. BCUA worked with the municipalities and their consultants to develop criteria for allowable dewatering rates to the BCUA intercepting sewers to limit dewatering pumping to periods when the plant could accept the flow without exceeding their design capacity. The BCUA notes that this will require the acceptance of additional stormwater along with the sanitary sewage from storage tanks. This runs contrary to BCUA extensive efforts to reduce inflows and the BCUA expects the NJDEP to acknowledge the greater benefit of CSO reduction and to make the necessary allowances to the BCUA's permit to accept this flow without penalty.

BCUA's role further extended to coordination of municipal plans regarding the impacts on CSO volumes, for the hydraulically connected system as well as within segments of the overall system, which represent distinct watersheds.

As part of the BCUA CSO Group's LTCP consisting of projects selected by the municipalities, BCUA LTCP implementation is limited to accepting dewatering flows from municipal CSO storage facilities. BCUA worked cooperatively with the municipalities to establish appropriate controls to allow the storage facilities to dewater without adverse impacts to BCUA facilities or permit compliance. In the typical year, it is anticipated that at least, due exclusively to the CSO LTCP projects, the BCUA will experience an annual reduction in flow of 0.6 MG, or a decrease in average daily flow of 0.002 MGD. Initially this change was made up of reductions of 15.3 MG from Fort Lee and 7.4 MG from Hackensack, which are offset by an increase of 22.1 MG from Ridgefield Park. However, with Ridgefield Park's shift towards sewer separation, an addition reduction of flow to the WPCF is expected. The BCUA intends to apply the stormwater inflow reductions from sewer separation projects against its targeted inflow and infiltration reduction program, creating a win-win scenario.

2.2. Fort Lee LTCP Summary

2.2.1. Background and Selected Level of Control

Borough of Fort Lee operates two CSO outfalls to the Hudson River. During the design year of 2004 outfall FL001 will discharge 124.5 MGD in 58 CSO events and outfall FL002 will discharge 25 MGD in 35 events. This achieves a CSO capture of 76.3% before any improvements (baseline). In 2017 two projects were built, The Towers and Hudson Lights. During construction this 16 acre area was converted from a combined area to a separately sewered area. This improved the CSO capture to 79.1%. As stated in Part IV G 4.1 of Fort Lee's CSO permit, the borough has selected the Presumptive Approach to capture 85% of the combined sewage entering the collection system during wet weather. The original plan in the July 2021 SIAR proposed a five phase program, separating approximately 60 acres of combined sewered area over 25 years.

NJDEP issued the pre-draft NJPDES Permit Renewal for the Borough of Fort Lee, NJPDES #NJ0034517 on July 6, 2023, along with a request for information (RFI), for additional detail in the implementation schedule for the selected alternative which was sewers separation. The Borough of Fort Lee along with their consultants (HDR Engineers and Boswell Engineers) met with NJDEP on July 12, 2023, to review the pre-draft permit and discuss a modification to the proposed alternative.

Due to redevelopment in the area of the Bluff Rd pump station and netting facility, an opportunity arose for the borough to address both the LTCP and an Administrative Compliance Order (ACO), Administrative Docket No. CWA-02-2018-3048 - Borough of Fort Lee, NJPDES Permit No. NJ0034517 by the Environmental Protection Agency (EPA) issued because of flooding during extreme wet weather events causing overflows onto Route 5 from the Bluff Rd netting facility.

In response to the ACO, the Borough is taking measures to alleviate flooding during these events. A resolution (CA-7) was adopted on April 20, 2023, by the Borough, allocating funds to the Bluff Rd Netting Facility Improvement Project which included modifications to the netting facility and a new stormwater overflow line to capture excess flows from the netting facility preventing discharge to Route 5.

Since the area surrounding the Bluff Road netting facility is being subdivided and redeveloped, a 25-foot easement for a future stormwater line (for the sewer separation) was proposed in lieu of the overflow line allowing the Borough alleviate flooding at the netting facility and while also addressing the Borough's LTCP. Revising the area to be separated provided several benefits to Ft. Lee; flows to the Bluff Road CSO netting facility would be reduced as tributary areas are separated under the LTCP and funds allocated for the Bluff Road stormwater overflow line could be applied to the separate stormwater line used for sewer separation, providing a significant savings to the Borough of Fort Lee.

2.2.2. Selected Plan

Evaluation of several alternatives in the DEAR, consultation with the Borough and public input and discussions with NJDEP resulted in sewer separation program as the preferred alternative. Under the revised plan approximately 89 acres of combined sewers will be separated over 9 years in four phases. This timeframe will allow Fort Lee to evaluate the impact of each phase on reaching 85% CSO reduction goal. This is an adaptive management approach to reaching the CSO goal. Areas separated by the plan will be managed in accordance with the Stormwater Management Rules at N.J.A.C. 7:8 as required under Fort Lee's NJPDES MS4 permit and Fort Lee's operations and management manual. Table 2-12-1 presents the impact of each phase on CSO percent capture, annual volume for the 2004 design year and number of CSO events. Figure 2-12-12-1 presents a plot of CSO capture with time to show how the LTCP will attain the CSO goal of 85% capture. EDP is "effective date of permit" and reflects the date the new permit is issued. For example, if the permit is issued in 2024 the four phases will follow in 2027, 2028, 2030, and 2032. This plan may change as new development and redevelopment projects occur if they include CSO reduction measures like The Towers and Hudson Lights developments.

Table 2-1: Fort Lee CSO LTCP Impact on CSOs

Condition	Acres Separated	% CSO Capture	CSO Volume (MG)	Number of Events
Baseline (2045)	-	76.3	161.6	58
New Development [1]	16	79.1	142.5	58
Sewer Separation Phase 1	24	81.8	124.1	58
Sewer Separation Phase 2	12	83.1	115.4	58
Sewer Separation Phase 3	17	84.9	103.1	58
Sewer Separation Phase 4	20	87.0	88.6	58

[1] Includes pump station modifications discussed in the DEAR report.

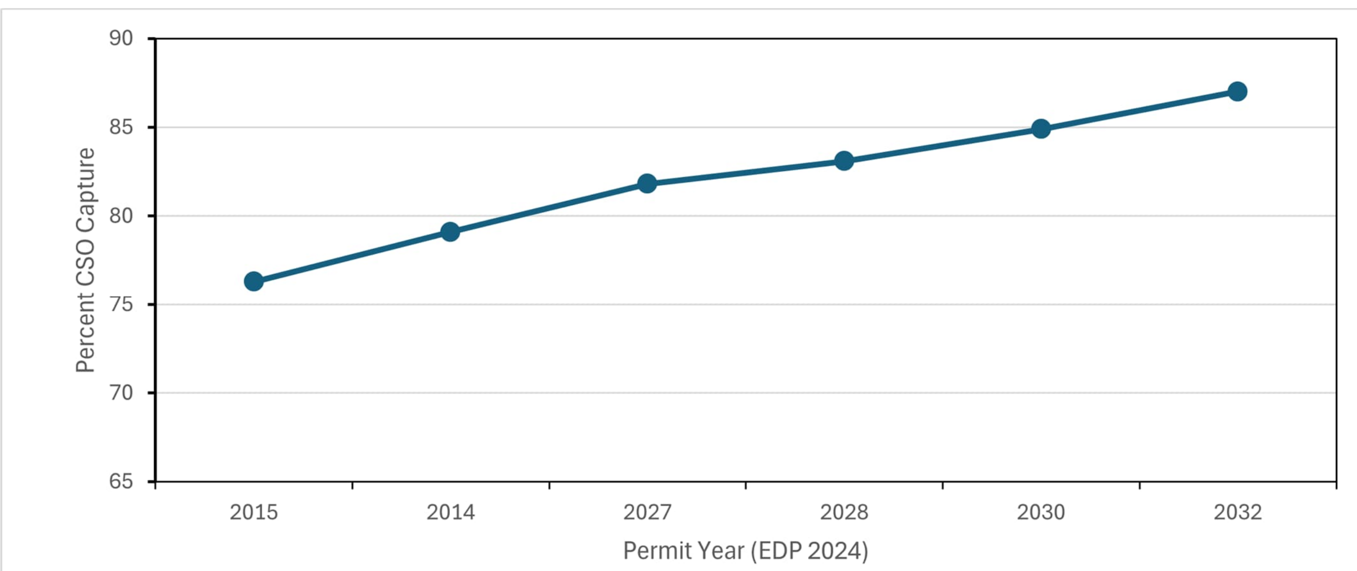


Figure 2-1: Time Required to Reach 85% CSO Capture With Separated Sewers

2.2.3. Public Participation

Public participation was engaged through Borough's local CSO Team and the BCUA Supplemental CSO Team meetings. While the CSO team members attended most of meetings, only two members of the public only attended one meeting, January 28, 2020. At that meeting each CSO community (BCUA, Hackensack, Ridgefield Park and Fort Lee) presented CSO control alternatives under consideration, an outline of the SIAR report and solicited comments on the selection of alternatives. There was one question from the public regarding the location of any green infrastructure projects. It was stated that green infrastructure projects would only be built on public property of rights of way. No green infrastructure projects would be built on private property without the owners' permission. Additional information regarding public participation is presented in the Fort Lee DEAR report and Public Participation Process Report.

2.2.4. Operational Plan, Schedule, and Post Construction Compliance Monitoring

The Borough's LTCP consists of four phases and is expected to take approximately 9 years to implement. Each phase will consist of design, permitting, funding, construction, post construction monitoring and model updates effort for sewers to be separated in the phase. Each phase is similar in scope and only differs in the location of the sewer separation work and the scale of the project. The first phase will separate approximately 24 acres of sewer and the final stage will separate 20 acres of sewer. The revised and original sewer separation areas are shown in Figure 2-22-22-2. After the post construction monitoring and model recalibration results of each phase, the plan may be modified to ensure the goals of the LTCP are met. A detailed schedule is show in Figure 2-3.

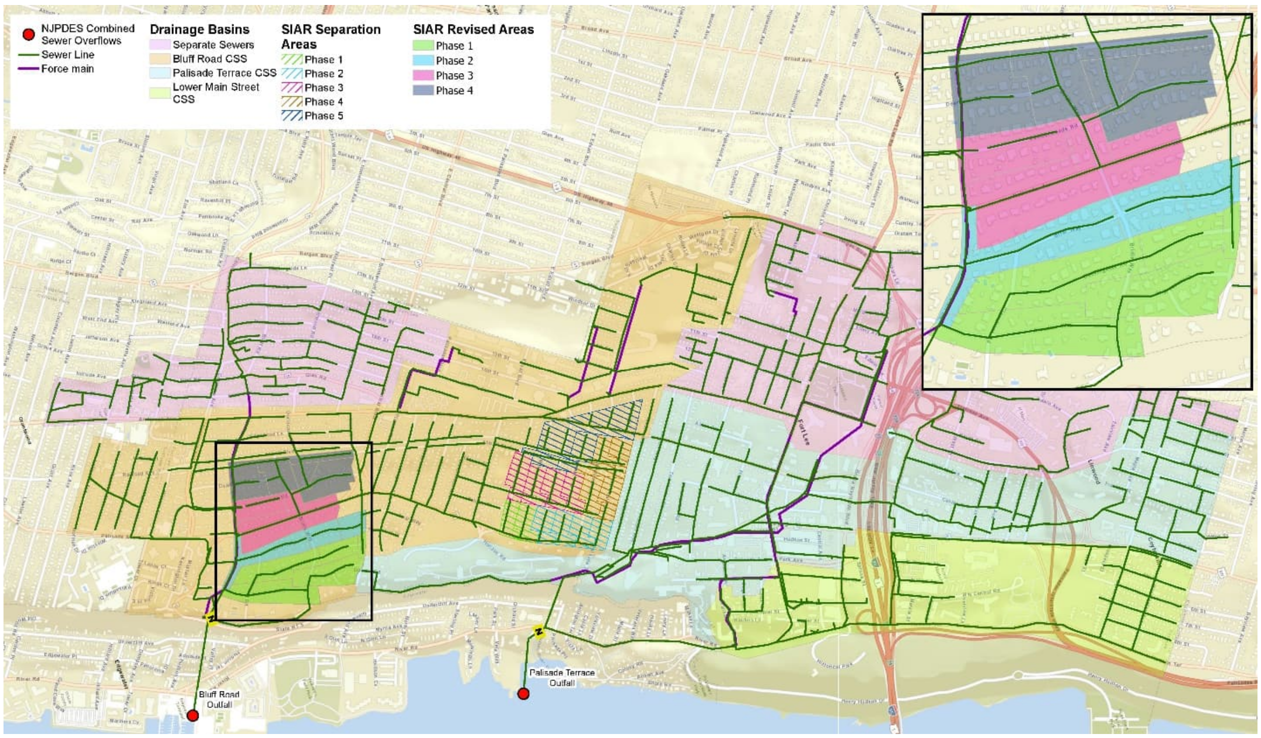
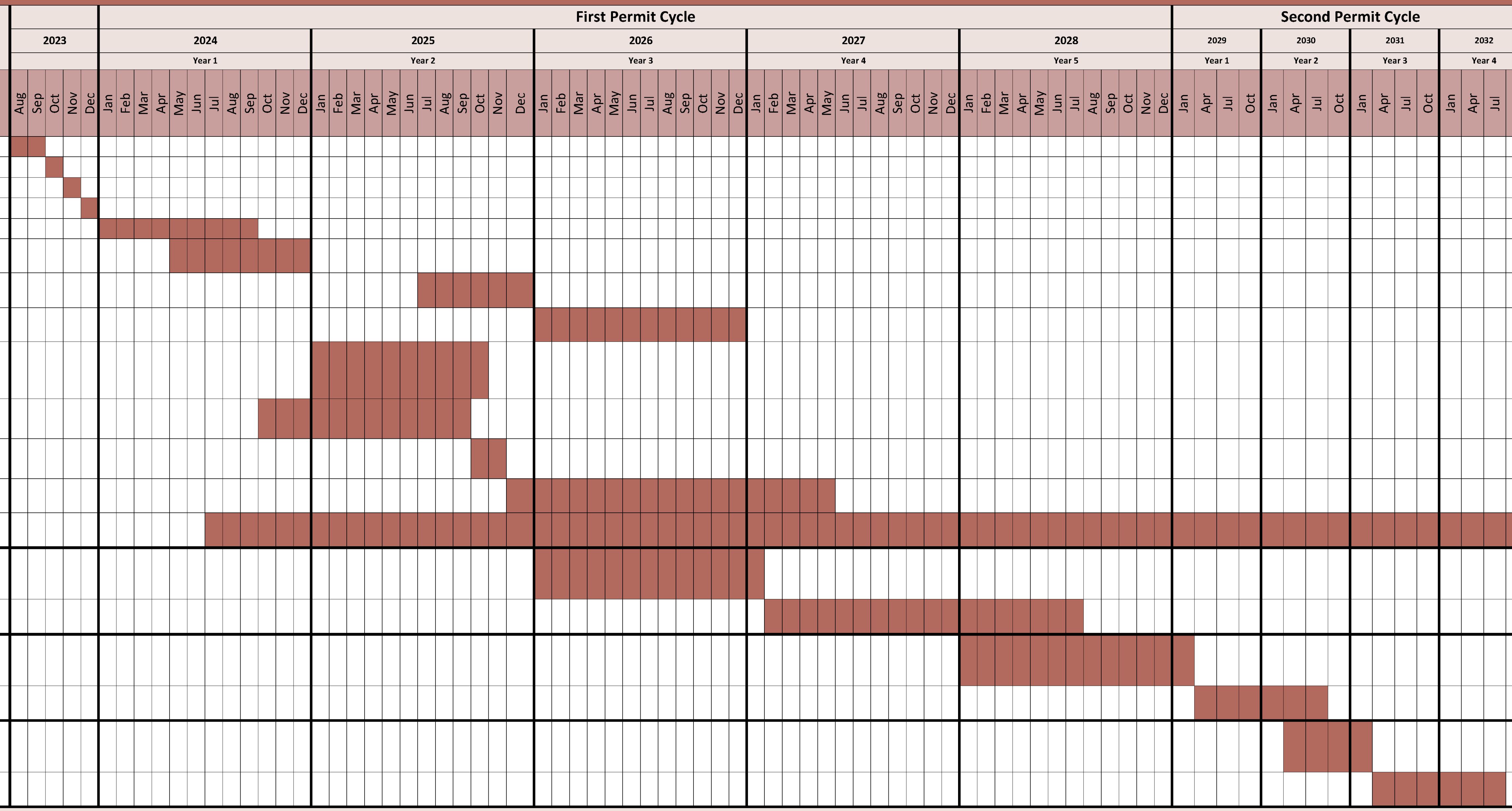


Figure 2-2: Proposed 89 Acre Sewer Separation Area and Phases

Ft. Lee LTCP Sewer Separation Implementation Schedule

Task ID	Task Name	Start Date	End Date
1	Bluff Rd Design	8/1/2023	9/30/2023
2	Final Plans	9/30/2023	10/31/2023
3	Project Bidding	10/31/2023	11/30/2023
4	Project Award	11/30/2023	12/30/2023
5	Bluff Road Modification	12/30/2023	9/30/2024
6	Separate Stormwater Conduit Install Complete	4/30/2024	12/31/2024
7A	Green Infrastructure Selection and Design	7/1/2025	12/28/2025
7B	Green Infrastructure Construction	12/28/2025	12/23/2026
8	Sewer Separation Model Revision and % Capture Confirmation	1/1/2025	10/28/2025
9A	Phase 1 Sewer Separation (Design) (24 Acres)	10/1/2024	9/26/2025
9B	Phase 1 Sewer Separation (Bidding) (24 Acres)	9/26/2025	11/25/2025
9C	Phase 1 Sewer Separation (Construction (24 Acres)	11/25/2025	5/19/2027
9D	Sewer Separation (Public Outreach)	7/1/2024	12/30/2032
10A	Phase 2 Sewer Separation Design and Coordination (12 Acres)	1/1/2026	1/1/2027
10B	Phase 2 Sewer Separation Construction (12 Acres)	2/1/2027	7/25/2028
11A	Phase 3 Sewer Separation Design and Coordination (17 Acres)	1/1/2028	1/1/2029
11B	Phase 3 Sewer Separation Construction (17 Acres)	3/1/2029	8/23/2030
12A	Phase 4 Sewer Separation Design and Coordination (20 Acres)	2/1/2030	2/1/2031
12B	Phase 4 Sewer Separation Construction (20 Acres)	3/1/2031	8/22/2032



Notes:

Phase 1 sewer separation includes updates to the Bluff Rd netting facility an installation of a stormwater conduit in the Bluff Rd easement.

Schedules for Phases 2-4 will follow a similar time line as Phase 1 Task 9 (A-D) will all sewer separation completed within two 5 year permit cycles.

Figure 2-3 Ft. Lee Detailed Implementation Schedule

2.3. Hackensack Summary

2.3.1. Background and Selected Level of Control

The City of Hackensack (the City) owns two CSO outfalls along the Hackensack River. The northern outfall, HK001A, is located near Anderson Street, and the southern outfall, HK002A, is located near Court Street. The City has been complying with the requirements in its current NJPDES permit since the effective permit date of July 1, 2015. Based on modeling the 2004 typical year precipitation against the 2015 baseline year infrastructure, the model output depicts the two outfalls discharge approximately 256.7 million gallons (MG) of combined sewage over the course of 56 overflow events for the typical year. Under baseline conditions, the City achieves an estimated 68.5% capture of combined sewage in its collection system during wet weather. Per Part IV.G.4.f of the City's permit, the City has elected to comply with the Presumptive Approach to capture 85% of combined sewage entering its collection system during wet weather.

Due to the tidal impacts of the Hackensack River, coupled with the topography of the City of Hackensack, the City has historically been prone to significant flooding. With that being said, the City has pursued a number of sewer separation projects to date, with the primary objective of eliminating flooding, while still increasing percent capture. Following the NJDEP's issuance of the pre-draft NJPDES Permit Renewal for the City of Hackensack in July 2023, and the subsequent issuance of the draft NJPDES Permit Renewal in August 2023, the City updated its implementation schedule to reflect the projects that have been progressed in advance of the permit's adoption.

2.3.2. Selected Plan

After the evaluations during the DEAR, consultations with the City, and input from the public, a multi-phased approach of projects was selected as the preferred LTCP. A combination of a Green Infrastructure program, a stormwater infrastructure project, and localized partial sewer separation projects will be the focus of the selected plan. Additional information regarding the City's selected plan is presented in Section 7.3 of this report. The green infrastructure program will provide some percent capture and allows the City to educate the public and install green infrastructure in suitable locations during the LTCP. Per the City's DEAR Report, it is estimated that if 10% of the City's impervious area in the CSS was converted to green infrastructure, the percent capture would only increase by approximately 2%. A storage tank near the Anderson Street outfall is also part of the recommended selected plan pending the impact of the stormwater project, partial sewer separation projects and green infrastructure program post construction monitoring. The stormwater infrastructure project will be in the Court Street subdrainage area, specifically in the flood-prone area commonly referred to as the Green Street Area. The focus of the stormwater infrastructure project will be to increase the CSO percent capture and mitigate long-term flooding issues in problematic areas. Additionally, the baseline model results indicate that the Court Street subdrainage area produces an estimated 46.1 MG more overflow volume than the Anderson Street subdrainage area. The City's flooding issues are a general concern based on public feedback obtained during the LTCP process. The stormwater infrastructure project will consist of a dedicated, large stormwater interceptor pipe system with in-line storage capabilities and a new outfall and pump station. The localized partial sewer separation projects will be primarily in the Court Street subdrainage area and will connect with the existing Foschini Park and Record Site stormwater outfalls. One partial sewer separation project is currently ongoing, and five partial sewer separation projects have been completed between the initial submission of this report in October 2020 and the current revision. Additional partial sewer separation projects will be identified during the City's implementation of the LTCP.

The City's selected plan intends to meet the minimum 85% capture requirement. The model results for the City's selected plan are presented in Table 2-22-2.

Table 2-2: Hackensack LTCP Summary of Overflows

	2015 Baseline		LTCP 85% Capture	
Outfall	Overflow Volume (MG)	Overflow Frequency	Overflow Volume (MG)	Overflow Frequency
HK-001A	105.3	56	70.5	30
HK-002A	151.4	56	37.5	23
Total	256.7	56	108.0	30

It should be reiterated that percent capture will be monitored at milestones throughout the LTCP. The expected LTCP overflow volumes and frequencies are modeling estimates and will be revisited during the LTCP implementation phase.

2.3.3. Public Participation

Public participation was engaged through a City specific CSO Team, Supplemental CSO Team meetings, meetings with City consultants which included peer reviews, a public survey posted on the City's website, and a City specific public meeting. Although public interest was difficult to obtain, attempts were made to inform the public about the City's NJPDES permit, LTCP and its potential impacts. The public stated that its biggest concerns are to resolve the City's flooding issues and the cost implications. Additional information regarding public participation to date is presented in Section 13.3 of this report and in the City's approved DEAR Report and Public Participation Process Report.

2.3.4. Operational Plan, Schedule, and Post Construction Compliance Monitoring

The City's selected plan is extensive, consists of multiple phases, and while the City has made progress on its partial sewer separation projects, is forecasted to take upwards of 30 years to implement due to hurdles that may be faced as more challenging portions of the plan are addressed. The implementation process will include feasibility studies, potential property acquisition, design, permitting, funding, construction, post construction monitoring and model updates. The City's first priorities will be to continue and complete the ongoing partial sewer separation projects and begin the stormwater infrastructure project to mitigate the ongoing flooding issues within the City. Once some of these projects are online, within 10-years of the start of the LTCP, a post construction monitoring and model recalibration process will begin in an effort to determine the percent capture impact of the constructed projects. After the post construction monitoring and model recalibration results, a decision to construct the Anderson Street storage tank will be made. If the model recalibration results indicate that an adequate percent capture is being achieved, the Anderson Street storage tank may not be necessary, or may diminish greatly in volume. Additional information regarding the operational plan, schedule and post construction compliance monitoring is presented in Sections 10.3 and 11.3 of this report.

2.4. Ridgefield Park LTCP Summary

2.4.1. Background and Selected Level of Control

The Village of Ridgefield Park (the Village) owns six (6) CSO outfalls. Based on modeling the 2004 typical year precipitation against the 2015 baseline year infrastructure, these outfalls discharge 52.2 million gallons (MG) over the course of 55 overflow events. Under baseline conditions the Village achieves a capture of 75.8% of the combined sewage entering its collection system during wet weather. Under Part

IV.G.4.f and the EPA's Combined Sewer Overflow Control Policy (1994) the Village has elected to comply with the Presumptive Approach's requirement for 85% capture of combined sewage entering the collection system during wet weather, as the targeted level of control. Additional detail on the targeted level of control can be found in Section 5.5.

2.4.2. Selected Plan

Through the evaluations performed during the DEAR and subsequent analysis and input from Village officials and the public (See Section 7.4.3) initially, a 0.7 MG CSO storage tank was selected as the preferred LTCP alternative. The tank will be situated on the west side of the Village and collect overflow from the two largest outfalls based on annual volume of discharge and the most active by frequency of overflow. The Village carefully considered potential sites and associated constraints, and based on available information feels the LTCP can be accomplished at the recommended site or one of the identified alternate sites. However, as with any project of this magnitude in the planning stages, unforeseen issues relating to technical challenges, permitting, site history or site acquisition may still arise. In addition, the Village will be evaluating the potential enhancing or completing sewer separation projects in drainage area 006A, other areas of the Village, and of those areas directly contributing flow to the BCUA Interceptor Sewer System to see if these steps could cost-effectively decrease the size of, or eliminate, offline storage required to achieve an 85% capture (by volume) of CSOs. While initially determined to be more costly, recent funding opportunities make sewer separation a cost-effective means of reducing the size of or eliminating the CSO storage tank through the separation of drainage area 006A and approximately 60 additional acres in other areas of the Village. Sewer separation supports other broader goals of the Village such as road reconstruction and maintains the current all-gravity conveyance system the Village currently owns and operates. Available funding will be assessed at the time of each planned sewer separation project to determine if it is cost effective within the context of the CSO LTCP and the broader infrastructure needs of the Village. Currently, the Village intends to pursue separation in parallel with planning for the CSO storage tank, as long as it is cost effective. Additional information on the selection process and selected LTCP can be found in Section 7.4.

The LTCP will provide the required 85% capture while reducing overflow volumes by 20.9 MG or 40% (from 52.2 MG to 31.3 MG) and reducing overflow frequency by 53% (from 55 events to 26 events) when evaluating the 2004 typical year precipitation. Table 2-3, shows the same information for sewer separation, which also provides the required 85% capture. It is notable that since the sewer separation is implemented earlier in phases, by the time the LTCP is complete, sewer separation will have prevented approximately 118 MG in overflows before the tank would have come online.

Table 2-3: Ridgefield Park LTCP Summary of Overflows with Sewer Separation*

	2015 Baseline		LTCP 85% Capture	
Outfall	Overflow Volume (MG)	Overflow Frequency	Overflow Volume (MG)	Overflow Frequency
001A	6.5	19	6.3	19
002A	0.6	12	0.6	12
003A	15.4	45	15.4	45
004A	25.3	53	8.4	42
005A	3.7	23	0.6	8
0006A	0.7	11	0.0	0
Total	**52.2**	**53**	**31.3**	**45**

2.4.3. Public Participation

The Village engaged the public through multiple venues and mediums including:

- Continuation of the Village's Supplemental CSO Team Meetings
- Maintained a dedicated CSO page on the Village website www.ridgefieldpark.org/home/pages/ridgefield-park-future-our-waterways-your-hands-0
- Literature and rain barrel demonstration at Village's Earth Day celebration
- Literature distribution at Village street fair.
- Articles in the Village Newsletter
- Presentations made at Village caucus meetings.
- Participation in the BCUA CSO Group regional Supplemental CSO Team meetings.
- Recorded LTCP Summary Presentations made public on the Village Website. The presentation actively solicited public comment and input.
- Held a hearing on September 29, 2020 to listen to comments from the public.

2.4.4. Operational Plan and Schedule

The Village is prepared to operate the CSO storage tank facility when it comes online in the project's 14th year. The anticipated schedule calls for:

Feasibility Study – 2 Years
Property Acquisition – 3 Years
Design Permitting and Funding – 3 Years
Construction – 5 Years
Monitoring and Model Update – 2 Years

Sewer separation would be implemented over a similar total duration of 14 years, note some projects overlap:

Drainage Area 006A – 4 Years
Sewer Separation Project 1 – 3 Years
Sewer Separation Project 2 – 3 Years
Sewer Separation Project 3 – 2 Years
Sewer Separation Project 4 – 2 Years
Sewer Separation Project 5 – 2 Years
Sewer Separation Project 6 – 2 Years

Operation and maintenance responsibilities will include:

- Sediment and floatable capture system
- Flushing system
- Pumping station
- Odor control system
- CSO storage tank
- Telemetry system with BCUA SCADA system

2.4.5. Post Construction Compliance Monitoring

Post construction monitoring of the combined sewer system will consist of installing temporary flow meters in the Ridgefield Park system and model recalibration to verify performance of the LTCP. Monitoring of the receiving waters will be performed in conjunction with the NJ CSO Group and Harbor Dischargers Group (HDG). For addition information see Section 12.

2.4.6. Project Cost and Impacts

The LTCP will have an impact on the Village's finances for many years. The construction costs of the project are expected to be approximately $18M (2020 dollars), to be financed through and conditioned on the Village's receipt of grants and long term loans at reasonable terms. In addition, there will be Operations and Maintenance and permit maintenance costs of approximately $100,000 (2020 dollars) following the completion of the project. Currently, sewer costs are funded through municipal taxes and it is anticipated that the LTCP will continue to be funded through municipal taxes. Municipal tax rate increases are expected with the average sewer portion of the bill expected to be about $450 higher than it would be without the CSO LTCP. This equates to an estimated increase of approximately 6.4% in the overall municipal tax bill by the year 2038.

The average sewer rate with the CSO LTCP included does not exceed the EPA recommended high burden threshold of 2% of median household income. However, the Village is under financial pressures not fully reflected in the EPA's evaluation and is deeply concerned about the impact to residents and the community. The Village is uncertain if it has the resources to complete the LTCP as presented without ruinous impacts to the community. It is anticipated that ongoing discussions will be held with the NJDEP regarding the costs and project schedule and availability of financial assistance.

The projections and conclusions concerning the affordability of the CSO control program proposed in this SIAR by the Permittee's financial capability to finance the CSO control program are premised on the baseline financial conditions of the Permittee 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 COVID-19 pandemic on the long-term affordability of the CSO LTCP are obviously still unknown, it is reasonable to expect that there will be potentially significant impacts. There are several dimensions to these potential impacts, including reduced utility revenues and household incomes.

Given the current and likely continuing uncertainties in New Jersey and national economic conditions, the Village will be reluctant 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 report, based on emergent economic conditions beyond the permittees' control. Considering the adaptive management practices noted above, a suitable approach to address likely financial challenges would be to develop a schedule for incremental improvements, and then revisit these improvements as financial conditions change or as new control technologies emerge.

2.5. Follow Up to DEAR Comments

In the Development and Evaluation of Alternatives (DEAR) approval letters the NJDEP requested certain items to be addressed in the SIAR, below is a brief summary of the comments and how each is addressed in the SIAR. The full comment letters are included as Appendix A.

2.5.1. BCUA

The BCUA received three comments from the NJDEP on February 12, 2020. BCUA wrote to the NJDEP on February 20, 2020 clarifying it understanding of the comments. The comments received are summarized as follows:

Comment 1: Requested a description of the public participation activities undertaken by the four permittees since the Public Participation Process Plan (PPP).

Response 1: The SIAR contains documentation of the public participation activities since the PPP. The activities are documented in Section 13, as well as specific input on the alternatives in Section 6 and the selection of the LTCP in Section 7. Meeting minutes, sign in sheets, and presentations can be found in Section 16 (Appendix B, C, D, and E).

Comment 2: The Department requested additional discussion of the impact on combined sewer overflow from an expansion of plant capacity. The Department also noticed a typographical error in Table 8-9 in which the Overpeck Creek Relief Sewer capacity was represented as 8 MGD rather than 18 MGD.

Response 2: Additional discussion of increasing plant capacity and the impact on CSOs has been included in 6.1. Table 8-9 has been reproduced as part of the SIAR using the correct values, see Table 6-16-1.

Comment 3: The Department reserved the right to comment on the percent capture calculation.

Response 3: The BCUA CSO Group has coordinated internally to use a consistent definition of % capture, the details of which are included in Section 5.5.3. The approach applied is also consistent with most, if not all, of the NJ CSO Group members.

2.5.2. Fort Lee

Comment 1: ….. 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 ant percent capture, as well as a clear explanation of hydraulically connected system.

Response 1: The equation used to compute percent capture was answered in response to this question.

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 flow 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 interconnected systems, based upon the specific nature of the sewer system layout, pump stations, gradients, location 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 the system should be considered “separate.” This justification could provided in a separate submission.

Response 2: A letter presenting our request to be segmented from the other communities was sent to the department on April 24, 2020 (See Appendix A) detailing the justification with enforcements from the other CSO communities.

Comment 3: In response to Comment 9 in the Department’s October 1, 2019 letter, it is premature and outside the scope of this report (DEAR) to draw any conclusion a regarding compliance with the water quality standards given that the ambient water quality modeling results have not yet been submitted.

Response 3: The water quality modeling study has been drafted and was submitted to NJDEP September 29, 2020.

Comment 4: In the October 2, 2019 letter, the Department requested clarification of your intentions regarding solids removal in conjunction with PAA. ….. Provided that 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 water quality standards.

Response 4: The selected alternative is sewer separation. The PAA alternative has not been selected.

Comment 5: Cost information 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 comment to the LTCP submission.

Response 5: Understood.

2.5.3. Hackensack

The City received three comments that are summarized as follows:

Comment 1: “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.”

Response 1: Understood. The final estimated opinion of probable LTCP costs are presented in this report.

Comment 2: “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.”

Response 2: The BCUA CSO Group has coordinated internally to use a consistent definition of % capture, the details of which are included in Section 5.5.3. The approach applied is also consistent with most if not all of the NJ CSO Group members.

Comment 3: "…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."

Response 3: After the DEAR Report submissions, the BCUA CSO Group submitted a letter to the Department regarding its stance of the interpretation of the hydraulically connected system. This letter is under the review of the Department at this time and is further discussed in Section 4.2 of this report.

2.5.4. Ridgefield Park

Comment 1: Cited the requirement for a cooperative effort among the permittees of the BCUA CSO Group. It also requested an expansion of investigating additional combinations of control programs.

Response 1: By providing this SIAR prepared jointly by the permittees, coordination among the permittees has been demonstrated. The process of selecting the LTCP is documented in Section 7.4. Regional alternatives which includes a discussion of diverting additional flow to the plant and combinations of control programs were provided by the BCUA in Section 6.1.4.

Comment 2: The Department reserved the right to comment on the percent capture calculation.

Response 2: The BCUA CSO Group has coordinated internally to use a consistent definition of % capture, the details of which are included in Section 5.5.3. The approach applied is also consistent with most, if not all, of the NJ CSO Group members.

3. Introduction

3.1. General Introduction to System, Plant and Municipalities

3.1.1. Bergen County Utilities Authority

The Bergen County Sewage Authority (now the Bergen County Utilities Authority or BCUA) constructed a trunk sewer and the Little Ferry sewage treatment plant (now called the Water Pollution Control Facility or WPCF) in the late 1940s to relieve the pollution in Overpeck Creek. The plant, which went into operation in 1951, provided secondary treatment for a design flow of 20 MGD to serve ten municipalities and industries along the Overpeck Valley. In the early 1960's, service was extended to sixteen additional municipalities including Hackensack City. In addition, the Southwest Trunk Sewer extended service from Little Ferry to Hasbrouck Heights in 1972. The third Trunk Sewer was completed in 1972, and two major subsystems were completed in 1976 extending service to the Passaic Valley and Northern Valley areas of Bergen County. The last municipality to be added to the District was Wood-Ridge in 1992. The Overpeck Valley Relief Sewer (OVRS) was completed in 2011.

Plant capacity was increased periodically over the years to extend service to municipalities in eastern Bergen County. The present permitted capacity is 94 MGD, and a wet weather capacity of 120 MGD. In 2014, the average daily flow treated averaged 77.3 MGD.

The BCUA and its WPCF now provide wastewater transportation and treatment services for 47 municipalities, serving a population of about 565,000 people. The BCUA service area covers approximately 135 square miles (Figure 3-13-13-1), primarily located in the Hackensack River and Overpeck Creek drainage basins. The areas serviced by the BCUA are primarily residential with isolated sections that service industrial and commercial facilities. It is estimated that approximately 8% – 10% of the dry weather flow to the BCUA Water Pollution Control Facility (WPCF) is contributed by these industrial and commercial facilities. Forty-four municipalities in the service area have separate sewer systems, while three municipalities have combined sewer systems: Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park.

While the BCUA owns and operates the trunk / intercepting sewer systems (trunk sewers) that transport flows to the WPCF, it does not own or operate any of local collector sewers, which are owned and operated by each individual municipality, also, the BCUA does not own any CSO outfalls. The BCUA does own and maintain three regulators in the Village of Ridgefield Park, known as R-1, R-2 and R-5.

3.1.2. Ft Lee Short Description of Municipality and Collection System

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 unsewered 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 the 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 two discharge points have Fresh Creek net systems. They are the Bluff Road and Palisade Avenue netting systems. The size of the combined and separate sewer areas are presented in Table 3-13-1.

Table 3-1: Combined and Separately Sewered Areas of Fort Lee (acres)

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	1505.2	

3.1.3. Hackensack Short Description of Municipality and Collection System

The City of Hackensack is located in Bergen County, New Jersey, and it serves as the county seat. The City occupies approximately 4.2 square miles of land. The City is bounded, or bordered, by many municipalities in Bergen County, but is specifically bordered by the Hackensack River to its east. While the City is mostly developed, the City adopted a Rehabilitation Plan for the Main Street area in 2012 in which development has taken place and future development projects are anticipated in the next several years. The City is home to the Bergen County Court House and the Hackensack University Medical Center (HUMC). Per the US Census Bureau, the 2018 population estimate for the City is 44,522.

The City of Hackensack has approximately 31 miles of combined sewer and 39 miles of sanitary sewer. The combined sewer system (CSS) lays within the central portion of the City, while the separated sanitary sewer surrounds the outer portions of the City. The CSS is estimated to serve 19,500 citizens in the City. The CSS consists of two subdrainage areas that convey combined sewerage flow to the Anderson and Court Street regulator facilities. The Anderson Street CSS includes about 14 miles of sewer and drains an area of approximately 470 acres. The Court Street CSS includes about 17 miles of sewers and drains an area of approximately 440 acres. Under normal circumstances, the City's sewage is conveyed to the BCUA Hackensack Valley Trunk Sewer line and is ultimately treated at the BCUA WPCF. When the capacity of the CSS is exceeded during wet weather events, both subdrainage areas discharge combined sewage flow through the Court and Anderson Street Screening Facilities into the Hackensack River.

3.1.4. Ridgefield Park Short Description of Municipality and Collection System

The Village of Ridgefield Park is located in south central Bergen County, New Jersey, occupying approximately 1,230 acres (1.92 sq. mi.) of which 490 acres is serviced by combined sewers. The Village is bounded by the Overpeck Creek on the east and south, the Hackensack River on the west and Interstate Highway 80 on the north. The Village is essentially fully developed, with about 90% of all land parcels supporting residential use, primarily one and two-family homes on relatively small lots. According to the 2015 mid-census estimate, the population is 12,976. A small commercial district lies along Main Street. Most of this residential and commercial area, comprising about 40% of the Village by area, is served by combined sewers.

There is some industrial land use along the Hackensack River and, west of the NJ Turnpike, along Overpeck Creek. Several large commercial buildings sit east of the Turnpike in the Overpeck Corporate Center, next to Overpeck County Park. Schools and recreation land lie just west of the Turnpike. These areas are served by separated storm and sanitary sewers.

The Village of Ridgefield Park owns and operates the combined sewer system within the Village limits. Wastewater from the Village is transported through the BCUA's Ridgefield Park Intercepting Sewers, under Overpeck Creek before discharging into the BCUA Overpeck Valley Trunk Sewer (OVTS), which flows to the BCUA WPCF in Little Ferry, approximately two miles away. The collection system consists of approximately 26 miles of combined sewer, sanitary sewer and storm sewers that flow into combined sewers. The Village has ten combined sewer overflow (CSO) regulating facilities, three of which are owned by BCUA. The regulators are connected to six CSO discharge points. Four of these discharge points flow into the Hackensack River while the remaining two discharge to Overpeck Creek west (seaward) of the tide gate at the Turnpike. Each outfall is equipped with a solids and floatables control facility.

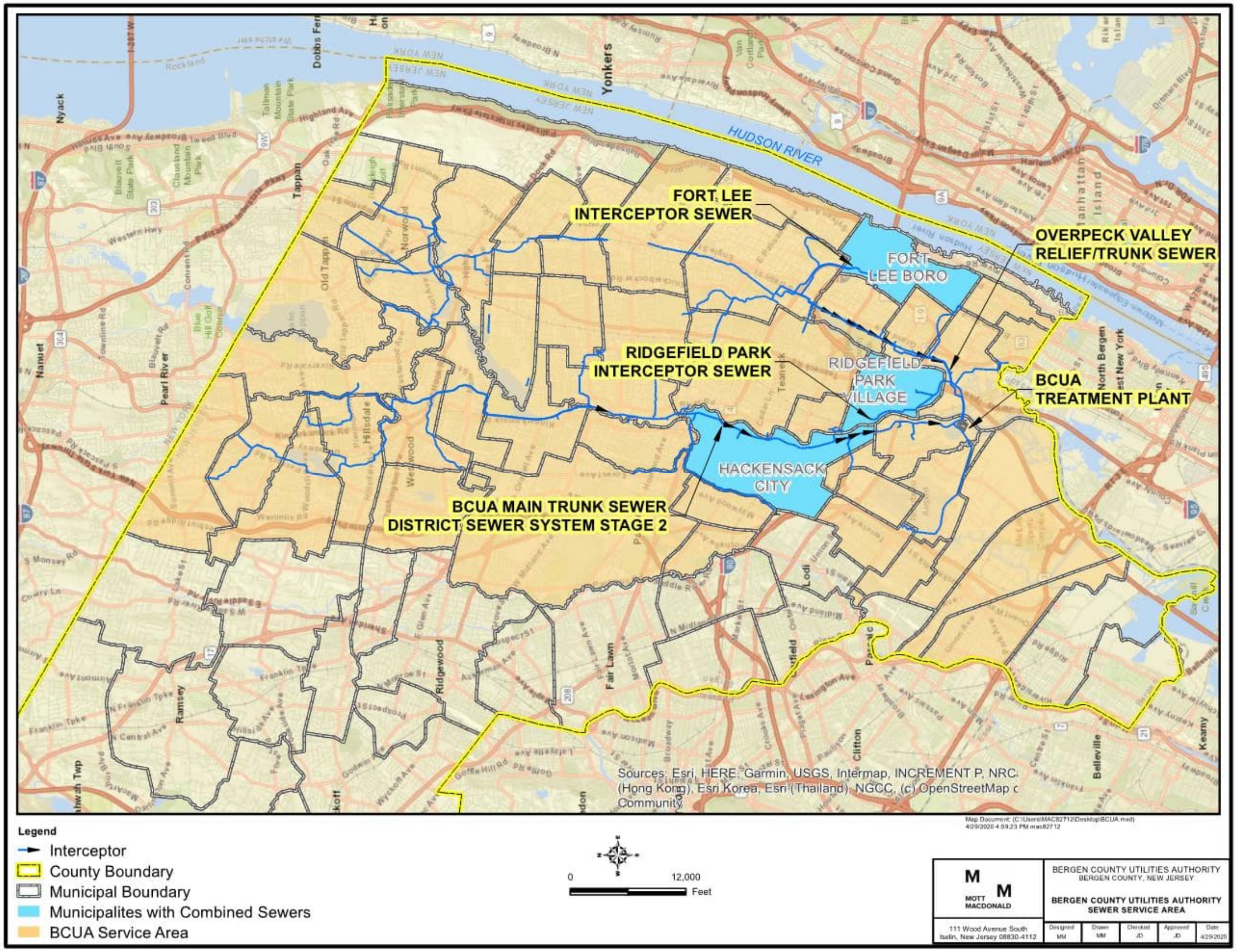


Figure 3-1: BCUA Service Area

3.2. Regulatory Background

In 2015, the New Jersey Department of Environmental Protection (NJDEP) revoked Master General Permit No. NJ0105023 and issued individual permits to municipalities and commissions/authorities that own or operate facilities that control, transport, or treat wastewater flows from combined sewer systems. Discharges from designated CSO outfalls in the Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park are now authorized and regulated by individual NJPDES Permits. While the BCUA does not own or operate CSO outfalls, the downstream portion of the BCUA trunk sewer system receives and conveys combined sewage from the Village of Ridgefield Park, the Borough of Fort Lee, and the City of Hackensack, whose systems are hydraulically connected. As such, the NJDEP revoked and reissued BCUA's individual Category "A" Permit No. NJ0020028 to incorporate CSO NJPDES permit requirements as part of the permit actions.

In the current NJPDES Individual Permits, the NJDEP has mandated that the permittees undertake steps, as needed, for the development of a CSO Long Term Control Plan, incorporating permit conditions that reflect the control standards and goals of the National CSO Control Policy (1994) established by United States Environmental Protection Agency (EPA). The individual permits also encouraged permittees to cooperate in the development of a plan that incorporates all permittees within a hydraulically connected system into a Regional CSO LTCP. The BCUA, Fort Lee, Hackensack, and Village of Ridgefield Park have joined to form the BCUA CSO Group to develop a regional plan. While the individual CSO municipalities must develop a plan for the reduction or elimination of CSO discharges, the BCUA needs to evaluate its transport and treatment facilities to ensure that it is, to the extent practical, maximizing flows to the WPCF during wet weather events.

A CSO LTCP involves a comprehensive study of the hydraulically connected sewer system and the evaluation of alternatives for reducing CSO impacts to receiving waters. It investigates the hydrologic and hydraulic relationships between precipitation, conveyance, treatment capacity, and overflows. It includes a feasibility study to evaluate the scope, costs, and performance of possible control alternatives for reducing the frequency and volume of CSO discharges.

The EPA CSO Control Policy and the individual NJPDES CSO Permits describe nine elements or requirements for the development of a CSO LTCP:

1. Characterization, monitoring, and modeling of the combined sewer systems to provide a thorough understanding of the hydraulically connected system, its response to various precipitation events, the characteristics of the overflows, and the water quality impacts that result from the CSOs; [See Characterization Reports submitted July 2018]
2. A public participation process that actively involves the affected public in the decision-making to select long term CSO controls; [See Public Participation Process Reports submitted July 2018 and Sections 6.2.2, 6.3.3, 6.4.5, 0, 7.3.3, 7.4.3, and 13 and Appendices B, C, D, and E]
3. Consideration of sensitive areas in identifying the highest priority for controlling overflows; [See Characterization Reports submitted July 2018, Regional Sensitive Areas Report submitted July 2018, and Section 4.4]
4. Evaluation of alternatives that considers a reasonable range of CSO control options that provide a level of control presumed (per the criteria given in the Policy and Permit) or demonstrated to meet the water quality-based requirements of the Clean Water Act (CWA); [See Development and Evaluation of Alternatives Reports submitted July 2019 and Section 6]
5. Cost/performance considerations to demonstrate the relationships among a comprehensive set of reasonable control alternatives; [See Development and Evaluation of Alternatives Report submitted July 2019 and Section 7]

6. An operational plan that incorporates revisions to the operation and maintenance program necessary after approval of the LTCP to incorporate its associated CSO controls; [See Section 11]
7. Maximizing treatment at the existing publicly owned treatment works (treatment plant) during and after each precipitation event so that such flows receive treatment to the greatest extent practicable utilizing existing tankage for storage, while still meeting permit limits; [See BCUA Development and Evaluation of Alternatives Report submitted July 2019 and Section 6.1]
8. An implementation schedule addressing the construction and financing of proposed CSO controls; and [See Sections 9 and 10]
9. A post-construction compliance monitoring program adequate to verify compliance with water quality-based CWA requirements and designated uses as well as to ascertain the effectiveness of implemented CSO controls. [See Section 12]

3.3. Related Permit Submissions and Reports

The NJPDES Individual Permit divided the above requirements into three steps. The tasks undertaken and the documents submitted under each step are as follows, with dates of approval listed in Table 3-23-2 below:

Step 1 (LTCP elements 1, 2 and 3) incorporated the characterization, monitoring, and modeling element and components of the public participation process, consideration of sensitive areas, and compliance monitoring program. Permittees were required to submit a System Characterization Work Plan by January 1, 2016, and a System Characterization Report, a Public Participation Process Report and a Consideration of Sensitive Areas Information document by July 1, 2018. These documents were submitted on time and served as the basis for the subsequent development and evaluation of alternatives efforts. Although listed separately from the steps in the permit under the LTCP Submittal Requirements, permittees were also required to submit a baseline Compliance Monitoring Program (CMP) Work Plan by January 1, 2016 and are then required to submit a baseline CMP Report and data by July 1, 2018. The members of the BCUA CSO Group collaborated with the NJ CSO Group, a coalition of New Jersey CSO permittees, to satisfy these permit conditions through a regional ambient water quality sampling and testing program and pathogen water quality modeling.

Under Step 2 (LTCP elements 4 and 5), permittees were required to submit a Development and Evaluation of Alternatives Report (DEAR) by July 1, 2019. This step involved evaluating a broad range of control alternatives to meet CWA requirements and water quality standards (WQS) using either the “Presumption” Approach or “Demonstration” Approach and the corresponding conditions prescribed in the permit. Maximizing treatment at the existing POTW treatment plant and cost and performance considerations were also addressed in Step 2. This report was submitted on time in June 2019.

Under Step 3 (LTCP elements 6, 7, 8 and 9), permittees are required to submit a Selection and Implementation of Alternatives Report that incorporates the final plan selection and implementation schedule for the construction and financing of proposed CSO controls. A proposed operational plan revision schedule and a post-construction compliance monitoring program also should be addressed. This report comprises this submittal, which was originally due June 1, 2020, but, as per NJDEP’s “Stay of Permit Condition Part IV.D.3.b.iv” on April 15, 2020, in response to the impact of the COVID-19 pandemic, submission has been delayed until October 1, 2020.

Table 3-2: Summary of CSO LTCP Report Submittals and Approval Dates

Step	Deliverable	BCUA	Ridgefield Park	Hackensack	Fort Lee
1	System Characterization Report	March 5, 2019	March 11, 2019	March 19, 2019	June 29, 2019
	Public Participation Process Report	June 26, 2019	June 26, 2019	June 26, 2019	Jan 18, 2019
	Regional Sensitive Areas Report[1]	March 1, 2019			
	Municipal Sensitive Areas Report[2]	NA	April 8, 2019	April 8, 2019	April 8, 2019
	Compliance Monitoring Program Report[1]	April 18, 2019			
2	Development and Evaluation of Alternatives Report	Feb 12, 2020	Feb 12, 2020	Feb 12, 2020	Feb 12, 2020
3	Selection and Implementation of Alternatives Report	This Report Due October 1, 2020			

1. Submitted by PVSC on behalf of the NJ CSO Group.
2. Submitted as part of the System Characterization Reports

4. System Characterization and Modeling

4.1. Hydraulically Connected System Definition and Segmentation

As part of a hydraulically connected system, the BCUA CSO Group agreed to work cooperatively on a regional CSO LTCP. The NJDEP requested that the BCUA CSO group define their hydraulically connected system using the definition in the permit. This section highlights the Permit definition of hydraulically connected system and applies it to the BCUA CSO Group to define the hydraulically connected system and any segmentation thereof.

Part IV D "Submittals" 1.c of the Permit requires

> *"Since multiple municipalities/permittees own separate portions of the hydraulically connected sewer system, the permittee shall work cooperatively with all other appropriate municipalities/permittees in the hydraulically connected sewer system to ensure that the Nine Minimum Controls (NMC) & Long Term Control Plans (LTCP) activities are being developed and implemented consistently."*

Part IV G 4.f of the Permit further requires that, for the demonstration approach, compliance with the permit requirements be met on the basis of the hydraulically connected system.

Part IV B 1.c of the permit provides the following definition:

> *"Hydraulically connected system" means the entire collection system that conveys flows to one Sewage Treatment Plant (STP)."*

Accordingly, the hydraulically connected system would be defined as the BCUA interceptor sewers and all the municipal separate sanitary and combined sewers that discharge to the interceptor and would also include the combined sewer outfalls, netting facilities and other structures on the outfalls downstream of the regulators.

The definition continues to allow segmentation of the hydraulically connected system on a case by case basis if justified by the nature of the system.

> "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"

Given that Fort Lee CSOs discharge into the Hudson River while Hackensack and the Village of Ridgefield Park discharge to the Hackensack River or Overpeck Creek just upstream from the Hackensack River, it was logical to consider segmentation of the hydraulically connected system. This concept was discussed with the NJDEP and a request to formalize the segmentation of the hydraulically connected system was provided to the NJDEP via letter on April 24, 2020 (see Appendix A). The letter requested segmenting the BCUA hydraulically connected system into the following two segments:

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

4.2. Hydraulic model development

Each of the Permittees prepared a model of their collection system that incorporated both dry weather and wet weather flows. The details of the individual models can be found in the respective Combined Sewer

System Characterization Reports. The following is a summary of the development of the BCUA districtwide model and the integration of the individual Permittee models into the overall model.

4.2.1. Monitoring

Mott MacDonald worked with BCUA to develop a monitoring and modeling quality assurance/quality control project plan (QAPP), which was submitted and subsequently approved by the NJDEP. The QAPP outlined real time hydraulic monitoring (flow and/or depth) at ten different locations spread along the various BCUA Trunk Sewers encompassing the CSO municipalities to develop data that could be utilized in the calibration and verification of the model. Flow monitoring was conducted for a period of approximately six months. Additional detailed information on the monitoring locations is provided in the System Characterization Report, submitted in June 2018 and available on the NJDEP CSO website.

In addition to the temporary monitoring as noted above, the BCUA maintains permanent meters on wastewater discharges into the BCUA Trunk Sewer System. These meters are maintained for billing purposes and were used as input in the development of the BCUA model. The BCUA owns and operates over 150 metering sites; a review of average daily flows showed that forty-five of the meters measure 85% of the wastewater flows into the system. Long term data from the forty-five largest permanent meters were used with EPA's Sanitary Sewer Overflow Analysis and Planning (SSOAP) Toolbox to evaluate and simulate Rainfall Derived Infiltration and Inflow (RDII) for assessments of flows for long term model simulations. Overall, the forty-five meters range in average daily flow from a low of 0.40mgd/day to about 4.0 mgd/day. BCUA owned and operated flow meters are calibrated quarterly to assure reliable billing data and thus were ideal for long term data analyses.

4.2.2. Model development

Development of a detailed, computerized hydraulic model is essential to evaluating current conditions and the effects of CSO alternatives. The development of the model is described in detail in the System Characterization Reports. Three different consultants were engaged in the development of models. The Borough of Fort Lee retained HDR, the City of Hackensack retained Arcadis, and the Village of Ridgefield Park and BCUA both retained Mott MacDonald. HDR and Mott MacDonald completed their sewer system modeling using the InfoWorks ICM software, while Arcadis utilized PCSWMM.

The BCUA collection system model was built and simulated using the InfoWorks ICM modeling software. The model was built using a combination of independently built and calibrated models for the combined sewer communities (Fort Lee, Hackensack, and Ridgefield Park) together with modeling to represent the BCUA trunk sewers, plant infrastructure, and contributions to that infrastructure from the separate sewer communities. InfoWorks has the ability to import data from other models and thus the PCSWMM model was integrated into the BCUA InfoWorks model and then tested using rainfall data from Hackensack to verify that the converted model was providing data consistent with the original PCSWMM Model. Good agreement was obtained between the converted and original model data. The BCUA model was appended to the Ridgefield Park model rather than being developed separately and importing the Ridgefield Park model. Fort Lee's model was initially developed in InfoWorksCM, the predecessor to InfoWorksICM. During 2020 the model was updated to InfoWorks ICM v 9.5 to be on the same platform as the BCUA model. However, due to a bug in InfoWorksICM v 9.5 the Fort Lee model could not be imported without changing the results. To preserve the model calibration output from Fort Lee, pumping stations and select sub-catchments were used as input to the BCUA model with care taken to verify that backwater impacts from the BCUA were not impacting the Fort Lee system.

4.2.3. Representative Hydrologic Year selection (Typical Year)

Modeling of current and possible future conditions is based on the precipitation in an average or typical year, which was represented by the actual precipitation in 2004 as recorded on the National Oceanic and

Atmospheric Administration (NOAA) gauge at Newark Liberty International Airport. Selection of 2004 was based on an analysis of many years of precipitation by the firms of Greeley and Hansen and CSM Smith for the NJ CSO Group. The process is documented in a separate report submitted by the NJ CSO Group to and approved by the NJDEP on May 31, 2018.

It is acknowledged that sea levels have been rising and are expected to continue to rise over the life of the project and beyond, however, the rate of change is uncertain. To overflow, the water level in the combined sewer must exceed the tide elevation. The rate of discharge is also related to the relative elevation difference between the water level in the combined sewer and the receiving water. Thus, increased sea levels would tend to reduce the volume of combined sewage overflow. There is potential for rising sea levels to impact the hydraulic performance of the combined sewer systems in Hackensack and Ridgefield Park. The potential for sea level rise to impact Fort Lee is very low. Fort Lee is located on the Palisades, a series of steep cliffs along the west side of the Hudson River. The elevation of Fort Lee is greater than 250 ft Mean Sea Level (MSL) above the Hudson River. The systems have been assessed for flooding under current conditions and any future flooding, resulting from sea level rise, would need to be addressed independently. Existing tide levels were used to provide a conservative estimation of the alternatives' performance for CSO reduction.

There have been discussions of changes in rainfall patterns. Unfortunately, there are no reliable predictions that can be applied to create a Typical Year for planning purposes. It is noted that, through the development of the Typical Year, that for the top 10 ranked years, there were years ranging from 1973 to 2014 with every decade in between represented, and initially the top two ranked years were from the 1980s. This seems to indicate that the rainfall pattern as they relate to Typical Year analysis have been relatively static. Accordingly, lacking a reasonable method for predicting future weather conditions, it is reasonable to assume the 2004 rainfall is suitable for use in the future baseline condition.

4.2.4. Future Baseline Conditions

The Permit requires permittees to simulate "conditions as they are expected to exist after construction and operation of the chosen alternative(s)" (Part IV.G.4.e). The intent is to reduce the risk that foreseeable changes in the community and sewer system will reduce the effectiveness of the proposed LTCP facilities. To address this, an evaluation of anticipated changes to population and potential changes to sewer flows was undertaken. Discussions were also held to document planned changes to the sewer system. It has been assumed that the alternatives that are selected through the LTCP process will be constructed and implemented over a 25 to 30-year period. As such, the year 2050 was selected as the future baseline condition for BCUA, Hackensack and Ridgefield Park. Fort Lee selected 2045 as the future baseline condition, since they are expected to reach full build out prior to this date, the difference in baseline year did not prohibit integration of the models or results, for more detail see the respective DEARs.

It is noted that there is a great deal of uncertainty in future projections and that as the planning horizon increases the uncertainty increases dramatically. This is evidenced in cases where a variety of reputable sources produce widely differing population projections. The goal was to select future conditions that would be a reasonable, yet conservative, estimate of likely future conditions. It is noted that actual future conditions could vary substantially due to demographic trends, economic conditions, changes in technology, climate impacts and a myriad of other influences beyond the control of the Permittee.

4.2.5. Updates to BCUA Model

The BCUA model underwent minor modification to the InfoWorks ICM to improve the calculation of force mains based on recommendations from the software vendor Innovyze. The changes included representing structures as "break nodes" and revising the pressurized pipe calculation options. No meaningful changes to model results were observed following these changes. To represent LTCP conditions, a revised PCSWMM model for Hackensack was imported. The conversion was conducted using the procedure and checking established during the DEAR.

4.2.6. Updates to Fort Lee Combined Sewer Model

The combined sewer model for Fort Lee was developed and calibrated in InfoWorks CS. This version of InfoWorks CS was not compatible with BCUAs InfoWorks ICM model. In March and April of 2020, the Fort Lee model was converted to InfoWorks ICM and model output was incorporated into the BCUA model. An update to the Fort Lee Characterization Report includes an improved recalibration and is provided in Appendix F.

4.2.7. Updates to Hackensack Model

No updates were made to the City's baseline modeling since the DEAR.

4.2.8. Updates to Ridgefield Park Model

The Ridgefield Park InfoWorkICM model was modified to distribute population according to US Census data rather than by overall population density. This resulted in an increase in annual overflow volume for the typical year from 50.3 MG to 52.2 MG producing slightly more conservative results.

4.2.9. Baseline Conditions System Performance

As noted above, the LTCP will take implemented over a 25-30 year period during which population growth is anticipated to change the average daily and peak flows tributary to the BCUA Interceptor System. Accordingly, anticipated population growth was estimated for each municipality within the district to better predict increases in dry weather flows over the next two to three decades. Population growth within separate sanitary sewered areas was added across the municipality, however in combined sewer regions an attempt was made to distribute potential growth within the combined sewered areas drainage basins based on undeveloped land or anticipated redevelopment areas based on information from Land Use Boards. Anticipated population growth and distribution was added to the models to develop future baseline flows upon which wet weather flows were added to obtain a better understanding of their impact upon the frequency and volume of overflows within specific CSO drainage areas. The future baseline condition model was used to implement alternatives, while the 2015 baseline model was used as the point of comparison to avoid potential for increased dry weather flows to skew the LTCP towards less conservative facilities. The Baseline Summary developed by this process using 2015 sewer system conditions and 2004 rainfall data is provided in Table 4-1.

Table 4-1: 2015 Baseline Summary of Typical Year Performance

Outfall	Overflow Events	Overflow Volume (MG)	Wet Weather Inflow (MG)	% Capture
FL-001	58	124.5	NA	NA
FL-002	25	25	NA	NA
Fort Lee/Hudson River Total	**58**	**149.5**	**631**	**76.3%**
HK-001	56	105.3	NA	NA
HK-002	56	151.4	NA	NA
Hackensack Total	**56**	**256.7**	**814.8**	**68.5%**
RP-001	19	6.0	NA	NA
RP-002	11	0.4	NA	NA
RP-003	45	15.2	NA	NA
RP-004	55	27.7	NA	NA
RP-005	25	3.4	NA	NA
RP-006	12	0.5	NA	NA
Ridgefield Park Total	**53**	**52.2**	**216.0**	**75.8%**
Hackensack River Basin Total	**56**	**308.9**	**1031**	**70.0%**
BCUA Systemwide	**58**	**458.4**	**1662**	**72.4%**

4.3. Receiving Waters and Water Quality Conditions

4.3.1. Baseline sampling program

The NJPDES CSO Permits, direct permittees to implement a Compliance Monitoring Program (CMP) adequate to verify existing ambient water quality conditions for pathogens and evaluate the effectiveness of future CSO controls related to compliance with water quality standards (WQS) and the protection of designated uses. Data gathering conducted in the initial CMP phase was intended to inform the selection of appropriate CSO controls. Per the NJPDES CSO Permits, pathogens are the pollutant parameters of concern for ambient water quality monitoring and WQS compliance, intended as an indicator that the controls meet the water quality-based requirements of the CWA. The BCUA CSO Group members collaborated with the NJ CSO Group in preparing a Compliance Monitoring Program that was approved by NJDEP in March 2019.

As part of the NJ CSO Group collaboration, a field sampling and analytical testing program for existing ambient pathogen water quality conditions in the participating CSO permittees receiving waters was conducted in 2016 and 2017. The NJ CSO Group Compliance Monitoring Program Report (CMP Report), dated June 2018, was submitted by PVSC as the lead organization of the NJ CSO Group to the NJDEP, and NJDEP approved it on March 1, 2019. The CMP Report provided a narrative of the implemented Baseline Compliance Monitoring Program, including the program description; the field sampling and the field and laboratory analytical methods used; the data quality objectives; an evaluation of data completeness, precision, and representativeness; and presentations and discussion of the program results. The intent of the program was to generate adequate data to establish existing ambient water quality conditions for pathogens in the CSO receiving waters and to update, calibrate and validate a pathogen water quality model of the receiving waterbodies.

The program involved baseline, source, and wet weather event sampling of waterbodies throughout the region, including sampling stations maintained by the New Jersey Harbor Dischargers Group (NJHDG). Baseline sampling was performed twice a month in May and June; weekly in July, August, and September; and monthly from October through April. Source sampling occurred at the same time as baseline sampling, but targeted major influent streams within the study area to establish non-CSO loadings. Event sampling was timed to coincided with rainfall, to capture three discrete wet-weather events, and was limited to select sampling locations.

The CMP Report organizes the baseline, source, and event sampling data by waterbody grouping, station number, and specific waterbody. A total of 23 baseline and source events were completed from April 2016 through March 2017, while the wet weather event sampling was completed across four sampling dates in June 2016, January 2017, and April 2017. All samples collected were analyzed for fecal coliform and enterococcus and samples from freshwater locations were also analyzed for E. coli. During field sampling, field measurements were also made for temperature, salinity, dissolved oxygen, light penetration (Secchi depth), and turbidity. Depending on the sampling location, samples were collected at either one or two depths. For event sampling, locations were typically sampled twice per day for three days.

4.3.2. New Jersey Water Quality Standards Applicable to Receiving Waters

The NJDEP established water quality standards for each receiving water within the State of New Jersey based on their intended use and whether they are freshwater or saline waters. The standards are based on both bacterial and physical/chemical standards such as levels of dissolved oxygen, turbidity, nutrients, pH, etc. Discharges from combined sewer overflows contribute pathogens, and thus the parameter of interest for CSOs is the bacterial standards. Bacterial standards are set using the monthly geometric mean at levels to protect the watercourse's primary or intended use, while single sample maximums are used for beach notifications set (N.J.A.C. 7:9B-1.5(c)7). Table 4-24-2 outlines the bacterial standards and protected uses for each water quality classification:

Table 4-2: Surface Water Quality Classification Summary

Class	Description	Bacterial Standards	Monthly Geometric Mean (cfu/100 ml)	Single Sample Maximum (cfu/100 ml)	Protected Uses
SC	Saline Ocean	Enterococci	35	104	Primary Contact, Shellfishing
SE1	Saline Estuary	Enterococci	35	104	Primary Contact
SE2	Saline Estuary	Fecal coliform	770	NA	Secondary Contact
SE3	Saline Estuary	Fecal coliform	1500	NA	Secondary Contact
FW2	Fresh Water	E. coli	126	235	Primary Contact and Public Water Supply

4.3.3. Hudson River

The Fort Lee combined sewer system overflows flow during rainfall events to the Hudson River. NJDEP has designated the Hudson River as a "Secondary Contact Recreation", Saline Estuary with a SE2 Class. The water quality standards for such receiving water bodies are set with monthly geometric 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 provides 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 31, shown on Figure 4-14-14-1, is located adjacent to Fort Lee's discharge and results are shown on the Figure 4-24-24-2. Though these data do not show a contravention of water quality standards, given the limited data set collected, an accurate assessment of compliance with water quality standards cannot be inferred.

Figure 4-1: BCMP Fort Lee Monitoring Location

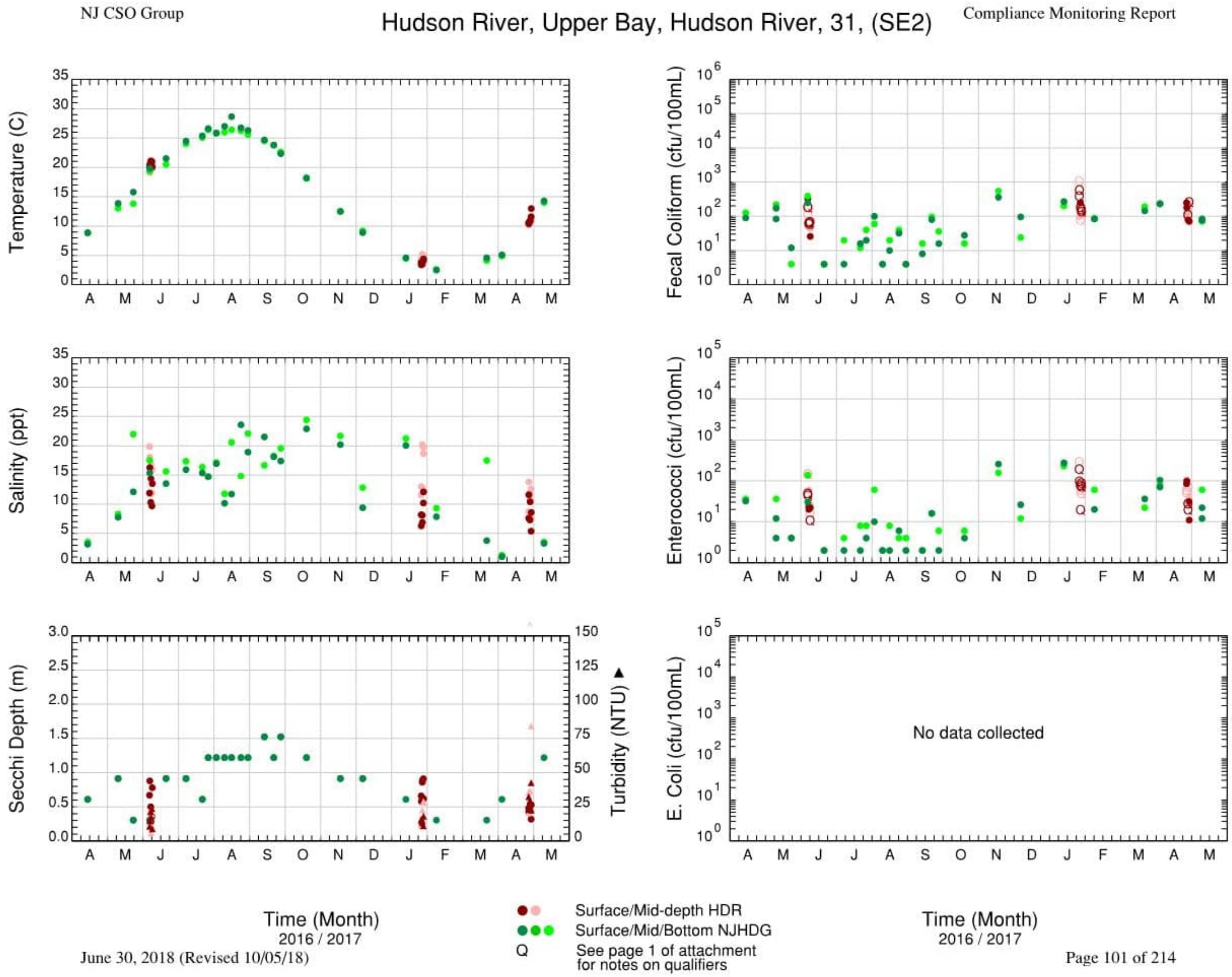


Figure 4-2: Site 31 Water Quality Sampling Data

4.3.4. Hackensack River

Ridgefield Park and almost all of Hackensack are located in the Hackensack River Watershed (Hydrologic Unit Code (HUC)-11 02030103180 - Hackensack River below and including Hirshfeld Brook), which is in State Watershed Management Area 5, see Figure 4-34-34-3. The Village of Ridgefield Park straddles a ridge that divides two the Village into two sub-watersheds, to the west where the combined sewer discharge is the Hackensack River, Fort Lee Road to Oradell gage (HUC-14 02030103180030; Sub-watershed ID 05BB03), to the east is the Overpeck Creek, see Figure 4-44-44-4. The Hackensack combined areas likewise drains into Hackensack River, Fort Lee Road to Oradell gage (HUC-14 02030103180030; Sub-watershed ID 05BB03). Other portions of the City, primarily in the west, drain to Coles Brook, Losen Slofe, and Berrys Creek, see Figure 4-44-44-4. The Hackensack River in the area of the CSOs has a surface water quality classification of Saline Estuary 1 (SE1), downstream of the Overpeck Creek the Hackensack River classification changes to SE-2. There is a tide gate on the Overpeck Creek at the New Jersey Turnpike (Route 95); the CSOs are downstream of this point, where the Creek is classified as Saline Estuary 2 (SE2), see Figure 4-54-54-5.

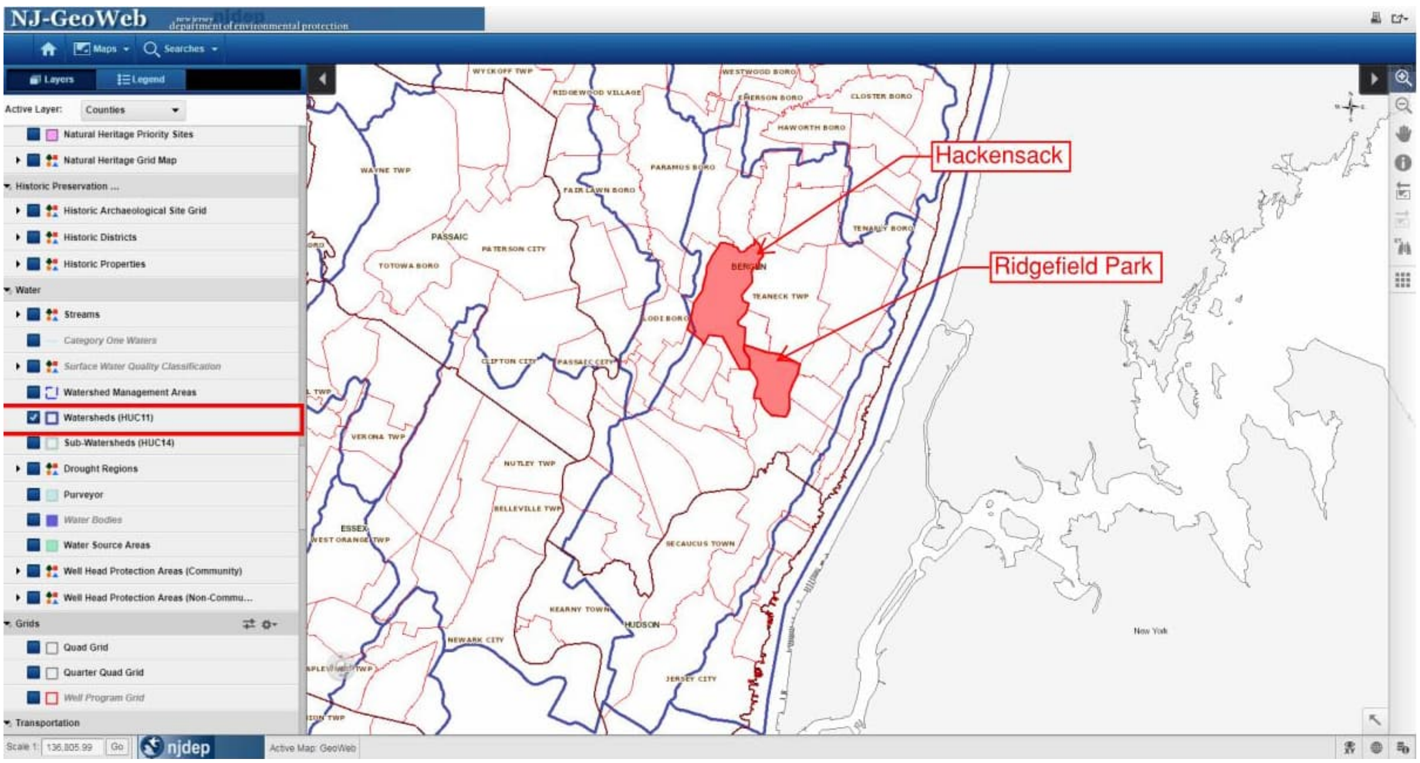


Figure 4-3: Ridgefield Park and Hackensack HUC-11 Map

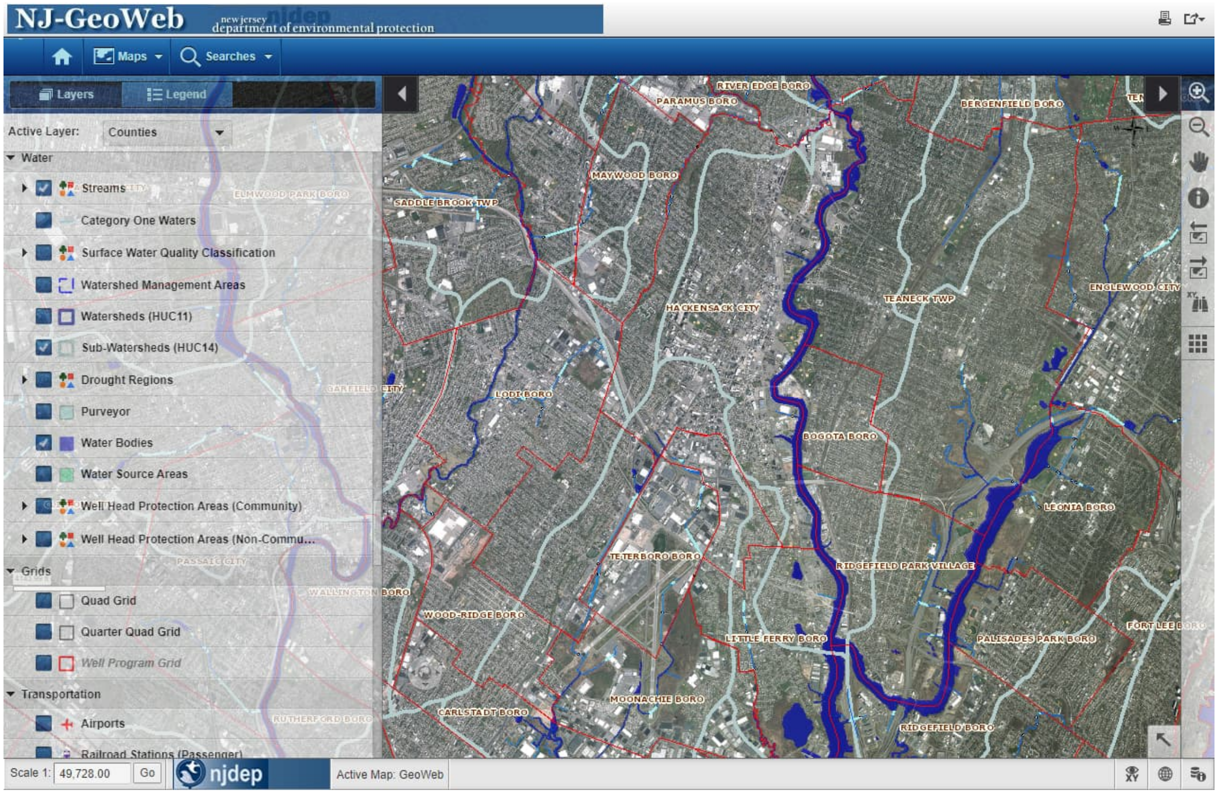


Figure 4-4: Ridgefield Park and Hackensack HUC-14 Map

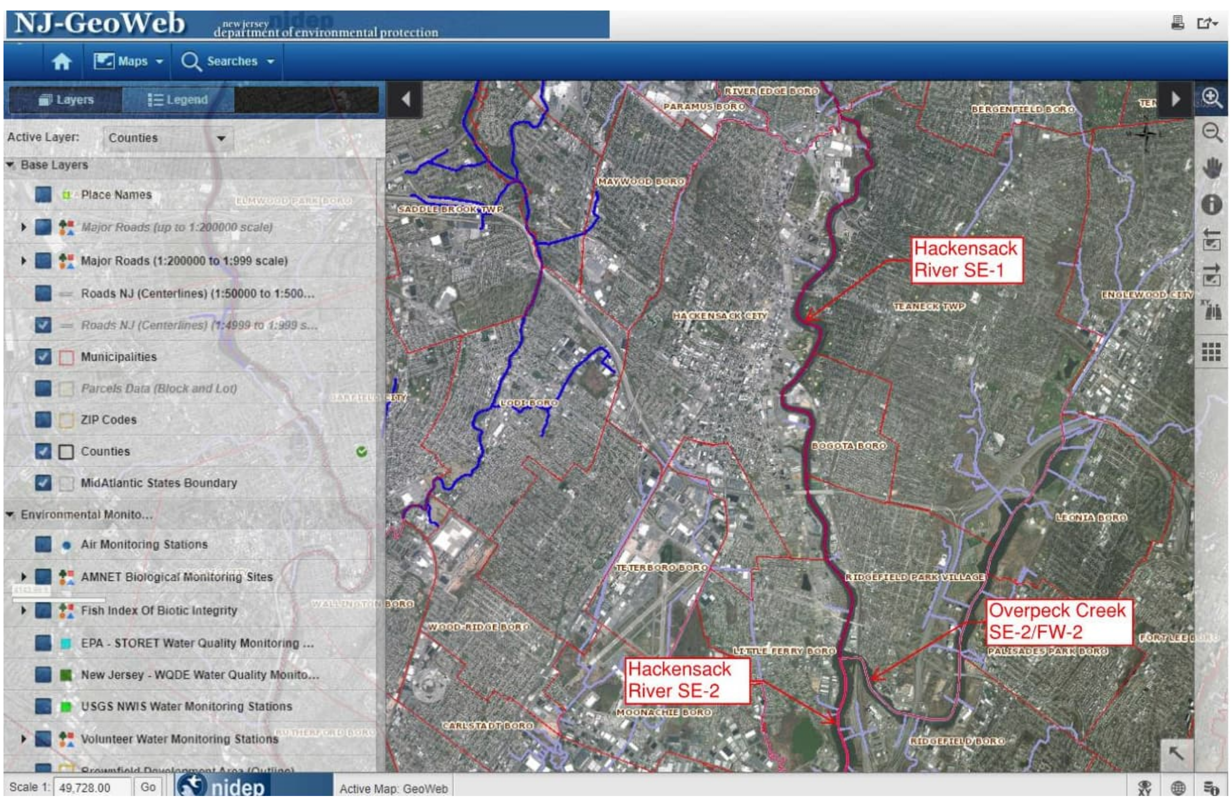


Figure 4-5: Hackensack River and Overpeck Creek Surface Water Classifications

The saline regions of the Hackensack River appear on the NJDEP's 303(d) List of Water Quality Limited Waters primarily for chemical and pesticide contamination including dioxin, heptachlor epoxide, and PCB, DDT and its metabolites, mercury, chlordane, and dieldrin in fish tissues extending the full length of the estuary from Newark Bay to the Oradell dam. These contaminants impact the designated use of fish consumption for SE1, 2, and 3 classified waters. In addition, low dissolved oxygen levels have been detected primarily in the SE-3 region and high enterococcus levels in the SE1 region of the river, which includes the reach along Hackensack and Ridgefield Park.

Overpeck Creek is listed on the 303(d) list for chemical and pesticide contamination including PCB, DDT and its metabolites, chlordane, and dioxin all in fish tissues, which impact the designated use of fish consumption for SE2 and FW2 waters. In addition, high levels of Escherichia coli (E coli) were also detected in the freshwater (FW2) segment of the Creek, which impacts recreation within the region. Note that there are no CSOs within this segment of Overpeck Creek.

The Baseline Compliance Monitoring Program described above including three monitoring locations in receiving water areas immediately adjacent to Hackensack and the Village of Ridgefield Park: sites B1 and B2 on the Hackensack River and site B11 on the saline estuary portion of Overpeck Creek. Maps of the sampling sites are shown in Figure 4-64-64-6 and Figure 4-74-74-7, the sampling results taken from the Program's report are presented below in Figure 4-84-84-8 through Figure 4-104-104-10

Figure 4-6: BCMP Hackensack Monitoring Location

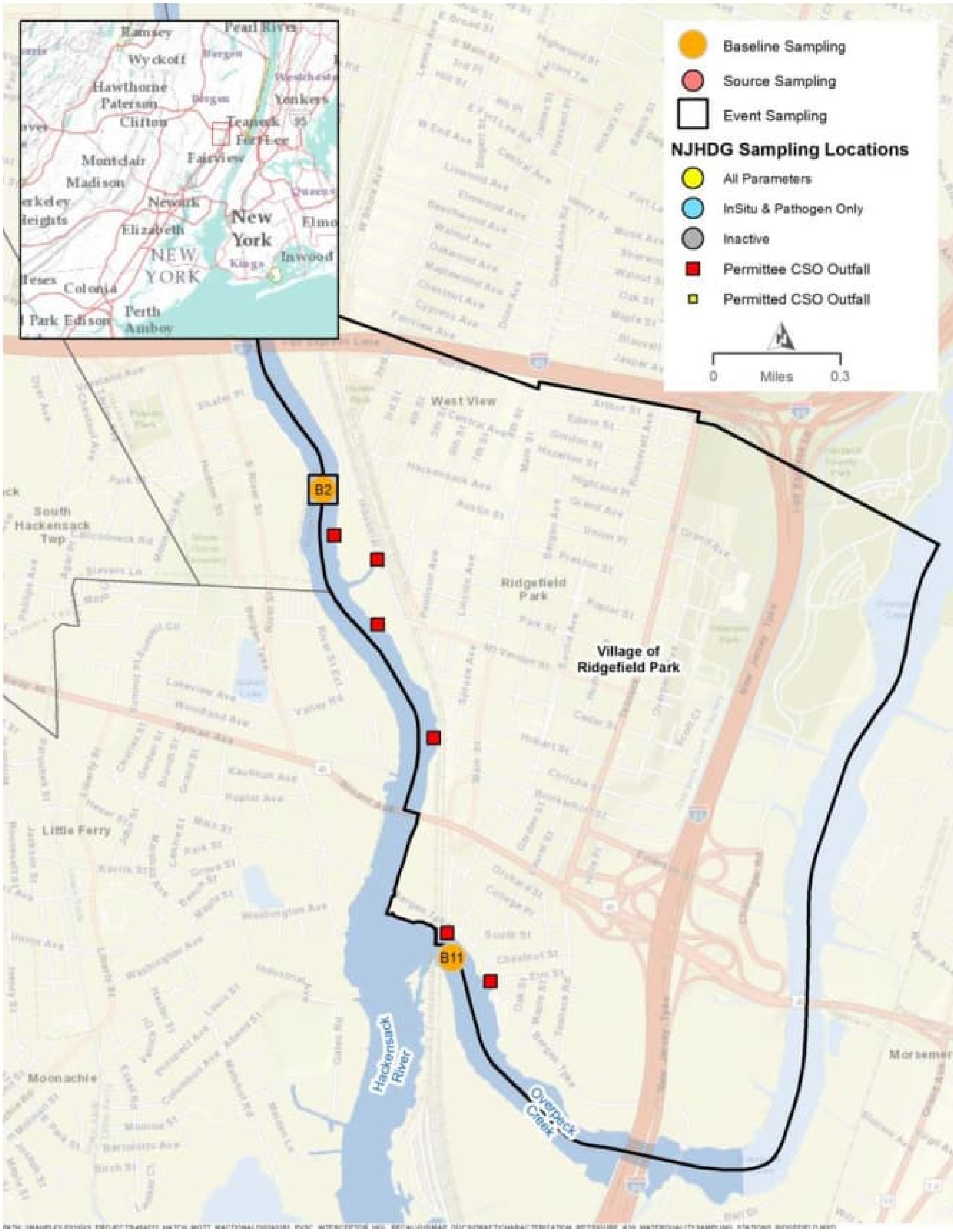


Figure 4-7: BCMP Ridgefield Park Monitoring Locations

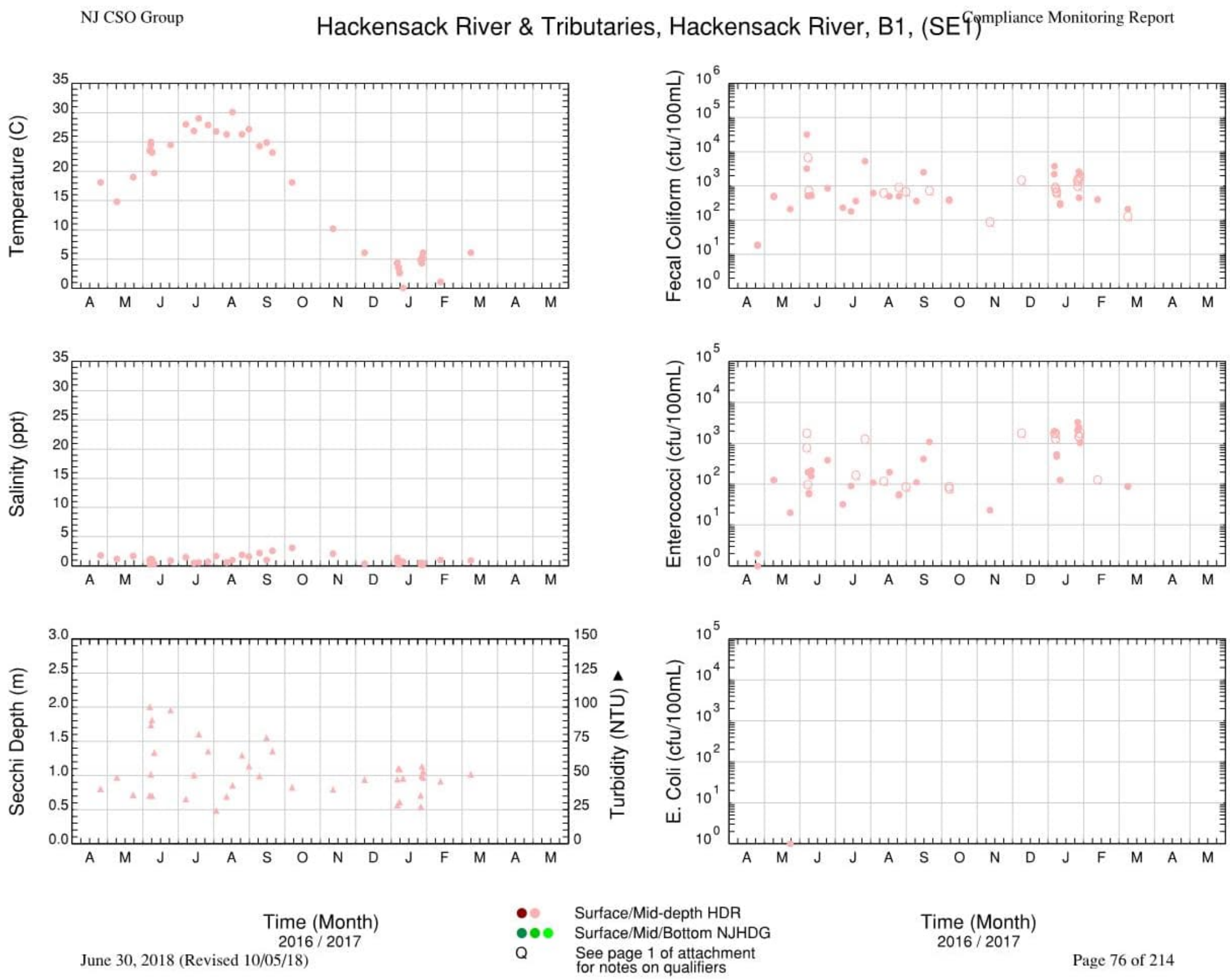


Figure 4-8: Site B1 Water Quality Sampling Data

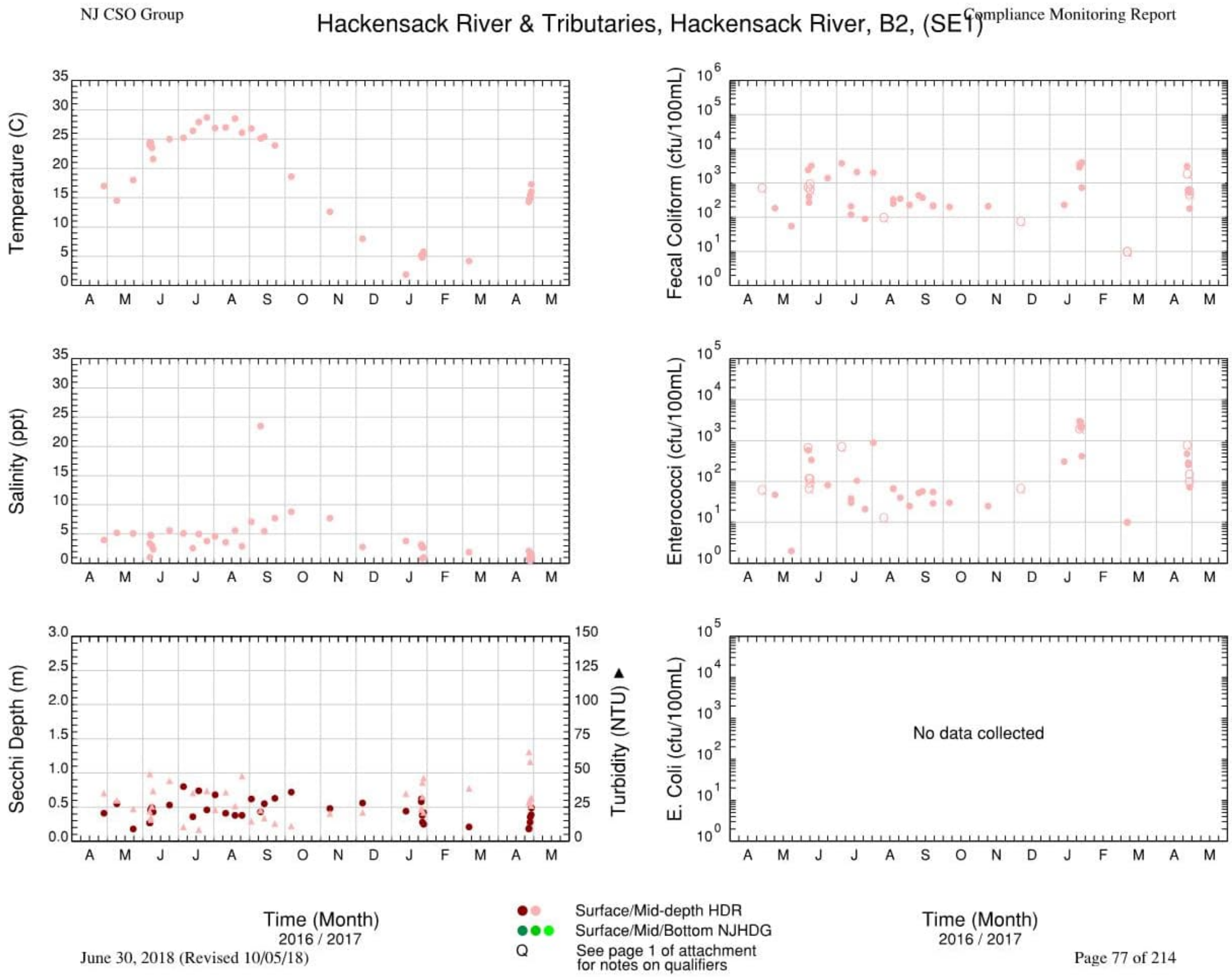


Figure 4-9: Site B2 Water Quality Sampling Data

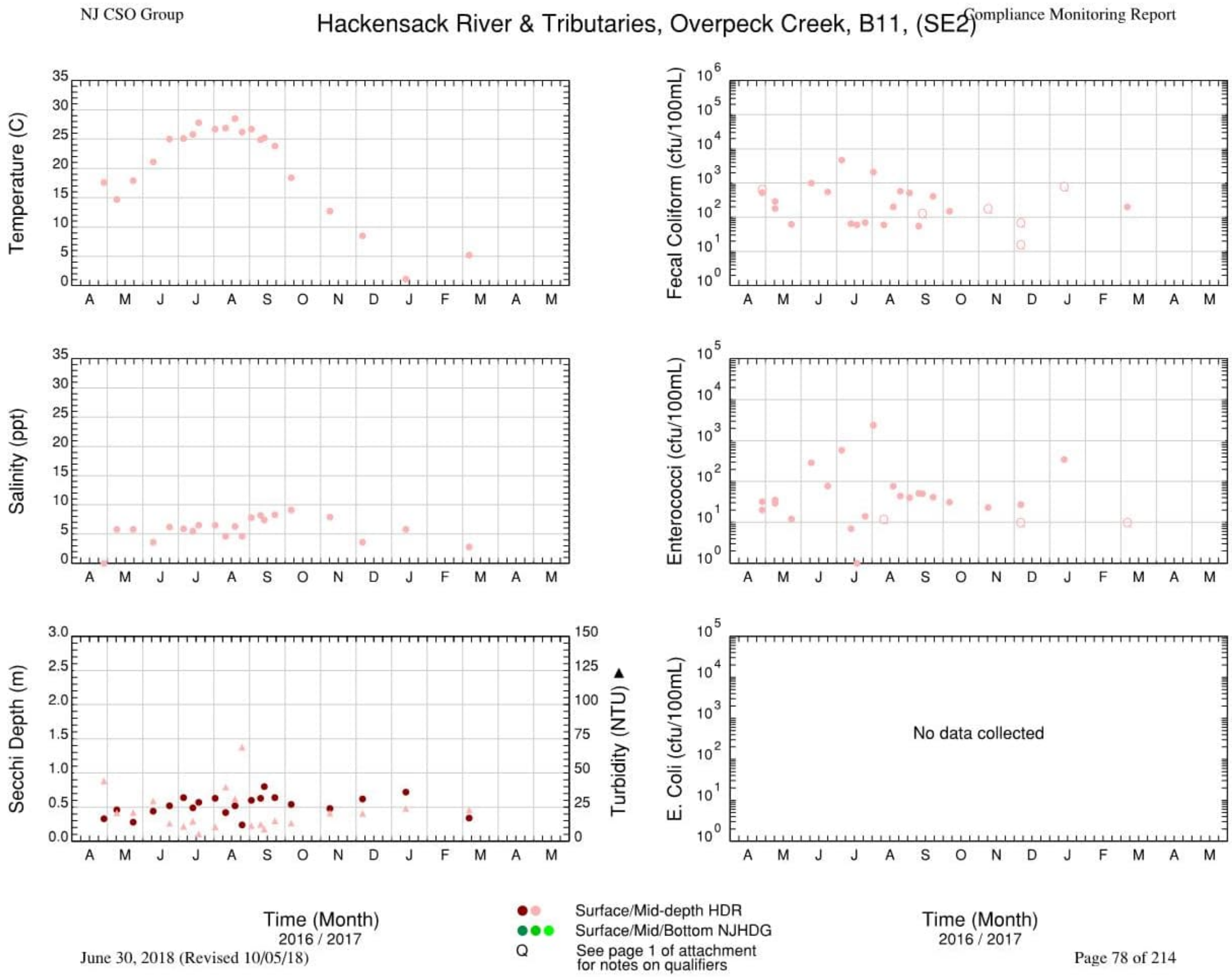


Figure 4-10:Site B11 Water Quality Sampling Data

4.4. Sensitive Areas

4.4.1. Hudson River

A comprehensive review of online databases, correspondence with regulatory agencies, direct observations, and local environmental organizations was conducted by the PVSC CSO Team 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's Identification of Sensitive Areas 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 Great Lakes Environmental Center 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.

4.4.2. Hackensack River

The NJ CSO Group, which includes the City of Hackensack and Village of Ridgefield Park, contracted Greeley & Hansen and CDM Smith through the PVSC to perform a regional sensitive areas analysis. The sensitive areas analysis included evaluation of the Hackensack River and Overpeck Creek. The Hackensack River is the receiving water body for City of Hackensack outfalls HK001A and HK002A, as well as Village of Ridgefield Park outfalls RP003A, RP004A, RP005A and RP006A. Overpeck Creek is the receiving body for Village of Ridgefield Park outfalls RP001A and RP002A. On behalf of the permittees of the NJ CSO Group, PVSC submitted a separate report detailing the results of the sensitive areas analysis, entitled "Identification of Sensitive Areas Report: CSO Long Term Control Plan" and dated June 2018 to satisfy the Part IV Section G.3 of the Permit requirements for sensitive areas.

The sensitive area analysis efforts included letters to regulatory agencies, review of online resources, and observation studies to identify within the regional study area any Outstanding National Resource Waters

(ONRW), National Marine Sanctuaries (NMS), threatened or endangered species, primary contact recreation activities, drinking water intakes, and shellfish beds. The results determined that there are no sensitive areas in proximity to the City of Hackensack or Village of Ridgefield Park combined sewer outfalls. The City of Hackensack and Village of Ridgefield Park reviewed and certified the sensitive areas report.

The NJDEP provided a technical comment letter to the PVSC regarding its sensitive areas report on September 10, 2018. PVSC submitted a revised Identification of Sensitive Areas Report to NJDEP on October 18, 2018 that addressed the NJDEP comments. An additional revision of the Sensitive Areas Report was submitted to the NJDEP on March 29, 2019 to address further comments from the NJDEP in a letter dated March 1, 2019. The Sensitive Areas Report was approved by NJDEP in a letter dated April 8, 2019.

Ridgefield Park and Hackensack performed local evaluations of sensitive areas and submitted those evaluations are part of the Combined Sewer Characterization Report. Both the regional and local evaluations concluded there are no sensitive areas within the vicinity of the Hackensack or Ridgefield Park combined sewer outfalls. Accordingly, based on sensitive areas, there is no need to prioritize the addressing any particular combined sewer outfalls in terms of schedule, increased level of control or elimination.

5. Control Plan Approach and Compliance Strategy

5.1. Background on Water Quality Objectives

To improve receiving water quality, the primary objectives of the CSO long term control program are to reduce pathogens and CSO volume. The goal is to select and implement a CSO control program to cost-effectively improve water quality of the receiving waters sufficient to meet the requirements of the permit and the Clean Water Act.

Pathogen Water Quality Model (PWQM) simulations were undertaken by the NJ CSO Group to understand the pollutant sources and their relative contributions for the affected study area. The results of this modeling are summarized in the “Calibration and Validation of the Pathogen Water Quality Model (PWQM) for the Passaic Valley Sewerage Commission”, September 2020. The NJ CSO Group water quality model was used to provide insight into the applicability of either the Demonstration or Presumption Approach. The Pathogen Water Quality Model was intended to demonstrate the maximum pollutant reduction benefits reasonably attainable for the receiving waters. It is noted that Section 3.2.1 of the EPA document titled “Combined Sewer Overflows: Guidance for Long-Term Control Plan” states:

> *The demonstration approach is particularly appropriate where attainment of WQS cannot be achieved through CSO control alone, due to the impacts of non-CSO sources of pollution. In such cases, an appropriate level of CSO control cannot be dictated directly by existing WQS but must be defined based on water quality data, system performance modeling, and economic factors.*

As such, the results of the component analysis completed by NJ CSO Group were used to determine the control approach and select the appropriate level of control.

5.2. Pathogen Water Quality Model

The goal of receiving water modeling is to characterize CSO impacts on receiving water quality under a range of CSO controls. The model can be used to demonstrate the CSO controls that will provide for the attainment of Water Quality Standards (WQS), including designated uses in the receiving water, and is typically used with the Demonstration Approach. While the Presumption Approach does not explicitly call for analysis of receiving water impacts, it usually involves at least screening-level models of receiving water impacts. The following provides a summary of information provided in the “Calibration and Validation of the Pathogen Water Quality Model (PWQM) for the Passaic Valley Sewerage Commission” September 2020 (PWQM report).

5.2.1. Methodology

In further coordination with the NJ CSO Group, water quality modeling was undertaken for the regional receiving waters of the member municipalities, including the Passaic, Hackensack, lower Hudson, Raritan and Elizabeth Rivers, Raritan Bay, the Upper and Lower Bays of NY-NJ Harbor System, connecting waterways Kill van Kull and Arthur Kill, and Newark Bay, see Figure 5-15-15-1. The objective of the water quality model was to assess the impact of CSO discharges on water quality impairment, and the corresponding level of CSO control necessary to meet water quality compliance requirements. The model was used to calculate bacteria concentrations in the waters of the NY/NJ Harbor complex under existing and anticipated future conditions to calculate degree of attainment of applicable water quality standards.

The model developed, is a mass balance model which considers upstream pollutant loadings and other pollution sources in addition to CSOs. The previously developed NY-NJ Harbor Estuary Program (HEP) pathogen model was the basis for the updated model. The model consists of two major components: a hydrodynamic module (Estuarine Coastal and Ocean Model - ECOMSED) that defines the transport of the estuarine water throughout the Harbor-Bight-Sound complex, and a water quality module (Row-Column AESOP - RCA) which tracks the fate of bacteria in the water column. The water quality component was included to track the fate of fecal indicator bacteria (FIB - E. coli, fecal coliform and enterococci) by incorporating sewer system model calculated outputs of CSO and stormwater discharges as inputs, along with boundary tidal, flow, and meteorological conditions. The model projects pollutant concentrations spatially, and temporally. The Pathogen Water Quality Model used for this LTCP updated the previous model with additional water quality sampling data to present performance against current water quality modeling standards. Hourly data was utilized to develop the baseline existing conditions model. The baseline conditions model was developed using the following:

- 2004 Newark International Airport meteorological conditions
- 2004 river flows
- 2015 infrastructure and development conditions
- Existing background pathogen loads

The sampling locations for available water elevations, current meter, temperature, and salinity data were the same as those presented in the CMP report (refer to Figure 4-14-14-1 for Hudson River and Figure 4-64-64-6 and Figure 4-74-74-7 for the Hackensack River and Overpeck Creek). The monthly or weekly temperature and salinity monitoring data collected at more than 30 locations in NY-NJ Harbor by NJ Dischargers Group and NYC DEP were available for the Passaic and Hackensack Rivers, Hudson River, Upper and Lower Bays, as well as the Kills. These data sets provided long-term spatial and temporal variations of temperature and salinity conditions at most of the water bodies within NY-NJ Harbor system. A field survey team also performed water quality surveys during wet weather events in 2016 and 2017 period.

The model was calibrated for each of the sampling locations over the course of time using 2016 data, as well as at various depths below the surface of the receiving waterbodies. It was determined that the model adequately captures variations in water elevations, velocities varying with depth, as well as reproducing magnitude and temporal variations of water quality data.

The model calibration utilized extensive field data, including surface water elevation, current velocity, temperature, and salinity, as follows:

- Monthly or weekly field survey data collected by NJ Harbor Dischargers Group from 2000 to 2018: Temperature/Salinity (T/S);
- Field survey data collected by HDR in 2016 and 2017 as part of the Baseline Compliance Monitoring: T/S;
- Monthly or weekly field survey data collected by NYC DEP from 1970s to present: T/S;
- Quarterly and in-situ T/S data collected by MERI in the Hackensack River from 1993 to present;
- In-situ T/S mooring data as part of Hudson River Environmental Conditions
- Observing System (HRECOS): PVSC plant, Castle Point, Pier 84, Yonkers, and Piermont Pier;
- Field data collected by Tierra Solutions Inc. (TSI) in 2009-2010 in the Lower Passaic River, Hackensack River, Newark Bay, Kill van Kull, Arthur Kill: in-situ moorings (T/S, and current meters); and
- NOAA tide gages at Sandy Hook, Bergen Point, the Battery, and Kings Point.

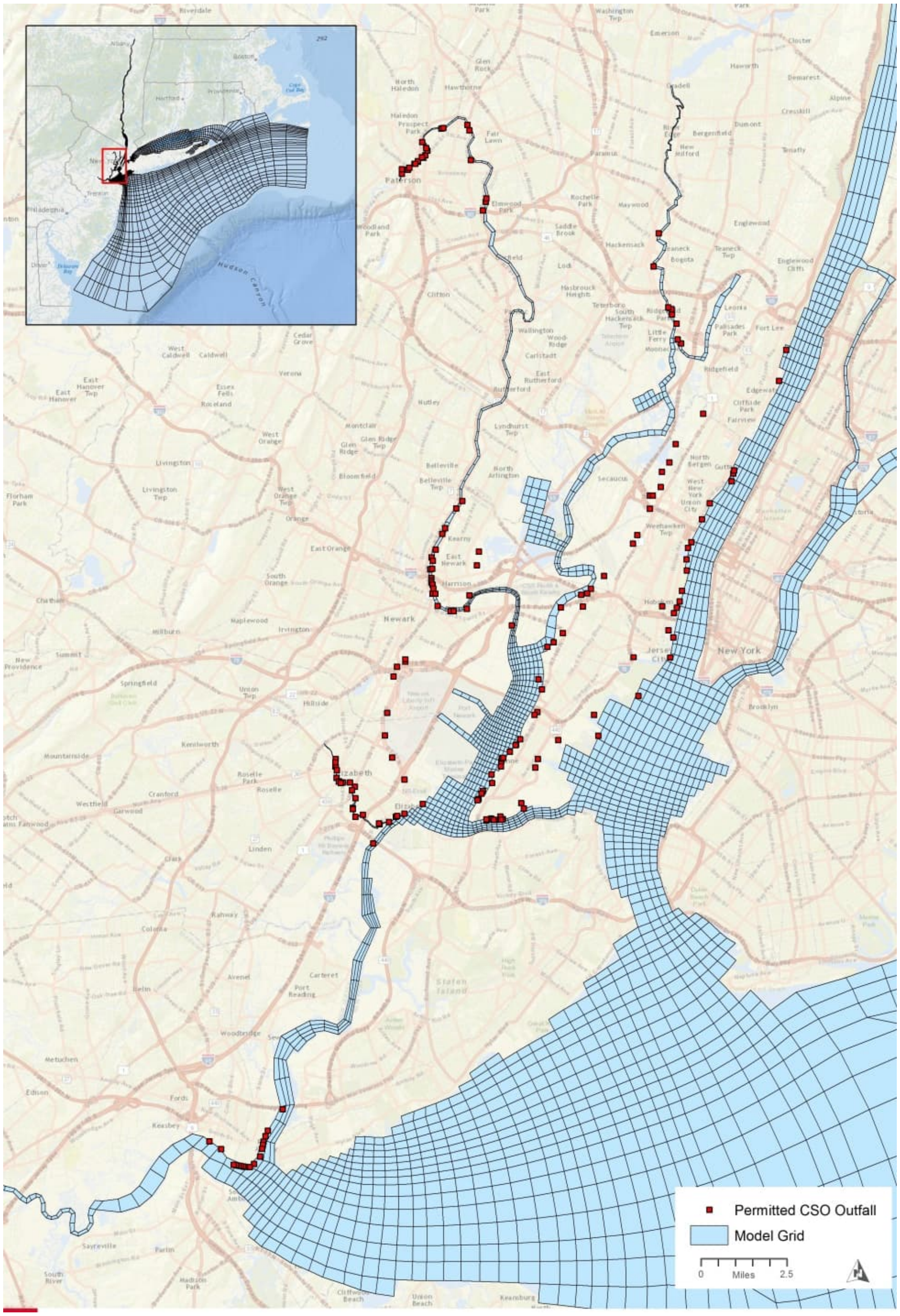


Figure 5-1: Receiving Water Model Extents

5.3. Percent attainment during Typical Year

As described in the PWQM Report, in order to calculate attainment of the criteria using the model, results from the surface layer of the model were used, such that the surface layer represents the top 10 percent of the water column. It was determined that this approach would be conservative since freshwater tends to stay on the surface because it is less dense than saline water, and most bacteria sources are associated with freshwater. In addition, attainment was based on spatial averaging over areas defined by NJDEP 14-digit Assessment Units (AU) coinciding with HUC-14 watersheds. Model surface cells within an AU were averaged, and the attainment was based on the average concentrations. An alternative approach using single model cells at locations where there were data to calibrate against would provide greater confidence in the model results however would have omitted spaces in the project area that were not sampled. The AU approach allowed for all locations within the project area to be assessed. Finally, the model utilized thirty-day rolling periods, shifted on an hourly basis, to calculate the geometric mean. The assessment of compliance under 100% CSO control was based on the elimination of all CSO discharges within all the waters being modeled.

5.3.1. Hudson River

The water of the Hudson River, adjacent to the CSO outfalls in Fort Lee, consistently met water quality standards as illustrated in Table 5-15-1 (Table 6-3 in the previously referenced report). The evaluation was performed for the Assessment Units (AU) on the basis of a rolling 30-day geometric mean of hourly data from the Pathogen Water Quality Model (PWQM), which showed the waterbody achieves compliance 100% of the time.

Table 5-1: AU Attainment in SE2 Waterbodies under Baseline and 100% Control Conditions

Table 6-3. AU Attainment in SE2 Waterbodies under Baseline and 100% Control Conditions

Assessment Unit Name	Assessment Unit Number	Baseline % Attainment	100% Control % Attainment
Hudson River (upper)	02030101170010-01	100.0	100.0
Hudson River (lower)	02030101170030-01	100.0	100.0
Hackensack R (Bellmans Ck to Fort Lee Rd)	02030103180050-01	92.6	100.0
Hackensack R (Rt 3 to Bellmans Ck)	02030103180080-01	100.0	100.0
Hackensack R (Amtrak Bridge to Rt 3)[1]	02030103180090-01	100.0	100.0
Hackensack R (below Amtrak bridge)[1]	02030103180100-01	100.0	100.0
Upper NY Bay / Kill Van Kull (74d07m30s)[1]	02030104010030-01	100.0	100.0
Arthur Kill waterfront (below Grasselli)[1]	02030103180070-01	100.0	100.0

1 This Assessment Unit had to be divided into two pieces because it spanned two waterbody classifications.

5.3.2. Hackensack River

The water of the Hackensack River, adjacent to the CSO outfalls in Hackensack and Ridgefield Park, consistently fails to meet water quality standards, as illustrated in Table 5-25-2. The evaluation was performed for Assessment Units (AU) on the basis of a rolling 30-day geometric mean of hourly data from the Pathogen Water Quality Model (PWQM), which showed the waterbody achieves compliance 0% of the time, as illustrated in Table 5-35-3. The Overpeck Creek achieves compliance 50% of the time, on the same basis, however, this would include a good portion of the creek upstream of the tide gates located at the NJ Turnpike, which is not impacted by CSO discharges. The behavior of the tidal portion of Overpeck Creek is likely similar to Hackensack River (Bellmans Creek to Fort Lee Road) as listed in Table 5-15-1. The PWQM was also run with 100% CSO control (elimination of CSO discharges within all of the receiving waters being modeled) see Table 5-25-2 and Table 5-35-3 (Tables 6-1, 6-2 and 6-3 in the previously referenced report). As can be seen for the SE-1 portion of the Hackensack River even if 100% CSO control was achieved, it would not impact the percent attainment, illustrating that WQSs are being impacted by pathogen sources outside of the combined sewered areas. For the SE-2 portion of the Overpeck Creek, there would be a slight increase in attainment.

Table 5-2: Hackensack River - Summary of Assessment Unit from PWQM Report

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
Raritan Bay (West of Thorns Ck)	02030104910010-01	93.0	94.0
Sandy Hook Bay (East of Thorns Ck)	02030104910020-01	100.0	100.0

Table 6-3. AU Attainment in SE2 Waterbodies under Baseline and 100% Control Conditions

Assessment Unit Name	Assessment Unit Number	Baseline % Attainment	100% Control % Attainment
Hudson River (upper)	02030101170010-01	100.0	100.0
Hudson River (lower)	02030101170030-01	100.0	100.0
Hackensack R (Bellmans Ck to Fort Lee Rd)	02030103180050-01	92.6	100.0
Hackensack R (Rt 3 to Bellmans Ck)	02030103180080-01	100.0	100.0
Hackensack R (Amtrak Bridge to Rt 3)[1]	02030103180090-01	100.0	100.0
Hackensack R (below Amtrak bridge)[1]	02030103180100-01	100.0	100.0
Upper NY Bay / Kill Van Kull (74d07m30s)[1]	02030104010030-01	100.0	100.0
Arthur Kill waterfront (below Grasselli)[1]	02030103180070-01	100.0	100.0

1 This Assessment Unit had to be divided into two pieces because it spanned two waterbody classifications.

Table 5-3: Overpeck Creek - Summary of Assessment Unit from PWQM Report

Table 6-1. AU Attainment in FW2 and FW2/SE2 Waterbodies under Baseline and 100% Control Conditions

Assessment Unit Name	Assessment Unit Number	Baseline % Attainment	100% Control % Attainment
Passaic R Lwr (Fair Lawn Ave to Goffle Road)	02030103120070-01	0.0	0.0
Passaic R Lwr (Dundee Dam to Fair Lawn Ave)	02030103120080-01	0.0	0.0
Passaic R Lwr (Saddle R to Dundee Dam)	02030103120090-01	0.0	0.0
Passaic R Lwr (Goffle Bk to Pump stn)	02030103120110-01	0.0	0.0
Passaic R Lwr (Second R to Saddle R)	02030103150030-01	0.0	0.0
Overpeck Creek	02030103180040-01	50.0	67.0
Berrys Creek (below Paterson Ave)	02030103180070-01	79.0	94.0
Hackensack R (Amtrak Bridge to Rt 3)[1]	02030103180090-01	100.0	100.0
Elizabeth River (below Elizabeth CORP BDY)[1]	02030104020030-01	0.0	0.0
Raritan R Lwr (MileRun to I-287 Piscataway)	02030105120160-01	0.0	0.0

1. This Assessment Unit had to be divided into two pieces because it spanned two waterbody classifications.

5.4. Summary of WQ Modeling Results

5.4.1. Component Analysis Overview

The water quality component analysis, which calculated the portion of the total pathogen load by source, was completed to develop an understanding of the three pathogens of interest in the receiving water bodies: E. coli, Fecal coliform, and Enterococci. The objective of the component analysis was to determine the concentrations of these pathogens based on relative contributions of all pollutant components, and to determine whether the concentrations of these pathogens, as a result of CSO contributions, would preclude attainment of water quality standards. The components analyzed were as follows:

- CSO contributions from New Jersey sources
- Stormwater runoff from Jew Jersey sources
- New Jersey sewage treatment plant contributions
- New York and Connecticut sewage treatment plant contributions
- New Jersey, New York and Connecticut rivers
- Hudson River
- Dry weather conditions
- New York City CSO and stormwater contributions

5.4.2. Hudson River

The component analysis was performed for the one monitoring point adjacent to the CSOs in Fort Lee:

- Station 31 – Located near the George Washington Bridge slightly upstream of the CSO outfalls F001 and F002 (Figure 5-25-25-2)

The water quality of This station is influenced by New York City CSOs and the North River WRRF. In spite of these influences the water quality continues to meet water quality standards.

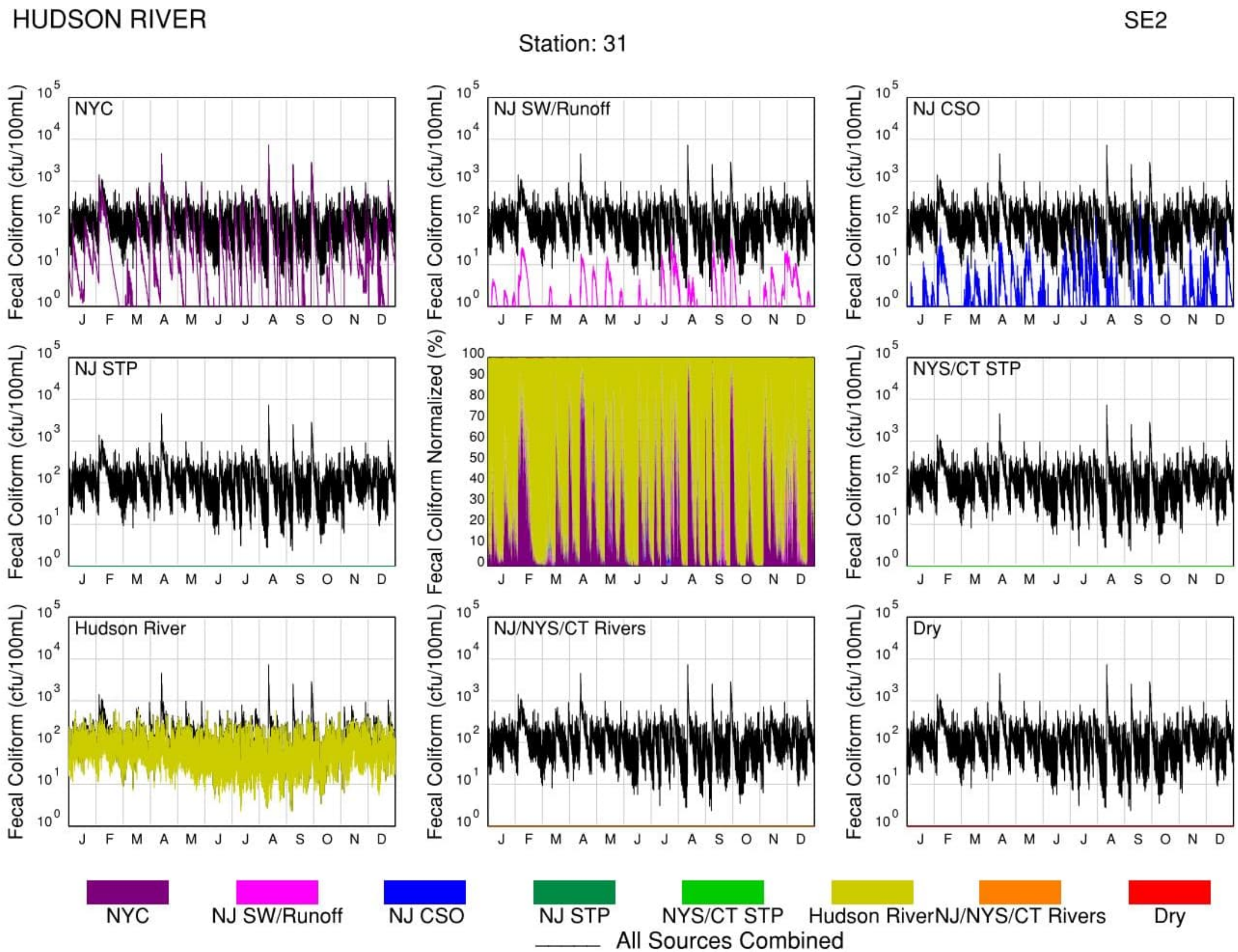


Figure 5-2: Hudson River, SE2, Station 31 Component Analysis

5.4.3. Hackensack River

The component analysis was performed for the three monitoring points adjacent to the CSOs in Hackensack and Ridgefield Park:

- Station B1 – Located at the Route 4 crossing of the Hackensack River at the north end of Hackensack, upstream of the CSO outfalls (reference Figure 4-64-64-6)
- Station B2 – Located on the Hackensack River behind the Shop Rite in Hackensack, at the extension of E. Moonachie Road, downstream of the Hackensack CSO outfalls and just upstream of the Ridgefield Park CSO outfalls (reference Figure 4-64-64-6 and Figure 4-74-74-7).
- Station B11 – Located on Overpeck Creek, just upstream of the rail crossings, at Outfall RP-002A downstream of CSO Outfall RP-001A (reference Figure 4-74-74-7).

Figure 5-35-35-3 through Figure 5-55-55-5 illustrate the levels of pathogens of interest at the three monitoring locations noted above. The figures are broken down into nine graphs to illustrate the contributions associated with the various sources evaluated, and as listed at the bottom of each figure. Individual graphs without color indicate that that particular source had no impact on that monitoring station. As can be seen, these portions of the Hackensack River and Overpeck Creek are free from the influence of New York City CSOs, NYC/CT WRRFs and the Hudson River. There is a minute contribution at Station B11 from NJ WRRF, but it registers in the single digits for pathogens. There is a small impact from NJ rivers. There is a steady dry weather contribution of Enterococci, between 10 and 100 CFU/100 ml at Stations B1 and B2 and between 50 and 200 CFU/100 ml at Station B11, which is significant in light of the SE-1 standard of 35 CFU/100 ml. In general, the contribution from CSOs and stormwater are of the same magnitude, with stormwater slightly higher upstream of the CSOs and contributions roughly equal downstream of that of CSO discharges.

This is consistent with the PWQM report which determined that for the SE-1 waters no greater level of attainment would be reached if CSOs were completely eliminated (Table 5-25-2), and the minimal improvement would be achieved on the Overpeck Creek (Table 5-35-3). Similarly, downstream of Ridgefield Park when the Hackensack River becomes SE-2 minimal improvement from the elimination of all CSO would be expected (Table 5-15-1).

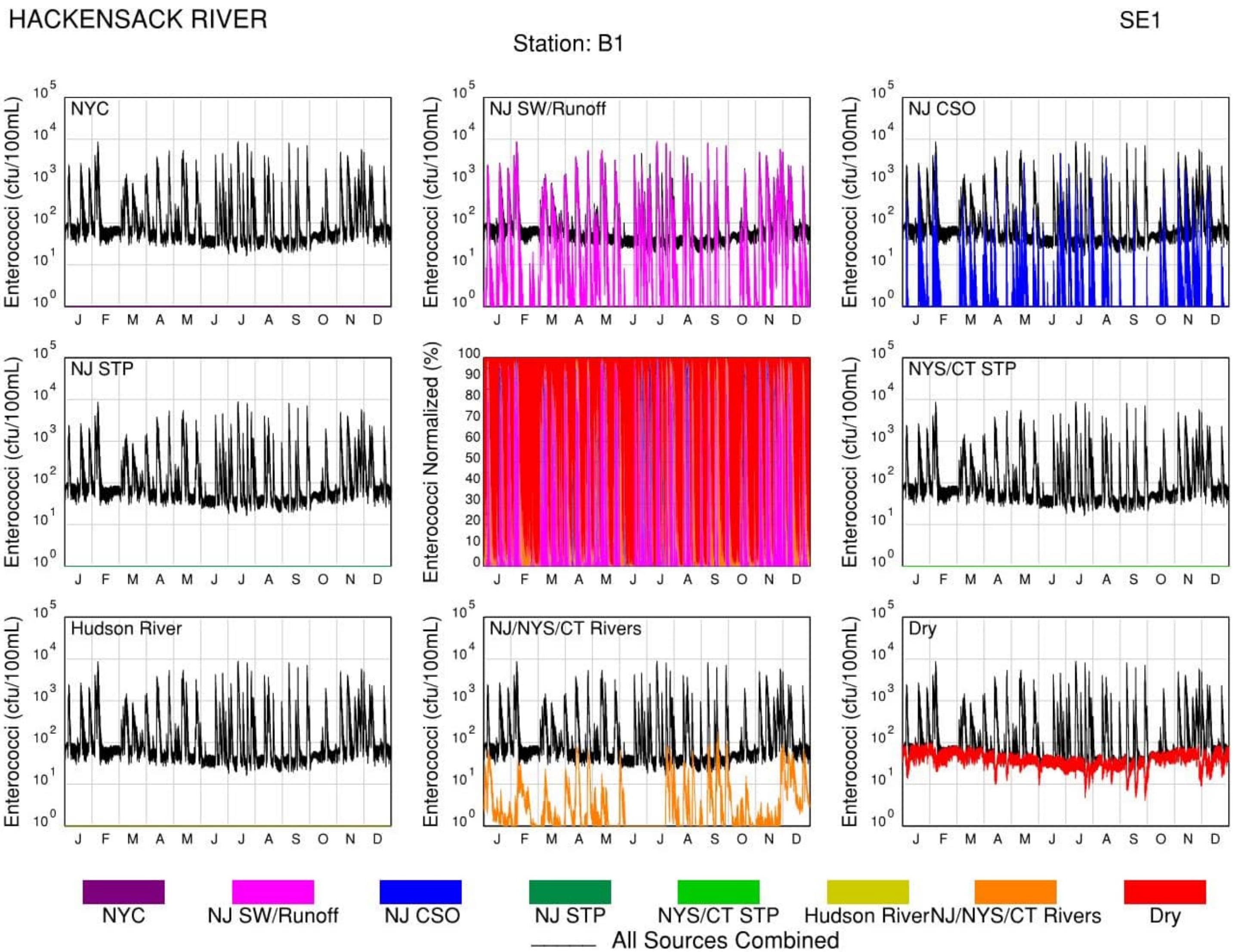


Figure 5-3: Hackensack River, SE1, Station B1 Component Analysis

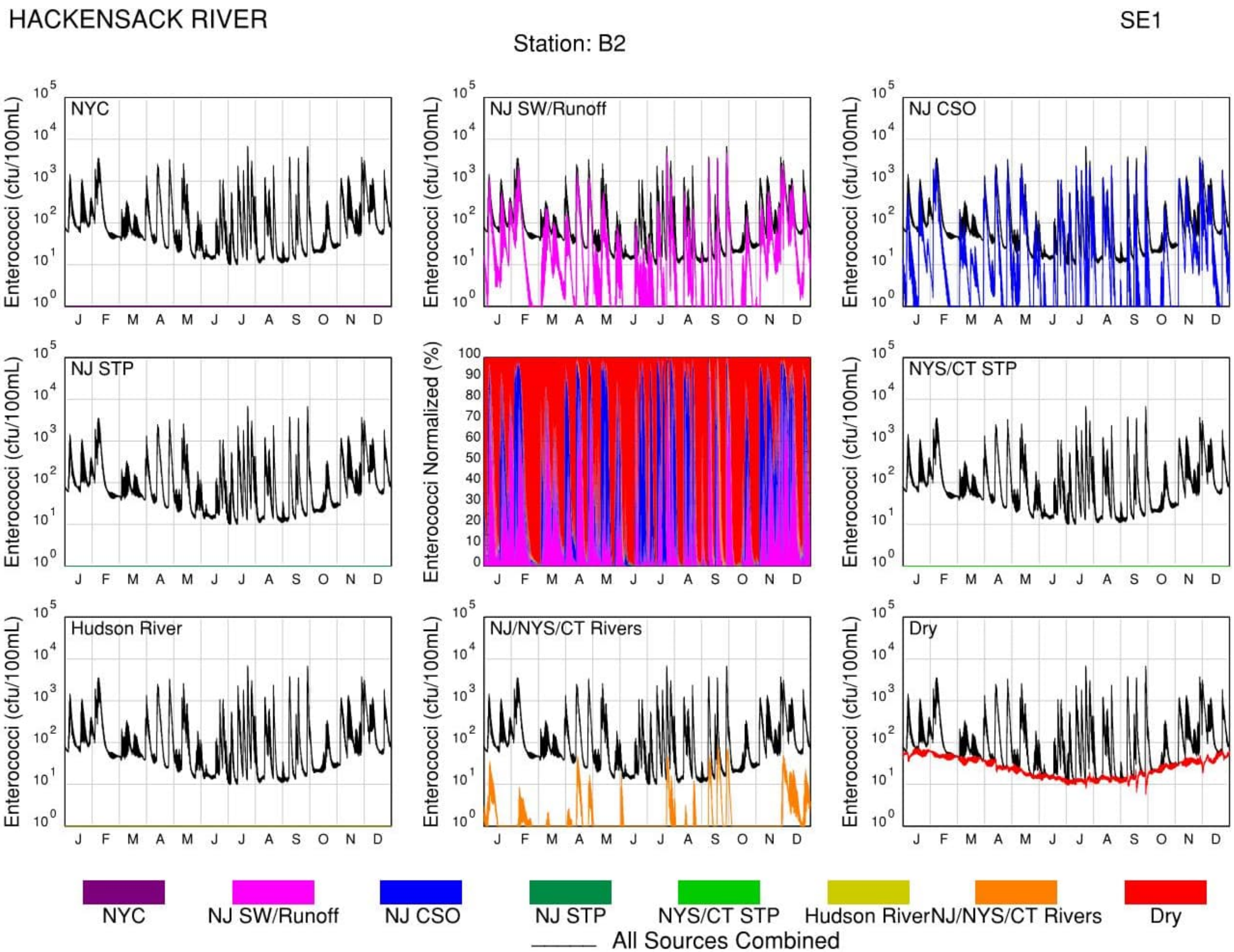


Figure 5-4: Hackensack River, SE1, Station B2 Component Analysis

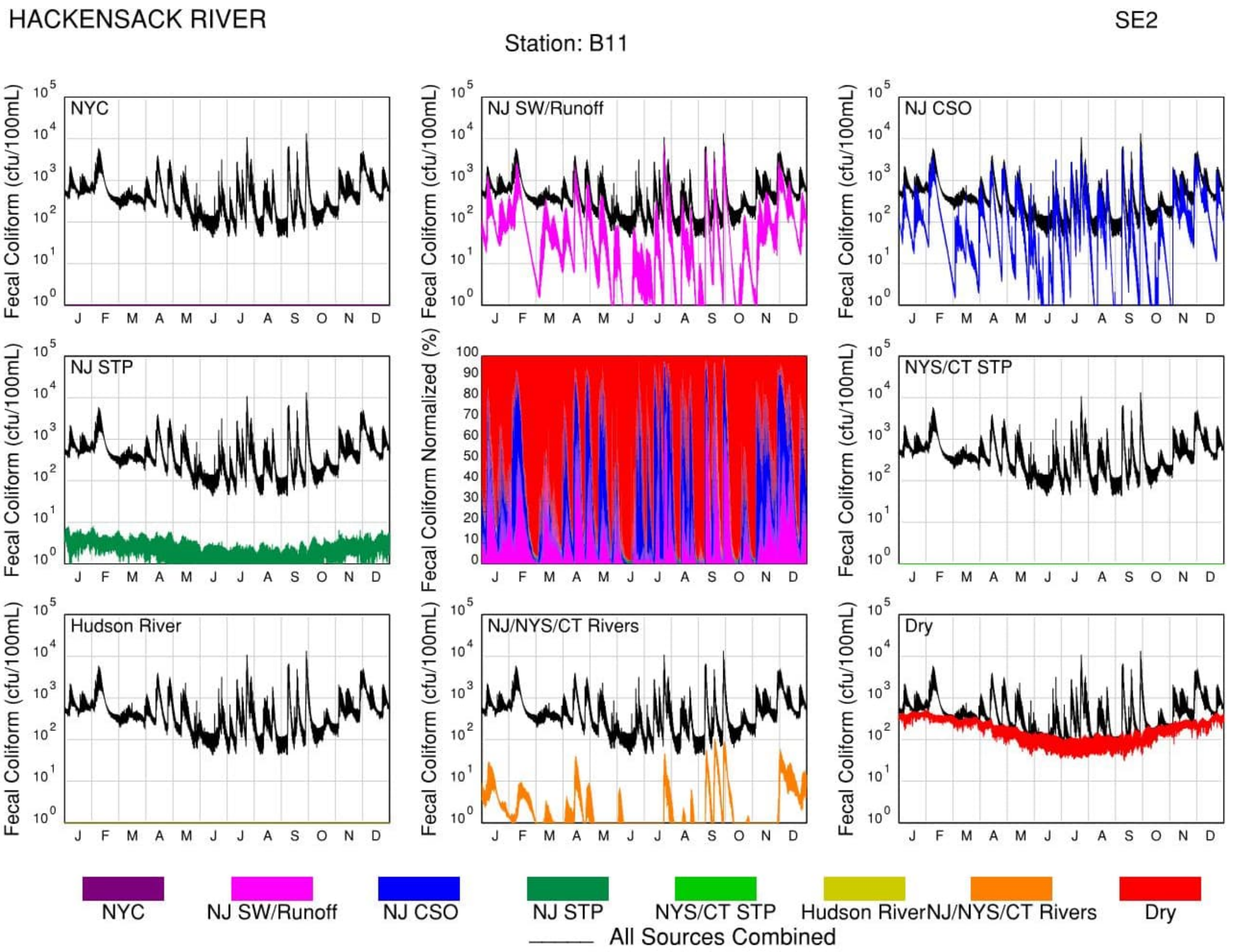


Figure 5-5: Overpeck Creek, SE2, Station B11 Component Analysis

5.5. Presumptive vs. Demonstration Approach

Per the National CSO Control Policy, the LTCP can adopt either the “Presumption” Approach or the “Demonstration” Approach. The NJPDES permit Section G 4 a likewise stipulates that permittees are to evaluate a reasonable range of CSO control alternatives that will meet the water quality-based requirements of the CWA using either the Presumption Approach or the Demonstration Approach.

The “Presumption" Approach refers to a program that is presumed to achieve attainment of water quality standards (WQS). The Presumption Approach requires that the CSO control program meets any of the following three (3) criteria, provided that the permitting authority (i.e., NJDEP), determines that the approach is reasonable in light of the data and analysis conducted in the characterization, monitoring, and modeling of the system and in consideration of sensitive areas:

1. No more than an average of four overflow events (see below) per year from a hydraulically connected system as the result of a precipitation event that does not receive the minimum treatment specified below. The Department may allow up to two additional overflow events per year. For the purpose of this criterion, an ‘event' is:
    - In a hydraulically connected system that contains only one CSO outfall, multiple periods of overflow are considered one overflow event if the time between periods of overflow is no more than 24 hours.
    - In a hydraulically connected system that contains more than one CSO outfall, multiple periods of overflow from one or more outfalls are considered one overflow event if the time between periods of overflow is no more than 24 hours without a discharge from any outfall
2. Elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the combined sewer system (CSS) during precipitation events on a hydraulically connected system-wide annual average basis.
3. The elimination or removal of no less than the mass of the pollutants, identified as causing water quality impairment through the sewer system characterization, monitoring, and modeling effort, for the volumes that would be eliminated or captured for treatment under paragraph 2 above.

The “Demonstration” Approach refers to a program that uses a receiving water model to demonstrate compliance with each of the following criteria from the National CSO Control Policy:

1. The planned control program is adequate to meet WQS and protect designated uses, unless WQS or uses cannot be met as a result of natural background conditions or pollution sources other than CSOs.
2. The CSO discharges remaining after implementation of the planned control program will not preclude the attainment of WQS or the receiving waters' designated uses or contribute to their impairment.
3. The planned control program will provide the maximum pollution reduction benefits reasonably attainable.
4. The planned control program is designed to allow cost effective expansion or cost-effective retrofitting if additional controls are subsequently determined to be necessary to meet WQS or designated uses.

Part IV G 4.c of the Permit states:

> *“The permittee shall select either Demonstration or Presumption Approach for each group of hydraulically connected CSOs, and identify each CSO group and its individual discharge locations”*

As per the definition of the hydraulically connected system provided in Section 4.1 selection of a control approach will be made on the basis of the segments of the hydraulically connected system the outfalls discharging to the Hackensack River/ Overpeck Creek and the outfalls discharging to the Hudson River.

5.5.1. Hudson River segment approach and level of control

The water quality modeling and sampling data shows that the Hudson River is consistently meeting the SE2 water quality standard of 770 cfu/100 mL, and the component analysis shows that the CSOs are a small portion of the pollutant loading. However, since the CSO capture is at 76.3%, and below the CSO policy goal of 85%. Fort Lee will separate sewers to attain this goal.

5.5.2. Hackensack River segment approach and level of control

The national CSO policy allows for the selection of the presumptive approach with the following condition:

> *"A program that meets any of the criteria listed below would be presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA provided the permitting authority determines that such presumption is reasonable in light of the data and analysis conducted in the characterization, monitoring and modeling of the system and the consideration of sensitive areas.. . " (II C .4.a)*

The water quality modeling and sampling data shows that the Hackensack River is not consistently meeting water quality standards, and the component analysis shows that the CSOs are a small portion of the pollutant loading into the Hackensack River and Overpeck Creek. An analysis at sampling Stations B1 and B2 of the Baseline pathogen modeling data, estimated that with dry weather sources alone, the SE-1 portion of the Hackensack River only achieved water quality standards 40%-60% of the time. Whereas, when CSO were evaluated alone attainment was achieved 90%-100% of the time, with periods of non-compliance primarily in February and November. Under the proposed LTCP the CSO load is reduced about 55% which would increase the compliance to an estimated 99%. As reference in Section 4.3.4 non-pathogen sources of pollution also impact the designated usage of the Hackensack River. Therefore, the presumption that if one of the presumptive standards is met the Hackensack River would be complying with the requirements of the Clean Water Act is reasonable. Accordingly, the City of Hackensack and the Village of Ridgefield Park which discharge into the Hackensack River have elected to adopt the presumptive approach to complying with the permit requirements. More specifically the long-term control plan for these two communities will be based on achieving 85% capture of the combined sewage flows entering the system during wet weather. This is consistent with the approach in the permit and the national CSO policy which states:

> *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 hydraulically connected system-wide annual average basis. (Part IV G4f.ii)*

5.5.3. Percent Capture Definition

To be consistent within the BCUA CSO Group, the group members coordinated with each other to standardize the components that would go into the percent capture calculation and how that calculation would be performed. This approach is consistent with most of the NJ CSO Group members and is summarized in Table 5-45-4. The following is a summary of the key components of the calculation and a description of how the available data is being applied:

- Communities contributing to the percent capture calculation - the flow contributions to the percent capture calculations were limited to the three combined sewer municipalities within the district. Percent capture calculations were performed for each CSO municipality, each segment of the BCUA hydraulically connected system, and for the entire BCUA hydraulically connected system.
- Wet weather flow contributions within CSO municipalities - The entire wet weather flow contribution from within each CSO municipality was used in the calculation of percent

capture. This includes the separately sewered areas within Ridgefield Park and Fort Lee as they discharge to the BCUA at the same location as the combined sewage. Hackensack considered only the combined sewer area and sanitary sewers flowing into combined sewers. There is a distinct divide with the remaining sanitary sewers discharging to the BCUA branch interceptor north and west due to a ridgeline.

- Wet weather definition - wet weather periods were identified through an analysis of the 2004 typical year rainfall record as described below.
    - The analysis used a 15-minute data interval.
    - Any data interval during which the precipitation in the prior 12 hours totaled 0.1 inches or more was considered wet. Effectively, the procedure used a 12-hour intra-storm interval, and a minimum storm threshold precipitation of 0.1 inches.
    - It excluded the early parts of storms before the cumulative rainfall reached 0.1 inches as this was thought a reasonable threshold for when runoff would start.
    - The period following the precipitation was extended 12 hours from when the last 0.1 inches of precipitation occurred to capture the extended impact of the precipitation. This is more conservative than using 12 hours following the end of the precipitation.
    - This method produces just under 1150 wet hours during the 2004 Typical Year.
    - This methodology is also consistent with the approach of most if not all members of the NJ CSO Group.
- Total Wet Weather Capture Volume – calculated from 2015 Baseline modeling results
- Percent Capture was calculated using the Formula:

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

The above analysis is illustrated in Figure 5-65-65-6.

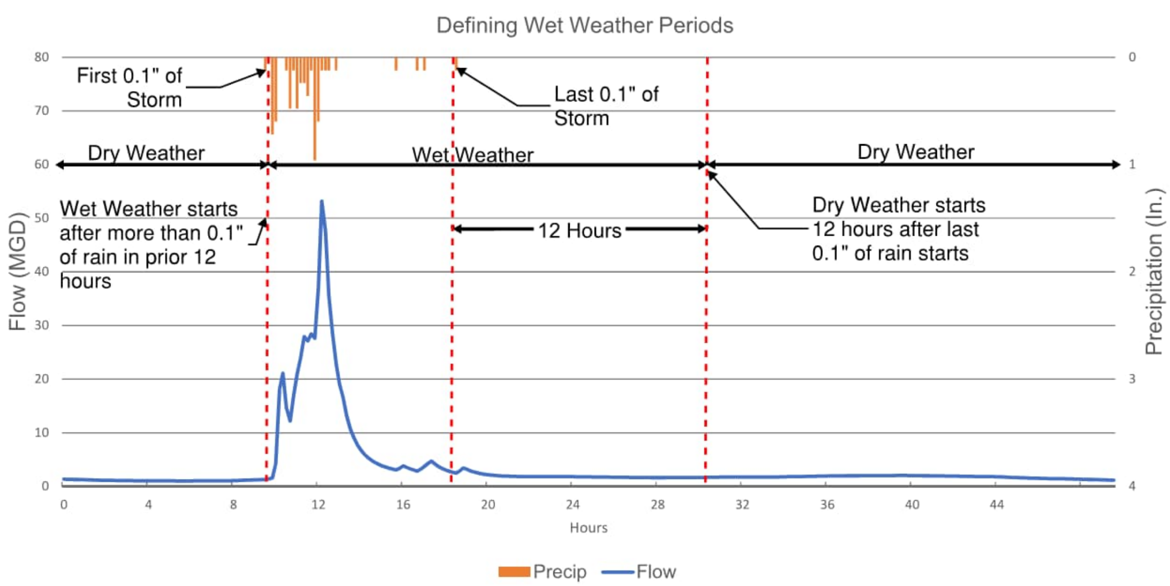


Figure 5-6: Sample Wet Weather Period for Percent Capture

The results of this analysis are summarized in Table 5-45-4. As noted, overall CSO communities, tributary to the Hackensack River are currently capturing 69.9% of wet weather inflow, and Districtwide the capture is 72.4%.

Table 5-4: Summary of 2015 Baseline Typical Year Municipal Percent Capture

Municipality	Wet Weather Inflow (MG)	Overflow (MG)	% Capture	Overflow @ 85% Capture (MG)
Fort Lee (Hudson River)	631	149.5	76.3%	94.7
Hackensack	814.8	256.7	68.5%	122.2
Ridgefield Park	216.0	52.2	75.4%	32.4
Hackensack River Total	1031	308.9	70%	154.7
BCUA Hydraulically Connected System	1662	458.4	72.4%	257

6. Development of Alternatives

This section summarizes the key elements of the development and evaluation of CSO control alternatives process. The detailed evaluation is provided in the following previously approved reports:

- BCUA: “Development and Evaluation of CSO Control Alternatives” report, dated July 2019, revised November 2019, and approved February 2019.
- Fort Lee: “Development and Evaluation of CSO Control Alternatives” report, dated July 2019, revised November 2019, and approved February 2019.
- Hackensack: “Development and Evaluation of CSO Control Alternatives” report, dated July 2019, revised November 2019, and approved February 2019.
- Ridgefield Park: “Development and Evaluation of CSO Control Alternatives” report, dated July 2019, revised November 2019 and approved February 2019.

The Development and Evaluation of Alternatives addressed the requirements of Part IV.G.4 of the NJPDES CSO Permit. This step involved evaluation of a reasonable range of CSO control alternatives that will meet the water quality-based requirements of the CWA, using either the Presumption Approach or the Demonstration Approach. It made use of the hydrologic, hydraulic and water quality modelling to simulate existing conditions as well as conditions incorporating CSO controls. It identified each CSO group and its individual discharge locations and evaluated CSO control programs based on meeting the water quality-based requirements of the CWA, as well as practical and technical feasibility, and cost/performance considerations.

The evaluation of seven (7) CSO control alternatives is mandated in Part IV.G.4.e of NJPDES CSO Permit. This list was not intended to be limiting, but rather to set general categories of control alternatives that must be considered. The list of control alternatives provided in the Permit was broad enough that all the control alternatives explored in the DEAR fell within the list. The seven (7) control alternatives listed in the Permit, and the corresponding section in which they are discussed herein, are:

1. Green infrastructure.

2. Increased storage capacity in the collection system.

3. Sewage Treatment Plant (STP) expansion and/or storage at the plant (an evaluation of the capacity of the unit processes must be conducted at the STP resulting in a determination of whether there is any additional treatment and conveyance capacity within the STP). Based

upon this information, the permittee shall determine (modeling may be used) the amount of CSO discharge reduction that would be achieved by utilizing this additional treatment capacity while maintaining compliance with all permit limits.

4. Inflow/Infiltration (I/I) reduction in the entire collection system that conveys flows to the treatment works to free up storage capacity or conveyance in the sewer system and/or treatment capacity at the STP, and feasibility of implementing in the entire system or portions thereof.

5. Sewer separation.

6. Treatment of the CSO discharge.

7. CSO related bypass of the secondary treatment portion of the STP in accordance with N.J.A.C. 7:14A-11.12, Appendix C, II C.7.

6.1. BCUA DEAR Summary

The BCUA does not own nor operate any combined sewer overflow outfalls, and thus, is not responsible for directly reducing the number of CSO events, which is a responsibility of the other members of the group. As the owner and operator of the transport and treatment facilities the BCUA has responsibility for maximizing wet weather flows to their Water Pollution Control Facility, as such it may influence the volume of overflow from the CSO communities. By its permit the BCUA is tasked with evaluating the feasibility and cost of treatment plant expansion and bypassing secondary treatment and blending of the effluent flows if the secondary treatment units are the limiting factor in the capacity of the plant.

The investigation of the BCUA Transport Facilities concentrated on the segment of the transport system that receives wet weather flows from the combined sewer municipalities of Fort Lee, Hackensack, and Ridgefield Park. The InfoWorks model used with rainfall from the typical year (2004), indicated that, except for those sewers directly impacted by the hydraulic grades within the influent wet well, the portion of the system receiving combined flows, generally operates under gravity flow conditions and does not surcharge except on branch interceptors. The model was also used to determine that flows in the Overpeck Creek Trunk and Relief Sewers are controlled by the pipe capacity in the upper reaches and branch interceptors, which reach a surcharged condition first.

The theoretical flows as determined through Manning's Equation indicate that the Main Trunk Sewer has a capacity of approximately 120 MGD, and that the joint Overpeck Valley Trunk and Relief Sewers have a combined capacity of approximately 143 MGD. Together these sewers should theoretically be able to transport approximately 265 MGD to the WPCF. Notwithstanding the theoretical calculation, the InfoWorksICM model step rainfall analysis indicated that the maximum flow capacity transfer through the Overpeck Valley Trunk Sewers is controlled by the upstream components of these sewers. Accordingly, the flows introduced downstream must be such that they do not negatively impact the upstream hydraulic grades to an extent that surcharging and potential backups are created upstream. Overall the modeling conducted indicates that approximately 210 MGD can be transported to the WPCF safely without hydraulically impacting upstream sewer systems as indicated in Table 6-16-1.

Table 6-1:Summary of BCUA Trunk Sewer Capacities

Trunk Sewer Description	Max Flow (MGD)
Main Trunk Sewer	130
Overpeck Valley Trunk Sewer	62
Overpeck Valley Relief Sewer	18*
Total Flow to WPCF	210

***This table has been corrected from the DEAR where the Overpeck Valley Relief Sewer capacity as inadvertently presented as 8 MGD.**

The BCUA then evaluated the hydraulic and treatment capacity of its Little Ferry WPCF's primary and secondary treatment units. Based on a hydraulic capacity assessment of the existing conveyance system to the BCUA LF WPCF, as much as 210 MGD can flow through the plant under hydraulic control, (six inches of freeboard on control weirs). If hydraulic control is not necessary, as in a major storm event, as much as 325 MGD can be accepted by the plant without flooding, not necessarily meeting permit limits, however existing influent trunk capacity is limited to 210 MGD. Based on process modeling and a review of New Jersey and 10 States design standards, the process capacity at the WPCF is estimated at 120 MGD under wet weather conditions.

6.1.1. Summary of Control Plans

Four (4) Control Programs were developed for BCUA, as part of the DEAR:

- Control Program 1 – Expansion of WPCF Capacity
- Control Program 2 – Wet Weather Blending
- Control Program 3 – Regional Storage
- Control Program 4 – Utilize Inline Storage in Interceptor for CSO

6.1.1.1. Control Program 1 – Expansion of WPCF Capacity

To provide secondary treatment for additional wet weather flows to accept additional combined sewage, the capacity of plant would need to be expanded. The feasibility of expanding the treatment capacity of the BCUA WPCF was investigated in 2007 as part of the prior LTCP. These evaluations were performed prior to the issuance of a new permit that instituted ammonia limits on the plant effluent. See Section 6.1.4 for additional discussion of plant capacity in light of the current permit. The 2007 evaluation investigated the required facilities and costs to increase the treatment capacity by:

- 29 MGD,
- 58 MGD,
- 86 MGD and
- 115 MGD

This alternative consisted of providing additional full treatment capacity by constructing a diversion from the plant headworks to the new facilities, a grit removal system, primary settling tanks, aeration tanks and chlorine contact tanks.

On a preliminary basis, it appears feasible to site future plant expansions within the available area, see Figure 6-16-16-1 and Figure 6-26-26-2. It is noted that one of the parcels required is currently owned by the Town of Little Ferry and this parcel would need to be acquired. The potential site is also encumbered by existing utility easements. The treatment facilities are large heavy structures and likely will require deep piles to support their weight in what are likely mucky soils. The location of the expansion is generally out of the public view and in areas not utilized for recreation. However, the facilities will be visible from the water and there may be objections from recreational boaters. It is likely any significant plant expansion would have high environmental impacts, particularly to wetlands, to which public opposition could be expected.

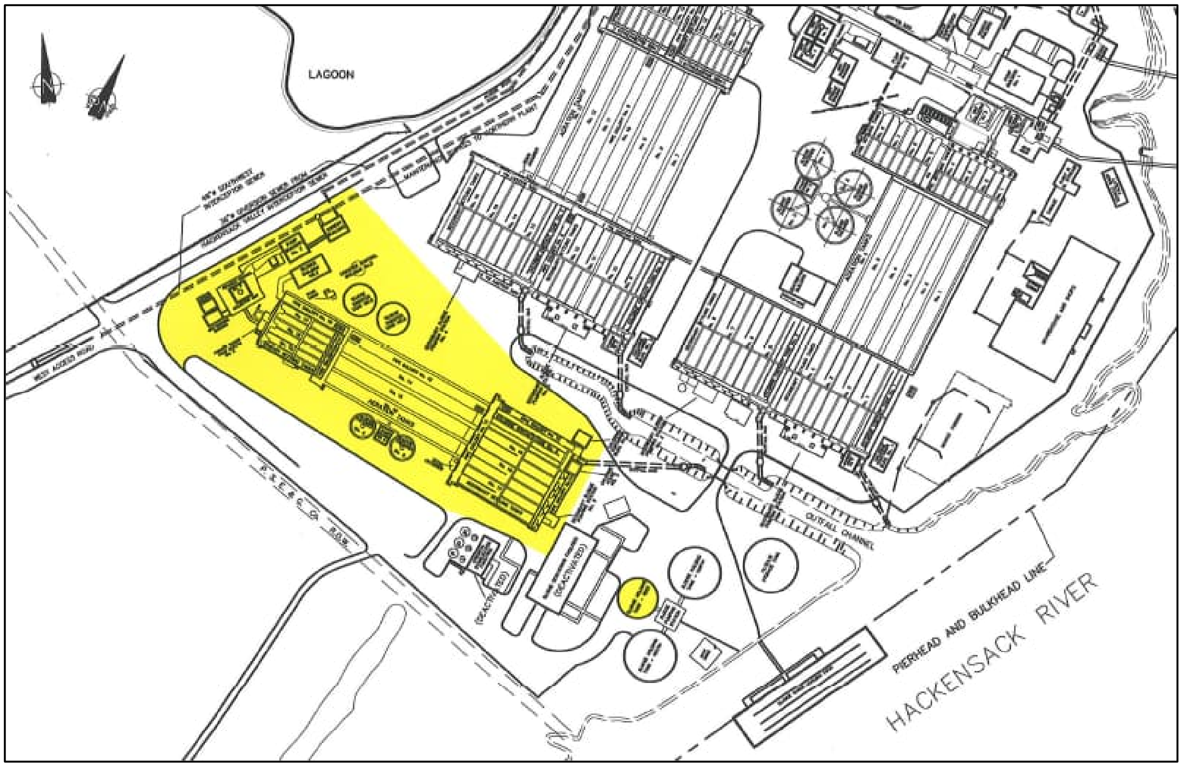


Figure 6-1: Facilities for 29 MGD Plant Expansion

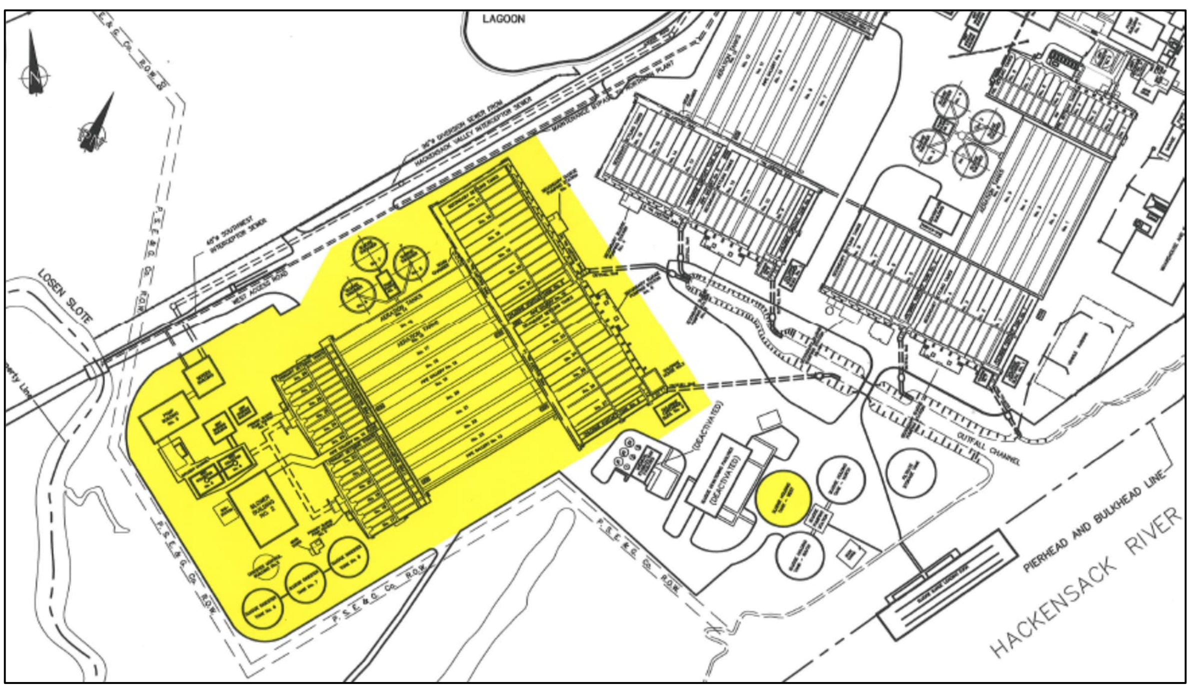


Figure 6-2: Facilities for 115 MGD Plant Expansion

Costs were developed in 2007 for the plant expansion, and were updated and are indexed to the January 2019 ENR CCI (11,206):

Table 6-2: Cost summary for WPCF expansion

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

Class 5 Costs (-50%+100%) ENR CCI = 11,206

6.1.1.2. Control Program 2 – Wet Weather Blending

Two alternatives were explored for blending, the first was to allow the bypass of 90 MGD around the final aeration tanks and final settling tanks to achieve a total blended flow of 210 MGD which is approximately the same as the 210 MGD capacity of the BCUA interceptors. The second was to allow a bypass of 180 MGD to provide a blended flow of 320 MGD which is approximately the hydraulic (not treatment) capacity of the primary settling tanks. Each alternative was investigated for processes to increase the primary treatment capacity. These two alternatives were chemically enhanced primary treatment (CEPT) and ballasted flocculation (BF), see Figure 6-36-36-3 and Figure 6-46-46-4.

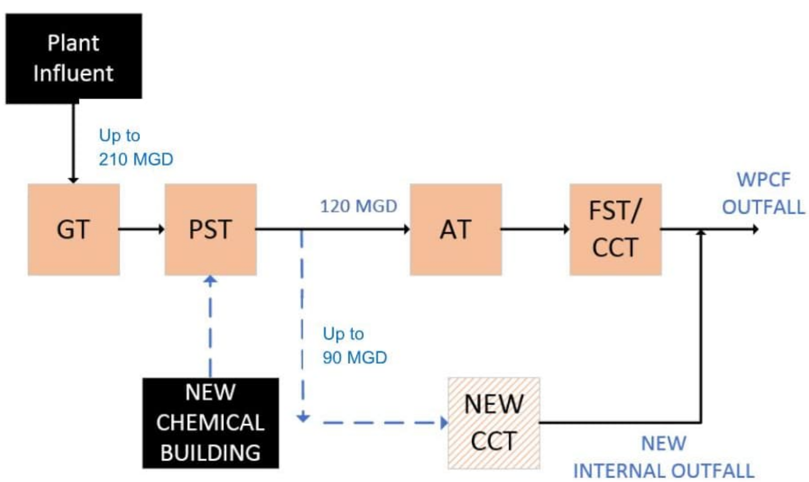


Figure 6-3: BCUA Schematic for total blended flow of 210 MGD using CEPT

Figure 6-4: Layout for total blended flow of 210 MGD using CEPT

The treatment facilities are large heavy structures and likely will require deep piles to support their weight in what are likely mucky soils. There are existing utilities easements that may require relocation of large existing utilities including a 138-kV electrical transmission line. The construction would also impact BCUA facilities requiring the relocation of pipelines and temporary facilities to achieve the necessary tie ins. The location of the additional facilities is generally out of the public view and in areas not utilized for recreation. However, the facilities will be visible from the water and there may be objections from recreational boaters. It is likely any significant plant expansion would have high environmental impacts, particularly to wetlands to which public opposition could be expected.

Costs were developed by Arcadis based on 2018 costs, and were updated to January 2019 (ENR CCI 11,206) to be consist with other costs presented in this report, Table 6-36-3.

Table 6-3: Cost summary for Wet Weather Blending (2018 Dollars)

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

Class 5 Costs (-50%+100%) ENR CCI = 11,206

These evaluations were performed prior to the permit revisions issued in June of 2019. Negotiations with the NJDEP must be had in order to be authorized to blend effluent from the wet weather stream with secondary effluent from the main WPCF. Blending will require a relaxation of current permit limits for cBOD and TSS, so the NJDEP will need to determine when the use of the wet weather stream will be authorized. Further, an evaluation of the sludge management/conveyance systems should be performed to confirm the current facilities can handle the additional loadings during wet weather events.

6.1.1.3. Control Program 3 – Regional Storage

Rather than increase the treatment capacity at the WPCF to treat the peak inflow, storage could be provided to equalize the flow entering the plant, also referred to as peak shaving. This storage could be provided in the form of a tunnel or tank. Since the goal is to site the additional facilities at the BCUA plant, only site tank(s) will be considered. Typically, but depending on the volume to be stored, tunnel storage is costlier when comparing cost per gallon of storage provided. This alternative consists of providing wet weather equalization storage by constructing:

- A diversion from the plant headworks to the new facilities
- New low lift pumps
- Conveyance piping to the tank site
- Storage tanks
- Dewatering pumping station
- Ancillary site improvements and utility relocations

To evaluate this alternative the 2050 (future) baseline plant influent time series data for the Typical Year precipitation was analyzed to determine the volume of flow that would have to be stored, based on the WPCF treatment capacity.

Table 6-46-4 below summarizes the storage (equalization) volume required to attenuate the peak flows to the treatment rate, to provide full treatment for the entire flow reaching the WPCF.

Table 6-4: BCUA WPCF Treatment Rate versus Storage Volume

Treatment Rate (MGD)	Required Storage Volume (MG)
120	40
140	7.9
160	0.5
180	0

There is adequate space on the site for a 7.9 MG storage tank, Figure 6-56-56-5, but not for a 40 MG tank, thus a 20 MGD plant expansion would also be required to bridge the gap between storage and treatment. Ideally the site of an equalization type storage tank is near the head end of the WPCF so that hydraulic grades between the wet well and storage unit can be matched, however the head end of the WPCF has limited land area available for a gravity system. In addition, the storage facility(s) are large, deep, and heavy structures that will necessitate extensive dewatering facilities during construction, and likely will require deep piles to support their weight in what are likely mucky soils. At the same time, the tanks may also need to be ballasted to protect against floatation. There are existing utilities easements that may require relocation of large existing utilities. The construction may also impact BCUA facilities requiring the relocation of pipelines and temporary facilities to achieve the necessary tie ins. The location of the expansion is generally below grade and out of the public view and in areas not utilized for recreation. However, the facilities may be visible from the water and there may be objections from recreational boaters. It is likely any significant plant expansion would have high environmental impacts, particularly to wetlands, to which public opposition could be expected.

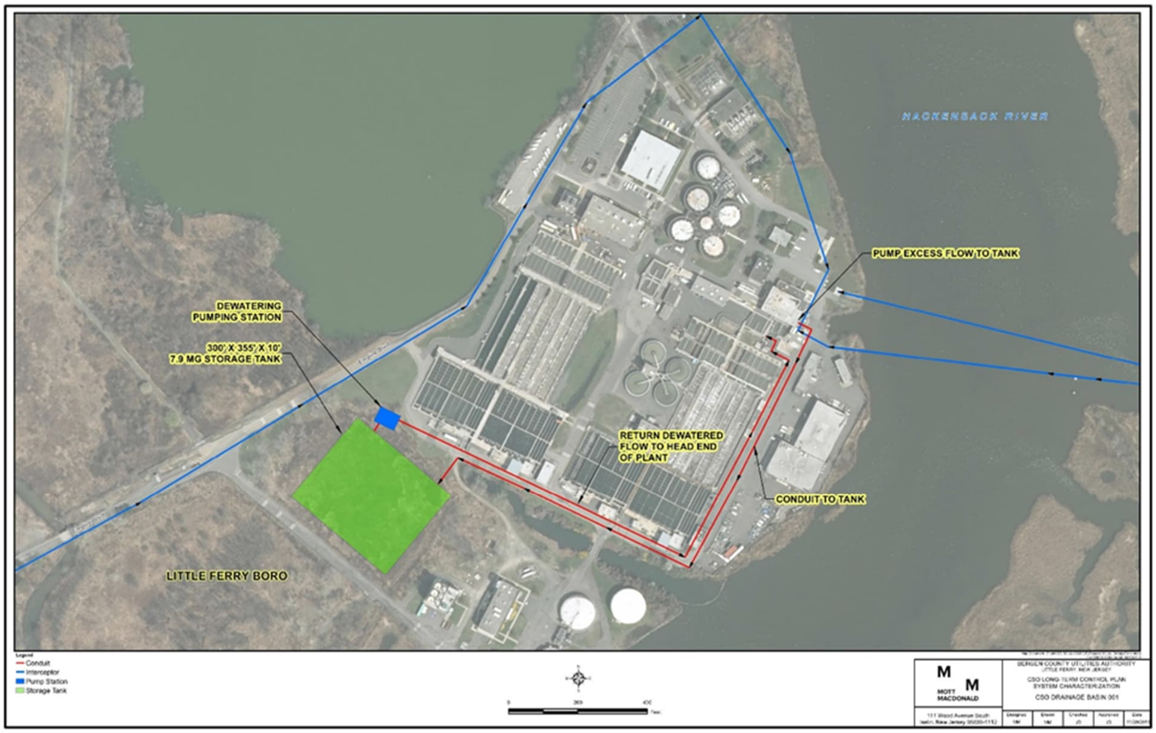


Figure 6-5: Conceptual Layout of 7.9 MG Storage Tank

Costs were developed using the 2018 Technical Guidance Manual developed by Greely and Hansen for the NJ CSO Group and were updated to January 2019 (ENR CCI 11,206).

Table 6-5: Cost summary for Storage Tanks

Tank Size	Required Plant Capacity Increase	Storage Capital Costs	Plant Capital Costs	Storage O&M Costs	Plant O&M Costs	O&M Present Worth (20-year)	Total Present Worth (20-year)
40 MG	0 MGD	$217,000,000	$0	$3,800,000	$0	$58,000,000	$269,000,000
7.9 MG	20 MGD	$56,000,000	$132,000,000	$1,200,000	$5,000,000	$94,000,000	$282,000,000
0.5 MG	40 MG	$9,000,000	$228,000,000	$430,000	$8,800,000	$140,000,000	$377,000,000

Note: This table was updated from the DEAR to include plant upgrade costs based on Table 6-26-2 as well as storage costs.
Class 5 Costs (-50%+100%) ENR CCI = 11,206

6.1.1.4. Control Program 4 – Utilize Inline Storage in Interceptor for CSO

During the evaluation of transport capacity, it was observed that there appears to be available storage within the interceptors. It may be possible to use the storage within the interceptors to store additional combined sewage and then treat the flow at the WPCF as the interceptor drains down. The first step in this process was to evaluate the storage volume available. This was accomplished by exporting the pipe dimensions and typical year peak hydraulic grades of the interceptors for the reaches of pipe between the WPCF and the CSO communities. The geometric properties of the pipe were used to determine cross sectional area occupied by sewage at each end of the pipe. These areas were then subtracted from the full pipe cross sectional area to determine the area available for storage. The average end area methodology was applied to determine the volume of storage available by multiplying the average available area for each pipe by the length of the pipe. The individual pipe volumes were then summed to a total volume of 6.1 MG, see Table 6-66-6.

The hydraulic condition within the interceptors is dependent on the tailwater at the BCUA headworks. In the model, the tailwater was fixed at the average of normal operating range which typically varies with a 5-6 foot band. To estimate the impact of a higher water level in the wet well, the storage volumes were calculated when 2 feet was added to the water levels. In this case, the storage volume dropped to 1.3 MG, see Table 6-66-6.

Table 6-6: Theoretical storage volume in BCUA interceptors

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

The BCUA operates its system to maximize conveyance to the treatment plant and the use of inline storage. However, taking advantage of inline storage inherently raises the water level in the interceptor and thus the risk of adverse impacts to basement flooding or surface flooding further upstream. While the model can give insight into the hydraulic performance of the system, it cannot account for unforeseen conditions that may occur in the "real" world. A rainfall step analysis conducted on the interceptor showed that once the lower larger interceptor pipes reach full capacity, extreme surcharging of the smaller upstream sewers occurs rapidly. In addition, there is a potential tradeoff between keeping the interceptor level drawn down to provide storage and the impact of pumping additional flow through the plant. As was observed in Control Program 3, under the current flows, storage would be useful to attenuate the peak flows at the WPCF. To increase storage by lowering the wet well level would require increasing the rate at which flow is pumped through the plant, thus defeating the purpose of reducing peak flows.

6.1.2. Rankings

The BCUA owns three (3) regulators in Ridgefield Park, but does not own any CSO outfalls, but has agreed to work cooperatively with the municipal permittees, who will be responsible for bearing the costs for any expansion of transport and treatment facilities to accommodate additional combined flow conveyed to and treated by the BCUA. Accordingly, the municipal permittees will need to weigh the costs of CSO controls within the municipality against the costs to convey and treat the flow at the BCUA WPCF. Therefore, the selection of alternatives acceptable to the BCUA lies with the municipal permittees. Notwithstanding this fact, the proceeding evaluation would indicate a preference for certain alternatives over others. The cost of blending is significantly less than full expansion of the treatment plant, however this does not appear feasible in light of the current plant permit, refer to Section 6.1.4 for applicability of blending under June 2019 permit revisions. The 2019 NJDPES permit acknowledges that loading limits could be revisited if additional CSO were diverted to the plant. Likewise, storage costs are relatively high when compared to blending costs. Therefore, BCUA has not directly ranked their alternatives, it has provided information for the municipalities to use in their evaluations. It is noted BCUA will need to agree to any municipal funded project that will result in changes to flow, transport or treatment capacity, but has agreed to accept dewatering flows from municipal CSO storage facilities, within the control parameters specified by the BCUA and provided to the municipalities.

6.1.3. Public Input

In addition to being published in the DEAR, the BCUA alternatives were presented at five meetings of the BCUA CSO Group SCSO Team (Meetings 8-12), all meetings were open to the public. As the meetings progressed the alternatives were presented in greater detail along with costs and potential impacts. Input was solicited directly from the members of the SCSO Team. There was little input from the public, minutes of the meetings are included as Appendix B. Comments and questions pertaining to BCUA alternatives are as follows:

At SCSO Meeting 9, a resident of Little Ferry stated that Little Ferry has almost no waterfront access, and would thus like to see an emphasis of green space.

At SCSO Meeting 10, an inquiry was made if the "American Dream" mall had been accounted for, the project team indicated that it had.

At SCSO Meeting 11, there was an inquiry about the decisions making process, to which the project team responded that BCUA is coordinating the decision to ensure that the selected alternative do not adversely impact treatment capacity.

Discussion of the overall Public Participation Process since the "Public Participation Process Report" July 1, 2018, revised January 4, 2019 can be found in Section 13.1.

6.1.4. Expansion of Treatment Capacity and CSO Bypass at Regional WPCF

An analysis of the BCUA LF WPCF was conducted as part of the DEAR. The NJDEP requested additional information regarding the impact on CSO volumes and the WPCF of increasing flows to the WPCF as well as expanding the plant. Consideration was also given to recent permit modifications issued to the BCUA in June of 2019, which due to the timing of their release could not be incorporated into the DEAR.

The Permit (Part IV.G.4.iii) states:

> "STP expansion and/or storage at the plant (an evaluation of the capacity of the unit processes must be conducted at the STP resulting in a determination of whether there is any additional treatment and conveyance capacity within the STP). Based upon this information, the permittee shall determine (modeling may be used) the amount of CSO discharge reduction that would be achieved by utilizing this additional treatment capacity while maintaining compliance with all permit limits"

The required analysis was performed as part of the DEAR which determined that there was no available capacity at the plant to accept additional flows from the combined sewer communities, without plant expansion. NJDEP provided the following comment on the DEAR:

> "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."

The BCUA responded:

> "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."

In the DEAR approval letter, the NJDEP requested the following comment be addressed in the SIAR:

> "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."

BCUA has carefully coordinated with the municipalities regarding plant and interceptor capacity. The DEAR analysis was shared with the municipalities. In addition, communication and coordination took place through regular BCUA CSO Group internal meetings as the report was being developed. The proceeding analysis and discussion is provided to supplement the information in the DEAR and to be responsive to NJDEP's comment to take a more comprehensive look at both conveying and treating more combined sewage at the LF WPCF. The analysis of plant expansion includes the following interrelated elements:

- Directing more flow to the BCUA interceptors, i.e. modifying regulators to increase their capacity as well as the size of the dry weather flow line to convey the flow to the BCUA intercepting sewers.
- Conveying additional flow to the treatment plant. This relates to the capacity of the interceptors and the hydraulic control implemented at the BCUA LT WPCF influent pumping station. If the interceptors must be expanded to accept additional combined sewage, those costs must be included as part of the alternative and borne by the municipalities that wish to access the additional plant capacity.
- The plant capacity upgrades that would be required to treat additional flow within the requirements of the BCUA permit, i.e. the additional flow cannot threaten the plant's ability to meet its permit requirements now or in the future. As discussed above, this is a condition of the Permit. If the plant must be expanded to accept additional combined sewage, those costs must be borne by the municipalities.

To be effective, a LTCP alternative must achieve the specified reductions without creating adverse impacts, or by providing modifications or additional facilities to mitigate those impacts. Each of these points are addressed below.

6.1.4.1. Directing more flow to the BCUA interceptors

It is possible to direct more flow to the BCUA interceptors, with system modifications including plant upgrades, each community would need to address their own unique regulator configurations. Hackensack relies on vortex valves to control the underflow from their regulators. These devices could be replaced with larger devices which would pass more flow under similar hydraulic conditions. Ridgefield Park has a variety of regulator mechanisms including vortex valves. Again, each of these could be enlarged to direct more flow to the BCUA branch interceptors in the Village. Such enlargements would require structural modifications to the regulator as well as new equipment. Fort Lee discharges combined sewage to the BCUA interceptors via pumping stations. Directing more combined flow to the BCUA interceptors would require upgrades to the pumping stations and depending on the increase in flows upgrades to the force mains may also be required.

Modeling was conducted to evaluate the reduction in overflows if the Hackensack and Ridgefield Park regulators were expanded by 25% and 50%. Fort Lee was evaluated by expanding their pumping capacity 25% and 50%.

6.1.4.2. Increasing Interceptor Capacity

In some cases, there may be downstream bottlenecks where the additional flow would cause adverse impacts, and limit conveyance to the plant. Due to backwater from the BCUA interceptors flow from the Ridgefield Park regulators was limited. Accordingly, the hydraulic profiles for the 25%

and 50% enlargement of regulators were reviewed. Locations where unacceptable levels of surcharging was experienced were identified. Example profiles of surcharged pipe are provided in Figure 6-66-66-6, these pipes were expanded in the model until the surcharging was alleviated. Once these steps were complete, the reduction in overflow volumes for the typical year, could be calculated using the model. The results of this analysis were also analyzed to determine the increase in peak flows to the LF WPCF as a precursor to estimating the cost of upgrading the treatment plant, see Figure 6-76-76-7. The impact to projected overflows and percent capture can be seen in Table 6-76-7. It is noted that the 25% and 50% regulator expansions and associated interceptor upgrades only provide about half the overflow reduction required to reach the 85% Presumptive Approach target.

To effectively convey all flow reaching the interceptor for the typical year, the BCUA maintains the level in the LF WPCF influent chamber at a relatively constant level. To replicate a more aggressive pumping approach, the modeled wetwell level was lowered two feet. However, there was no measurable impact on overflows and surcharged interceptors.

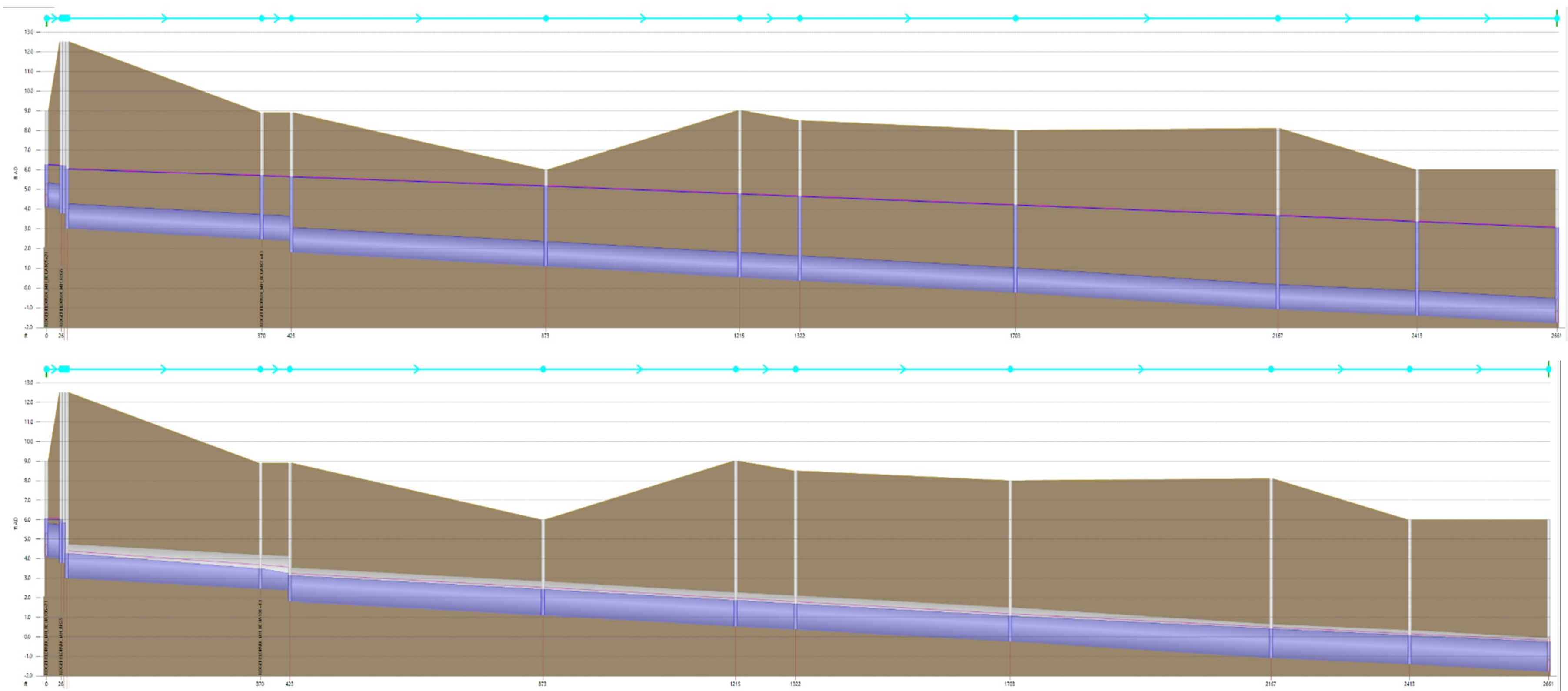


Figure 6-6: Sample profiles of surcharged interceptors before (top) and after upgrades (bottom)

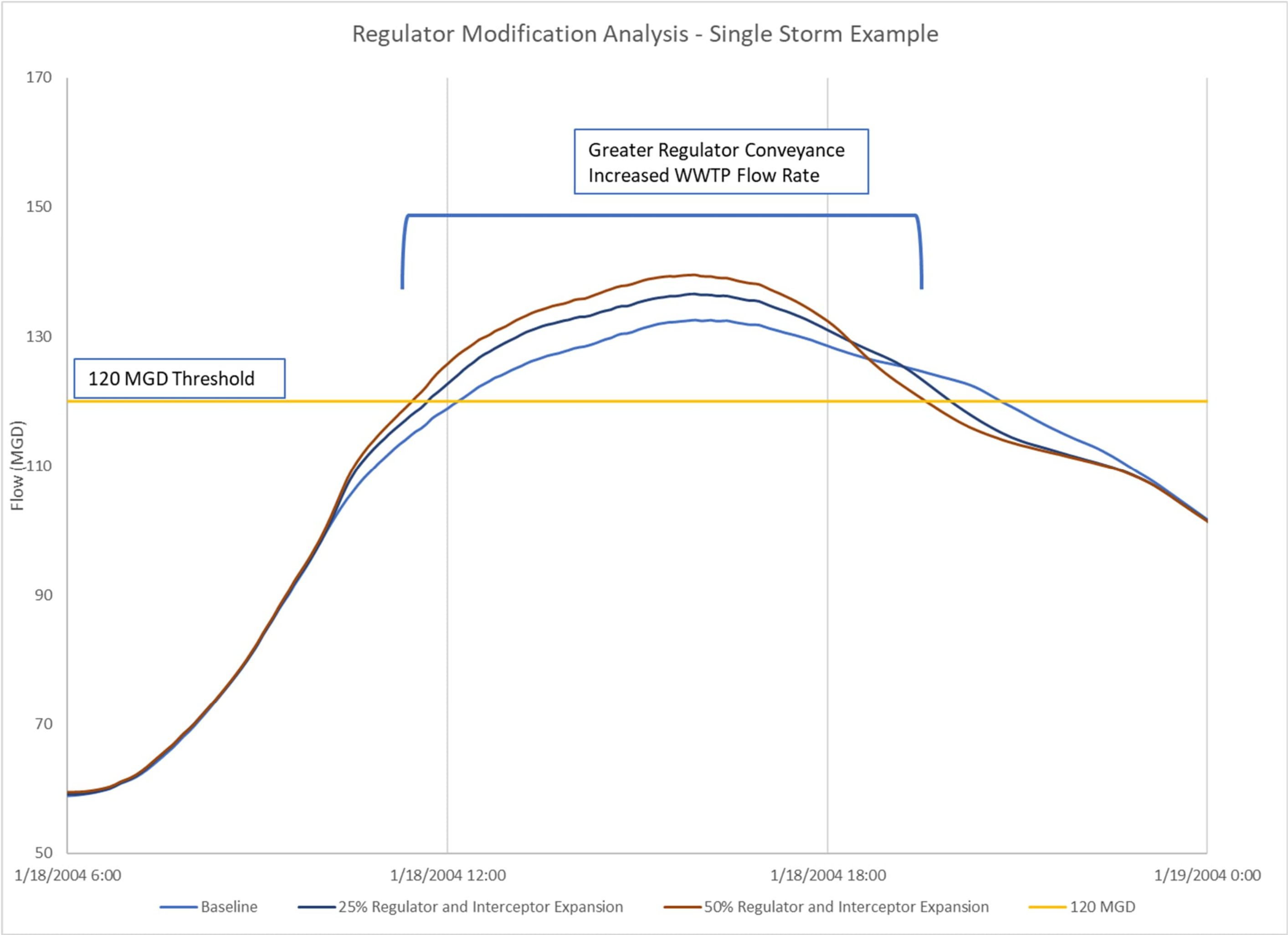


Figure 6-7: Impact of regulator and interceptor expansions on WPCF flows

Table 6-7: Impact on Overflow Volumes of Regulator and Fort Lee Pumping Stations Modifications

Scenario	2050 Baseline[1]	Increase Regulator and PS Capacity 25%	Increase Regulator and PS Capacity 50%
Total BCUA Overflow Volume (MG)[2]	448	387	348
Change from Baseline (MG)	NA	61	100
Peak Flow Increase at LF WPCF (MGD)	NA	20.5	28
% Capture	72.3%	76.1%	78.5%

1. **Reflects previously planned separation in Fort Lee.**
2. **Values derived from regional model may differ slightly from municipal models, the purpose in this case was to evaluate the differential impact.**

6.1.4.3. Description of Existing Regional WPCF Treatment Facilities

BCUA's regional wastewater treatment plant in Little Ferry (LF WPCF) was constructed in phases starting in 1948. The liquid treatment facilities are made up of 4 independent treatment trains (batteries), each with a dedicated outfall to a man-made ditch that flows to the Hackensack River. The liquid treatment facilities consist of raw sewage pumping, grit removal with detritors, after which the flow is split into the four liquid treatment batteries.

Each treatment battery consists of primary settling, conventional activated sludge/contact stabilization, final settling, disinfection with sodium hypochlorite and dechlorination with sodium bisulfite. The liquid treatment process is designed for the removal of $cBOD_5$ and TSS, followed by disinfection.

Biosolids are thickened and anaerobically digested. Liquid digested and thickened sludge is taken off-site for ultimate disposal. Side streams generated from solids processing are returned to the influent pumping station and reintroduced to the liquid treatment process.

6.1.4.4. Existing Capacity at Regional WPCF

Hydraulic analysis of the LF WPCF indicates that the facility's raw sewage pumping station is capable of conveying flows greater than 400 mgd and the primary treatment facilities have a hydraulic capacity of 325 mgd. However, the secondary treatment facilities are limited by their process capacity at flows greater than 120 mgd.

The capacity of the secondary facilities is limited by the ability of the existing final settling tanks (FSTs) to prevent solids wash-out at higher flows. There are 4 FSTs in each of the 4 batteries, resulting in a total of 16 FSTs at the LF WPCF. Each FST has an approximate surface area of 6,328 square feet (sf), and a side water depth of 10 feet. The side water depth of the tanks is below depths recommended in contemporary design texts and recommended guidelines, including WEF Manual of Practice No. 8 and Ten States Standards. Based on the NJDEP design criteria of 1,000 gpd/sf, the FSTs have a total capacity of 101.25 mgd with all units in service. To maximize the capacity of the secondary treatment facilities, the BCUA has conducted field demonstration testing to document that the performance of the FSTs can be improved with use of polymer. Accordingly, this improvement was implemented by BCUA. BCUA has also started an FST improvement project to increase weir length, replace troughs, install V-notched weirs and other improvements. They are also designing a new polymer feed system that they intend to install by the end of the year. These projects are not necessarily CSO related, but rather pertain to the overall WPCF capacity to serve the entire district.

Existing Flows at Regional WPCF

Analysis of average hourly effluent flow data for the LF WPCF for the period January 1, 2016 through December 31, 2019 indicates the following flows have been received at the LF WPCF:

Table 6-8: LF WPCF Effluent Flows January 2016-Decemember 2019

Flow, MGD	Hourly	4 hours	6 hours	12 hours	24 hours
Average	75	75	75	75	75
Max	226	224	222	216	193
Min	11	32	35	43	51
Percentile					
99.80%	174	171	169	163	158
99%	141	140	139	136	133
95%	113	112	111	110	109
50%	72	72	72	71	71
5%	46	47	49	53	55

Review of 4 years of data shows that the LF WPCF average daily flow is below 110 mgd for 95% of the time and below 160 mgd for 99.8% of the time. Inspection of the data also indicates that peak hourly flows exceed 174 mgd 0.2% of the time but that flows in excess of 200 mgd have been received at the facility.

Accordingly, analysis of the most recent flows for the LF WPCF demonstrates that the use of the existing treatment facilities has been maximized to the extent practical.

Having confirmed that the LF WPCF's wet weather treatment capacity is 120 MGD hourly peak flow, the impact of increasing combined flows to the plant can be considered. During wet weather plant flows can quickly rise above 120 MGD and remain elevated for extended periods. This does not necessarily mean the plant is failing to meet its permit requirements, it does however increase the potential for an exceedance. Further stressing of the plant under these conditions through the increase in flow rates would be considered unacceptable. The effects of increasing regulator and interceptor capacity can be seen in Figure 6-86-86-8. The blue dots represent 2050 baseline conditions while the green dots represent upgrades to the regulators and interceptors. For illustration purposes, several pairs of corresponding dots have been identified by red arrows. The downward shift indicates a reduction in overflow, while the rightward shift indicates the increase in flow at the WPCF. As can be seen, the incidences of higher flows at the plant are increased by expanding the regulators and interceptors. The plant capacity must be expanded accordingly, the required plant expansions are summarized in Table 6-76-7.

This data also allows for an estimate of idealized automated controls and interceptor upgrades to convey flows up to the plant's capacity without allowing an overflow. Idealized conditions would consist of automated gates connected to that plant's SCADA system to allow a specified flow to reach the plant before an overflow occurs. In reality, such a level of control would be quite expensive and almost impossible to achieve. To achieve 85% capture, the plant capacity would need to be increased to 162 MGD, see Figure 6-96-96-9, that is, under this scenario all overflows are sent to the plant until the plant capacity reaches 162 MGD. The two red lines represent the existing plant capacity and the expanded plant capacity. Under idealized conditions the overflow represented by any dot under the line could be fully captured and treated at the WPCF. For any dot above the line, the overflow event could be reduced by height of the line which represents the available capacity at the plant, for example if the plant's flow was 150 MGD and the overflow was 100 MGD, then the overflow could be reduced by 12 MGD (162 MGD – 150 MGD) resulting in a plant flow of 162 MGD and an overflow of 88 MGD. The results would be the green dots, which show no overflow until the plant flow reaches 162 MGD. For reference purposes, approximate costs are included in Table 6-126-12. The actual costs would be expected to be higher as idealized controls cannot be achieved in real life. It is noted that the costs of the idealized 85% capture exceed the expected costs of achieving 85% locally through municipal improvements.

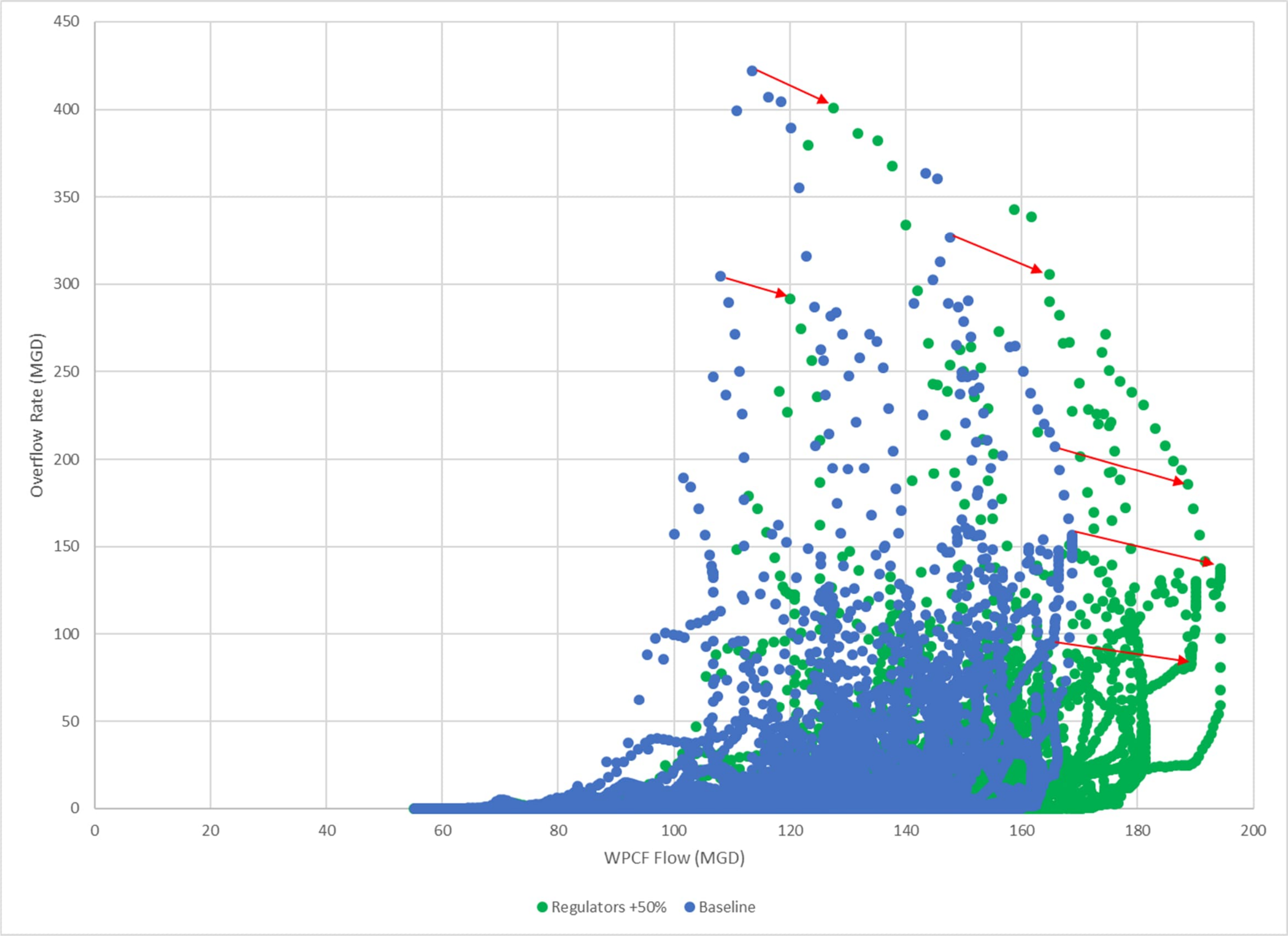


Figure 6-8: Scatter Plot of Plant Flows versus Overflows

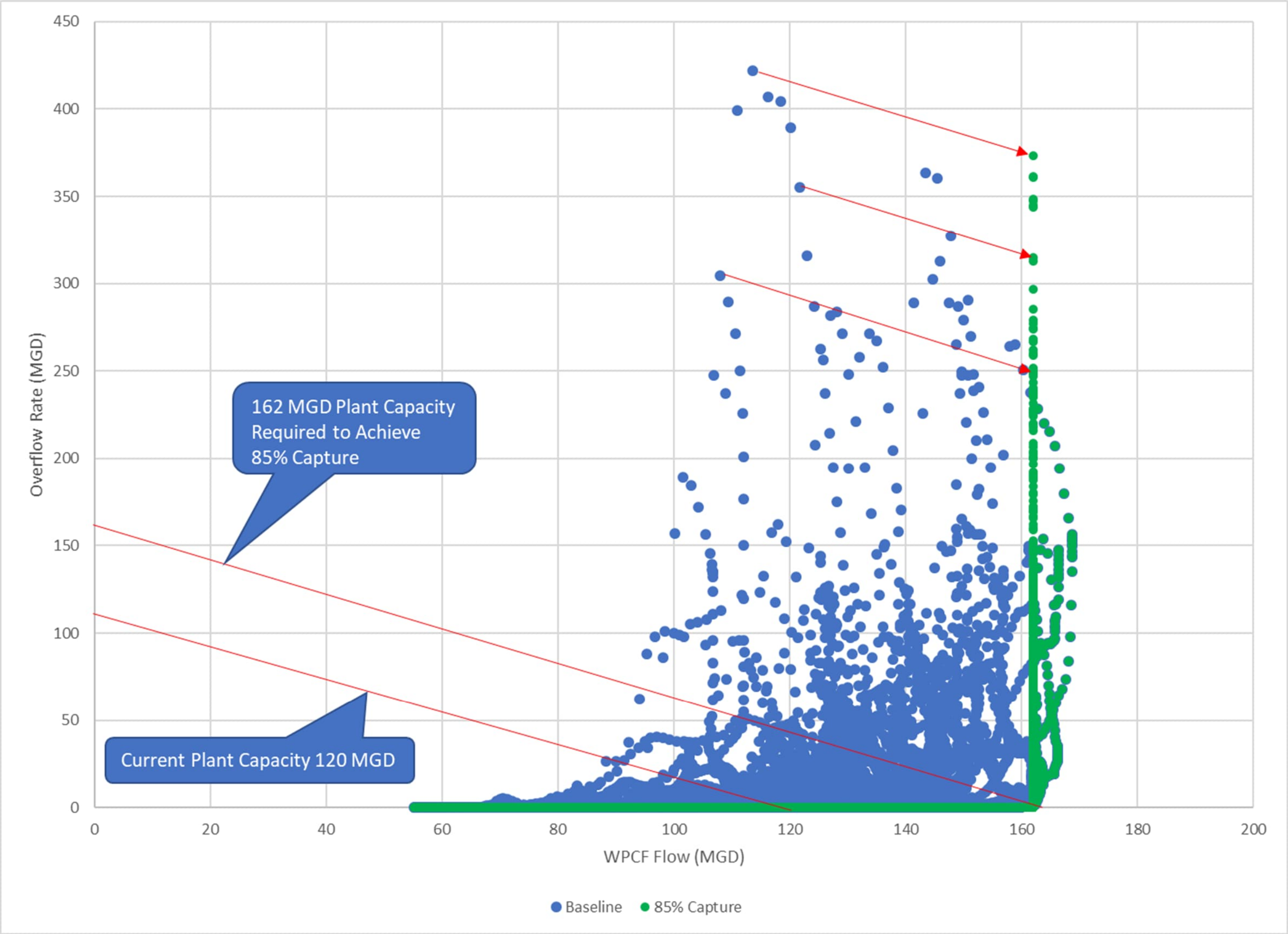


Figure 6-9: Scatter Plot, Idealized 85% Capture

6.1.4.5. Existing Regional WPCF Permit Requirements

NJPDES permit No. NJ0020028 regulates the surface water discharge from the BCUA's LF WPCF including combined sewage flows received from combined sewer municipalities served by the BCUA. The NJPDES flow for the facility is 94 MGD. The permit including was issued on March 15, 2015 and became effective on July 1, 2015. A minor permit modification was issued on October 9, 2015. A major permit modification was issued on June 28, 2019 with an effective date of August 1, 2019. The June 2019 version of the permit includes new effluent limitations for ammonia. The BCUA has contested the permit requirements added in June 2019 and has requested a Stay and Adjudicatory Hearing to discuss more favorable permit conditions. In addition, on March 20, 2020, the NJDEP issued another draft NJPDES Permit Major Modification for the LF WPCF. The March 2020 version of the permit includes electronic reporting requirements, relocates language in the permit regarding the CSO requirements, revises pretreatment notification requirements, and provides other clarifications.

6.1.4.6. CSO Bypass at the Existing WPCF

There is no current means to bypass the primary or secondary treatment units to blend raw wastewater with treated effluent prior to discharge. The influent pumping station currently discharges directly into the grit removal facilities, after which, flow is split and flows by gravity to the primary clarifiers and subsequent treatment units in each of the four batteries.

Hydraulic analysis of the facility indicates that the primary clarifiers have a hydraulically capacity of up to 325 MGD. However, there is no ability to bypass flow from the primary clarifiers to the existing chlorine contact tanks. Furthermore, the combined capacity of the existing chlorine contact tanks is currently limited to a peak flow of 109 mgd, based on current NJDEP TWA design criteria. Due to the configuration of the treatment plant, it is not feasible to construct a bypass from the primary clarifiers to the chlorine contact tanks because the existing chlorine contact tanks are currently at capacity and they are integral to the final settling tanks. Due to site limitations, there is no room for expanding the capacity of the existing chlorine contact tanks to provide the ability to blend primary and secondary effluent while maintaining compliance with the current permit conditions.

Another suggested way to maximize treatment with the existing facilities is to implement chemical addition at the primary settling tanks. Chemically Enhanced Primary Treatment (CEPT) is a well documented method of increasing treatment during wet weather events. To implement CEPT, a portion of the primary effluent would be redirected to the plant disinfection facilities where it is combined with secondary effluent prior to discharge. To implement CEPT, facilities to divert primary effluent to the existing disinfection process are required.

Based on the current plant configuration, CEPT cannot be implemented at the LF WPCF without constructing a new primary clarifier effluent pumping station this is due to limited space for gravity conveyance facilities to convey the required flow with limited available hydraulic head. A dedicated chlorine contact tank would also be required since the capacity of the existing chlorine contact tanks is limited. The dedicated chlorine contact tank is where the primary effluent would be disinfected and following that, blended with the secondary effluent at the 4 existing chlorine contact tanks prior to discharge. Alternatively, the primary clarifier effluent pumping station could direct the primary effluent to a ballasted flocculation facility and dedicated disinfection facility for blending prior to discharge. These alternatives are discussed under Control Program 2 above.

When implementation of either of these CSO bypass or "blending" alternatives is assessed in conjunction with the future requirements for secondary treatment facilities with nitrification capability, as discussed above, it is not considered a feasible option while still meeting all of the plants permit requirements. The 2019 NJDPES permit acknowledges that loading limits could be revisited if additional CSO were diverted to the plant.

6.1.4.7. Expansion of the Existing Regional WPCF

Expansion of the BCUA's existing regional WPCF is highly dependent on the level of treatment that is required to be achieved at the facility. The June 2019 permit modification proposed an ammonia limit. This is significant because the existing regional treatment facilities are not capable of ammonia removal, which requires a higher level of treatment (nitrification). Modification of the current biological activated sludge secondary treatment process to implement nitrification will effectively reduce the capacity of the existing regional WPCF.

As can be seen, there are limited opportunities to convey additional flow to the treatment plant while maintaining the total plant flow below the design capacity of 120 MGD. Therefore, to ensure the plant operates at least as well as it currently does additional treatment will need to be provided to offset and increase in peak flows due to the CSO LTCP. Treatment of CSO at the outfall requires primary treatment and disinfection. However, once the flow is conveyed to the plant is must be treated to the plant's permit limits. Given the load limits of the receiving water and the nitrification requirements any additional peak flow to the plant would need to receive full treatment.

With the new effluent permit limits requiring nitrification and lower cBOD5 discharge concentrations, the existing facility would need to be de-rated to 60 MGD average annual flow and 120 MGD peak hydraulic flow The BCUA is in the process of preparing a Capacity Analysis Report, that report evaluated a potential 60 MGD expansion of the treatment plant, providing levels of treatment as required by the current permit, and which would also be required to treat additional combined sewage flows at the LF WPCF, if any additional CSO are directed to the plant, however none are planned other than tank dewatering flows. The current estimate for such an expansion is $303M or about $5M for each MGD of treatment capacity. Cost estimates for increasing regulator capacity by 25% and 50% along with the associated interceptor and treatment plant upgrades are shown in Table 6-96-9 and Table 6-106-10, and summarized in Table 6-126-12. Cost per gallon of CSO reduction range from $2.39 to $4.26/gal. This information is made available by the BCUA, for the individual municipalities to make their own determinations as to its cost effectiveness.

Table 6-9: Estimate to upgrade regulator capacity 25% and associated interceptor and plant upgrades

ITEM No.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	AMOUNT
1	MOBILIZATION	1	LS	$3,199,000	$3,199,000
2	UTILITY RELOCATION	1	LS	$400,000	$400,000
3	EXCAVATION	69,646	CY	$10	$696,464
4	DEWATERING	1	LS	$100,000	$100,000
5	TRAFFIC CONTROL	1	LS	$330,000	$330,000
6	UNCONTAMINATED SOIL DISPOSAL	35,000	CY	$30	$1,050,000
7	CONTAMINATED SOIL	56,000	TON	$75	$4,200,000
8	DGA	47,638	CY	$30	$1,429,130
9	AASHTO #2 CLEAN STONE FOR PIPE BEDDING	9,094	CY	$40	$363,780
10	SEWER SERVICE RECONNECT	50	EA	$1,700	$85,000
11	CONCRETE CURB	6,875	LF	$50	$343,760
12	PAVEMENT RESTORATION	14,317	SY	$75	$1,073,803
13	MILL AND REPAVE	37,814	SY	$60	$2,268,814
14	CONCRETE SIDEWALK	6,111	SY	$80	$488,903
15	REGULATOR MODIFICATIONS	8	EA	$390,000	$3,120,000
16	PRECAST MANHOLE	183	EA	$5,000	$916,692
17	12" RCP	336	LF	$145	$48,738
18	15" RCP	1,352	LF	$168	$227,133
19	18" RCP	228	LF	$190	$43,335
20	24" RCP	12,662	LF	$235	$2,975,493
21	30" RCP	8,052	LF	$260	$2,093,634
22	36" RCP	2,785	LF	$320	$891,060
23	48" RCP	2,086	LF	$470	$980,378
24	Pumping Station Upgrades	1	LS	$1,300,000	$1,300,000
25	Plant Upgrades	20.5	MGD	$5,000,000	$102,500,000
	SUBTOTAL				$131,125,117
	CONTINGENCY (25%)				$32,781,300
	SUBTOTAL				$163,906,417
	DESIGN (10%)				$16,390,600
	CONSTRUCTION MANAGEMENT (10%)				$16,390,600
	ADMINISTRATIVE/LEGAL (5%)				$8,195,300
	TOTAL (SAY)				$204,900,000
	ANNUAL O&M COSTS, 3.5% OF PLANT UPGRADES				$3,587,500
	20-YEAR O&M PRESENT WORTH				$54,630,000
	20-YEAR PRESENT WORTH				$260,000,000

Table 6-10: Estimate to upgrade regulator capacity 50% and associated interceptor and plant upgrades

ITEM No.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	AMOUNT
1	MOBILIZATION	1	LS	$4,149,000	$4,149,000
2	UTILITY RELOCATION	1	LS	$400,000	$400,000
3	EXCAVATION	70,185	CY	$10	$701,850
4	DEWATERING	1	LS	$100,000	$100,000
5	TRAFFIC CONTROL	1	LS	$330,000	$330,000
6	UNCONTAMINATED SOIL DISPOSAL	35,000	CY	$30	$1,050,000
7	CONTAMINATED SOIL	56,000	TON	$75	$4,200,000
8	DGA	47,812	CY	$30	$1,434,366
9	AASHTO #2 CLEAN STONE FOR PIPE BEDDING	9,213	CY	$40	$368,507
10	SEWER SERVICE RECONNECT	50	EA	$1,700	$85,000
11	CONCRETE CURB	6,875	LF	$50	$343,760
12	PAVEMENT RESTORATION	14,410	SY	$75	$1,080,783
13	MILL AND REPAVE	37,814	SY	$60	$2,268,814
14	CONCRETE SIDEWALK	6,111	SY	$80	$488,903
15	REGULATOR MODIFICATIONS	8	EA	$390,000	$3,120,000
16	PRECAST MANHOLE	183	EA	$5,000	$916,692
17	12" RCP	234	LF	$145	$33,973
18	15" RCP	1,465	LF	$168	$246,094
20	24" RCP	12,879	LF	$235	$3,026,500
21	30" RCP	4,063	LF	$260	$1,056,329
22	36" RCP	6,774	LF	$320	$2,167,743
23	48" RCP	2,086	LF	$470	$980,378
24	Pumping Station Upgrades	1	LS	$1,550,000	$1,550,000
25	Plant Upgrades	28	MGD	$5,000,000	$140,000,000
	SUBTOTAL				$170,098,690
	CONTINGENCY (25%)				$42,524,700
	SUBTOTAL				$212,623,390
	DESIGN (10%)				$21,262,300
	CONSTRUCTION MANAGEMENT (10%)				$21,262,300
	ADMINISTRATIVE/LEGAL (5%)				$10,631,200
	TOTAL (SAY)				$265,800,000
	ANNUAL O&M COSTS, 3.5% OF PLANT UPGRADES				$4,900,000
	20-YEAR O&M PRESENT WORTH				$74,610,000
	20-YEAR PRESENT WORTH				$340,000,000

Table 6-11: Estimate to achieve 85% capture at BCUA idealized collection system[1]

ITEM No.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	AMOUNT
1	MOBILIZATION	1	LS	$5,899,000	$5,899,000
2	UTILITY RELOCATION	1	LS	$400,000	$400,000
3	EXCAVATION	70,185	CY	$10	$701,850
4	DEWATERING	1	LS	$100,000	$100,000
5	TRAFFIC CONTROL	1	LS	$330,000	$330,000
6	UNCONTAMINATED SOIL DISPOSAL	35,000	CY	$30	$1,050,000
7	CONTAMINATED SOIL	56,000	TON	$75	$4,200,000
8	DGA	47,812	CY	$30	$1,434,366
9	AASHTO #2 CLEAN STONE FOR PIPE BEDDING	9,213	CY	$40	$368,507
10	SEWER SERVICE RECONNECT	50	EA	$1,700	$85,000
11	CONCRETE CURB	6,875	LF	$50	$343,760
12	PAVEMENT RESTORATION	14,410	SY	$75	$1,080,783
13	MILL AND REPAVE	37,814	SY	$60	$2,268,814
14	CONCRETE SIDEWALK	6,111	SY	$80	$488,903
15	REGULATOR MODIFICATIONS	8	EA	$390,000	$3,120,000
16	PRECAST MANHOLE	183	EA	$5,000	$916,692
17	12" RCP	234	LF	$145	$33,973
18	15" RCP	1,465	LF	$168	$246,094
20	24" RCP	12,879	LF	$235	$3,026,500
21	30" RCP	4,063	LF	$260	$1,056,329
22	36" RCP	6,774	LF	$320	$2,167,743
23	48" RCP	2,086	LF	$470	$980,378
24	Pumping Station Upgrades	1	LS	$1,550,000	$1,550,000
25	Plant Upgrades	42	MGD	$5,000,000	$210,000,000
	SUBTOTAL				$241,848,690
	CONTINGENCY (25%)				$60,462,200
	SUBTOTAL				$302,310,890
	DESIGN (10%)				$30,231,100
	CONSTRUCTION MANAGEMENT (10%)				$30,231,100
	ADMINISTRATIVE/LEGAL (5%)				$15,115,500
	TOTAL (SAY)				$377,900,000
	ANNUAL O&M COSTS, 3.5% OF PLANT UPGRADES				$7,350,000
	20-YEAR O&M PRESENT WORTH				$111,920,000
	20-YEAR PRESENT WORTH				$490,000,000

1. Assumes similar collection system upgrades to 50% regulator expansion.

Table 6-12: Summary of regulator, interceptor and plant upgrades

Alternative	20-Year NPW Cost	CSO Volume Reduction	Cost per gallon of CSO Reduction
25% regulator expansion	$260M	61 MG	$4.26
50% regulator expansion	$340M	100 MG	$3.40
Idealized 85% Capture	$490M	205 MG	$2.39

6.2. Fort Lee DEAR Summary

The Borough of Fort Lee was issued a Combined Sewer Overflow (CSO) permit (NJPDES Permit No. NJ0034517) by the New Jersey Department of Protection in 2015. The Development and Evaluation of Alternatives Report was issued to NJDEP in June 2019 with a response to comments in November 2019. It discusses all the alternatives available for CSO reduction and selects alternatives that could be used to reduce CSOs in Fort Lee.

The Borough of Fort Lee comprises 1,505.2 acres which is serviced by combined and separately sewered areas. The combined sewer system consists of 639.1 acres discharging to three pump stations and two CSO outfalls. The CSO outfalls are activated in rainstorms.

One significant improvement was made in 2016 to the combined collection system that impacts CSOs. In 2016 a sewer infrastructure project servicing the new Hudson Lights project revised the sewer collection system. Before 2016, the Lower Main Pump Station sent pumped flow to a 12 inch pipe by gravity to the Palisade Terrace Pump Station which would then pump to the interceptor. After 2016, the flow from the Palisade Terrace Pump Station was rerouted to a new 12 inch pipe that discharges directly to the BCUA interceptor. In addition to the rerouting the flow, the pump station capacity was upgraded from 2 MGD to 5 MGD.

It is understood that Fort Lee will segment their CSOs to apply only to them. The federal CSO Policy as well as the permit at Part IV.G.4.c states, “The permittee shall select either Demonstration or Presumption Approach for each group of hydraulically connected CSOs and identify each CSO group and its individual discharge locations.” Fort Lee has request in a letter to NJDEP on April 24, 2020 that it be segmented from the rest of BCUA’s CSO communities because its CSOs discharge to the Hudson River while the other BCUA CSO communities discharge their overflows to the Hackensack River. Fort Lee’s Selection and Implementation of Alternatives Report assumed that this request will be granted.

The Hudson River is an SE2 water body in the vicinity of Fort Lee with a current fecal coliform criteria (geometric mean) of 770 cfu/100 mL. Currently, sampling programs show the water quality to be in compliance with the current criteria; therefore, water quality is not a driver for CSO control based on the current regulations.

The Development and Evaluation of Alternatives Report, submitted to NJDEP in June 2019, stated that if Fort Lee is required to reduce CSOs further, the alternatives that they could use to reduce or eliminate CSOs are gray infrastructure alternatives such as disinfection, high rate filtration with disinfection and storage tanks.

Control alternatives that could reduce but not eliminate CSOs are sewer separation and green infrastructure. Fort Lee may use sewer separation or green infrastructure to increase CSO capture to 85%. If more CSO capture is required by NJDEP then we will consider the gray infrastructure alternatives of disinfection, high rate filtration with disinfection and storage tanks.

For the CSO alternatives presented in the Development and Evaluation of Alternatives Report, the lifecycle cost for achieving 85% capture by sewer separation or GI ranges from $6,250,000 to $10,000,000. For tank storage, the most expensive CSO control alternative considered, the range is $47,000,000 to $167,000,000. For filtration with disinfection the cost range from $36,000,000 to $85,000,000. If disinfection alone proves to be a viable option then costs may range from $3,720,000 to $7,270,000. These evaluations of alternatives will serve as a base for the consideration and development of final selected CSO control plan in Fort Lee. We believe the most cost effective solution for meeting the current water quality objectives and complying with the EPA CSO control policy will be GI, sewer separation or treatment and disinfection with compressible media filter (such as a FlexFilter or Fuzzy Filter) and PAA.

Subsequent to the DEAR report the compressible media filter and PAA was dropped as a consideration because:

a. It has only been demonstrated as a CSO control at centralized facilities, such as wastewater treatment plants, with experienced and qualified operators who are available to respond to wet weather events.
b. Fort Lee is not experienced with operating and maintaining treatment systems like a compressible media filter (such as a FlexFilter of Fuzzy Filter) and PAA.
c. Automation would be required for satellite facilities such as flow metering, PAA dose control and backwashing the compressible media filter.
d. A building to house controls, chemical storage and the compressible media filter would be required at satellite facilities.

e. There is insufficient area available for the compressible media filter at Fort Lee's CSO outfalls.
f. By their nature, CSO flows vary widely and there would be a risk of maintaining the required chemical dosage.
g. There is a risk of false activations which could deliver PAA to a system with no background flow.
h. CSO water quality varies throughout a CSO event and it is presumed that the PAA background demand would also vary proportionally. This would overly complicate the PAA delivery system for a satellite system.

Some of these issues can be considered in the engineering, however, satellite systems like what would be needed in Fort Lee would first need to be pilot tested and optimized if testing is successful. This could be a technology that develops in the future, however, given the requirement of compliance with the CSO Permit, it is not considered a viable technology at this time. For this reason, sewer separation has been selected as the preferred CSO control.

6.2.1. Rankings

Candidate CSO control technologies have been discussed in the Fort Lee DEAR and certain technologies were selected as candidate technologies for further consideration. All CSO control technologies under consideration for Fort Lee were evaluated for siting, institutional issues, public acceptance, performance, implementability and cost. An weighting factor was applied to each scoring criteria to weight the scores. During the Evaluation of Alternatives phase the alternatives being considered were ranked based on what was known at the time. Since the DEAR was submitted other issues, such as previously stated for the PAA process, have modified the ranking.

Table 6-136-13: Alternatives Evaluation Matrix presents weighted rankings of the alternatives. The scale of the evaluations is scored from one to five and each was multiplied by the index to get a score value. Higher scores are considered A score of one is unfavorable. A score of five is very favorable. The preferred alternative is one with the higher score. Sewer separation was selected based on this ranking approach. The key to its higher ranking is that it will be limited to approximately 60 acres which is reflected in the cost.

Table 6-13: Alternatives Evaluation Matrix

Alternatives	Siting	Institutional Issues	Public Acceptance			Performance	Implementability				Cost	Overall Score
			Environmental Impacts	Social Benefits	Multiple-use Considerations		Constructability	Reliability	Operability	Adaptability		
Weighting Factor	1	1	0.5	0.5	0.5	2	0.5	1	0.5	0.5	2	
Sewer Separation	5	4	2	1.5	2.5	10	2	5	2.5	2.5	8	45
I/I Reduction	5	4	1.5	1.5	2.5	2	2	4	2.5	2.5	10	37.5
Green Infrastructure	3	5	2	2.5	2	4	1.5	3	1.5	2.5	8	35
Off-line Storage with Storage Tanks	1	1	2	1.5	2.5	10	1.5	5	1	2	8	35.5
Collection System Controls	4	4	1.5	1	1.5	4	2	4	2	2	6	32
Treatment of CSO Discharge	2	2	1	1.5	0.5	4	1	3	1	1.5	8	25.5

6.2.2. Public Input

According to the NJPDES permit, each permittee is required to establish a Supplemental CSO team comprised of members of the public and other stakeholders. The Supplemental CSO Team works with the permittee's consultants and assigned staff to act as a liaison between the general public and the decision makers for the permittee. The Borough also created a local CSO Team to carry out the same functions. The goals of the Supplemental and Local CSO Teams consists of the following elements:

- Meet periodically to assist in the sharing of information and to provide input to the planning process;
- Review the proposed nature and extent of data and information to be collected during LTCP development;
- Provide input for consideration in the evaluation of CSO control alternatives; and
- Provide input for consideration in the selection of those CSO controls that will cost effectively meet the Clean Water Act requirements.

The BCUA CSO Group established a Supplemental CSO Team by posting an invitation on its website providing notification of the project and inviting individual members, or interest groups with the community to join. The website invitation was posted for approximately a one-month period, but there was no public response.

In an effort to obtain regional input the BCUA extended a personal invitation to the Hackensack River Keeper, who accepted. In addition, each member of the BCUA CSO Group was invited to designate two members of their municipality or supplemental team to join the Regional Team. The members identified by Fort Lee are:

1. Jan Goldberg;

2. Bob Applebaum; and
3. Sal Pagano.

The CSO Supplemental Team began meeting in the first quarter of 2017 and have met on a quarterly basis thereafter. Each meeting had a general theme that provided some preliminary education on combined sewer systems or the various tasks that needed to be completed under the permit. The BCUA CSO Group has held quarterly meetings of the Supplemental CSO Team beginning in June 2017 and thereafter on the following dates:

- June 13, 2017 – Project introduction and overview
- September 19, 2017 – Models and project scheduling
- December 12, 2017 – Green infrastructure
- April 10, 2018 – Sensitive areas, typical year analysis, models and Sewer System Characterization Report
- June 12, 2018 – Results of Sewer System Characterization Study and Report
- October 10, 2018 – Development and Evaluation of Alternative Control
- December 4, 2018 – Receiving Water and Gray Infrastructure Modeling
- May 15, 2019 – Review of Controls
- September 10, 2019 - Present and discuss the results of the Development and Evaluation of Alternatives Reports
- October 15, 2019 – Review of DEAR comments with NJDEP
- January 28, 2020 – Present the LTCP option and the initially selected alternative and solicit public comment and input

Detailed information including the sign-in sheets, Power Point presentations made to the group, and meeting minutes are provided in a report to NJDEP entitled Public Participation Program Report for the Borough of Fort Lee. The Group will continue meeting on a quarterly basis until the LTCP is developed.

Mr. Goldberg, Mr. Applebaum, and Mr. Pagano are also on the Local CSO Team. Three local team meetings were held with all members in attendance at each. In addition to the team members, the Mayor, Council members, Borough Engineer and Department of Public Works members also attend some meetings. This Local CSO team held meetings that presented and discussed issues specific to Fort Lee. These meetings were held on:

- June 8, 2017 – Long Term Control Plan
- January 11, 2018 – Modeling Update
- June 4, 2018 – CSO Characterization Report

These meetings presented an overview of the CSO permit Long-Term Control Plan requirements, an update of the Fort Lee landside (collection system) model and reviewed the CSO Characterization Report.

On August 13, 2020 a presentation was given to the officials of Fort Lee at a council work session. The permit requirements were reviewed and the LTCP was presented as a 25 year five phase program at a cost of $18,000,000. Some member of the council discussed funding options including the New Jersey Infrastructure Bank (IBank) for gray infrastructure and Department of Transportation resources for green infrastructure.

6.3. Hackensack DEAR Summary

The City of Hackensack's Permit specifies seven CSO control alternatives to be evaluated by the City. Five of those alternatives were evaluated in the DEAR Report: green infrastructure, increased storage capacity in the collection system, inflow and infiltration reduction(I/I), sewer separation, and treatment of the CSO discharge. The two other alternatives were sewage treatment plant (STP) expansion and/or storage at the plant, and CSO related bypass of the secondary treatment portion of the STP. As discussed in the DEAR Report, the two other alternatives pertain to improvements that may be undertaken by the BCUA at the STP. These two alternatives, if determined to be financially feasible by BCUA, may impact the sizing of the five alternatives evaluated herein. The CSO control alternatives were prescreened to determine if certain CSO control alternatives were economical and feasible for the City to further evaluate. The prescreening process utilized the 2007 LTCP Cost and Performance Analysis Report (2007 Report), prepared by Malcolm Pirnie, Inc. (now Arcadis U.S., Inc.) that was required per the City's previous NJPDES Permit No. NJ0105023. During the DEAR process, City-wide sewer separation, STP expansion, CSO related bypass of secondary treatment at the STP, and maximizing the storage within the City's existing CSS network were prescreened out of further consideration due to external factors, extensive costs, and limited capacity within the existing CSS.

Green infrastructure, satellite storage tanks, a regional storage tank, a tunnel, I/I reduction, and treatment of CSO discharge were further evaluated in the DEAR Report. In the City's evaluation of the CSO control alternatives, the City used a NJDEP approved hydrologic/hydraulic model where applicable. The City utilized the model to simulate existing conditions and proposed conditions of evaluated alternative(s). The City evaluated the practical and technical feasibility of the proposed CSO control alternative(s) and the water quality benefits of constructing and implementing various CSO controls or a combination of such controls. The CSO control alternatives were evaluated for 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 for the 2004 typical year. It should be noted that the prescreened City-wide sewer separation alternative was also considered as a zero-overflow event alternative.

After further evaluation, the most cost effective CSO control alternative to minimize overflows was storage utilizing either satellite tanks or tunnel. Treatment of the CSO discharge was evaluated for disinfection alone and disinfection with pretreatment. If disinfection alone were determined to be an adequate CSO control alternative, it would be a candidate to be selected as a preliminary CSO control alternative for the City. However, because of the uncertainty of future pretreatment requirements, it is not known if this alternative would satisfy the water quality requirements for future permits. The green infrastructure and I/I reduction alternatives are beneficial for the City for a variety of reasons; however, they are not solely adequate to reach the water quality goals. Therefore, a combination of storage tanks or tunnel with green infrastructure and I/I reduction may be the most effective and economical CSO control alternative for the City to incrementally implement in order to reach the required water quality goals. As future conditions change for the City and additional CSO technologies become available or improve, the CSO control alternatives in the DEAR Report may be revisited in order to suit the City's best interests and needs to meet the water quality goals.

After the DEAR submission, as part of the City's evaluation, a more focused stormwater infrastructure project and localized partial sewer separation projects were also considered as part of the City's LTCP to address both flooding and CSO compliance.

6.3.1. Summary of Control Plans

Table 6-146-14: Summary of Alternatives Screening presents a summary of the alternatives that were screened during the DEAR analysis. This table also indicates whether the alternative was further evaluated during the DEAR process. The individual screening process for each alternative is further discussed in the subsequent sections.

Table 6-14: Summary of Alternatives Screening

Alternative Screened		Further Evaluation by City of Hackensack?	Reason
1	Green infrastructure	Yes	High public acceptance; potentially reduces street flooding in localized scenarios; typically, aesthetically appealing; flexible designs; positive results in other cities; lower capital cost for installation compared to other alternatives.
2a	Increased storage capacity - Satellite storage tank(s)	Yes	Effectively limits the quantity and frequency of CSOs; potentially reduces street flooding and water quality issues; cost effective compared to other alternatives.
2b	Increased storage capacity - Storage tunnel	Yes	Effectively limits the quantity and frequency of CSOs; potentially reduces street flooding and water quality issues; minimal disturbance to existing infrastructure or utilities; limited aboveground land required; reasonable cost compared to other alternatives.
2c	Increased storage capacity - Maximize storage in the collection system	No	No additional capacity available in the City's CSS.
3	STP expansion and/or storage at the plant	No	City cannot expand or increase storage at the STP; BCUA is undertaking a study regarding STP expansion; preliminary investigations show that the trunk sewer and STP are near maximum capacity.
4	I/I reduction	Yes	Saves money by extending the life of the City's CSS; reduces the need for expansion, lowers treatment costs for I/I flow that is conveyed to BCUA.
5	Sewer separation (system-wide)	No	Significant capital cost to accomplish City-wide.
6	Treatment of the CSO discharge	Yes	Dependent on extent of pretreatment required; potentially low capital costs for installation compared to other alternatives.
7	CSO related bypass of secondary treatment at STP	No	City cannot determine if bypass of secondary treatment at STP is possible; BCUA is undertaking a study regarding CSO related bypass at secondary treatment; preliminary investigations show that the trunk sewer and STP are near maximum capacity.

6.3.1.1. Regional

The expansion of the regional STP and CSO related bypass at secondary treatment at the STP were two of the control alternatives screened during the DEAR analysis. There were no other regional control plans evaluated during the DEAR analysis.

The BCUA is undertaking a study regarding STP expansion. Preliminary investigations show that the trunk sewer and STP are near maximum capacity. CSOs can potentially be reduced by increasing the treatment capacity of the plant. The plant expansion would allow a larger portion of wet weather flows to be directed to the treatment plant instead of being discharged to receiving waterbodies. Increasing the portion of flows that is directed to the treatment plant cannot entirely achieve CSO abatement controls because the existing trunk sewers cannot convey enough wet weather flows to the BCUA to achieve 85% capture or to minimize the amount of CSOs. However, if it is determined that additional wet weather flow can be conveyed to the BCUA trunk sewer by the City, this may reduce the size of other technologies that are being evaluated by the City. This alternative remained on the alternatives short list to further explore the cost saving impact during the final selection process. Prior to further evaluation, this alternative must be approved by the BCUA. Therefore, this alternative was not further evaluated in the DEAR Report.

The BCUA is undertaking a study regarding CSO-related bypass at secondary treatment. Preliminary investigations show that the BCUA trunk sewer and STP are near maximum capacity. If it is determined that additional wet weather flow can be conveyed to the BCUA trunk sewer by the City, this may reduce the size of other technologies that are being evaluated by the City. This alternative remained on the alternatives short list to explore further the cost saving impact during the final selection process. Prior to further evaluation, this alternative must be approved by the BCUA. Therefore, this alternative was not further evaluated in the DEAR Report.

6.3.1.2. Local

Local control alternatives considered during the screening process of the DEAR analysis consisted of green infrastructure, increased storage capacity, I/I reduction, sewer separation and treatment of the CSO discharge.

- **Green Infrastructure**: A variety of factors were considered to evaluate the implementation of green infrastructure in the City of Hackensack. The selected green infrastructure technology will need to be both visually appealing and effective at retaining at least 1-inch of rainwater from the designated treatment area. The green infrastructure technologies that were initially evaluated were roadside rain gardens/bioswales and permeable pavement. These technologies can be effective for both stormwater quantity control and stormwater quality control.

  Roadside rain gardens/bioswales are being implemented in large scale programs in cities such as New York City and Philadelphia. Given the design flexibility and the positive results in other cities, roadside rain gardens/bioswales were chosen for further evaluation as a green infrastructure technology alternative. Permeable paving is also considered a viable green infrastructure control for the City of Hackensack.

- **Increased Storage Capacity:** The objective of a storage alternative is to reduce overflows by capturing and storing wet weather flows within the system. Once the wet weather event subsides and increased capacity becomes available in the CSS and STP, the captured combined sewage will be conveyed to the STP. A storage facility is sized to handle a certain quantity of flow necessary to achieve water quality goals. If a storm exceeds the design capacity of the storage system, the first flush, or the most hazardous combined sewage, will be captured and the remaining portion, which would be primarily stormwater, will overflow to the receiving waterbody. Storage technologies typically have high construction and operations and maintenance (O&M)

costs compared to other CSO control technologies, but they are a very reliable means of achieving CSO control goals. Storage tanks, deep tunnels, and increased in-line storage, which are various types of storage technologies, were evaluated for the City.

- Satellite storage tanks are large storage facilities installed in proximity of existing outfalls to store wet weather flows until capacity becomes available in the BCUA trunk sewer and at the STP. The storage tanks typically are covered, underground structures that include odor control facilities. A dewatering pump system at each tank conveys the combined sewage through a force main back to the existing BCUA trunk sewer after each wet weather event. To prevent flooding of upstream systems, the storage tanks are equipped with an overflow to discharge combined sewage to the receiving water body if the captured volume of combined sewage exceeds the available storage in the tanks.

  The use of storage tanks, sized to allow a targeted number of overflows per year, can effectively limit the quantity and frequency of CSOs. This technology can be implemented incrementally, one tank at a time, with prioritization for construction of a storage tank in an area with more significant water quality concerns or flooding issues. Drawbacks of this technology include the relatively large land area requirements, high construction and O&M costs, and potential odor issues.

  The April 2007 Cost and Performance Analysis Report (2007 Report) that was prepared for the City by Malcolm Pirnie, Inc. (now Arcadis U.S., Inc.) evaluated two storage tank scenarios. The first involved two storage tanks: one upstream of the Anderson Street outfall and one upstream of the Court Street outfall. The second involved one regional storage tank for the City's CSS located near the Court Street outfall, which would require diversion of the flow from the Anderson Street subdrainage area to the regional storage tank. The regional storage tank alternative would eliminate the need for the Anderson Street outfall and utilize the Court Street outfall as the City's only outfall. Note that the regional storage tank alternative presented in this Alternatives Report would store combined sewage only from the two subdrainage areas of the City's CSS; the regional storage tank alternative presented does not refer to a regional tank for the hydraulically connected communities of the BCUA, Ridgefield Park, and Fort Lee.

- A tunnel was evaluated as a storage alternative in the City. Tunnels are advantageous because they do not take up valuable aboveground area in the City, where City-owned land is not always accessible. The tunnel would be bored about 100 feet below ground so it would not disturb any existing infrastructure or utilities. The tunnel would be connected to the Anderson Street and Court Street outfalls by drop-down shafts. Tunnels usually have a high overall cost, but their cost per million gallons of storage is reasonable compared to other storage technologies. It was determined that a tunnel alternative was worth further evaluation due to the relatively low cost per unit storage and minimal conflicts with existing infrastructure.

- In-line storage takes advantage of storage within the existing CSS collection system. The City's CSS occasionally surcharges during certain wet weather events. The City has flood-prone areas due to the limited existing capacity of the existing CSS collection system. The City's PCSWMM model supports that the CSS collection sewers surcharge during wet weather events. The flood sensitive areas are shown in Figure 3-1B of the City's Characterization Report. If the City adjusted its regulators to take advantage of additional CSS in-line storage, street flooding would increase during wet weather events.

Therefore, due to the City's limited CSS collection system capacity and the existence of flood-prone areas, this alternative was not further considered.

- **I/I Reduction:** Excessive I/I can consume the hydraulic capacity of a collection system and increase overall O&M costs. Inflow comes from sources such as roof drains, manhole covers, cross connections from storm sewers, catch basins, and surface runoff, which enter the CSS by design. Within a CSS, surface drainage is the primary source of inflow. Infiltration refers to groundwater that seeps into the CSS through leaking pipe joints, cracked pipes, manholes, and other similar sources. The flow from infiltration tends to be constant, but at a lower volume than that of inflow.

  Identifying I/I sources is labor intensive and requires specialized equipment. Significant I/I reductions can be difficult and expensive to achieve. I/I reduction for combined sewers provides limited gains since water tends to find another way into the system. However, the benefit of an I/I control program is that it can save money by extending the life of the system, reducing the need for expansion, and lowering pumping and treatment costs.

  As mentioned in the City's approved Characterization Report, a condition assessment was performed in 2015. The condition assessment included observations of potential I/I issues. This information allowed for a more detailed I/I analysis as part of this alternatives screening.

- **Sewer Separation**: Sewer separation refers to conversion of the CSS into separate stormwater and sanitary systems. This can involve construction of a new stormwater conveyance system and utilization of the existing CSS for sanitary only, or vice versa. Sewer separation can eliminate or significantly reduce the occurrence of combined sewage back-ups into streets or basements. In a complete sewer separation scenario, sanitary flows would be conveyed to the treatment plant during both wet weather and dry weather, and stormwater flows during wet weather would discharge directly to receiving waterbodies. Complete sewer separation meets water quality goals by significantly reducing the quantities of fecal coliform and other bacteria that enter receiving waters; complete sewer separation is considered the only technology that can achieve zero combined sewer overflows with certainty. However, complete sewer separation is costly and disruptive to the public, especially in highly dense urban areas. It is estimated that City-wide sewer separation could cost upwards of $555 million. Other CSO control technologies are more cost effective for the City; therefore, the alternative of complete sewer separation was not further evaluated for the City. However, well defined stormwater infrastructure projects and localized partial sewer separation projects to reduce problematic flooding issues were considered as part of the City's LTCP.

- **Treatment of CSO Discharge**: It was determined that both a disinfection alternative and a disinfection with pretreatment alternative would be evaluated. Disinfection typically is performed on a total suspended solids (TSS) reduced stream following screening and pretreatment. The effectiveness of the disinfection alternative relies on the TSS concentration of the sewage.

  The disinfection chemicals considered were sodium hypochlorite and peracetic acid (PAA). Chlorine dioxide was excluded from further evaluation as it has many drawbacks, including safety issues during transport and storage, stability, and production of toxic byproducts. Sodium hypochlorite is more widely used in practice than PAA, but the use of sodium hypochlorite typically requires the addition of sodium bisulfite for dechlorination, which raises O&M costs. PAA will be evaluated because it has a stronger oxidation potential than chlorine dioxide. PAA is non-toxic and does not produce disinfection byproducts during disinfection. Through pilot studies, it has been determined that the effectiveness of PAA disinfection is not inhibited by TSS, NH_3, chemical oxygen demand (COD), dissolved oxygen (DO), or pH. Due to the effectiveness of PAA disinfection in a variety of conditions, it was selected as the primary disinfectant in the disinfection only alternative.

The second treatment alternative evaluated was a combination of PAA disinfection with upstream pretreatment. There are multiple pretreatment technologies available today. For purposes of this evaluation, the SanSep treatment unit was chosen. SanSep has a simple design with no moving parts. The technology is effective at removing TSS at a variety of loading rates. The pretreatment alternative being evaluated in Hackensack would include two groups of SanSep units, one at each outfall, upstream of PAA disinfection.

Disinfection alone and pretreatment in combination with disinfection would treat the CSO discharge. The extent of pretreatment that may be required to meet future water quality standards is unknown. Despite the uncertainty associated with the level of pretreatment required, the treatment alternative was further evaluated in the DEAR Report because it is cost competitive with other alternatives.

Green infrastructure, satellite storage tanks, a regional storage tank, a tunnel, I/I reduction, and treatment of CSO discharge were further evaluated during the DEAR analysis. If modeling was applicable for the evaluation of an alternative, the City's calibrated PCSWMM model was utilized to further evaluate the performance of each alternative. These evaluations included scenarios consisting 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 for the 2004 typical year.

The performance results from the evaluation are summarized in the following Table 6-156-15: Performance Results Summary:

Table 6-15: Performance Results Summary

	Sub Drainage Area (SDA), Outfall Name	Anderson Street	Court Street	Total Wet Weather Overflow Volume	Percent of Capture	No. Of Overflows	Reduction of Overflow Volume from Baseline (%)
	Outfall Number	001A	002A				
	Name of Alternative	Overflow Volume (MG)					
1	Baseline Conditions for 2004	105.3	151.3	256.6	68%	56	N/A
2	Disinfection	105.3	151.3	256.6	68%	56	N/A
3	Pretreatment & Disinfection*	105.3	151.3	256.6	N/A	0	N/A
4	GI - 5% Impervious Area Conversion	91.8	131.6	223.4	70%	51	13.0%
5	GI - 10% Impervious Area Conversion	91.6	127.0	218.6	70%	51	14.8%
6	Removal of Inflow and Infiltration (I&I)	105.2	151.2	256.4	68%	56	0.1%
7	Tunnel Storage - 30 ft Diameter by 5,530 ft Long Tunnel (0 Overflows)	0.0	0.0	0.0	100%	0	100.0%
8	Tunnel Storage - 17.8 ft Diameter by 5,530 ft Long Tunnel (4 Overflows)	22.9	3.7	26.6	96%	4	89.6%
9	Tunnel Storage - 17 ft Diameter by 5,530 ft Long Tunnel (8 Overflows)	26.5	6.3	32.8	95%	8	87.2%
10	Tunnel Storage - 14 ft Diameter by 5,530 ft Long Tunnel (12 Overflows)	37.4	14.8	52.2	93%	12	79.7%
11	Tunnel Storage - 10.5 ft Diameter by 5,530 ft Long Tunnel (20 Overflows)	68.3	32.2	100.4	86%	20	60.9%
12	Tunnel Storage - 10.5 ft Diameter by 5,530 ft Long Tunnel (85% Capture)	68.3	32.2	100.4	86%	20	60.9%
13	Satellite Tanks - Two tanks, 150 ft & 190 ft dia., 100 ft deep (0 Overflows)	0.0	0.0	0.0	100%	0	100.0%
14	Satellite Tanks - Two tanks, 115 ft dia., 100 ft deep (4 Overflows)	4.9	13.0	17.9	98%	4	93.0%
15	Satellite Tanks - Two tanks, 105 ft dia., 100 ft deep (8 Overflows)	6.5	19.8	26.4	96%	8	89.7%
16	Satellite Tanks - Two tanks, 87 ft dia., 100 ft deep (12 Overflows)	9.8	37.3	47.1	94%	12	81.6%
17	Satellite Tanks - Two tanks, 73 ft dia., 100 ft deep (20 Overflows)	28.3	56.7	85.0	89%	20	66.9%
18	Satellite Tanks - Two tanks, 60 ft dia., 100 ft deep (85% Capture)	43.6	77.7	121.3	85%	25	52.7%
19	Regional Tank - One tank, 200 ft dia., 130 ft deep (0 Overflows)	0.0	0.0	0.0	100%	0	100.0%
20	Regional Tank - One tank, 120 ft dia., 130 ft deep (4 Overflows)	N/A	21.1	21.1	97%	4	91.8%
21	Regional Tank - One tank, 120 ft dia., 110 ft deep (8 Overflows)	N/A	31.0	31.0	96%	8	87.9%
22	Regional Tank - One tank, 100 ft dia., 105 ft deep (12 Overflows)	N/A	58.2	58.2	92%	12	77.3%
23	Regional Tank - One tank, 80 ft dia., 100 ft deep (20 Overflows)	N/A	93.6	93.6	88%	20	63.5%
24	Regional Tank - One tank, 65 ft dia., 100 ft deep (85% Capture)	N/A	118.7	118.7	85%	21	53.8%
25	Control Program Alternative - I&I Removal and GI 5% Impervious Area Conversion	91.6	131.5	223.1	70%	50	13.0%
26	Control Program Alternative - I&I Removal and GI 10% Impervious Area Conversion	91.7	127.0	218.7	70%	51	14.8%

*Any discharges that are part of a NJDEP-approved pretreatment and disinfection process are no longer considered combined sewer overflows or events.

6.3.2. Rankings

In addition to the performance of each alternative, all CSO control technologies under consideration for the City's CSS were also evaluated for factors including siting, institutional issues, public acceptance, implementability and cost.

Table 6-166-16: Alternatives Evaluation Matrix presents rankings of the evaluated alternatives during the DEAR analysis. The scale of the evaluations is scored from one to five. A score of one is unfavorable. A score of five is very favorable. Total present worth (TPW) cost estimates, including capital and O&M costs, were performed for the evaluated alternatives. For detailed explanations of all evaluated factors please refer to the City's DEAR Report.

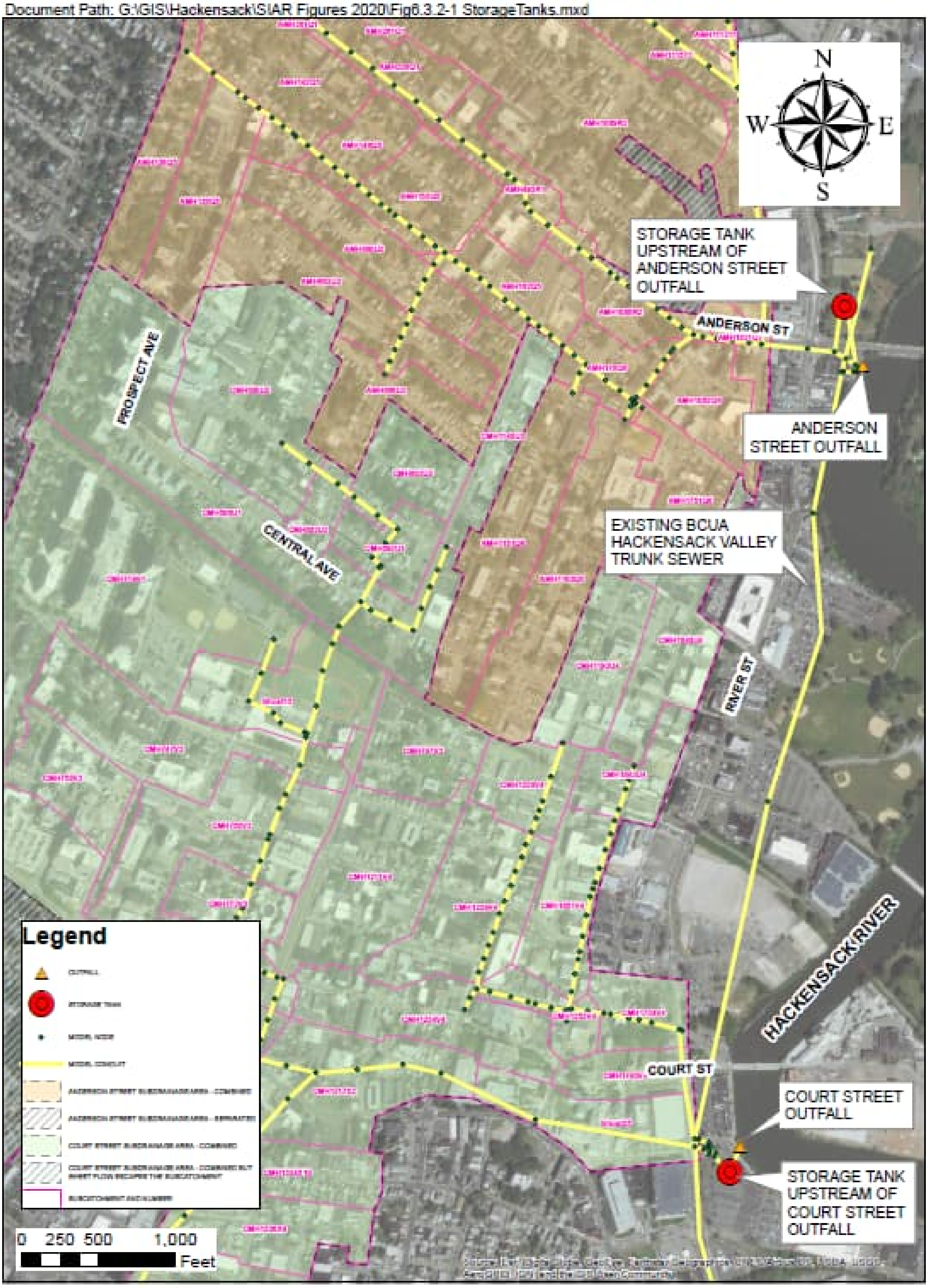
Table 6-16: Alternatives Evaluation Matrix

Alternatives	Siting	Institutional Issues	Public Acceptance			Performance	Implementability				Cost	Overall Score
			Environmental Impacts	Social Benefits	Multiple-use Considerations		Constructability	Reliability	Operability	Adaptability		
Green Infrastructure	3	5	4	5	4	2	5	3	3	5	4	43
I/I Reduction (replacement and rehabilitation)	5	4	3	1	1	1	4	4	5	5	5	38
Collection System and Source Controls	4	4	3	2	3	2	4	4	4	4	3	37
Off-line Storage with Storage Tanks	1	1	4	3	5	5	3	5	2	4	2	35
Off-line Storage with Tunnels	3	1	4	3	3	5	2	5	2	2	3	33
Off-line Storage with Regional Storage Tank	2	1	4	3	5	5	1	5	2	2	2	32
Treatment of CSO Discharge	3	2	2	1	1	3	4	4	2	3	4	29

If all criteria are weighted equally, preliminary analysis indicates that a combination of storage tanks or tunnel with green infrastructure and I/I reduction is the most socially acceptable, effective, and economical CSO control alternative for the City to incrementally implement in order to reach the required water quality goals at the time of the DEAR Report. However, as stated in Section 2.2.2 in the City's DEAR Report, the City was undergoing a stormwater study, as well as localized partial sewer separation projects. These alternatives have since been further evaluated and added as potential projects for the City's LTCP. Section 7.3.6 further discusses the additional alternatives in detail.

Figure 6-106-106-10: Storage Tanks Alternative and Figure 6-116-116-11: Green Infrastructure Locations present potential layouts of the storage tanks and potential locations for green infrastructure within the City, respectively. However, it should be noted that no conclusions were made for the City's recommended plan during the DEAR analysis

Document Path: G:\GIS\Hackensack\SIAR Figures 2020\Fig6.3.2-1 StorageTanks.mxd



CITY OF HACKENSACK
DEVELOPMENT OF ALTERNATIVES
STORAGE TANK ALTERNATIVE

ARCADIS Design & Consultancy for natural and built assets

Figure 6-10: Storage Tanks Alternative

.

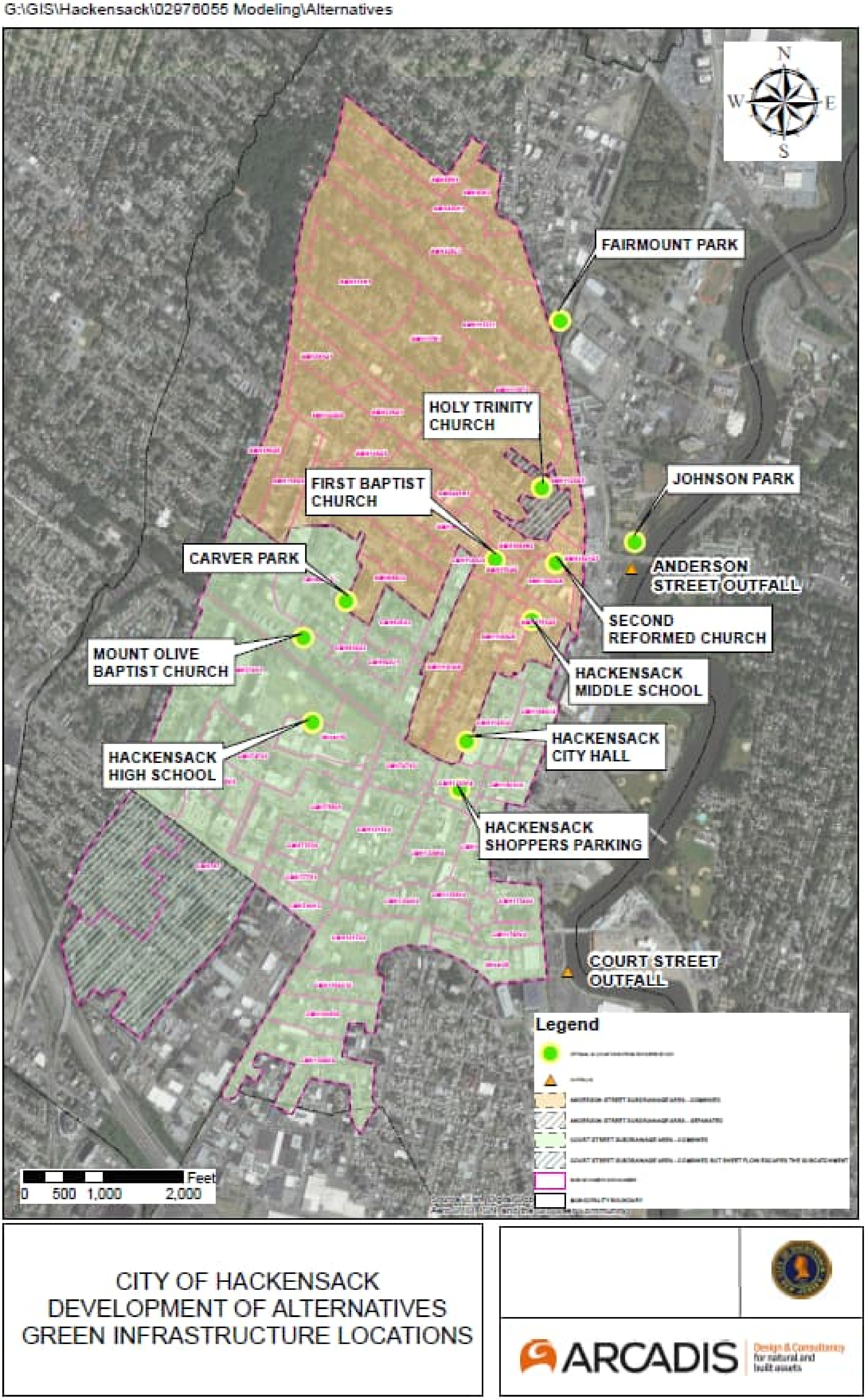


Figure 6-11: Green Infrastructure Locations

Table 6-176-17: Evaluated Alternatives Summary Matrix presents the performance, costs and key constraints of each alternative considered during the DEAR analysis.

Table 6-17: Evaluated Alternatives Summary Matrix

Name of Alternative		Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	Total Estimated Cost	Cost per Gallon of CSO Removed	Key Constraints
1	Baseline Conditions for 2004	68%	56	N/A	-	-	-
2	Disinfection	68%	56	N/A	$ 16,000,000	N/A	Uncertain if this alternative satisfies water quality goals, no pretreatment.
3	Pretreatment & Disinfection	N/A	0	N/A	$ 50,000,000	N/A	Uncertain if pretreatment will satisfy and future water quality standards.
4	GI - 5% Impervious Area Conversion	70%	51	13.0%	$ 32,000,000	$0.96	Does not reach performance & water quality goals, number of overflows not reduced.
5	GI - 10% Impervious Area Conversion	70%	51	14.8%	$ 43,000,000	$1.13	Does not reach performance & water quality goals, number of overflows not reduced.
6	Removal of Inflow and Infiltration (I&I)	68%	56	0.1%	$ 11,000,000	$58.20	Does not reach performance & water quality goals, number of overflows not reduced.
7	Tunnel Storage - 30 ft Diameter by 5,530 ft Long Tunnel (0 Overflows)	100%	0	100.0%	$ 135,000,000	$0.53	Constructability of a deep tunnel has risks, high cost.
8	Tunnel Storage - 17.8 ft Diameter by 5,530 ft Long Tunnel (4 Overflows)	96%	4	89.6%	$ 97,000,000	$0.42	Constructability of a deep tunnel has risks, high cost.
9	Tunnel Storage - 17 ft Diameter by 5,530 ft Long Tunnel (8 Overflows)	95%	8	87.2%	$ 94,000,000	$0.42	Constructability of a deep tunnel has risks, high cost.
10	Tunnel Storage - 14 ft Diameter by 5,530 ft Long Tunnel (12 Overflows)	93%	12	79.7%	$ 85,000,000	$0.42	Constructability of a deep tunnel has risks, high cost.
11	Tunnel Storage - 10.5 ft Diameter by 5,530 ft Long Tunnel (20 Overflows)	86%	20	60.9%	$ 74,000,000	$0.47	Constructability of a deep tunnel has risks, high cost.
12	Tunnel Storage - 10.5 ft Diameter by 5,530 ft Long Tunnel (85% Capture)	86%	20	60.9%	$ 74,000,000	$0.47	Constructability of a deep tunnel has risks, high cost.
13	Satellite Tanks - Two tanks, 150ft & 190ft dia., 100 ft deep (0 Overflows)	100%	0	100.0%	$ 264,000,000	$1.03	Siting issues for tank locations, high cost.
14	Satellite Tanks - Two tanks, 115ft dia., 100ft deep (4 Overflows)	98%	4	93.0%	$ 140,000,000	$0.59	Siting issues for tank locations, high cost.
15	Satellite Tanks - Two tanks, 105ft dia., 100ft deep (8 Overflows)	96%	8	89.7%	$ 123,000,000	$0.53	Siting issues for tank locations, high cost.
16	Satellite Tanks - Two tanks, 87ft dia., 100ft deep (12 Overflows)	94%	12	81.6%	$ 96,000,000	$0.46	Siting issues for tank locations, high cost.
17	Satellite Tanks - Two tanks, 73ft dia., 100ft deep (20 Overflows)	89%	20	66.9%	$ 79,000,000	$0.46	Siting issues for tank locations, high cost.
18	Satellite Tanks - Two tanks, 60ft dia., 100 ft deep (85% Capture)	85%	25	52.7%	$ 66,000,000	$0.49	Siting issues for tank locations, high cost.
19	Regional Tank - One tank, 200ft dia., 130ft deep (0 Overflows)	100%	0	100.0%	$ 246,000,000	$0.96	Siting issues for tank location, large diameter sewer construction, high cost.
20	Regional Tank - One tank, 120ft dia., 130ft deep (4 Overflows)	97%	4	91.8%	$ 119,000,000	$0.51	Siting issues for tank location, large diameter sewer construction, high cost.
21	Regional Tank - One tank, 120ft dia., 110ft deep (8 Overflows)	96%	8	87.9%	$ 108,000,000	$0.48	Siting issues for tank location, large diameter sewer construction, high cost.
22	Regional Tank - One tank, 100ft dia., 105ft deep (12 Overflows)	92%	12	77.3%	$ 87,000,000	$0.44	Siting issues for tank location, large diameter sewer construction, high cost.
23	Regional Tank - One tank, 80ft dia., 100ft deep (20 Overflows)	88%	20	63.5%	$ 71,000,000	$0.44	Siting issues for tank location, large diameter sewer construction, high cost.
24	Regional Tank - One tank, 65ft dia., 100ft deep (85% Capture)	85%	21	53.8%	$ 63,000,000	$0.46	Siting issues for tank location, large diameter sewer construction, high cost.
25	Control Program Alternative - I&I Removal and GI 5% Impervious Area Conversion	70%	50	13.0%	$ 43,000,000	$1.29	Does not reach performance & water quality goals, number of overflows not reduced.
26	Control Program Alternative - I&I Removal and GI 10% Impervious Area Conversion	70%	51	14.8%	$ 54,000,000	$1.43	Does not reach performance & water quality goals, number of overflows not reduced.

After the submission of the DEAR report, the City revisited the possible alternatives.

6.3.3. Public Input

This section herein describes the City's public participation process and public input received through the DEAR analysis.

In accordance with the requirements of Part IV.G.2 of the Permit, the City has undertaken a public participation process to inform the affected public about CSOs and the LTCP process and to solicit feedback throughout the process. Details of the public participation process are provided in the City of Hackensack Public Participation Process Report (PPP Report), prepared by Arcadis and revised January 2019, and in the Supplemental Letter Response – Review of Public Participation Process Report Required by Part IV.D.3.b.iii – City of Hackensack, NJPDES Permit No. NJ0108766 (Supplemental Letter), prepared by Arcadis and dated May 21, 2019.

As detailed in the PPP Report and Supplemental Letter, the City established the Hackensack Public Participation Group, an internal team dedicated to planning public outreach efforts related to the LTCP. Outreach efforts conducted included:

- Creating a page on the City's website dedicated to information about CSOs and the LTCP: hackensack.org/CSO. The webpage includes links to various sites containing information about CSOs, a map of the City's CSS, and the City's CSO handout. The City's approved reports related to the LTCP are publicly available on the NJDEP website. The City's webpage will continue to be updated throughout the remaining phases of the LTCP.
- Disseminating information about the City's CSS in the City's seasonal newsletter and by distributing paper handouts at the City's 4th of July Event and public spaces such as the Department of Public Works, City Hall, the public library, and the Health Department.
- Developing a CSO survey to solicit feedback from the public. The CSO survey was posted on the City's CSO webpage and distributed via mass email to residents of the City.
- Including a presentation about the LTCP in the City Council meeting on June 11, 2019.

The City participates in the Supplemental CSO Group established by the BCUA, along with the hydraulically connected systems of the Village of Ridgefield Park and the Borough of Fort Lee. The City and its representatives attend the recurring Supplemental CSO Group meetings, and the City shares updates about its LTCP progress. Additionally, in accordance with Part IV.G.2.c, the City has invited several residents of the City to participate in the Supplemental CSO Group activities.

Public feedback was received during the presentation at a City Council Committee of the Whole (CoW) meeting on June 11, 2019. There was no specific public feedback at the meeting that indicated which alternative may be most publicly accepted for the City. However, a general overview of the public feedback provided involved concerns of flooding issues within the City. The feedback received was to ensure flooding was considered during the evaluation of different alternatives for the LTCP. The feedback received at the CoW meeting was consistent with the feedback received from the 32 survey responses from the survey that was posted on the City's website. Out of the 32 survey responses, the feedback that was most important to the public was for the City to reduce the amount of street flooding.

Additionally, the City posts video of the public meetings and transcribed meeting minutes that encompass public comments. The transcribed meeting minutes and video can be found at the links below:

- June 11, 2019 - Public Meeting Minutes:
    - https://www.ecode360.com/documents/HA0454/public/500050103.pdf
- June 11, 2019 - Public Meeting Video of Presentation:
    - http://www.hackensack.org/video
    - https://youtube.com/watch?v=55OSRIltbwo

6.4. Ridgefield Park DEAR Summary

6.4.1. Screening of CSO Technologies

A two-tiered approach was applied to the development of alternatives, starting with a screening analysis followed by an evaluation of the remaining CSO control alternatives. The intent was to give adequate attention to the breadth of alternatives available, while limiting the list of alternatives evaluated to a reasonable amount. This is consistent with Chapter 3 of EPA's Guidance for Long Term Control Plans.

The first step of the screening process was to identify the breadth of alternatives which was then narrowed down to alternatives appropriate for the evaluation process. If necessary, a representative technology to apply to the evaluation was identified. A comprehensive list of CSO control alternatives prepared by the NJCSO Group was used as a starting point.

The screening took place on several levels. In some cases, a general category was screened in or out based on its applicability to the Village. If the general category of technologies was applicable as were many sub-categories, the screening reduced the sub-categories to a reasonable number of representative sub-categories.

The screening was based on the requirement to "evaluate the practical and technical feasibility of the proposed CSO control alternative(s)" (Part IV.G.4.e) to determine if the alternative proceeded to a more detailed evaluation in Section D of the DEAR. The above requirement introduced three concepts that were addressed for each technology:

- Evaluate – can the alternative provide a measurable impact on water quality in terms of reduction in CSO volume or load.
- Practical – Can the alternative actually be executed by the Village.
- Technical Feasibility – Is the alternative a technology that is currently available and implementable on a scale suitable for a LTCP.

Details on each CSO control technology are presented below and the above criteria was subsequently applied in the screening process to determine the suitability of the control to the subject combined sewer system. The following matrixes in 1, Table 6-196-19, and Table 6-206-20 summarize the results of the previously conducted alternatives screening process. Simply because an alternative was not selected for additional investigation under the DEAR does not exclude it from inclusion in the LTCP.

Table 6-18: Screening summary - Source Control Technologies

Source Control Technologies							
Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Stormwater Management	Street/Parking Lot Storage (Catch Basin Control)	Low	Low	Flow restrictions to the CSS can cause flooding in lots, yards and buildings; potential for freezing in lots; low operational cost. Effective at reducing peak flows during wet weather events but can cause dangerous conditions for the public if pedestrian areas freeze during flooding.	No	No	No
	Catch Basin Modification (for Floatables Control)	Low	None	Requires periodic catch basin cleaning; requires suitable catch basin configuration; potential for street flooding and increased maintenance efforts. Reduces debris and floatables that can cause operational problems with the mechanical regulators.	No	Yes	No
	Catch Basin Modification (Leaching)	Low	Low	Can be installed in new developments or used as replacements for existing catch basins. Require similar maintenance as traditional catch basins. Leaching catch basins have minor effects on the primary CSO control goals.	No	No	No
Public Education and Outreach	Water Conservation	None	Low	Water purveyor is responsible for the water system and all related programs in the respective City. However, water conservation is a common topic for public education programs. Water conservation can reduce CSO discharge volume, but would have little impact on peak flows.	Yes	Yes	No
	Catch Basin Stenciling	None	None	Inexpensive; easy to implement; public education. Is only as effective as the public's acceptance and understanding of the message. Public outreach programs would have a more effective result.	Yes	Yes	No
	Community Cleanup Programs	None	None	Inexpensive; sense of community ownership; educational BMP; aesthetic enhancement. Community cleanups are inexpensive and build ownership in the city.	Yes	Yes	No
	Public Outreach Programs	Low	None	Public education program is ongoing. Permittee should continue its public education program as control measures demonstrate implementation of the NMC.	Yes	Yes	No
	FOG Program	Low	None	Requires communication with business owners; Permitee may not have enforcement authority. Reduces buildup and maintains flow capacity. Only as effective as business owner cooperation.	Yes	Yes	No
	Garbage Disposal Restriction	Low	None	Permitee may not be responsible for Garbage Disposal. This requires an increased allocation of resources for enforcement while providing very little reduction to wet weather CSO events.	No	No	No
	Pet Waste Management	Medium	None	Low cost of implementation and little to no maintenance. This is a low cost technology that can significantly reduce bacteria loading in wet weather CSO's.	Yes	Yes	No
	Lawn and Garden Maintenance	Low	Low	Requires communication with business and homeowners. Guidelines are already established per USEPA. Educating the public on proper lawn and garden treatment protocols developed by USEPA will reduce waterway contamination. Since this information is already available to the public it is unlikely to have a significant effect on improving water quality.	Yes	No	No
	Hazardous Waste Collection	Low	None	The N.J.A.C prohibits the discharge of hazardous waste to the collection system.	Yes	Yes	No

Source Control Technologies								
Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Ordinance Enforcement	Construction Site Erosion & Sediment Control	None	None	In building code; reduces sediment and silt loads to waterways; reduces clogging of catch basins; little O&M required; contractor or owner pays for erosion control. A Soil Erosion & Sediment Control Plan Application or 14-day notification (if Permitee covered under permit-by-rule) will be required by NJDEP per the N.J.A.C.	Yes	Yes	No
	Illegal Dumping Control	Low	None	Enforcement of current law requires large number of code enforcement personnel; recycling sites maintained. Local ordinances already in place can be used as needed to address illegal dumping complaints.	Yes	Yes	No
	Pet Waste Control	Medium	None	Requires resources to enforce pet waste ordinances. Public education and outreach is a more efficient use of resources, but this may also provide an alternative to reducing bacterial loads.	Yes	Yes	No
	Litter Control	None	None	Aesthetic enhancement; labor intensive; City function. Litter control provides an aesthetic and water quality enhancement. It will require city resources to enforce. Public education and outreach is a more efficient use of resources.	Yes	Yes	No
	Illicit Connection Control	Low	Low	Site specific; more applicable to separate sanitary system; new storm sewers may be required; interaction with homeowners required. The primary goal of the LTCP is to meet the NJPDES Permit requirements relative to POCs. Illicit connection control is not particularly effective at any of these goals and is not recommended for further evaluation unless separate sewers are in place.	Yes	Yes	No
Good Housekeeping	Street Sweeping/Flushing	Low	None	Labor intensive; specialized equipment; doesn't address flow or bacteria; City function. Street sweeping and flushing primarily addresses floatables entering the CSS while offering an aesthetic improvement.	Yes	Yes	No
	Leaf Collection	Low	None	Requires additional seasonal labor. Leaf collection maximizes flow capacity and removes nutrients from the collection system.	Yes	Yes	No
	Recycling Programs	None	None	Most Cities have an ongoing recycling program.	Yes	Yes	No
	Storage/Loading/Unloading Areas	None	None	Requires industrial & commercial facilities designate and use specific areas for loading/unloading operations. There may be few major commercial or industrial users upstream of CSO regulators.	Yes	No	No
	Industrial Spill Control	Low	None	PVSC has established a pretreatment program for industrial users subject to the Federal Categorical Pretreatment Standards 40 CFR 403.1.	Yes	Yes	No

Source Control Technologies							
Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Green Infrastructure Buildings	Green Roofs	None	Medium	Adds modest cost to new construction; not applicable to all retrofits; low operational resource demand; will require the Permitee or private owners to implement; requires regular cleaning of gutters & pipes; upkeep of roof vegetation. Portions of Cities have densely populated areas, but this technology is limited to rooftops. Can be difficult to require on private properties.	Yes	No	No
	Blue Roofs	None	Medium	Adds modest cost to new construction; not applicable to all retrofits; low operational resource demand; will require the Permitees or private owners to implement; requires regular cleaning of gutters & pipes; upkeep of roof debris. Portions of the Cities have densely populated areas, but this technology is limited to rooftops. Can be difficult to require on private properties.	Yes	No	No
	Rainwater Harvesting	None	Medium	Simple to install and operate; low operational resource demand; will require the Permitees or private owners to implement; requires regular cleaning of gutters & pipes. Portions of the Cities have densely populated areas, but this technology is limited to capturing rooftop drainage. Capture is limited to available storage, which can vary on rainwater use. Can be difficult to require on private properties.	Yes	No	No
Green Infrastructure Impervious Areas	Permeable Pavements	Low	Medium	Not durable and clogs in winter; oil and grease will clog; significant O&M requirements with vacuuming and replacing deteriorated surfaces; can be very effective in parking lots, lanes and sidewalks. Maintenance requirements could be reduced if located in low-traffic areas, and can utilize underground infiltration beds or detention tanks to increase storage.	Yes	No	Yes
	Planter Boxes	Low	Medium	Site specific; good BMP; minimal vegetation & mulch O&M requirements with regular overflow and underdrain cleaning; effective at containing, infiltrating and evapotranspirating runoff in developed areas. Flexible and can be implemented even on a small-scale to any high-priority drainage areas. Underground infiltration beds or detention tanks can be utilized to increase storage.	Yes	No	No
Green Infrastructure Pervious Areas	Bioswales	Low	Low	Site specific; good BMP; minimal vegetation & mulch O&M requirements; not as flexible or infiltrate as much stormwater as planter boxes. Technology requires open space and is primarily a surface conveyance technology with additional storage & infiltration benefits. Can be modified with check dams to slow water flow. Limited open space in most Cities means land can be utilized in more effective ways with the existing infrastructure.	Yes	No	Yes
	Free-Form Rain Gardens	Low	Medium	Site specific; good BMP; minimal vegetation & mulch O&M requirements with regular overflow and underdrain cleaning; effective at containing, infiltrating and evapotranspirating diverted runoff. Rain Gardens are flexible and can be modified to fit into the previous areas. Underground infiltration beds or detention tanks can be utilized to increase storage.	Yes	No	No

Table 6-19: Screening summary - Collection System Technologies

Collection System Technologies							
Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Operation and Maintenance	I/I Reduction	Low	Medium	Requires labor intensive work; changes to the conveyance system require temporary pumping measures; repairs on private property required by homeowners. Reduces the volume of flow and frequency; Provides additional capacity for future growth; House laterals account for 1/2 the sewer system length and significant sources of I/I in the sanitary sewer.	Yes	No	No
	Advanced System Inspection & Maintenance	Low	Low	Requires additional resources towards regular inspection and maintenance work. Inspection and maintenance programs can provide detailed information about the condition and future performance of infrastructure. Offers relatively small advances towards goals of the LTCP.	Yes	No	No
	Combined Sewer Flushing	Low	Low	Requires inspection after every flush; no changes to the existing conveyance system needed; requires flushing water source. Ongoing: CSO Operational Plan; maximizes existing collection system; reduces first flush effect.	Yes	No	No
	Catch Basin Cleaning	Low	None	Labor intensive; requires specialized equipment. Catch Basin Cleaning reduces litter and floatables but will have no effect on flow and little effect on bacteria and BOD levels.	Yes	Yes	No
Combined Sewer Separation	Roof Leader Disconnection	Low	Low	Site specific; Includes area drains and roof leaders; new storm sewers may be required; requires home and business owner participation. The Cities are densely populated and disconnected roof leaders have limited options for discharge to pervious space. Disconnection may be coupled with other GI technologies but is not considered an effective standalone option.	Yes	No	No
	Sump Pump Disconnection	Low	Low	Site specific; more applicable to separate sanitary system; new storm sewers may be required; interaction with homeowners required. The Cities are densely populated and disconnected sump pumps have limited options for discharge to pervious space. Disconnection may be coupled with other GI technologies but is not considered an effective standalone option.	Yes	Yes	No
	Combined Sewer Separation	High	High	Very disruptive to affected areas; requires homeowner participation; sewer asset renewal achieved at the same time; labor intensive.	No	Yes	Yes
Combined Sewer Optimization	Additional Conveyance	High	High	Additional conveyance can be costly and would require additional maintenance to keep new structures and pipelines operating.	No	No	No
	Regulator Modifications	Medium	Medium	Relatively easy to implement with existing regulators; mechanical controls requires O&M. May increase risk of upstream flooding. Permitees have an ongoing O&M program and system wide replacement program for CSO regulators and tide gates.	Yes	No	No
	Outfall Consolidation/Relocation	High	High	Lower operational requirements; may reduce permitting/monitoring; can be used in conjunction with storage & treatment technologies. Combining and relocating outfalls may lower operating costs and CSO flows. It can also direct flow away from specific areas.	Yes	No	Yes
	Real Time Control	High	High	Requires periodic inspection of flow elements; highly automated system; increased potential for sewer backups. RTC is only effective if additional storage capacity is present in the system.	Yes	No	No

Table 6-20: Screening summary - Storage and Treatment Technologies

Storage and Treatment Technologies								
Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Linear Storage	Pipeline	High	High	Can only be implemented if in-line storage potential exists in the system; increased potential for basement flooding if not properly designed; maximizes use of existing facilities. Pipe storage for a CSS typically requires large diameter pipes to have a significant effect on reducing CSOs. This typically requires large open trenches and temporary closure of streets to install.	No	Yes	No
	Tunnel	High	High	Requires small area at ground level relative to storage basins; disruptive at shaft locations; increased O&M burden.	No	No	Yes
Point Storage	Tank (Above or Below Ground)	High	High	Storage tanks typically require pumps to return wet weather flow to the system which will require additional O&M; disruptive to affected areas during construction. Several CSO outfalls have space available for tank storage. There may be existing tanks in abandoned commercial and industrial areas to be converted to hold stormwater. Tanks are an effective technology to reduce wet weather CSO's.	No	No	Yes
	Industrial Discharge Detention	Low	Low	Requires cooperation with industrial users; more resources devoted to enforcement; depends on IUs to maintain storage basins. IUs hold stormwater or combined sewage until wet weather flows subside; there may be commercial or industrial users upstream of CSO regulators.	Yes	No	No
Treatment-CSO Facility	Vortex Separators	None	None	Space required; challenging controls for intermittent and highly variable wet weather flows. Vortex separators would remove floatables and suspended solids when installed. It does not address volume, bacteria or BOD.	Yes	No	No
	Screens and Trash Racks	None	None	Prone to clogging; requires manual maintenance; requires suitable physical configuration; increased O&M burden. Screens and trash racks will only address floatables.	Yes	No	No
	Netting	None	None	Easy to implement; labor intensive; potential negative aesthetic impact; requires additional resources for inspection and maintenance. Netting will only address floatables.	Yes	Yes	No
	Contaminant Booms	None	None	Difficult to maintain requiring additional resources. Contaminant booms will only address floatables.	Yes	No	No
	Baffles	None	None	Very low maintenance; easy to install; requires proper hydraulic configuration; long lifespan. Baffles will only address floatables.	Yes	No	No
	Disinfection & Satellite Treatment	High	None	Requires additional flow stabilizing measures; requires additional resources for maintenance; requires additional system analysis. Disinfection is an effective control to reduce bacteria and BOD in CSO's.	Yes	No	Yes
	High Rate Physical/Chemical Treatment (High Rate Clarification Process - ActiFlo)	None	None	Challenging controls for intermittent and highly variable wet weather flows; smaller footprint than conventional methods. This technology primarily focuses on TSS & BOD removal, but does not help reduce the bacteria or CSO discharge volume.	Yes	No	Yes
	High Rate Physical (Fuzzy Filters)	None	None	Relatively low O&M requirements; smaller footprint than traditional filtration methods. This technology primarily focuses on TSS removal, but does not help reduce the bacteria or CSO discharge volume.	Yes	No	No
Treatment-WRTP	Additional Treatment Capacity	High	High	May require additional space; increased O&M burden.	No	No	No
	Wet Weather Blending	Low	High	Requires upgrading the capacity of influent pumping, primary treatment and disinfection processes; increased O&M burden. Wet weather blending does not address bacteria reduction, as it is a secondary treatment bypass for the POTW. Permittee must demonstrate there are no feasible alternatives to the diversion for this to be implemented.	Yes	No	No
Treatment-Industrial	Industrial Pretreatment Program	Low	Low	Requires cooperation with Industrial User's; more resources devoted to enforcement; depends on IU's to maintain treatment standards. May require Permits.	Yes	No	No

Siting of CSO Facilities

Preliminary siting issues is listed in USEPA's Combined Sewer Overflow – Guidance for Long Term Control plans (EPA 832-B-95-002 September 1995) as a screening mechanism and recommends the evaluation of the following:

- Availability of sufficient space for the facility on the site
- Distance of the site from CSO regulator(s) or outfall(s) that will eb controlled
- Environmental, political, or institutional issues related to locating the facility on the site

The Village of Ridgefield Park was first analyzed using the following publicly available GIS information:

- Aerial photography
- Land Use / Land Cover
- Parcel data, including vacant land, land ownership, and property value information
- Open Space / Green Acres
- Soil Type
- Topography
- Known Contaminated Sites
- Brownfields

Potential sites were identified as were the constraints on each site. Some sites were eliminated from consideration due to the suitability for siting CSO control facilities. Additional detail of the siting analysis can be found in Section 6 of the Ridgefield Park DEAR.

Performance Objectives

The magnitude of the facilities in terms of CSO volume managed is the primary driver of both its cost and effectiveness. Accordingly, a procedure was developed to achieve the desired control objectives, in the case of the DEAR, limiting the overflows to 0, 4, 8, 12 or 20 during the Typical Year. Since the permit requires the levels of control to be established based on the hydraulically connected system it was not adequate merely to achieve the desired number of overflows at each individual outfall, or within Ridgefield Park. Prior to the evaluation it was necessary to determine for the BCUA system what storm events must be controlled for each level of control. Since the LTCP may incorporate a mix of volume-based controls (storage) as well as peak flow-based control (treatment) the same sets of storms were established for either control methodology.

6.4.2. Summary of Control Plans

Six (6) Control Programs were developed.

- Control Program 1 – Elimination of CSO 006A
- Control Program 2 – Consolidated Tank Storage
- Control Program 3 – Consolidated Tunnel Storage
- Control Program 4 – Consolidated End of Pipe Treatment
- Control Program 5 – Sewer Separation
- Control Program 6 – Green Infrastructure

Each alternative was implemented in the approved InfoWorks ICM 2050 baseline model and the modeled facilities scaled to achieve each of the performance objectives for the Typical Year rainfall. The exception was green infrastructure which was implemented to address 2.5%, 5%, 7.5%, and 10% of the modeled directly connected impervious areas. 20-year net present worth costs (NPW) were generated for each alternative using estimated capital costs and operations and maintenance costs. For comparison purposes each alternative was normalized by the NPW cost to remove on gallon of CSO during the Typical Year.

6.4.2.1. Control Program 1 – Elimination of CSO 006A

Considering the small volume of overflow from outfall 006A and the configuration of the Ridgefield Park system it may be feasible to eliminate outfall 006A, see Figure 6-126-126-12.This control program consolidated Outfalls 005A and 006A by eliminating the wet weather discharge from the two structures that make up Regulator-006A. InfoWorksICM model results indicated that surcharge and potential flooding were observed in the pipe that connects R-006 to R-005. It was determined that to complete the consolidation, additional system upgrades would be required, either in the form of sewer separation upstream of R-006 or upgrades to the pipes between R-006 and R-005. There is no compelling need or water quality benefit to eliminating the outfall since it does not discharge to a sensitive area, nor will the consolidation relocate Outfall 006A to a different watercourse, with a different water quality standard or to avoid a sensitive area. Accordingly, this control program received no further consideration as an independent alternative, since it would impose additional costs without generating water quality benefits. However, it was be retained as a potential mechanism for consolidation of outfalls or early completion alternative to reduce the side of other facilities.

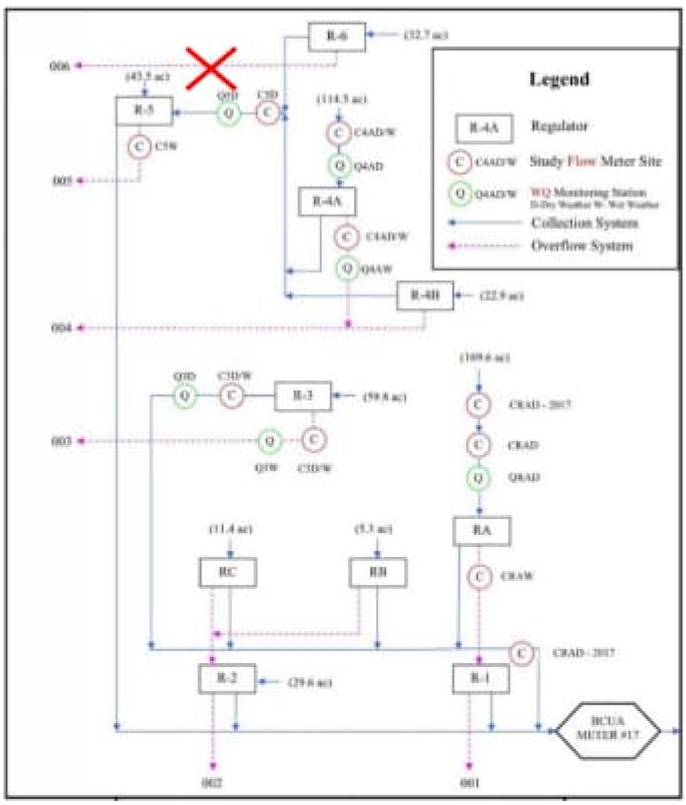


Figure 6-12: Ridgefield Park system schematic showing elimination of Outfall 006

6.4.2.2. Control Program 2 – Consolidated Tank Storage

Previous work determined that consolidated facilities would be more efficient for CSO control in Ridgefield Park as opposed to facilities sited at the individual outfalls. This control program consisted of siting storage tanks to capture overflows at consolidated outfalls, detain the overflows and then return them the interceptor to receive treatment at the BCUA WPCF. Storage tanks were input into the model to identify any impacts to CSO reduction.

This control program offered some advantages over placing tanks at individual outfalls:

- The result would be only leave two active discharge outfalls; the consolidated outfall for Outfall 001A and 002A and an outfall for Outfall 003A through 006A. This will simplify future permitting and effectively eliminate four outfalls.
- This control program would result in fewer facilities for the Village to maintain.
- It reduced the number of parcels impacted and reduced the number of properties the Village would need to acquire.
- With some limitations, existing land uses can be maintained over the tank with minimal surface disturbance after construction. It may also be possible to create public amenities such as parks on top of the tanks.

There are also some potential disadvantages:

- There would be more disturbance and interruptions to local streets because of the consolidation piping.
- There would be additional costs associated with the consolidation piping, however, it is anticipated that these would be offset by fewer pumping stations and the greater construction and operating cost efficiency of larger tanks.

There was an underutilized commercial space (former restaurant) adjacent to Outfall 002A with an area of approximately 1.5 acres. A commercial auto recycling yard was identified just north of Outfall 004A that appears large enough to provide a consolidated storage facility for Outfalls 003A, 004A, 005A and 006A. Since the elimination of 006A may not be feasible as previously discussed, this outfall could also be diverted to the storage facility as noted. The land available at both locations was not sufficient to achieve a level of control corresponding to 0 overflows.

Installation of storage tanks in urban areas can be challenging. Excavating requires costly dewatering and support of the excavation, which is made more challenging by adjacent buildings which must be protected and monitored throughout construction. In addition, utilities impacted by construction must be relocated, protected, or supported, including the BCUA's Ridgefield Park Branch Interceptors. As noted previously noted, the tank sites are near the Hackensack River, or Overpeck Creek, which create additional issues and risks with keeping the site dewatered during construction. Piles may be required to anchor the tanks, so they do not become buoyant in the event of a flood, or periods of high groundwater. The construction required for storage tanks is large and invasive making public acceptance of the project a concern. Once construction is completed, tanks are generally preferable from the standpoint of public acceptance since most of the facility is underground. Schematic layouts of consolidated tanks sized to provide a level of control equivalent to 4 overflows are shown in Figure 6-136-136-13 and Figure 6-146-146-14, greater detail is provided in the Ridgefield Park DEAR. It is noted since the overflows from outfalls 001A and 002A are small, a tank or series of tanks would be less efficient than at other locations.

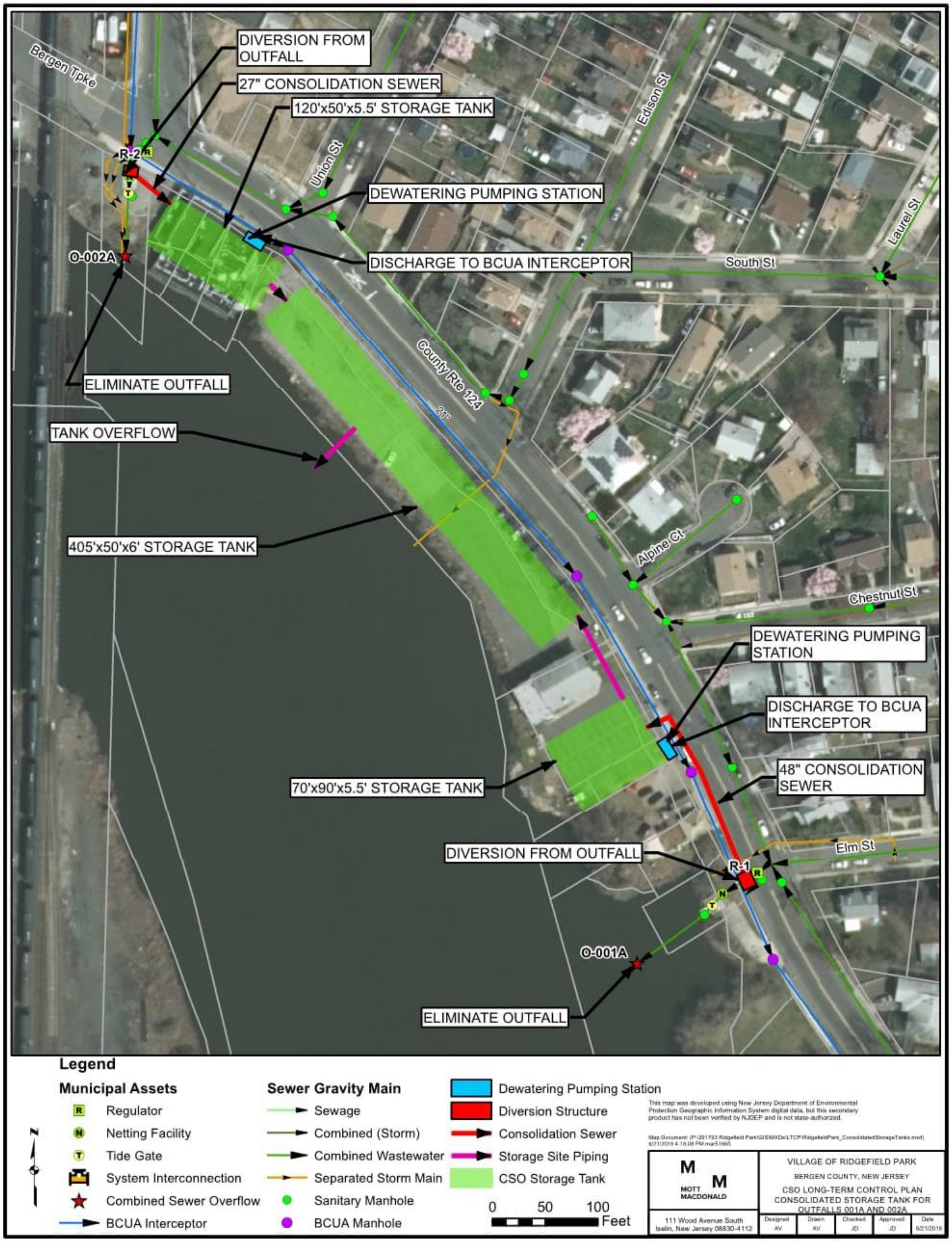


Figure 6-13: Consolidated Storage 001A and 002A

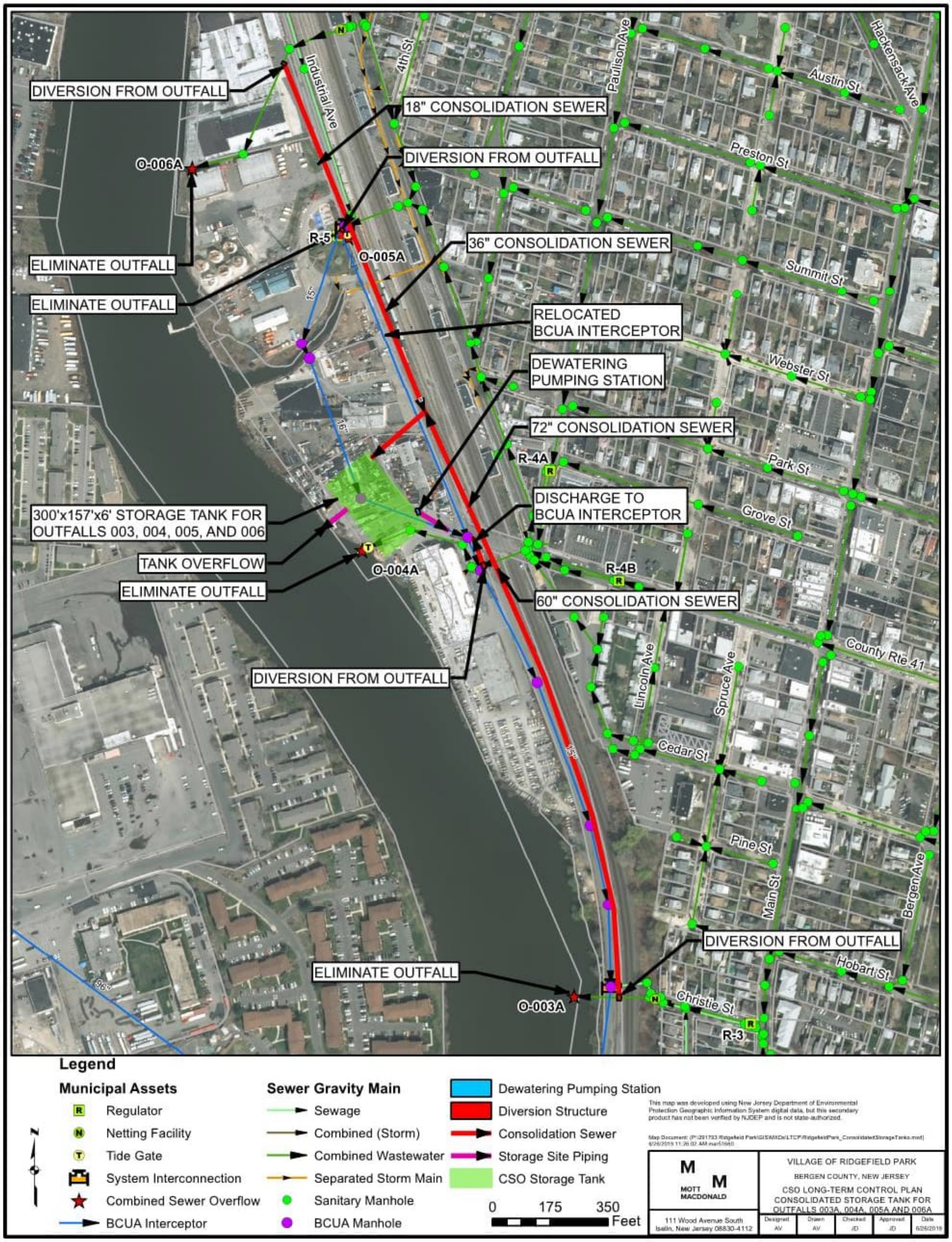


Figure 6-14: Consolidated Storage Outfalls 003A, 004A, 005A and 006A

6.4.2.3. Control Program 3 – Consolidated Tunnel Storage

This control program called for a tunnel from Regulator 005 near Industrial Avenue to the intersection of Main Street and Bergen Turnpike and Regulator 002, and for the consolidation of all outfalls into the tunnel for storage. The tunnel will be dewatered into the interceptor and include an overflow to the river. The result will be only one outfall. The available route limited the tunnel length to 5,900 feet.

Consolidation piping would be needed to bring relatively small flows from Outfall 006A to the area of Regulator 005 where it would be diverted to the tunnel. The BCUA Ridgefield Park Branch Intercepting Sewer has a limited capacity and thus it may be better to pump across the Hackensack River and directly into the BCUA Main Trunk Sewer. Accordingly, the conceptual plan called for a tunnel under the Hackensack River to the BCUA Hackensack interceptor. There is adequate room for a pumping station to be constructed in the vicinity of the intersection, as well as force main to the BCUA Hackensack Interceptor. It was noted that the layout and feasibility of tunnels is highly dependent on geotechnical information. The available soils information indicate that the tunnel may be in soft ground which increases both risk and expense.

The tunnel volume could be adjusted to provide the various levels of control up to providing storage for 0 overflows. Implementing a tunnel within the confines of an urban area is challenging. Mining and recovery shaft areas are required for this alternative to be feasible, and available area in Ridgefield Park for this purpose is minimal. While it is possible to control the flow into the tunnel using automated gates and level sensors, the tunnel must still be provided with a relief point. Tunnels may also be subject to highly complex hydraulic transients. Typically, these are controlled by limiting the tunnel inflow and preventing the tunnel from filling completely and by providing a tunnel overflow structure to relieve the excess flow.

The construction required for tunnels is large and invasive making public acceptance of the project a concern. In general, the construction would be limited to industrial areas, however the area near Main Street and Bergen Turnpike is a high traffic area and a main artery out of the Village. Most of the facilities would be underground, some facilities such as electrical equipment and pumping station controls would be above grade. The impact on existing industrial/commercial establishments during construction would need to be considered and the Village may wish to consider purchasing the land needed for these improvements. Following construction, tunnels are generally preferable from the standpoint of public acceptance since most of the facility is underground. Aboveground features would still be required such air release, electrical facilities, odor control facilities and access points to pumps. A schematic layouts of a storage tunnel sized to provide a level of control equivalent to 4 overflows is shown in Figure 6-156-156-15, greater detail is provided in the Ridgefield Park DEAR.

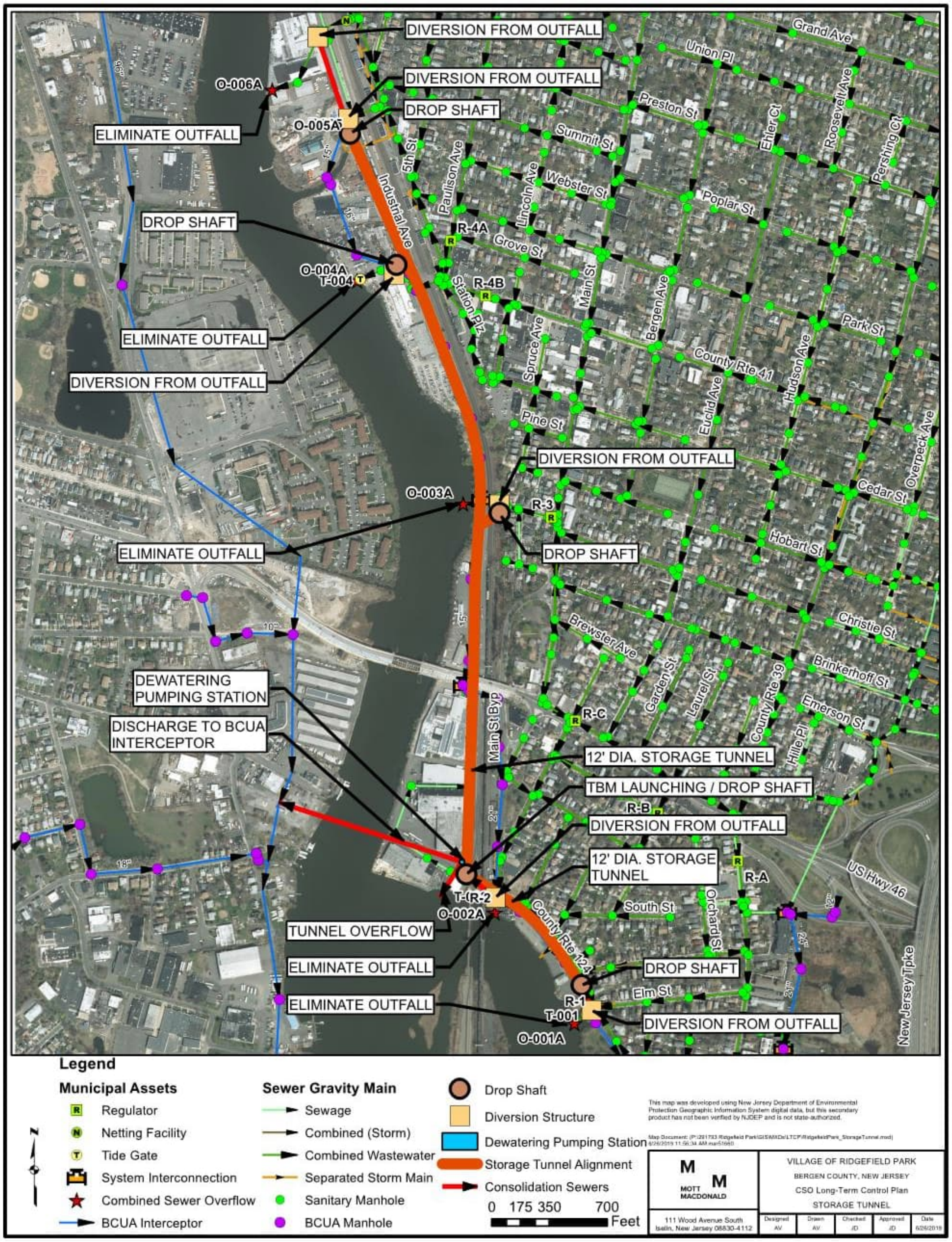


Figure 6-15: Tunnel Storage Conceptual Layout

6.4.2.4. Control Program 4 – Consolidated End of Pipe Treatment

This control program consisted of siting a treatment facility and consolidation piping from 001A and 002A and 003A-006A. By providing a treatment train capable of providing disinfection and the accompanying solids removals (primary treatment), the number of overflows can be reduced by removing overflows that discharge at flow rates less than the treatment provided. This is based on the definition provide in the

National CSO Control Policy, which indicates flows receiving primary treatment and disinfection (if needed) are not considered overflows. Partial treatment would be provided for storms whose peak flow exceeds to treatment rate.

The evaluation of practicality and feasibility drew on the siting analysis to identify locations for each facility and drives the consolidation of select facilities. Consolidation offers some advantages over siting individual facilities at each outfall:

- The result would be only two consolidated outfalls. This will simplify future permitting and effectively eliminate four outfalls.
- This control program would result in fewer facilities for the Village to maintain.
- For the most part it made use of public rights-of-way and land that will be under the control of the Village.

There are also some potential disadvantages:

- There would be more disturbance to local streets from consolidation piping.
- There would be additional costs associated with the consolidation piping.
- The larger above ground facility would have a greater impact, possibly reducing the usable area available for the park at Outfall 001A. The benefit would be reduced impacts on the rest of the Village.
- The larger above ground facility would have a greater impact at Outfalls 003A through 006A, possibly requiring taking and demolishing the entire auto recycling facility. The benefit would be reduced impacts on the rest of the Village.

The sizing for treatment facilities are often the same to achieve 4, 8 and 12 overflows, and sizing was difficult to combine with storage-based control programs. This was because sizing of the end of pipe treatment facilities is driven by peak rainfall intensity, while sizing of end of pipe storage facilities is generally driven by total rainfall depth. Achieving a consistent level of control for peak flows, required a much higher level of control to be achieved through end of pipe treatment.

The properties previously discussed for consolidated offline storage facilities were the same properties that could be used for consolidated treatment of the CSO discharges for a level of control corresponding to 4 overflows during a typical year. There does not appear to be available space to achieve a level of control corresponding to 0 overflows. The consolidated treatment for the other outfalls within the Village could be sited at the end of Mount Vernon Street, for a level of control corresponding to 4 overflows during a typical year.

Installation of end-of-pipe treatment facilities in urban areas can be challenging due to space and access limitations. Unlike end-of-pipe storage tanks, end-of-pipe treatment facilities are generally above-grade. As such, deep excavation is generally not required, reducing the complexity of excavation in proximity to other foundations. Above-grade facilities however would be susceptible to possible damage from freezing and may need to be housed in a structure. There is little available information on the soil conditions at the sites, however, given the proximity to the floodplain, soil conditions may be poor, and the facilities may need to be situated on piles.

The proposed treatment facilities for Outfalls 001A and 002A is across the street from a residential area and freezing is a concern. Thus, it is anticipated that the facilities at this location may need to be primarily constructed below grade, negating the potential benefits of reduced excavation. Excavating requires costly dewatering and support of the excavation, which is made more challenging by proximity to the receiving waters. In addition, utilities will need to be relocated which may be a significant challenge.

The construction required for an end-of-pipe facility is large and invasive, making public acceptance a concern. The facilities proposed are generally above or at grade, so they have the potential to produce visual impacts, odors, and noise, making them more difficult to site in residential and commercial areas. There may be concerns with odors at the proposed site on Bergen Turnpike due to proximity to commercial and residential areas. Following construction, end-of-pipe treatment facilities are less preferable than tanks due to the permanent visibility of the structure. They also use land area that could otherwise be utilized by the community for other purposes. The consolidated sites are located on industrial parcels and land slated for redevelopment, and the construction may be more acceptable in terms of public acceptance than other sites. Schematic layouts of consolidated end-of-pipe treatment sized to provide a level of control equivalent to 4 overflows are shown in Figure 6-166-166-16 and Figure 6-176-176-17, greater detail is provided in the Ridgefield Park DEAR.

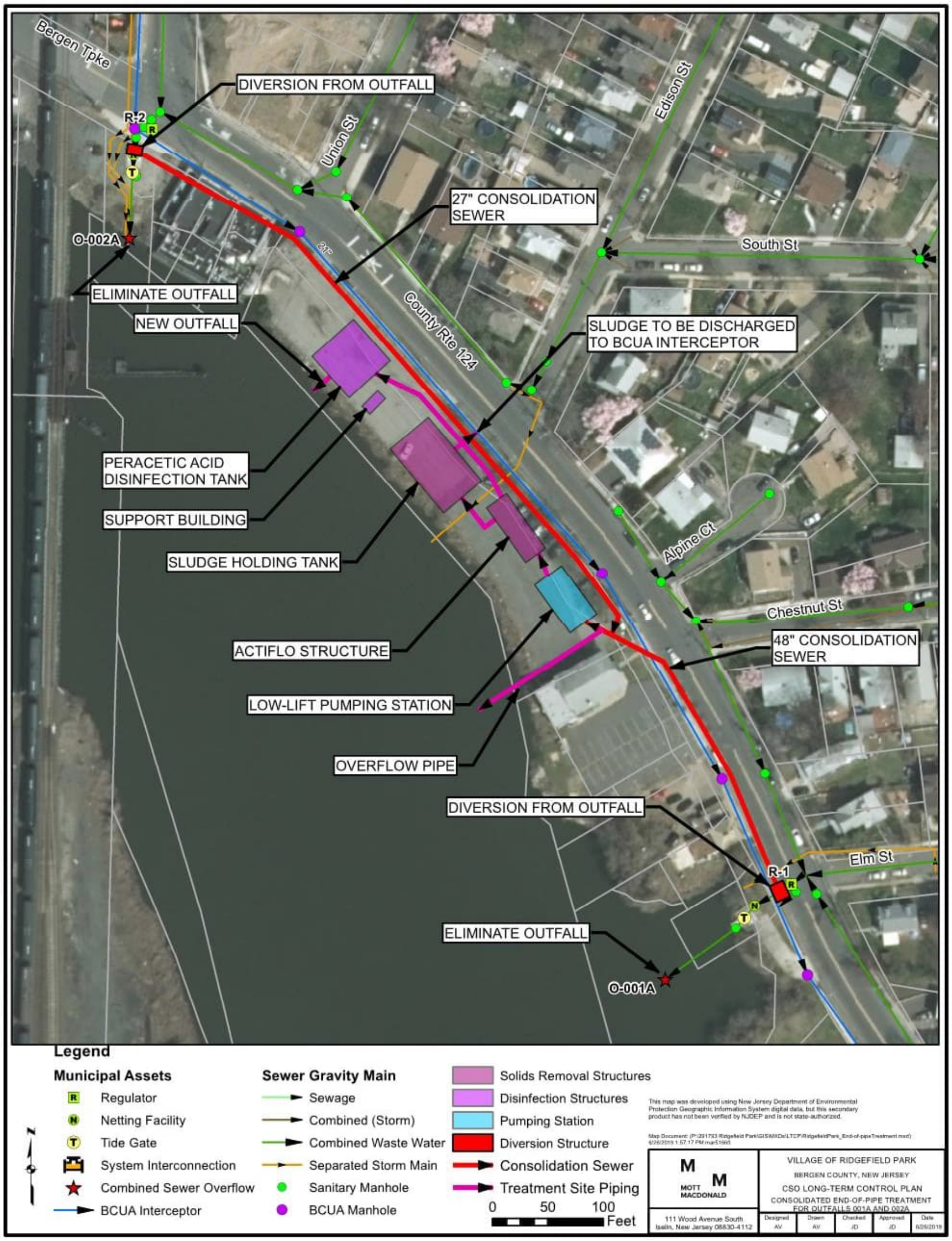


Figure 6-16: Consolidated Treatment for Outfalls 001A and 002A

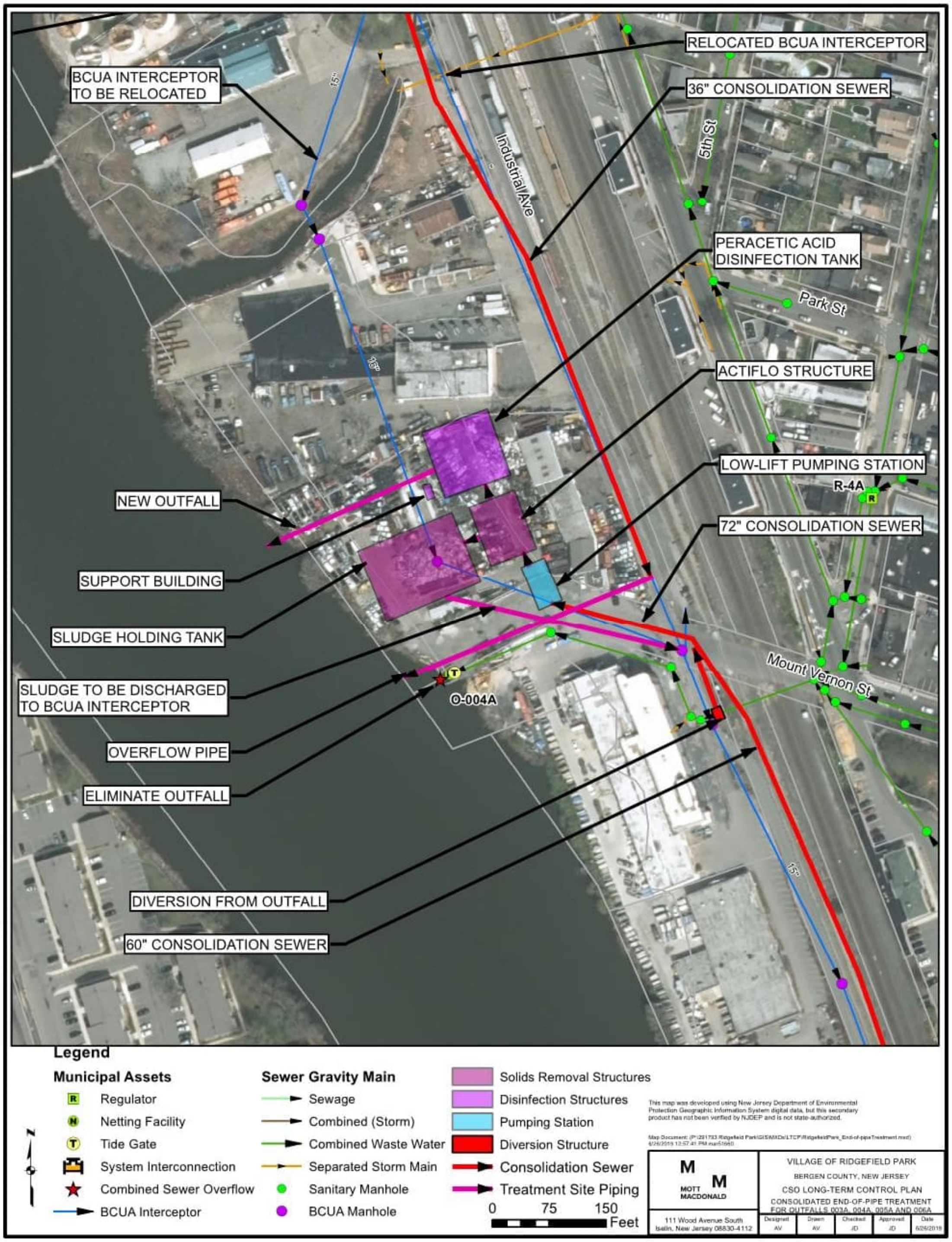


Figure 6-17: Consolidate Treatment for Outfalls 003A, 004A and 005A

6.4.2.5. Control Program 5 – Sewer Separation

This control program constitutes constructing a new sanitary sewer system and converting the existing combined sewer into a storm sewer. This would effectively remove the Village of Ridgefield Park from being a CSO community.

The benefits of this alternative include:

- Work remains in public right-of-way, no new land required,
- Opportunity for system renewal, reconstruction, and
- Elimination of outfalls

The challenges include:

- Highly disruptive to roads and traffic,
- Need to redirect every sanitary service connection on each street, and
- Possible stormwater controls and treatment in the future.

New sanitary or storm sewers would be constructed within the existing right-of-way, however utility conflicts may be significant, especially within those areas that already have multiple sewers within the roadways. In addition, it is noted that separating out stormwater flow may not be an effective long-term solution. This is because stormwater contributes to pollution of the receiving waters, and as such may eventually need to be treated or controlled

Since the proposed work would mostly be completed within the existing right-of-way, minimal land acquisition would be required. However, installation of separate sewers in urban areas can be challenging due to traffic impacts, utility conflicts, and space limitations. Such an undertaking will result in road closures across the Village and resulting traffic redirection over the course of construction. Installation of a new sanitary connections to each residence and business will also be a very extensive undertaking. This would also make public acceptance of the project a significant concern. This was also a very costly alternative when compared to other control programs. Following construction, sewer separation might be preferable from the standpoint of public acceptance since the resulting facilities would be underground and similar to sanitary sewer facilities in most other municipalities.

6.4.2.6. Control Program 6 – Green Infrastructure

This control program consists of installing green infrastructure to provide storage or detention to contribute to meeting the overflow requirements. Green infrastructure (GI) refers to practices which reduce stormwater volume or flow rate by allowing the stormwater to infiltrate, be stored, or be treated by vegetation or soils. The anticipated green infrastructure was expected to consist primarily of bioswales and permeable pavement.

For purposes of evaluation, directing 2.5%, 5%, 7.5% and 10% of the impervious area within the combined sewer area to green stormwater infrastructure was evaluated. Available data on soils and groundwater levels in Ridgefield Park indicate that ground conditions are likely not conducive to infiltrating green stormwater infrastructure, thus bioswales were assumed to have an infiltration rate of 0.25 inches/hour and equipped with a sub-drain to drain excess flows back into the collection system. The public right-of-way offers the best opportunity for green stormwater infrastructure. It was assumed that only one bioswale could be installed per each side of the street segment. The typical bioswale is 20’x3’ and using a 15:1 loading ratio it would treat 900 sf of impervious area. Through GIS analysis it was determined the Village has approximately 287 street segments which results in 574 bioswales, or 2.4 acres of impervious area treated.

Permeable pavement would be applied to parking lanes. It is assumed that the last 50 feet at either end of the block would be reserved for turning lanes resulting in an average of 210 linear feet of parking area available for permeable pavement on either side of the street. The NJ Stormwater BMP Manual recommends permeable paving for slopes less than 5%, however, as discussed in the DEAR, much of Ridgefield Park is steeper than 5%. It was assumed that only 10% of the Village was suitable for installation of permeable pavement resulting in 2520 sf per street segment. At a four to one ratio of impervious area to BMP area, this results in a maximum of 72,300 sf of permeable paving in the Village, or 6.6 acres of impervious area treated.

GI modeling showed that it has a very minimal impact on both peak flow and volume mitigation. As such, it was understood that a high level of proliferation of GI was required to provide a significant improvement in CSO reduction and volume mitigation.

Land acquisition issues were anticipated to be minimal as the GI program would be sited primarily in the public right-of-way with no land acquisition required. Permeable pavement will face challenges with existing utilities, particularly supporting the utilities during permeable pavement construction when significant depths of the road subgrade will be replaced with the reservoir course. However, there are myriad of field conditions that can prevent construction of green stormwater infrastructure on a site identified through a desktop study, including soil conditions, utility locations, and proximity to trees, building entrances, or bus stops. The high level of attrition was reflected in the estimate of green stormwater infrastructure proposed, to realistically reflect this implementability challenge.

It is generally assumed that public acceptance of green stormwater infrastructure will be high since it serves as an amenity to the community. This is likely true for implementation of bioswales as they provide additional green space and the construction footprint is relatively small. The implementation of permeable pavement may be less accepted by the public as the construction is more invasive. However, upon completion of the project the area will closely resemble the existing condition. Accordingly, the likelihood of public acceptance for green stormwater infrastructure should be considered high.

Figure 6-18: Typical street segment with green stormwater infrastructure

6.4.3. Summary of Ridgefield Park DEAR Control Plan Cost and Performance

Performance and cost for each of the six control programs are summarized below in Table 6-216-21 through Table 6-256-25. The Permit requires alternatives to be evaluated under expected condition at the end of the LTCP, accordingly, alternatives were implemented in the 2050 baseline model while the results were compared to the 2015 baseline:

Table 6-21: 20-Year net present worth for all control programs

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	

Class 5 estimate -50%/+100%. Costs indexed to January 2019 ENR CCI 11,205.

Table 6-22: Summary of CSO Volumes (MG) 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. Consolidated 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 6-23: Summary of CSO Volume Reductions (MG) 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	50.3	44.5	44.4	40.6	28.7
3. Tunnel	50.3	50.3	45.6	45.6	42.4	38.8
4. Consolidiated End of Pipe Treatment	50.3	50.3	50.0	50.0	50.0	47.2
5. Sewer Separation	50.3	50.3	NA	NA	NA	NA
% Impervious to GI		2.5%	5%	7.5%	10%	
6. Green Infrastructure	50.3	0.3	0.8	1.4	2.0	

Table 6-24: 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 6-25: Net present worth costs normalized by gallon of CSO reduction

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	

Class 5 estimate -50%/+100%. Costs indexed to March 2020 ENR CCI 11,205.

6.4.4. Rankings

To provide a more concise comparison, each control program was rated for the level of control corresponding to four overflows in the Typical Year. For Control Program 6, green stormwater infrastructure, the results for directing 5% of modeled directly connected impervious to GI were presented, which is closest to the estimated maximum amount of green infrastructure that can be formally attributed to the LTCP. It was noted that green infrastructure does not achieve the desired level of control in terms of volume reduction or reduction in CSO frequency. However, it does provide a volume reduction and it is anticipated that if included in the LTCP it would additive to other control programs. Each alternative was ranked on the six categories below, and the results are summarized in Table 6-266-26:

- Cost – Costs were normalized by $/gal of annual CSO reduction based on the Typical Year and level of control corresponding to 4 overflows and 5% of directly connected impervious areas being directed to green stormwater infrastructure. Cost was a primary driving factor and was assigned a weighting of 25% of the overall score. The following ratings were assigned based on the normalized cost.
  - 5: $0-$1.00 per gallon of CSO removed
  - 4: $1.00-$2.00 per gallon of CSO removed
  - 3: $2.00-$3.00 per gallon of CSO removed
  - 2: $3.00-$4.00 per gallon of CSO removed
  - 1: over $4.00 per gallon of CSO removed
- CSO Reduction – Since the outfalls in Ridgefield Park all discharge to the Hackensack River and adjacent portion of the Overpeck Creek along a relatively short reach, it is appropriate to consider the overall reduction of CSO volume achieved by the control alternatives during the Typical Year. CSO reduction was considered a key factor and was assigned a weighting of 15%. The following ratings were applied to the CSO volume reductions:
  - 5: over 40 MG of CSO volume reduction in the Typical Year
  - 4: 30 MG - 45 MG of CSO volume reduction in the Typical Year
  - 3: 20 MG - 30 MG of CSO volume reduction in the Typical Year
  - 2: 10 MG - 20 MG of CSO volume reduction in the Typical Year
  - 1: under 10 MG of CSO volume reduction in the Typical Year
- CSO Frequency – The frequency of overflow during the Typical Year is an important metric both in regard to regulatory compliance under the Presumptive Approach and in terms of public

acceptance. Since overflow frequency is closely related to overflow volume it is assigned a weighting of 15%. The following ratings were applied to the CSO volume reductions:

- 5: 4 or fewer overflows during the Typical Year
- 4: 5 to 8 overflows during the Typical Year
- 3: 9 to 12 overflows during the Typical Year
- 2: 13 to 20 overflows during the Typical Year
- 1: over 20 overflows during the Typical Year

- Institutional Issues (Permitting) – Institutional issues particularly permitting can have a significant impact on a project particularly the schedule of design which can then delay the commencement of construction. If institutional issues cannot be overcome, the project may need to be redesigned potentially affecting not just the schedule, but the cost. Experience has shown for important projects just as CSO LTCP institutional issues can generally be overcome due to the overall need for the project. Accordingly, institutional issues were assigned a weighting of 15%. The following ratings were assigned to institutional issues:
    - 5: Unlikely to impact schedule or budget.
    - 4: small possibility of delay in schedule less than six months.
    - 3: medium possibility to delay project less than six months and impact budget by 5% or less.
    - 2: medium possibility to delay project more than six months and impact budget by more than 5%.
    - 1: high possibility to delay project by more than six months and impact budget by 10% or more.
- Implementability – High level planning studies such as a LTCP must formulate plans based on incomplete information. Unexpected factors such as poor soil conditions and conflicts with unknown existing infrastructure can impact a project's schedule and budget. Accordingly, implementability was assigned a weighting of 15%. The following ratings were assigned to implementability:
    - 5: Unlikely to impact schedule or budget.
    - 4: small possibility of delay in schedule less than six months.
    - 3: medium possibility to delay project less than six months and impact budget by 5% or less.
    - 2: medium possibility to delay project more than six months and impact budget by more than 5%.
    - 1: high possibility to delay project by more than six months and impact budget by 10% or more.
- Public Acceptance – Public acceptance of an alternative is largely based on experience which, guides anticipated public reaction. These responses can change as demographic and economic changes occur as well as overall societal trends towards the environmental develop. Public acceptance was an important criterion, but ultimately the Village's obligations are driven by the permit requirements, accordingly, public acceptance was assigned a weighting of 15%. The following ratings were applied to the anticipated public acceptance.
    - 5: Public would welcome and support proposed plan.
    - 4: Public would accept proposed plan, but no provide external support.
    - 3: Public objects to proposed plan but takes minimal action.
    - 2: Public objects to proposed plan, and actively opposes.

- o 1: Strong public opposition, including legal challenges

Each of the six control programs was rated as per the above criteria, see Table 6-266-26.

Table 6-26: Summary of Control Program 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%

6.4.5. Public Input

In addition to being published in the DEAR, the alternatives were presented to members of the public on several occasions, primarily at Ridgefield Park Supplemental CSO Team Meetings #7 - #9. As the meetings progressed the alternatives were presented in greater detail along with costs and potential impacts. Input was solicited directly from the members of the SCSO Team. Comments and responses were recorded in the meeting minutes and can be found in Appendix E. Key comments relating to the alternatives are summarized below:

Meeting #8 May 28, 2019

- 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.

- Question: If we stop sending stormwater 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.

- 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.

- Question: If we separate the sewer system will that solve the problem?
  Answer: Separation will keep stormwater from entering the BCUA treatment plant, nevertheless storm water may still need some level of treatment before being discharged to the receiving waters.

- 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.

- 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.

- Question: Could a tank be located on the property under the Route 80 bridge?
  Answer: That is a possibility that can be explored.

- 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.

Meeting #9 – September 24, 2019

- 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.

- 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.

- 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.

- 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.

- 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.

- 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.

- 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.

- Question: Is the BCUA prepared for the increase in flow from the towns?
  Answer: The BCUA 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.

- 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.

- Questions: Are the properties in Industrial Avenue the only ones being considered?
  Answer: In 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.

As can be seen the residents were most concerned with costs, then impacts to the community, and wanted CSO facilities to fit within existing and planned land uses.

6.5. Significant Indirect Users (SIUs)

The NJPDES CSO Permit requires that impacts from significant indirect users (SIUs) contributing to the CSOs are minimized. Under the current rules and regulations, each SIU is required to incorporate a level of pretreatment prior to discharge to the sewer system based on the loading and toxicity of the SIU contributions. BCUA monitors SIUs for compliance with the pretreatment requirements. There are two SIUs within the combined sewer area serviced by BCUA, summarized in Table 6-276-27.

Table 6-27: SIU Summary

SIU Name and Address	CSO Basin	Contributing Flow Rate	Description
Custom Silicon Wafer 80 Railroad Avenue Ridgefield Park	RP-006A	250 gpd	Manufacture of SEMI Prime Silicon Wafers
General Aviation and Electronics 30 Jersey Place Hackensack	H-002A (Court Street)	645 gpd	Sheet Metal Fabrication

The discharge from these SIUs were analyzed to assess whether, during overflow events, the discharge would negatively affect water quality focusing on toxic metals and organics. Based on the concentration and the discharge flow rate, the annual mass load was calculated for each measured contaminant over the annual duration of overflow events for the typical year. All concentrations were found to be very low, less than 10^{-4} (0.0001) mg/L or 0.1 ppb. This is attributable to dilution, as the average flow rate of the CSO is about 1,900 times larger than the flow rate from Custom Silicon Wafers and about 1,000,000 times larger for General Aviation and Electronics. The concentrations were compared with the EPA's aquatic life criteria (*National Recommended Water Quality Criteria – Aquatic Life Criteria Table, USEPA, undated*), where criteria were available. Given that the concentrations are low and do not exceed EPA criteria, it was determined that special measures to prevent or limit discharges from SIUs during wet weather are not warranted. The complete SIU analysis is included in the DEAR report.

7. Selection of LTCP

7.1. Introduction

The decision-making process for the selection of a LTCP is primarily in the hands of the CSO municipalities. The BCUA, as the receiving WPCF, is an integral part of the LTCP planning process. The BCUA has conducted an analysis of their plant and collection system to determine if there is excess capacity to convey and treat additional flow. The analysis revealed that certain portions of the BCUA interceptor system have some available capacity, while other segments are limited. However, given the current permit limitations, the WPCF does not have excess capacity to treat additional wet weather flows. To accept additional wet weather flows would require a plant expansion, the costs of which have been made known to the CSO municipalities. As previously noted, a regional approach having additional flows going to BCUA for treatment is not cost-effective and thus the municipalities have elected to implement CSO Controls municipality individually. The BCUA has agreed to accept dewatering flows from storage facilities when peak flows have receded and has provided the municipalities with control rules for limiting dewater flow rates. However, given that the alternatives are a combination of storage and separation the net flow to the plant is estimated to decrease by 0.6 MG during the typical year once the plans are implemented. The BCUA intends to incorporate the volume from dewatering flows into their future plans.

The Long Term Control Plan recommendations are based upon information and evaluations performed during the earlier phases of the planning process, including the characterization of the receiving waters, hydraulic and water quality modeling, screening of CSO control technologies, development and evaluation of alternatives, public participation, and the nine minimum controls. Following completion of these permit requirements, the selection and implementation of alternatives for regional implementation took place and is further discussed in this report and in the respective individual Permittee SIAR plans as noted below.

The selected alternatives have been broken down by individual Permittee, which in total constitutes the recommended Regional CSO Long Term Control Plan. Each project will be optimized using adaptive management as the LTCP implementation proceeds. To that end, included in the plan is adaptive management, which provides an opportunity for the BCUA CSO Group permittees to conduct post construction monitoring, after partially implementing strategic projects of the plan to re-assess the implementation schedule. These projects will be monitored to determine if they are operating as intended, and 85% percent capture is achieved. All permittees are committed to the projects necessary to achieve the goals set forth in the NJPDES Permit. However, if this post construction monitoring indicates a modification to the investment or actions are needed, those investments and actions will be evaluated, and a supplemental control plan, or adaptive management plan, will be developed for review and approval by the NJDEP. If necessary, this adaptive management plan will also incorporate any new technologies or group similar projects to reduce costs, pending regulatory approval and other anticipated factors. Minimizing community impacts is one of the cornerstones and key benefits of the Selected CSO Control Plan; however, construction/implementation activities are anticipated to initiate some public and private impacts. There will likely require some re-purposing of public land, a need for rights of way, and potentially the need for some land now in private or public ownership.

7.2. Fort Lee Selected Alternative

7.2.1. Summary of High Ranked alternatives

The selection process for CSO control in Fort Lee was presented in the DEAR. At that time compressible media filtration and PAA disinfection was selected as the preferred alternative. However, as discussed in Section 6 this technology was removed from consideration because of the stated reasons. Removing this low cost technology from consideration allowed Fort Lee to reconsider separating sewers as a control technology which is the selected technology based on ranking presented in Section 6.

7.2.2. Selection Methodology

The selection of alternatives is presented in the DEAR. It was based on the factors that are presented in the rankings assessment on Section 6. Performance factors included providing 85% reduction in CSO flows. Cost was also a primary factor for selecting the alternative. Green infrastructure was also selected in a secondary role. The technology is limited in its CSO flow reducing characteristics; however, it is a preferred technology to some members of the public because it is a visible technology. This visibility also requires that it be maintained. Location of proposed GI projects have yet to be determined. Fort Lee will review planed road improvement projects, park renovations and proposed developments to look for opportunities to couple these types of projects with GI. Fort Lee expects the allocated funds to be used to develop two visible green infrastructure projects or as an alternative several smaller deployments of GI practices such as tree pits or bioswales. Maintenance plans for GI implemented will be incorporated into the O&M manual. Public **Input**

Two meetings were held to present the LTCP and respond to questions. The first meeting was a Supplemental CSO meeting held on January 28, 2020 in Fort Lee. CSO reduction alternatives were presented and input from the public was sought for selection of a preferred alternative. There was one comment form the public with regard to location of green infrastructure. Fort Lee is interested in locating this technology of public property or rights of way. The public had no comment on a CSO reduction alternative.

Also on August 13, 2020 a presentation was given to Fort Lee officials on the tentative selection of a CSO control alternative. The presentation included a review of the CSO permit, the 85% removal goal and the selected alternative of sewer separation at a cost of $23,000,000 over 28 years ($4,800,000 has been estimated to have been spent on the new development, $200,000 on GI, and $18,000,000 was estimated on the original sewer separation program). This prompted a discussion of funding options such as the New Jersey Infrastructure Bank (IBank) and Department of Transportation funding alternatives.

Figure 7-17-17-1 shows the cost for permit compliance under the revised plan of the 9 year program.

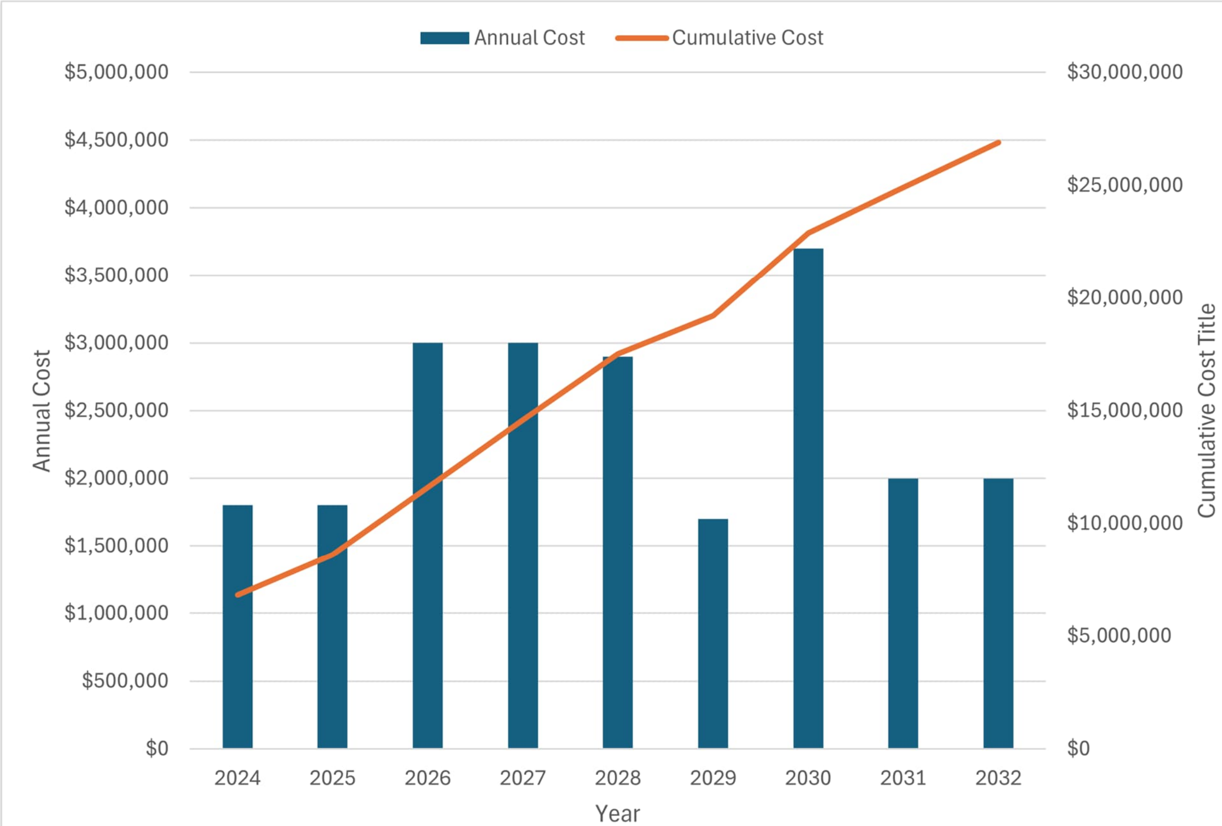


Figure 7-1: Construction Duration and Cost of the Sewer Separation Alternative

7.2.3. Selection of Alternative

As discussed in Section 6, sewer separation has been selected as the primary CSO reduction alternative with Green Infrastructure playing a secondary role. A multiphase LTCP program that best suits the public and the Borough has been selected to achieve a minimum of 85% CSO capture. The recommended plan is a four phase, 9 year plan that gradually improves CSO capture to 85% or more as shown on Figure 7-27-27-2. During each construction phase CSO flows will be monitored and the model will be used to determine the effectiveness of separating sewers. This incorporates an adaptive management approach to the plan that will allow it to be redefined with each phase. Also, future projects are expected in Fort Lee that may separate sewers or use other CSO reduction technologies. These will be incorporated into the model also.

A regional approach with the BCUA CSO Group is not recommended for the Borough. A regional approach was evaluated by the BCUA and included the following options:

- BCUA treatment facility expansion capacity
- Secondary treatment by-pass implementation
- Storage tank and additional interceptor sewer construction to increase capacity of flow to BCUA

First, the total estimated shared cost of a regional approach would prove to be less cost effective for the Borough compared to the local recommended LTCP plan and sending additional CSO flow to BCUA for treatment would significantly add to the Boroughs annual treatment costs. Detailed information regarding the BCUA regional alternatives can be found in the BCUA DEAR Report and in sections within this SIAR Report.

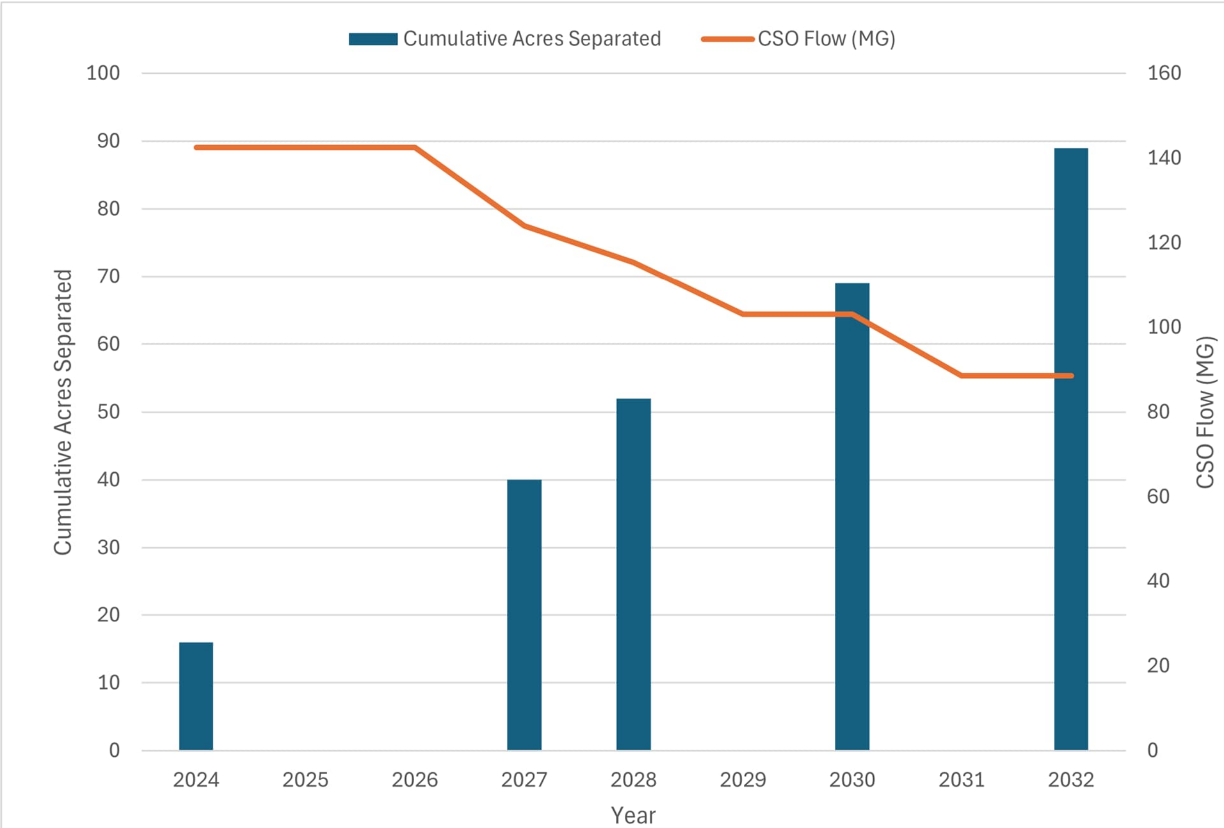


Figure 7-2: Impact of the Progression of Sewer Separation on CSO Flow

7.2.4. Cost and Performance Evaluation (Level of control vs. costs)

The technology costs were presented the DEAR and are presented in Figure 7-37-37-3 with the addition of sewer separation. The upper bound represents the present value cost of CSO storage tanks for 0 to 20 overflows per year and the lower bounds represents treatment (compressible media filtration with PAA disinfection). Sewer separation is shown at 85% CSO reduction. Sewer separation has been selected because CSO storage tanks would be difficult to site and construct in Fort Lee and treatment has not selected because of the reasons stated in Section 6.2.

7.2.5. Opinion of Cost for LTCP

The cost schedule with the impact on CSO percent capture and CSO flows is presented in

Table 7-17-1. The sewer separation costs are based on $300,000 per separated acre developed by PVSC. A total cost of $26,900,000 will be spent in Fort Lee for CSO control to achieve 87% CSO reduction. $4,800,000 has been through 2017 on The Towers and Hudson Lights projects and $22,200,000 will be spent on sewer separation. over 9 years. The Boroughs portion is shown in

Table 7-17-1. Depending on the percent CSO capture attained the total amount of sewer separation may be adjusted.

Table 7-1: Cost Schedule, Percent Capture and CSO flows for Fort Lee's LTCP

Phase	Year	Acres Separated	Cumulative Acres Separated	% CSO Capture	CSO Volume (MG)	Sewer Sep / Dev	Green Infrastructure	Total	Cumulative
Baseline	2015	0	0	76.3	161.6	$0	$0	$0	$0
New Dev. and GI	2014	16	16	79.1	142.5	$4,800,000	$200,000	$5,000,000	$5,000,000
1	2024	16	16	79.1	142.5	$1,800,000	$0	$1,800,000	$6,800,000
1	2025	16	16	79.1	142.5	$1,800,000	$0	$1,800,000	$8,600,000
1 & 2	2026	16	16	79.1	142.5	$3,000,000	$0	$3,000,000	$11,600,000
1 & 2	2027	24	40	81.8	124.1	$3,000,000	$0	$3,000,000	$14,600,000
2 & 3	2028	12	52	83.1	115.4	$2,900,000	$0	$2,900,000	$17,500,000
2 & 3	2029	12	52	83.1	103.1	$1,700,000	$0	$1,700,000	$19,200,000
3 & 4	2030	17	69	84.9	103.1	$3,700,000	$0	$3,700,000	$22,900,000
4	2031	17	69	84.9	88.6	$2,000,000	$0	$2,000,000	$24,900,000
4	2032	20	89	87.0	88.6	$2,000,000	$0	$2,000,000	$26,900,000

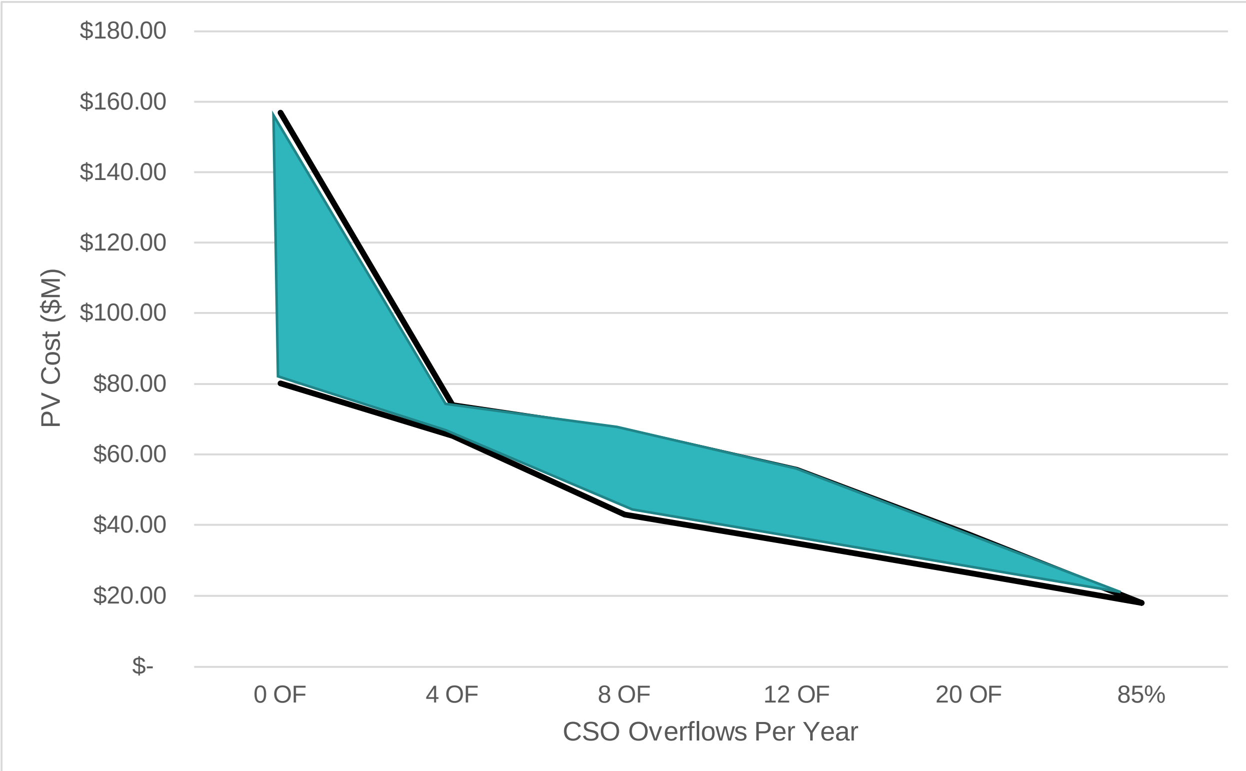


Figure 7-3: Cost Analysis for Treatment, CSO Storage and Sewer Separation Alternatives

7.2.6. Selected Plan

The recommended selected LTCP for Fort Lee will consist of a 9 year, four phase sewer separation program with two green infrastructure projects. Sewer separation will be constructed in Phases to allow the effectiveness of each phase to be determined before the next phase is designed. This will allow Fort Lee to incorporate any development impacts on CSO reduction. Green infrastructure projects will be constructed on public property or rights of way.

7.2.6.1. Flexibility

The effectiveness of the LTCP will be determined by CSO flow monitoring that will be done as the LTCP proceeds. This flow data will be incorporated into the model and new projections of CSOs for the 2004 design year will be generated. New development and other projects that impact CSO flows will also be incorporated.

7.2.6.2. Adaptive Management

The adaptive management approach has been previously described in Section 7.2.3. Flow data will be collected during each phase of construction and changes to the LTCP may be warranted.

This LTCP is based on projected conditions and modeling. The Borough recommends the LTCP be flexible and adaptable to changes during the implementation of the program. Changes over the 9-year LTCP period may become necessary given the unforeseen circumstances that may such as the current COID 19 outbreak and the financial impact associated with it. Additionally, the future requirements of the Borough's MS4 permit may also impact the Borough's LTCP.

7.2.7. Environmental Justice

No environmental justice issues are anticipated with the Borough's LTCP. Ultimately, the work will result in an overall reduction of pollution within the Borough. Construction will take place throughout the Borough. The location of the construction is not anticipated to adversely impact any specific community or commonly used public locations.

7.3. Hackensack Selected Alternative

This section of the SIAR Report presents the process used to evaluate the CSO control technologies being considered by the City.

7.3.1. Summary of High Ranked Alternatives

As the City's DEAR Report states, the highest ranked alternatives were green infrastructure, I/I reduction and off-line storage tanks. Additionally, a stormwater study in the Court Street subdrainage area, culminating in a large-scale stormwater project, and ongoing localized partial sewer separation projects were subsequently added to the list of alternatives for selection. This section further describes the practicality of the highly ranked alternatives specific to the City.

Green infrastructure has a minimal impact to achieving the City's overall percent capture goal of a minimum 85%. However, green infrastructure has a positive impact on the community to help solve some minor localized flooding issues as well as provide an educational purpose to the public. Green infrastructure can help boost the educational awareness of flooding and combined sewer issues within the City. Therefore, a green infrastructure program is included as part of the City's LTCP.

I/I reduction has close to a negligible impact on the City's overall percent capture goal. As stated in the DEAR Report, if a vast I/I reduction program were implemented in the City, it would cost an estimated $11M and increase the percent capture by less than 0.5%. Therefore, the City does not prefer to pursue an I/I reduction program as part of its LTCP but will evaluate specific sections of the collection system, as needed, which are susceptible to I/I and also can correct structural deficiencies of the existing infrastructure.

Tank storage is an effective alternative to assist with increasing the percent capture of the City's combined sewage. Tank storage is scalable depending on the level of control desired and can be built in a variety of methods, i.e. deep vertical shafts or shallow. Storage tanks typically capture smaller and medium size storm events, which are the typical wet weather events observed throughout a typical year. Storage tanks were chosen as a potential alternative for the City's LTCP because of their effectiveness in capturing combined sewage and their reasonable cost per gallon of combined sewage captured compared to other prescreened alternatives.

An additional alternative that the City has selected as part of its LTCP is a stormwater infrastructure project in the Court Street subdrainage area. This project, formerly known as the Court Street Stormwater Project, is now known as the Green Street Combined Sewer Separation Project. Currently, the City suffers from longstanding flooding issues east of Railroad Avenue in the low-lying area bound by Essex Street, South State Street, Division Place, and Green Street. This area is commonly known as the Green Street Area, and it is adjacent to another area of frequent flooding known as the South Newman Street Area. The Green Street Combined Sewer Separation Project involves the construction of a large, dedicated stormwater interceptor and outfall with in-line storage capabilities and a pump station near the Hackensack River. These improvements would drain the Green Street Area as well as a portion of the South Newman Street Area. This project would serve two main purposes for the City: flood mitigation and decreasing the amount of stormwater that would be entering the combined sewer system, ultimately increasing the percent capture. The new stormwater interceptor and outfall will include stormwater quality treatment and adhere to the latest stormwater management rules. The City's goal is to satisfactorily comply with its NJPDES Permit as well as increase the standard of living for its residents in the flood-prone areas. The Green Street Combined Sewer Separation Project was selected by the City as a project for its LTCP, to fulfill its vision of a large-scale stormwater infrastructure project for the Court Street subdrainage area.

Ultimately, the only way for the City to become a non-CSO community is to separate its sewers. However, full sewer separation on a City-wide basis would be an expensive and disruptive method of CSO control. However, small scale partial sewer separation projects can help assist the City with achieving its percent capture goal, assist in mitigating localized flooding, and reduce the quantity of combined sewers in the City. The City has completed five partial sewer separation projects in the vicinity of Main Street and Clay Street, since the initial submission of this report, that will have an impact on the City's percent capture and LTCP. Those projects are as follows:

Main Street Combined Sewer Separation: Contract A – Atlantic St to Mercer St
Main Street Combined Sewer Separation: Contract B – Mercer St to Berry St
Clay Street Combined Sewer Separation: Contract 1 – Park St to Main St
Clay Street Combined Sewer Separation: Contract 2 – Camden St to Outfall
Clay Street Combined Sewer Separation: Contract 3 – Railroad Avenue to Park Street

In addition to the five complete projects, the City also has the Anderson Street Combined Sewer Separation Project ongoing as of July 2024. Beyond these projects, the City will explore additional localized partial sewer separation projects to undergo as part of its LTCP.

7.3.2. Selection Methodology

The City considered water quality findings in the Hackensack River, sensitive areas, effectiveness of CSO reduction control programs from the DEAR Report and special studies, public input, and costs as the main focal points of the selection process.

The summary of the water quality monitoring and modeling findings described in Section 5.5.2 is the basis for the presumptive approach selection for the City. Therefore, the City determined that that first necessary step in the selection process is to select a LTCP that will capture a minimum of 85% of the CSO volume during a typical year per Part IV.G.4.f.ii of the NJPDES permit. The City must increase the CSO percent capture from 68.5% to a minimum of 85% based on the 2004 typical year model simulations. The reduction of CSO volume is the most important criteria for the selection process in order to maintain compliance with the City's NJPDES permit.

7.3.3. Public Input

Public input on the alternatives from SCSO Team Meetings, the City's public presentation, and the online survey was taken into consideration. The most received public input considered was:

- Mitigate longstanding flooding issues within the CSS;
- Reduce CSOs;
- Improve water quality in the Hackensack River;
- Green infrastructure inclusion; and
- Costs

The City understands that public input is an important parameter while selecting a program for its LTCP. The highest concern from the public during the LTCP process was the longstanding flooding issues in areas within the CSS. The City received 32 responses to its online survey. The online survey asked the public specific questions to understand what criteria is most important to the public. The public survey responses were ranked by importance in the following manner:

1. Reduce flooding in Hackensack
2. Reduce the City's combined sewer overflows
3. Improve the water quality in the Hackensack River
4. Install green infrastructure in the City

The City wanted to ensure that the selected LTCP program would assist in flooding issues as well as meet the requirements of the NJPDES permit. The majority of the flooding issues reside within the Court Street subdrainage area. The Green Street Combined Sewer Separation Project is designed to assist with the longstanding flooding issues as well as effectively reduce the volume of CSOs. Therefore, the Green Street Combined Sewer Separation Project is recommended as a priority for the City's LTCP.

7.3.4. Selection of Alternative

Based on the selection methodology described, a multiphase LTCP program that best suits the public and the City has been selected to achieve a minimum of 85% CSO capture. The recommended plan consists of the Green Street Combined Sewer Separation Project, localized partial sewer separation projects, a green infrastructure program and, if necessary, a storage tank near the Anderson Street outfall. The program meets the concerns described in the previous subsections section by:

- Achieving a minimum 85% CSO capture and complying with NJPDES Permit regulations.
- Mitigating longstanding flooding issues within the Court Street subdrainage area by implementing a largescale focused stormwater infrastructure project such as the Green Street Combined Sewer Separation Project.
- Considering the costs of the selected alternatives while maintaining the flooding mitigation issues as a top priority of the LTCP program.

A regional implementation of alternatives approach with the BCUA CSO Group is not recommended for the City. A regional approach was evaluated by the BCUA and included the following options:

- Regulator upgrades
- Interceptor sewer upgrades
- BCUA treatment plant upgrades

The total estimated present worth cost of the regional approach to achieve 85% capture is $490M. Since the Borough of Fort Lee is seeking approval to be hydraulically disconnected from the regional group, this cost would most likely be shared between the City of Hackensack and the Village or Ridgefield Park. Therefore, the regional approach would prove to be less cost effective for the City compared to the local recommended LTCP plan. Additionally, a regional approach does not assist with the City's flooding issues. Finally, sending additional CSO flow to BCUA for treatment would significantly add to the City's annual treatment costs. Detailed information regarding the BCUA regional alternatives can be found in the BCUA DEAR Report and in sections within this SIAR Report.

7.3.5. Cost and Performance Evaluation (Level of Control vs. Costs)

The cost effectiveness of the recommended plan was compared to various size storage tanks that could capture zero to twenty overflows during the typical year. A knee-of-the-curve analysis graph was created for the comparison to verify that the recommended plan was cost-effective. Figure 7-47-47-4: System Wide Knee-of-the-Curve Analysis presents the knee-of-the-curve analysis for the City's recommended plan.

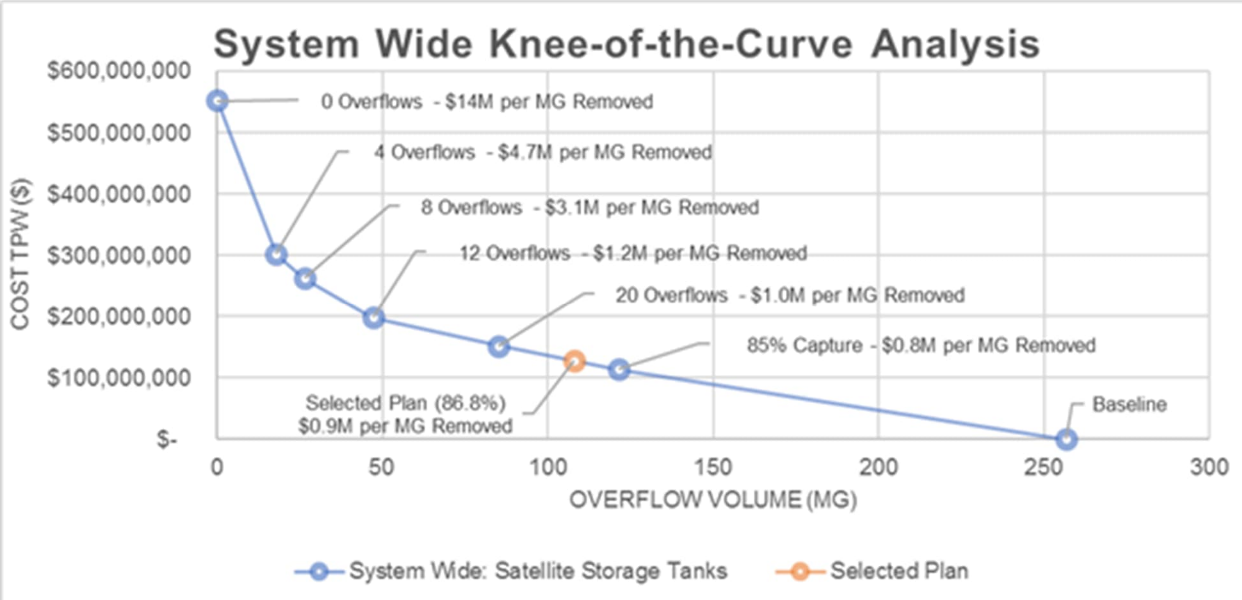


Figure 7-4: System Wide Knee-of-the-Curve Analysis

The knee-of-the-curve analysis indicates that the recommended plan, presented in orange, achieves close to the best percent capture per dollar spent. The other storage alternatives shown on the knee-of-the-curve graph would be more expensive and less cost-effective for the City to implement. The recommended plan is approaching the point at which the curve begins to increase, approximately at the twenty-overflow point, which indicates that the cost per CSO volume removed is still within the effective range. It should be noted that the knee-of-the-curve neglects to incorporate other important non-monetary factors in determining the most effective plan for the City, such as flooding issues.

7.3.6. Selected Plan

Currently, the recommended selected LTCP for the City will consist of a combination of the following alternatives:

- Green Street Combined Sewer Separation Project
- Localized partial sewer separation projects
- Green Infrastructure program
- Storage tank at Anderson Street (as needed)

The following sections further describes details of the City's selected plan.

7.3.6.1. Selected Alternatives Description

The following section presents a detailed description of City's the selected LTCP. Figure 7-57-57-5 presents the City's recommended selected LTCP program.

Localized Partial Sewer Separation Projects:

The City currently has one partial sewer separation project under construction in the area west of the New Jersey Transit Pascack Valley Line Railroad, near the location where the Court Street and Anderson Street subdrainage areas meet. This project is known as the Anderson Street Sewer Separation Project and will drain approximately 22.50 acres of contributing stormwater runoff, some of which is from the Court Street area and some of which is from the Anderson Street area. This project was initially designed to drain the 25-year storm event, however, due to topographic constraints, it was only possible to drain the 10-year storm event without surcharge. This project is considered "partial" sewer separation because it does not account for 100% of the roof runoff, or other unknown internal building stormwater plumbing connections, that may remain connected to the combined sewer system.

Additionally, since the initial submission of this document, the City has completed the construction of five other partial sewer separation projects. These projects all drain stormwater runoff from the Court Street subdrainage area and were sized to be as large as possible given the topographic and subsurface utility constraints. These five projects, their locations, and their drainage areas, are as follows:

Main Street Combined Sewer Separation: Contract A – Atlantic St to Mercer St
  Main St from Atlantic St to Mercer St, and Moore St from Demarest Pl to East Mercer St – 9 acres
Main Street Combined Sewer Separation: Contract B – Mercer St to Berry St
  Main St from Mercer St to Berry St, and East Camden St from Main St to Foschini Park – 27 acres
Clay Street Combined Sewer Separation: Contract 1 – Park St to Main St
  Clay St from Park St to Main St, and Union St from Central Ave to Camden St 12 acres
Clay Street Combined Sewer Separation: Contract 2 – Camden St to Outfall
  Camden St to the Hackensack River via Foschini Park – 0 acres, outfall improvements only
Clay Street Combined Sewer Separation: Contract 3 – Railroad Avenue to Park Street
  Clay St from Railroad Ave to Park St, and Railroad Ave from Passaic St to Clay St – 16 acres

These five projects, as well as the sixth under construction, are the start to the City's LTCP. In addition to these projects, the City will consider undertaking more localized sewer separation projects and construct adequately sized stormwater outfalls during the LTCP. At this time, two projects have been identified, one being the final Clay Street Project, and one being additional sewer separation and stormwater storage near the Hackensack High School. Any additional partial sewer separation project locations and sizes will be developed after submission of the SIAR Report, during the City's LTCP implementation phase.

Green Street Combined Sewer Separation (Stormwater) Project:

The Green Street Combined Sewer Separation Project was the result of the Court Street Stormwater study that the City began in 2019 just after the submission of the DEAR Report to examine problematic flooding issues in certain areas. This study evaluated different alternatives, conceptual designs, and cost estimates for the management of stormwater both east and west of Railroad Avenue in the Court Street Subdrainage Area. This area is notorious for flooding during rainfall events and has been a longstanding issue for City residents. The goal of this study was to provide the City with a feasible and economical conceptual design that would alleviate the flooding problems in this area. As the study was taking place, it quickly became apparent that this project also could positively impact the City's CSS and assist with the LTCP.

The stormwater concepts were implemented into the City's CSS PCSWMM model and initially evaluated for the hydrologic and hydraulic impacts of a 25-year storm. The conclusion of the study recommended a dedicated stormwater interceptor sewer system with in-line storage in the vicinity of Railroad Avenue and a pump station located near a new stormwater outfall. The outfall would likely be located at the Costco Lot along the Hackensack River. The stormwater project would be able to drain approximately 200 acres of area primarily east of Railroad Avenue, but some from the west as well. The stormwater system would be designed for a 25-year storm event to the greatest extent possible, at high tide with a sea level rise increase projected for the year 2050 to account for estimated climate changes. The in-line storage would be capable of storing approximately 1.5 MG of stormwater, and the pump station near the outfall would be capable of pumping approximately 190 MGD. Figure 7-7-6 presents the conceptual alignment and size of the recommended system. This recommended project was then implemented into the City's LTCP selected plan model and further evaluated for the 2004 typical year rainfall.

As previously noted, one of the main points of the public input during the public participation outreach was the concern to address long-standing flooding issues within the City. By undertaking the Court Street Stormwater Study, the City intends to create a project that assists in mitigating a City specific flooding issue as well as assists with the CSO reduction requirements in the City's NJPDES permit. This project could also serve as the beginning of sewer separation for the problematic Green Street and South Newman Street areas and potentially for other nearby areas of the City. There are many variables regarding the logistics of this project that must be determined prior to committing to a specific location and size of project. Please note that the pipe sizes, pump station, and project alignments are subject to change during detailed design.

Green Infrastructure Program:

Through SCSO Team meetings, it was understood that green infrastructure, although providing minimal CSO reduction impact, was an important aspect of the public input. Therefore, the City intends to include a green infrastructure program within its selected plan. The green infrastructure program will set aside a specific amount of funds, including grant funding, per year of the LTCP implementation that will be allocated towards a green infrastructure program. Currently, it is estimating that those funds will be approximately $100,000 per year. The green infrastructure program would allow for the City to create and implement an ordinance to require developers to install, operate, and maintain green infrastructure as part of their developer agreement. The other function of the green infrastructure program is to serve as an educational program for the public. The program could offer:

- Localized benefits of stormwater management and aid in flooding mitigation
- Public awareness of the impact of CSOs and impervious coverage on the environment (i.e. City rain barrel program or seminars).

Potential green infrastructure sites and technologies, in addition to the identified locations as part of the Rutgers Study, will be further evaluated, designed, and installed during the LTCP as it is crucial to perform feasibility studies and subsurface soil testing prior to design and construction.

Storage Tank at Anderson Street:

The CSOs from the Anderson Street subdrainage area discharge to Outfall 001A. As the LTCP selected plan currently stands, a storage tank upstream of Outfall 001A may be required to achieve a minimum 85% system-wide capture in the City. The storage tank would have a storage capacity of approximately 0.85 MG. The tank can either be a deep vertical treatment shaft, 60 feet diameter by 40 feet deep, or a more conventional type of underground storage tank, 70 feet wide by 70 feet long by 23 feet deep. The current site for the storage tank would be underneath the parking lot near Johnson Park, across Anderson Street from Outfall 001A and the screening facility. The parking lot would still be accessible by the public after construction of the storage facility. Some of the items that the storage facility would require are:

- Storage tank to store the CSO volume during wet weather events
- A diversion structure to divert the CSO flow to the storage tank
- Tank flushing system to clean the bottom of the storage tank

- Dewatering pumping system to pump back the stored flow to the BCUA
- Odor control units to reduce the amount of odor caused by CSO flow in the storage tank
- Back-up generator system to ensure the facility can operate at all times

The size and necessity of a storage tank will be reevaluated after the first phases of the City's LTCP are implemented. This is further explained in Section 10.3.

G:\Projects\R15009-Y24\CAD\WIP\Concepts\15009.Y24 Projects Exhibit.dwg Wed, Jul 10, 2024 - 3:55pm slogue SUBURBAN CONSULTING ENGINEERS, INC.

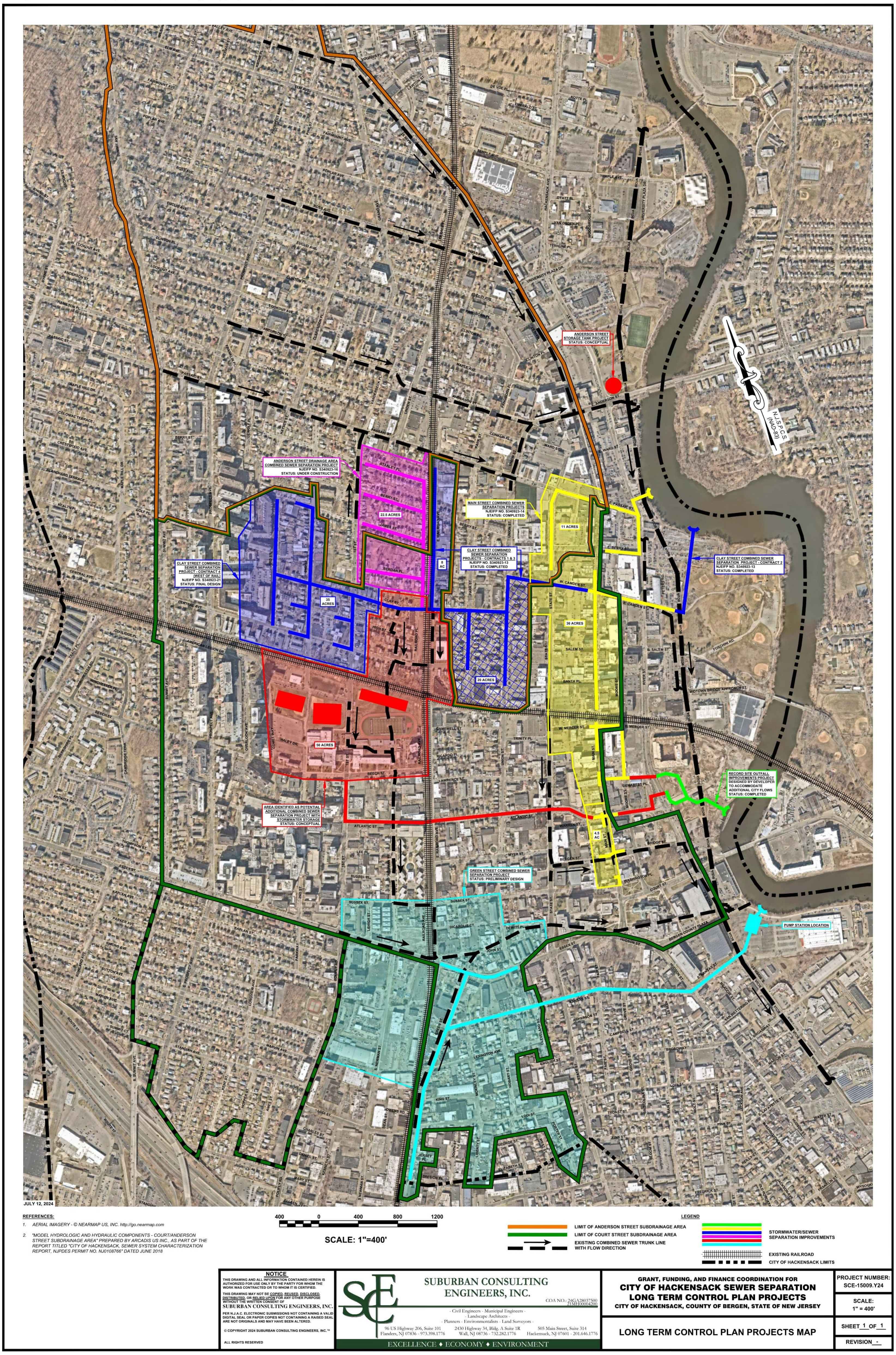


Figure 7-5: Recommended Selected LTCP Alternative

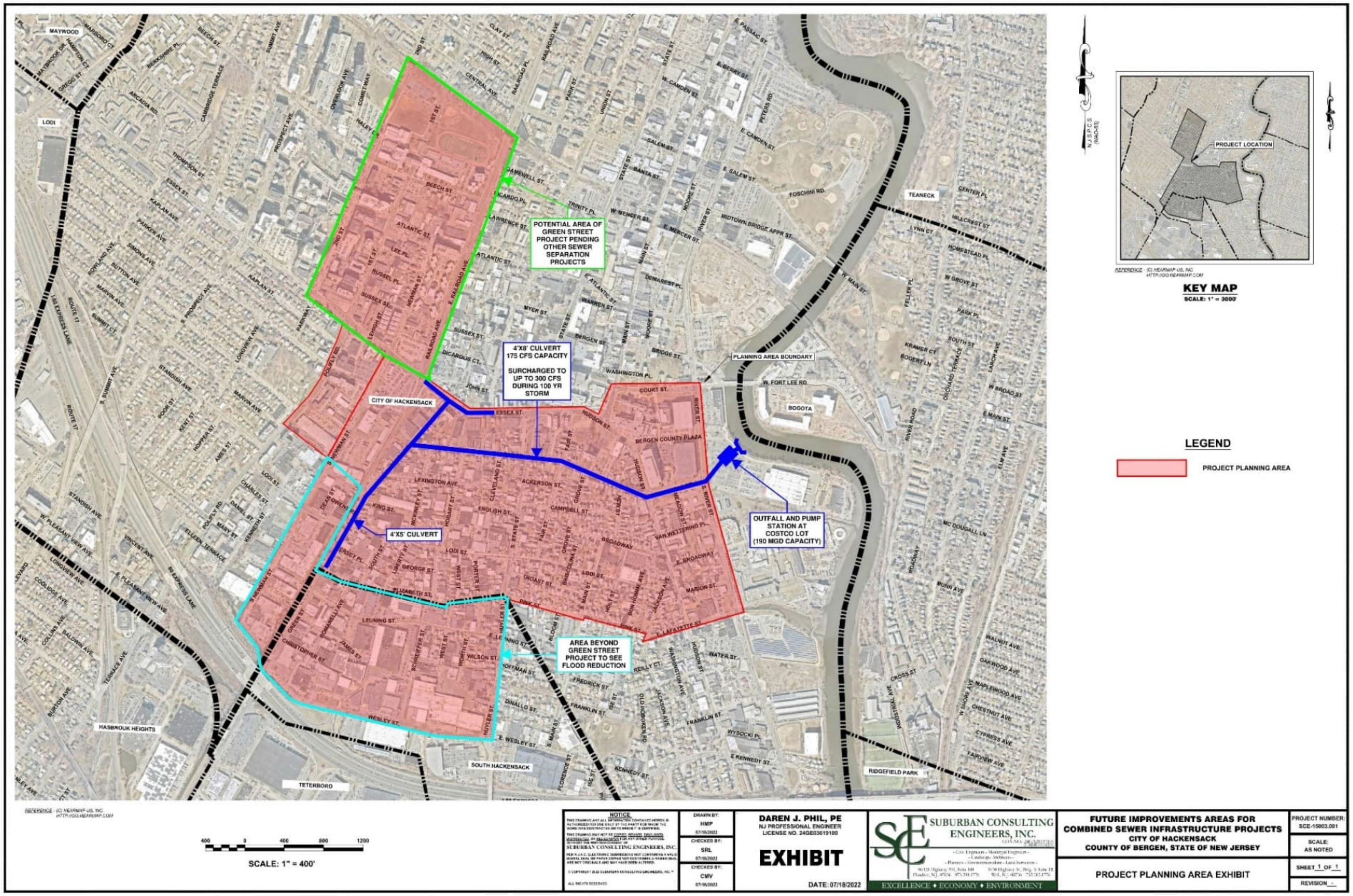


Figure 7-6: Green Street Stormwater Project Conceptual Alignment

7.3.6.2. Selected Plan Institutional Issues

Institutional issues pertain to factors and influences from various organizations, or other special interest groups that may have significant impacts on the success or failure of a given project. Regulatory compliance and permitting requirements are other important institutional issues regarding the City's selected plan. The following is a list of known institutional issues surrounding the City's selected LTCP:

- Real estate: The City has a successful real estate market. If the LTCP requires land acquisition, those alternatives may be less favorable than alternatives that can be placed in public right-of-way or easements.
- Special Interest Groups: Groups such as, but not limited to, NJ Futures and the Hackensack Riverkeeper could have influence and input that should be considered during the design and implementation of the LTCP.
- BCUA Coordination: Coordinate storage CSO discharge rates with the BCUA to ensure the specified capacity is not exceeded.

The following is a list of known permits that would be involved to implement the City's selected LTCP:

- Issuance of NJDEP Waterfront Development permits.
- NJDEP Stormwater Discharge – Tier A Municipal Stormwater Permits (MS4s).
- Issuance of Local permits (i.e. municipal and county).
- Soil Conservation District permits.
- NJ Transit: The City will need to construct pipe underneath the NJ Transit railroad.

7.3.6.3. Selected Alternatives Performance

Table 7-27-2: City Wide LTCP Selected Plan Performance presents the performance of the City's selected plan for overflow volume and percent capture on a City-wide basis:

Table 7-2: City Wide LTCP Selected Plan Performance

<table>
<tr><th>Condition</th><th>Volume Description</th><th>City Volumes (MG)</th><th>City Overflow Frequency</th><th>City Percentage of CSO Volume Captured (%)</th></tr>
<tr><td rowspan="3">Baseline Condition prior to LTCP Implementation</td><td>Total Wet Weather Volume</td><td>814.8</td><td rowspan="3">56</td><td rowspan="3">68.5%</td></tr>
<tr><td>Wet Weather Overflow Volume</td><td>256.7</td></tr>
<tr><td>Volume Captured to BCUA</td><td>558.1</td></tr>
<tr><td rowspan="4">Recommended Selected Plan</td><td>Total Wet Weather Volume</td><td>814.8</td><td rowspan="4">30</td><td rowspan="4">86.8%</td></tr>
<tr><td>Wet Weather Overflow Volume</td><td>108.0</td></tr>
<tr><td>Volume Captured to BCUA</td><td>550.7</td></tr>
<tr><td>Stormwater Volume Separated</td><td>156.1</td></tr>
</table>

Table 7-37-3: Phased LTCP Selected Plan Alternatives Performance presents the performance of the City's selected plan for overflow volume, frequency, and percent capture on an outfall basis per each recommended phase of the selected plan implementation. Note, the total "captured" flow is the combination the amount of CSO flow capture and sent to BCUA. The total "separated" flow is the amount of stormwater flow separated from the City's LTCP projects. The total "captured" and "separated" flow is what is included in the percent capture calculation for the LTCP.

Table 7-3: Phased LTCP Selected Plan Alternatives Performance

Condition / Phase of LTCP	Outfall	City Overflow Volume (MG)	City Volume Captured to BCUA (MG)	City Storm water Volume Separated (MG)	City Overflow Frequency	City Percentage of CSO Volume Captured (%)
Baseline Condition prior to LTCP Implementation	Outfall 001A	105.3	162.3	N/A	56	60.7%
	Outfall 002A	151.4	395.8	N/A	56	72.3%
	Total System	256.7	558.1	N/A	56	68.5%
Localized Main Street Sewer Separation Projects	Outfall 001A	105.3	162.3	N/A	55	60.7%
	Outfall 002A	132.7	390.1	24.4	52	75.7%
	Total System	238.0	552.4	24.4	56	70.8%
Localized Main Street Sewer Separation Projects + Green Street Combined Sewer Separation Project	Outfall 001A	105.3	162.3	N/A	55	60.7%
	Outfall 002A	37.5	353.6	156.1	23	93.1%
	Total System	142.8	515.9	156.1	56	82.4%
Full Recommended Plan: Localized Main Street + Clay Street Sewer Separation Projects + Green Street Combined Sewer Separation Project + Anderson Street Storage Tank	Outfall 001A	70.5	197.1	N/A	30	73.6%
	Outfall 002A	37.5	353.6	156.1	23	93.1%
	Total System	108.0	550.7	156.1	30	86.8%

The values shown in the tables above indicate that after implementation of the City's recommended LTCP program, CSO volume in a typical year would be reduced from an estimated 256.7 MG to 108.0 MG. That is a total decrease of 148.7 MG of CSO volume. The recommended LTCP program model results indicate that a minimum of 85% capture would be obtained with the LTCP implementation.

7.3.6.4. Adaptive Management and Flexibility

This LTCP is based on projected conditions and modeling. The City's recommended LTCP is flexible and adaptable to changes during the implementation of the program. Changes over the 30-year period, such as this LTCP, may be deemed necessary based on the unforeseen circumstances that will occur over an extended period of time, such as a 30-year implementation period. The green infrastructure, partial localized sewer separation projects, Green Street Combined Sewer Separation Project and Anderson Storage Tank can be implemented in phases that could change over time. Based on these unknowns the recommended LTCP will also address permit section G.4.g.iv, where it "...allows for cost effective expansion or retrofitting if additional controls…" are needed in years to come. Additionally, the future requirements of the City's MS4 permits may also impact the City's LTCP.

7.3.7. Environmental Justice

No environmental justice issues are anticipated with the City's LTCP. Ultimately, the work will result in an overall reduction of pollution and flooding within the City. Construction will take place throughout the City in various streets within the CSS amongst various demographics. The location of the construction is not anticipated to adversely impact any specific community or commonly used public locations. In fact, the construction will be strategic to assist with flood mitigation and partial sewer separation in locations it will improve the quality of life in the City.

7.3.8. Opinion of Cost for LTCP

Table 7-47-4: LTCP Opinion of Probable Cost presents an opinion of probable construction cost including total capital cost, annual O&M, and total present worth (TPW) for each phase of the LTCP program. All of the costs except for the ongoing partial sewer separation projects and green infrastructure program were computed by utilizing the Updated Guidance on Costing for LTCP CSO Planning Memo from PVSC dated April 8, 2020. An additional 25% contingency was added to the LTCP projects due to unknowns during construction such as soil remediation, which has been an issue in the past in the City. The ongoing partial sewer separation projects have opinions of probable cost computed by the design engineer of the projects. The green infrastructure program is based on funding of up to $100,000 per year with an O&M cost based on an estimated 30 acres of GI treatment installed during the LTCP implementation.

Table 7-4: LTCP Opinion of Probable Cost

Description	Estimated Quantities	Units	Unit Cost	Total
Partial Sewer Separation OPCC: Main Street Sewer Separation Costs + Outfall Extension Estimate				
Total Capital Cost	N/A	N/A	N/A	$ 12,300,000
Estimated Equivalent Annual Financing Cost (EUAC)				$ 800,000
Court Street Stormwater Project				
8 ft by 10 ft Box Culvert including Installation	0.56	MG	$ 20,080,000	$ 11,000,000
10 ft by 10 ft Box Culvert including Installation	0.89	MG	$ 18,530,000	$ 16,000,000
New Storm Pipes including Installation (7 ft)	1,187	FT	$ 3,600	$ 4,000,000
New Storm Pipes including Installation (8 ft)	3,047	FT	$ 4,500	$ 14,000,000
RR Crossing Pipes	100	FT	$ 7,800	$ 1,000,000
RR Crossing Pits	2	EA.	$ 129,400	$ 300,000
Pump Station including Installation	1	EA.	$ 19,342,900	$ 19,000,000
Total Capital Cost (includes 25% City specific contingency)				$ 66,000,000
Operation Pump Station				$ 240,000
Maintenance Pump Station				$ 770,000
Annual O & M Cost				$ 1,000,000
Total Present Worth				$ 81,000,000
Estimated Equivalent Annual Financing Cost (EUAC)				$ 5,400,000
Anderson Street Storage Tank				
Tanks including Installation	0.8	MG.	$ 18,690,000	$ 15,810,000
Total Capital Cost (includes 25% additional contingency)				$ 19,800,000
Land Use	0.22	AC.	$ 2,930,000	$ 640,000
Storage O & M Cost				$ 640,000
Annual O & M Cost				$ 640,000
Present Worth O & M Cost				$ 9,700,000
Total Present Worth				$ 30,000,000
Estimated Equivalent Annual Financing Cost (EUAC)				$ 2,000,000
Green Infrastructure Program				
30 Year Program ($100,000/year)	1	QTY	$ 3,000,000	$ 3,000,000
Annual O & M Cost	30 (assumed)	AC.		$ 70,000
Present Worth O & M Cost				$ 1,100,000
Total Present Worth				$ 4,100,000
Estimated Equivalent Annual Financing Cost (EUAC)				$ 300,000
Entire LTCP Program Total Present Worth				**$ 127,700,000**

*20 years life cycle costs for operation and maintenance with an interest rate of 2.75% for present value calculation (P/A = 15.227)

*Note that the Court Street Stormwater Project is now referred to as the Green Street Combined Sewer Separation Project.

The TPW assumes a 20-year life cycle cost for O&M with an interest rate of 2.75% (P/A = 15.277). The estimated equivalent annual uniform financing cost (EUAC) also assumes a capital recovery calculation with an interest rate of 2.85% with a loan term of 20-years, based on recent bonds utilized by the City. It should be noted that recent NJ I-bank interest rates are estimated around 1%. However, these can rates fluctuate on a yearly basis. The TPW of the recommended LTCP is estimated at $127,700,000. The total capital cost of the recommended LTCP is estimated at $101,100,000.

7.4. Ridgefield Park Selected Alternative

7.4.1. Summary of High Ranked Alternatives

Six control programs were evaluated in the DEAR. These alternatives were ranked as summarized in Table 6-266-26. The top three ranked alternatives were Consolidated Storage Tanks, Tunnel Storage and Consolidated End-of-Pipe treatment, with scores of 4.0, 3.5 and 3.6 respectively. This subsection discusses these high ranked alternatives and how the LTCP was narrowed down to the use of a particular technology. It is noted that outfalls are clustered into two sets of outfalls, those discharging to the Overpeck Creek (RP-001A and RP-002A) and those discharging to the Hackensack River (RP-003A, RP-004A, RP-005A, and RP-006A). There were no isolated bottlenecks identified in the system and the clustered discharge points are similar, therefore while many technologies and control programs were considered and approaches that consist of combinations of technologies applied to different locations is not likely to provide a superior outcome.

Tank storage and tunnel storage are functionally similar; however, tunnels carry a greater cost, increased technical challenges for design, construction and maintenance. Accordingly, tanks were chosen in favor of a tunnel as the preferred storage alternative and tunnels were eliminated from further consideration.

End-of-pipe treatment was the second ranked alternative. It offers scalability, in that it can be sized to provide any desired level of control. However, end-of-pipe treatment is more expensive, both to construct and to operate. There are also concerns that the regulatory requirements on the discharge from the end-of-pipe treatment may be subject to numeric limits in the future. The maintenance and operation of end-of-pipe is more complex than tanks, there is more mechanical equipment which creates more opportunities for failure. The end-of-pipe system also require chemicals and disposals of residuals. Currently, the Village of Ridgefield Park sewer system operates entirely by gravity and transitioning to maintaining and operating complex equipment with chemical addition, and sampling requirements will be challenging. According, the Village determined that it would prefer to eliminate end-of-pipe treatment from the LTCP.

Regional alternatives were evaluated in light of the analysis performed by the BCUA. The Village must eliminate approximately 21 MG over overflow volume in the typical year. If the Village were to act in concert with the City of Hackensack to eliminate the required 155 MG to reach 85% capture, the estimated cost per gallon of CSO reduction would be about $2.80 based on Table 6-126-12. This would make the Village's share approximately $60M which is not cost competitive with other alternatives. Therefore, sending additional flow to the BCUA LF WPCF was eliminated from consideration.

Tanks storage is the remaining and preferred technology to apply to the LTCP. It is scalable to provide any desired level of control. Storage is most effective for smaller and medium sized events, because the tank fills to capacity frequently. As higher levels of control are attempted with larger storms the tank increases in size, but the additional volume is utilized less frequently. Since the level of control (85% capture) targets volume reduction but allows overflow for higher return period storms, tanks are effective at efficiently providing the selected level of control.

While not initially high ranked in the DEAR, sewer separation is being considered due to funding opportunities, and other Village infrastructure needs, as well as the minimal operational and maintenance requirements, which are consistent with the current DPW's responsibilities and capabilities.

7.4.2. Selection Methodology

The selection process started by evaluating the gap between the existing level of control and the 85% capture level of control targeted by the presumptive approach. As previously shown in Table 5-45-4, to achieve 85% control the Village must reduce its overflow volume to 32.4 MG for the Typical Year.

The existing attainment of water quality standards was also considered. The Overpeck Creek is SE-2 where the combined sewers discharge and achieves compliance about 50% of the time (Table 5-35-3) with only a slight improvement if all CSO discharges were completely eliminated. The CSO discharges to the Overpeck Creek are among the smaller discharges by volume and frequency. Upstream of the confluence with the Overpeck Creek, the Hackensack River is SE-1 and consistently fails to attain pathogen water quality standards, due to background sources. Under existing pollutant loads to the Hackensack River the elimination of the CSO discharges would not increase attainment of water quality in the Hackensack River. Nevertheless, if background pollution sources were reduced, the impact of the CSO discharges would be more pronounced. Thus, it was determined that the CSO LTCP would focus on reducing the volume of overflow into the SE-1 portion of the Hackensack River. Since the Hackensack River is tidal, the loading from the CSO is carried both upstream and downstream. There are also no identified sensitive areas. Thus, the reduction of the total discharge volume is more important than reducing overflows at a specific location. The impacts of CSO are episodic where the impacts are driven by short durations of discharges of pathogens at high levels relative to the standards. Accordingly, the LTCP facilities will be focused on the highest frequency and highest volume outfalls, which are RP-003A and PR-004A.

7.4.3. Public input

The public input on the alternatives was taken into consideration as detailed in Section 6.4.5. Presentations were made at two SCSO Team meetings; Meeting #10 on February 5, 2020 which presented the process by which the alternatives were narrowed down and Meeting #11 on July 30, 2020 which presented the tentatively selected LTCP. The Village also included an article in its March 2020 Newsletter (Volume 37 Number 1 https://www.ridgefieldpark.org/home/news/village-newsletter-march-2020) about the alternatives. The article included a contact email for comments to be sent to and invited the residents to a public meeting. Initially, a public meeting was scheduled for May 26, 2020, however this was canceled due to the pandemic. Input was solicited via a video posted on the Village website. The video included a contact email and phone number for residents to provide comments. It also announced a hearing which was held on September 29, 2020. Input from the public outreach relating to the LTCP selection is summarized below. Full copies of meeting minutes, presentations and Newsletters are included in Appendix E.

Meeting #10 February 5, 2020

- Resident Comment: Costs need to be ranked highly as they will be of great interest to the residents.
- Resident Comment: We are concerned about the potential impact of future regulations.
- Resident Comment: It looks like Program #2 (Consolidated Tanks) is the best candidate.
- 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.

- 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.

- 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.

- Resident Comment: According to preliminary estimates, complete sewer separation is a costly alternative. It will also require additional measures to address stormwater quality.

- 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.

- 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.

Meeting #11 July 30, 2020

- Question: Will the surface restoration of storage tank in Ridgefield Park would look like the one shown in the presentation.

  Answer: The project team responded that this would depend on what the Village decides. 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.

- Question: Would it be possible to extend the implementation over a longer period of time?

  Answer: The schedule is conservative, but extending it could be explored.

- Question: Why does removing CSOs not achieve water quality standards.

  Answer: The project team 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, and other pollutant sources exceed those limits.

- Question: Is surface runoff a contributor to water quality and would the tanks also capture surface water. Is the Village also accountable for controlling surface water?

  Answer: 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. It was 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.

Public Meeting September 29, 2020

The Village held a meeting open to the public on September 29, 2020. While the meeting was advertised no members of the public attended and there were no comments.

Additional comments received from the public, if any, will be incorporated into the report in the future as part of any revisions/response to comments from NJDEP.

7.4.4. Selection of Alternatives

Based on the above, a consolidated tank was selected to address overflows at RP-003A and PR-004A, to achieve 85% capture. This meets the requirements established by the previous sub-sections through the following:

1. Costs have been minimized by selecting the lowest cost technology, which is tanks. By addressing two outfalls rather than all four on the Hackensack River or all six CSO outfalls, costs have been reduced by reducing consolidation piping. By sizing the tank to provide 85% capture by volume, costs are saved versus electing to control to a given number of overflows. By addressing the highest frequency outfalls, the tank is utilized more frequently increasing its CSO reduction efficiency.
2. The location is an industrial area with minimal impact to the residents or businesses, as requested by the public. The tank is largely underground and will have minimal visual impacts and the operation of the existing business will be able to continue with minimal loss of space.
3. By addressing the outfalls with the highest overflow frequency, the greatest reduction of Village-wide overflow frequency is achieved.
4. Reductions are focused on the SE1 portion of the Hackensack River, which has higher water quality standards.

Sewer separation will proceed in parallel with the CSO storage tank planning and will be regularly evaluated to determine if the size of the tank can be reduced or eliminated. Sewer separation aligns with other Village priorities such as road reconstruction. By coupling sewer separation with road reconstruction projects, costs are reduced because the roadway restoration costs would already have been allocated to the roadway reconstruction. The current Ridgefield Park sewer system is entirely gravity driven which is reliable and efficient from a maintenance perspective. Retaining a purely gravity driven system would be a great benefit to the Village's DPW staff, rather than owning and operating/maintaining a pumping station, flushing system and odor control system which would be associated with a CSO storage tank. Planned updates to the Stormwater Management Rules may influence the viability of sewer separation as a means to reduce or eliminate the storage tank.

Sewer separation would consist of the following basic steps:

- Village-wide CCTV inspection of the existing combined sewers to identify service connections and to assess the overall condition of the sewers.
- Planning to determine the feasible extent of the proposed sewer separation.
- Survey of the combined sewers as well as other utilities and topographic features.
- Field investigations to determine if any roof leaders or area drains are connected to the combined sewer system.
- Design of the sewer separation, including any rehabilitation or lining of the existing combined sewer to reduce I/I.
- Completing the permitting and funding process.
- Construction of the new storm sewer, outfall and green and gray stormwater infrastructure as required under the Stormwater Management Rules current at the time of the project.
- Monitoring and modeling to verify performance and Typical Year CSO volume reduction and percent capture.

7.4.5. Cost and Performance Evaluation (Level of control vs. costs)

To achieve the selected level of control of 85% capture, a 0.7 MG tank is required to address overflow from Outfall RP-003A and RP-004A. The cost effectiveness of the recommended alternative was tested to see if additional benefits could be achieved at a low cost by expansion of the facilities. Figure 7-77-77-7 shows a plot of additional cost per gallon of CSO reduction versus different size tanks. The knee of the curve occurs at a tank size of 0.25 MG. Thus, it was necessary to go beyond the knee of the curve to meet the water quality objectives. Increasing the project scope to achieve additional reductions could only be done so with diminishing returns. Noting that financing opportunities, particularly principal forgiveness opportunities available for limited timeframes may make sewer separation, which can be planned, designed and executed more quickly than the tank, a more financially viable alternative.

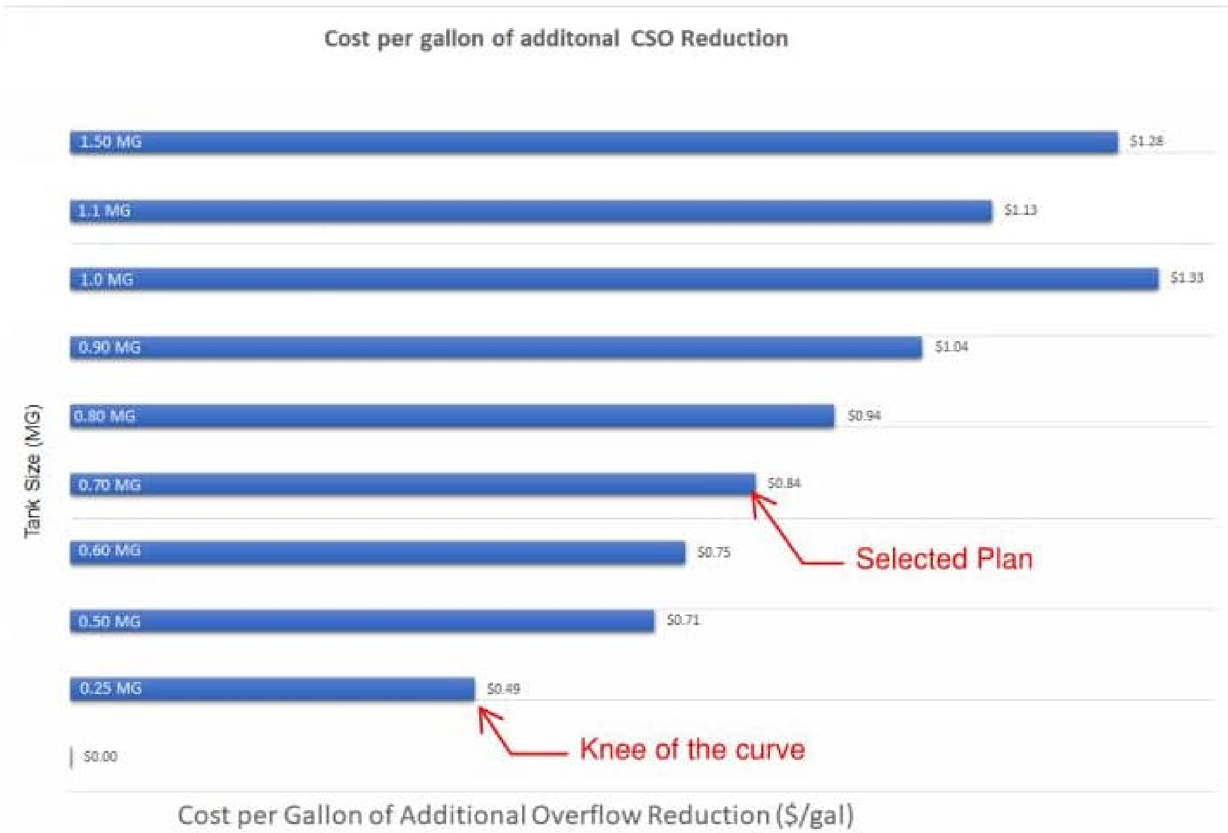


Figure 7-7: Incremental Cost per Gallon of Additional CSO Reduction (Construction Costs)

7.4.6. Selected Plan

7.4.6.1. Selected Plan Facilities

The initially selected plan was a CSO storage tank, estimated at 0.7MG, to increase the percent capture of CSO volume from the Village to 85% by capturing overflows from outfall 003A and 004A. A potential location of the initial facilities is depicted in Figure 7-87-87-8 and Figure 7-97-97-9.

Sewer separation, progressing in tandem with CSO storage tank planning, will be pursued to reduce the size of or eliminate the storage tank. The bulk of the costs for the CSO storage tank are 10 years in the future when construction begins. This long-time horizon increases uncertainty which increases risk. The

Village has opportunities to fund sewer separation in the short term that make it more feasible and less financially risky than projects planned well into the future. Therefore, as there is opportunity, the Village intends to use available funding and to coordinate sewer separation with other Village projects to reduce or eliminate the CSO storage tank. Depending on the degree of tank size reduction that is feasible, its location and the routing of consolidation conduits may change. A potential series of sewer separation projects sufficient to achieve 85% capture is shown in Figure 7-107-10.

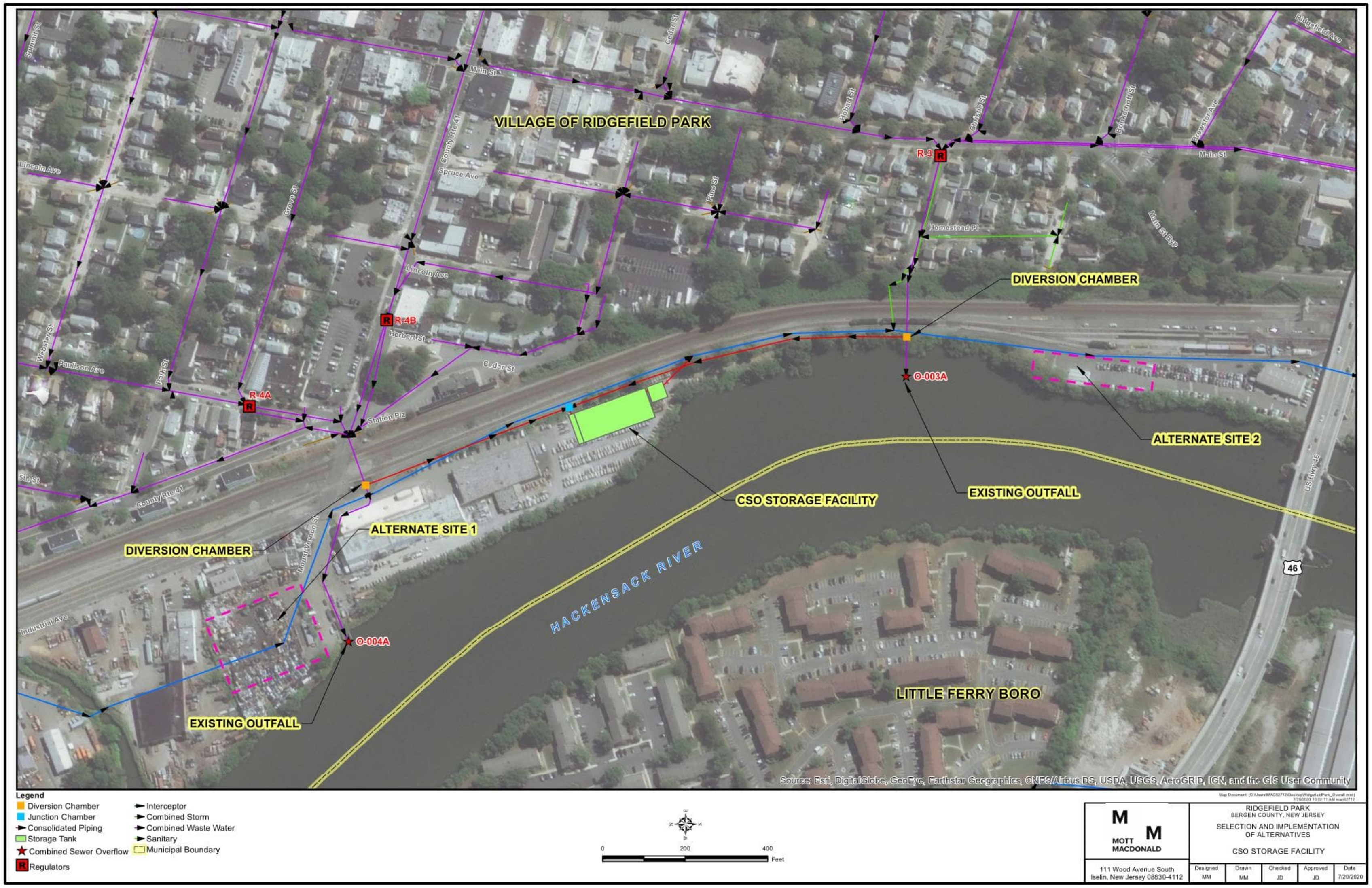


Figure 7-8: Alternate Selected Plan Overview

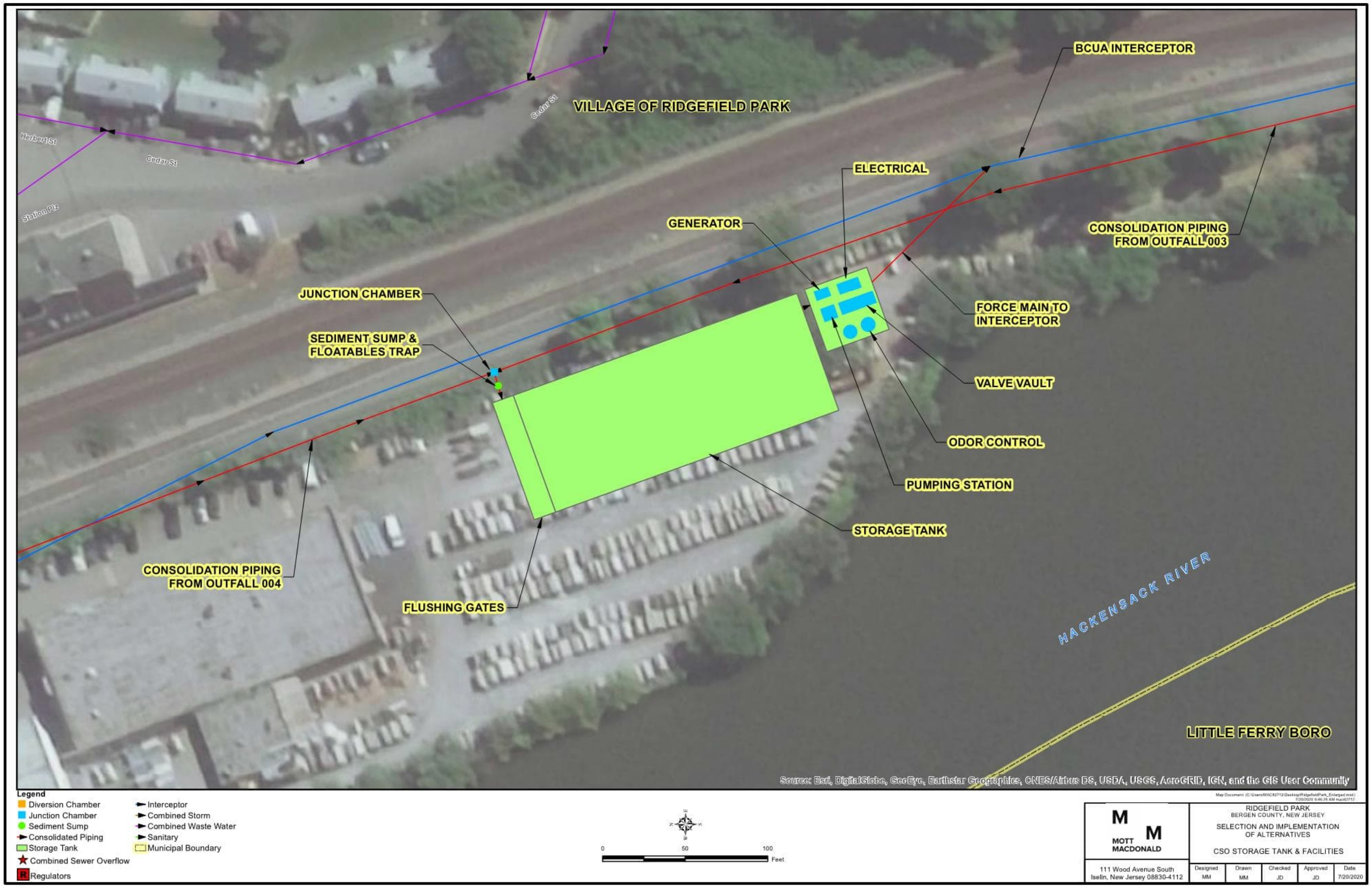


Figure 7-9: Alternate Selected Plan Site

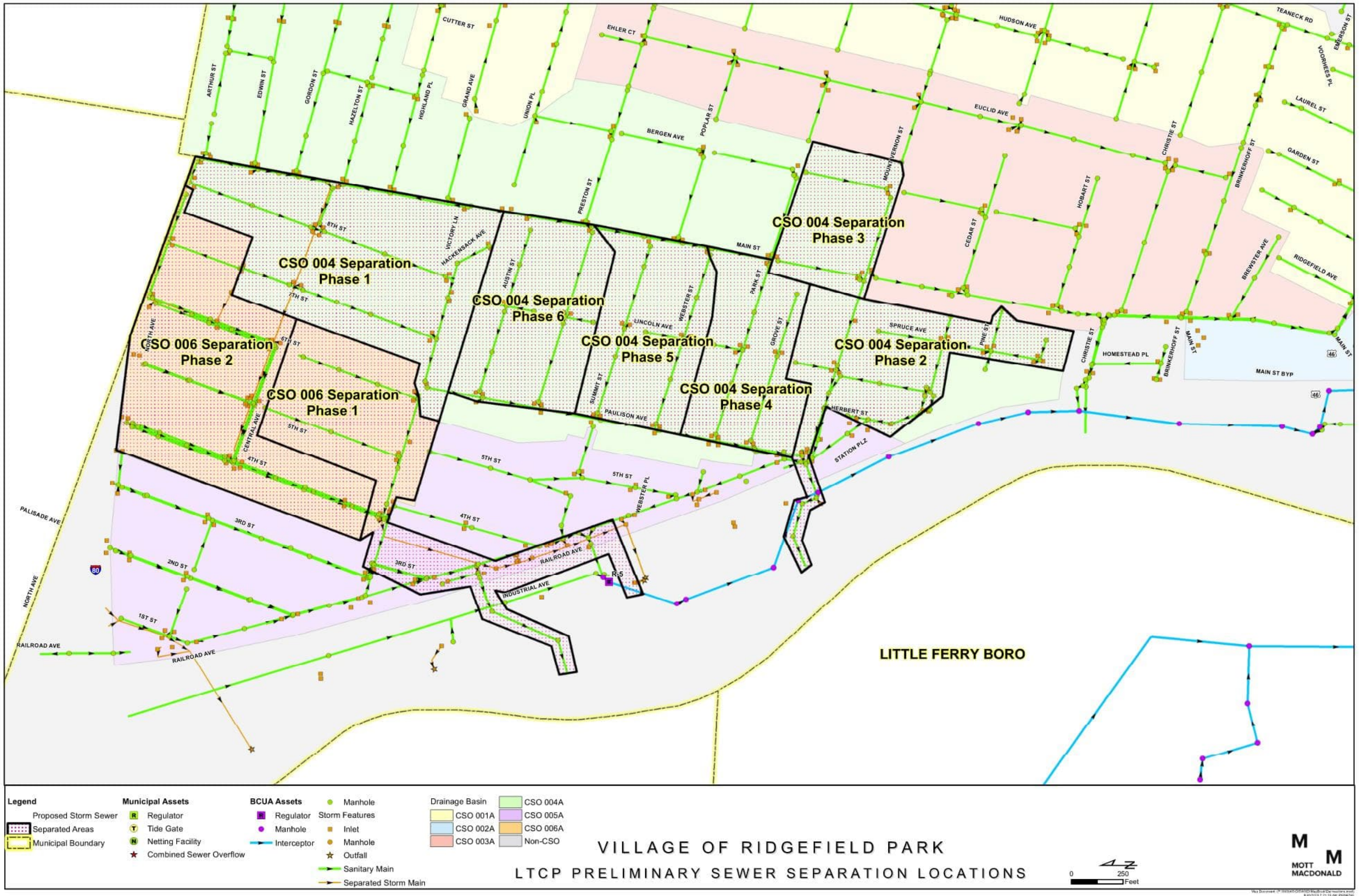


Figure 7-10: Sewer Separation Projects to Achieve 85% Capture

As previously noted in Section 6.4 it was determined that under current conditions that the CSO flows from Outfall 006A could not be diverted to Outfall 005 without considerable upgrades to the combined sewers downstream of the regulator. Regulator 006 was constructed by the Village approximately twenty-five years ago to divert dry weather flows to Regulator 005 when it was determined that, what was thought to be a separate storm sewer was creating dry weather discharges to the receiving waters. Nevertheless, the Village had undertaken, at some expense in the past, what was to have been a sewer separation project in the region. Accordingly, as part of the feasibility study to be undertaken prior to implementation of the Village's LTCP we recommend including, but not necessarily limited to, internally inspecting the separate storm sewers tributary to Regulator 006, to determine the number of households contributing dry weather flow to the sewer and to evaluate the feasibility of diverting these connections into the existing and immediately adjacent combined sewer system. If feasible and cost-effective the diversion of these flows would allow for the abandonment of Regulator 006, the ability to transform Outfall 006A to a separate storm sewer connection to the receiving waters, and provide the potential of decreasing the size of the storage tank needed to obtain 85% removal of CSO flows to the Hackensack River.

In addition, the east side of Ridgefield Park has been partially separated and is tributary directly to the BCUA Ridgefield Park Trunk Sewer just upstream of Overpeck Creek. Monitoring and modeling conducted as part of the LTCP program indicate that under high rainfall conditions that this direct sewer connection absorbs most of the flow capacity within the Trunk Sewer, thus leaving little capacity for wet weather flows from the upstream regulators. It is currently suspected that some of this wet weather flow is coming from direct stormwater connections on private property to the BCUA Branch Trunk Sewer and Village sewers. Accordingly, it is also recommended that, as part of the feasibility study that the Village undertake smoke testing of the east side sewers directly tributary to the BCUA Ridgefield Park Branch Trunk Sewer to evaluate the feasibility and cost-effectiveness of eliminating direct stormwater connections in an effort to reduce peak flows from the region and thus provide additional Trunk Sewer capacity to service the upstream CSO regulators. The feasibility study will also evaluate whether the volume of offline storage required to achieve 85% removal of CSO discharges can be modified.

The selected plan, pending reductions or modifications from other planned sewer separation projects, thus consists of:

- Outfall 006A – the completion of a feasibility study of the combined sewer upstream of Regulator 006 to determine the means and cost-effectiveness of diverting dry weather sanitary flows from the storm sewer to adjacent combined sewers and thus completing the sewer separation previously undertaken by the Village. If feasible, Regulator 006 would be abandoned and Outfall 006A will be converted to a separate storm sewer outfall.
- A feasibility study will be conducted on the combined sewers servicing the east side of Ridgefield Park to determine whether there are any direct stormwater connections that could be cost-effectively diverted to separate storm sewer connections.
- Sewer separation investigation and phased projects where feasible.
- Two diversion structures to divert flow from Outfalls 003A and 004A.
- Consolidation piping from the diversion structures to the tank. Consolidation piping sizes are estimate to be 24-36" diameter, with a total length of approximately 1,500 feet.
- Grit and solids/floatables pretreatment
- A 0.7 MG CSO storage tank, which may be precast or cast-in-place depending on the layout and site conditions. (The size of the tank may be modified or eliminated after completion of the above referenced direct connection investigations and sewer separations.)
- Tank flushing system, which may consist of flushing gates, tipping buckets or some other system.
- A dewatering pumping station.
    - The pumping station will be sized to dewater the tank in 48 hours.

  - As coordinated with the BCUA, the controls will be connected to the BCUA SCADA system to prevent dewatering when plant flows exceed 115 MGD to protect plant operations.
  - The controls will also be connected to the water level in the BCUA interceptor to minimize surcharge of the interceptor.
- Odor control units to reduce odors from sewage. Typically, these would be granular activate carbon filters, but other systems may be employed.
- Emergency generator – While the performance of the tank would generally not be impacted by a power failure during a given storm a generator will provide reliability and the potential for back to back storms.

The proposed CSO Storage Tank site lies within the floodplain of the Hackensack River which is tidally controlled. All electrical equipment and mechanical equipment that could be impacted by flooding will need to be elevated or floodproofed. Compliance with floodplain requirements would be accomplished within current standards at the time of design, including are requirements related to projected sea level rise.

7.4.6.2. Selected Plan Site

The preferred sewer separation sites are shown in Figure 7-10, pending the success of sewer separation the tank, if needed will be implemented. Four potential tank locations were identified to site the CSO storage tank, see Figure 7-87-87-8. Conceptual plans were developed for the site that offered the shortest consolidation piping runs. The site indicated is a storage yard for stone associated with the Marble.com facility located to the north. It is estimated that the construction footprint will be about 0.75 acres, with the final facilities occupying an area of less than 0.5 acres and aboveground facilities occupying less than 0.1 acres. If not eliminated, areas will be reduced by separation projects, the reduced size may also allow for other sites to be considered. Temporary storage will be required for the stone inventory during construction. Upon completion of the project, the site can be returned to its current use with limited areas fenced off for the pumping station, odor control, generator and flushing system. The actual location of the storage facility will be determined during the feasibility study.

7.4.6.3. Selected Plan Institutional Issues

Institutional issues refer to permitting requirements, likelihood of receiving permits and timeline to receive permits, regulatory compliance in terms of water quality improvements, and ownership of the site (public vs. private). Regulatory considerations such as Green Acres, flood hazard area, wetlands, and threatened or endangered species are also evaluated, as well as zoning/planned development of the site by the municipality, and whether the site could be re-purposed for multiple-use (such as a parking facility over a storage tank). Institutional issues also refer to built-in limitations such as capacity in the BCUA interceptor and WWTP.

The institutional issues surrounding the Selected Plan are typical of a large-scale construction project in an urban area. While located in an industrial area, construction of the facilities associated with this control program will require environmental permits. Below is list of anticipated permits/approvals required:

- Waterfront Development Permit.
- Flood Hazard Area Permit.
- USACE Nationwide 404 Permit – not anticipated as the plan does not call for new outfalls. However, it is possible the facilities implemented may be equipped with an overflow depending on the selected location and system hydraulics.
- Local Construction Permits
- Soil Conservation District (SCD) Certification

- Stormwater Management Compliance – not anticipated, but project may be close to 1 acre of disturbance, and regulatory thresholds may change by the time of construction.
- NJDEP Tidelands – While there are some riparian grants on adjacent lots, it appears a license or grant will be required for the site evaluated.
- NJDEP Treatment Works Approval
- Coordinate discharge rates from storage facilities with BCUA – will require interconnecting with BCUA SCADA control. BCUA has agreed to accept the dewatering flow, within the limits stipulated so as not to increase peak flow at the LF WPCF above 120 MGD.
- Railroad occupancy (possible for consolidating piping), coordination may also be required if facilities fall within the theoretical railroad embankment prism.

These permits are standard permits and while they must be obtained, they do not appear to have the potential to extend the project schedule beyond that anticipated, or add excessive risk to the project. Similar permits would be required for sewer separation, however a USACE Nationwide 404 permit would be required for the new outfalls, as would a stormwater management permit, to address the loss in water quality due to the loss of treatment provided by conveying stormwater to the BCUA WPCF.

7.4.6.4. Selected Alternatives Performance

The results of the sewer separation modeling are presented in Table 7-5. They demonstrate that separating Outfall 006A, plus approximately 60 additional acres will achieve a similar performance to the CSO storage tank. Partial separation of Outfall 004A was used to represent potential sewer separation projects, which could take place throughout the Village. Overflow volumes have been reduced by 22 MG, and the remaining overflow volume of 31.3 MG corresponds to a percent capture of 85.6%.

Table 7-5: Ridgefield Park LTCP Performance Summary Sewer Separation

	2015 Baseline		LTCP - 85% Capture		Change	
Outfall	# of Events	Volume (MG)	# of Events	Volume (MG)	# of Events	Volume (MG)
001A	19	6.5	19	6.3	0	-0.2
002A	12	0.6	12	0.6	0	0.0
003A	45	15.4	45	15.4	0	0.0
004A	53	25.3	42	8.4	-11	-16.9
005A	23	3.7	8	0.6	-15	-3.1
006A	11	0.7	0	0.0	-11	-0.7
Total	53	52.2	45	31.3	-8	-20.9

7.4.6.5. Flexibility

The nature of combined sewer overflow poses challenges for control alternatives. CSO flows are often rapidly varying in magnitude as well as pollutant concentration. The flows may also contain heavy sediment loads as well as larger debris. Tanks offer a great deal of flexibility to accommodate these conditions.

- They function well regardless of how long they go between uses and have been sized to accommodate the likely occurrences of back-to-back storms through modeling of the typical year.
- Their performance is independent of the pollutant and sediment load and is largely independent of the rate of change of flow.
- During an individual storm they are not impacted by mechanical or power failures.
- Unlike other technologies tanks are immediately effective in reducing CSO volumes, as soon as an overflow starts, and do not require startup time.
- If a higher level of control is required in the future, the facilities can be readily expanded. The consolidation piping can be oversized to provide conveyance for increased flows in the future. Additional tanks can be constructed adjacent to and interconnected with the original tank to expand the capacity. The recommended site has additional space available for such an approach.

Likewise, sewer separation is flexible:

- Separation functions well regardless of time between uses, and is not impacted by occurrences of back-to-back storms.
- Performance is independent of the pollutant and sediment load, and is largely independent of the rate of change of flow.
- It is not impacted by mechanical or power failures.
- Sewer separation is immediately effective in reducing CSO volumes, and does not require startup time.
- Sewer separation can be brought online in phases, realizing benefits earlier in the overall LTCP schedule.
- If a higher level of control is required in the future sewer separation is scalable and the initial outfalls can be designed for full separation and the project expanded in phase as needed.

7.4.6.6. Adaptive Management

This LTCP is based on projected conditions and various modeling sources. However, the only true projection of future conditions is to wait and see what occurs. Therefore, this LTCP will adopt a strategy of Adaptive Management. Adaptive Management will be applied through the PCCMP via monitoring receiving water conditions and periodic monitoring of the collection system and updates to modeling to confirm the impact of LTCP facilities. There are several factors that could affect the implementation schedule, which will require adaptive management to keep the implementation of the CSO projects on track. These include:

- Easements and land acquisition: The Village must be able to acquire (purchase) the property on which the facilities are sited or obtain permanent easements that will allow for maintenance, as well as potential future upgrades. Depending on factors such as the property owner (public, private, railroad, etc.), or the current or planned occupancy, the process of obtaining an easement or acquiring a property to site a project may have an impact on the implementation schedule.
- Permitting: The timeline to receive required permits can have a significant impact on the project schedule, particularly in areas where there are unique regulatory considerations such as Green Acres, flood hazard area, or wetlands. If unforeseen circumstances related to permitting arise, the implementation schedule may need to be lengthened or project sequencing adapted accordingly. In addition, any future changes to environmental policy, such as potential treatment of stormwater discharges, is unknown at this time and increased regulatory requirements could impact the implementation of proposed projects.

- Land use: The impact of MS4 regulations which are continually evolving may gradually change the runoff characteristics of the Village as may population, social and environmental trends.
- Public acceptance: Public acceptance refers to the degree to which community residents, businesses and institutions would be impacted or perceive the alternative to be favorable or unfavorable. The decision-making process and the components of the selected CSO control plan have been presented to the public throughout the development of the LTCP, including providing the public with several opportunities to comment and provide feedback. Even so, during implementation, new or renewed concerns may be introduced by the public, which could have an impact on project implementation. These concerns could include construction disturbance (traffic, noise, dust), visibility/aesthetics of the project and its fit into the surrounding community, impact to community spaces and cultural/historic resources, and considerations of environmental justice. Addressing these concerns may require adaptation of project implementation, in terms of projects selected, project location, or construction methods.
- Environmental: There is significant uncertainty associated with the future potential impacts of climate change. Future conditions such as changes in precipitation patterns and sea level rise will impact the effectiveness of proposed CSO control projects. Current research on climate change impacts should be considered throughout the implementation schedule, and projects may be modified to consider these impacts, both to adjust capacities and ability to capture/treat CSO flows, as well as structural considerations to provide resiliency to potentially vulnerable infrastructure.
- Financial conditions: As demonstrated by the COVID-19 pandemic, financial situations can change dramatically in a short period of time. In general, if financial conditions change, the capital availability constraints will need to be identified and addressed, which may require changes to the implementation schedule. Implications specific to the COVID-19 pandemic are discussed in Section 8.1.
- Financial capability assessment (FCA) guidance: In September 2020, the United States Environmental Protection Agency (EPA) announced its proposed 2020 Financial Capability Assessment guidance document, describing changes to the existing assessment to include additional considerations for economically disadvantaged communities. Updates to the EPA guidance may impact the affordability analysis, and in turn the LTCP implementation schedule presented. As such, elements of the LTCP may be revised in the future to incorporate the EPA's proposed approach.
- Funding Opportunities: Depending on the magnitude of reduced interest rates and principal forgiveness or grants offered by the Water Bank and other funding sources, the LTCP may be modified in favor of alternatives with shorter planning durations to take advantage of those opportunities.
- Realignment of Village Priorities: The Village is continually updating its master plan and ordinances and looking for opportunities in enhance the Village through green space. Changes may be required to adapt the proposed facilities to the Village's master plan.
- System Changes: It is also possible a significant source of infiltration or inflow may come to the Village's attention, that once addressed may reduce the overflow volume. Depending on the nature of observed changes, the Village will re-evaluate the sizing of the tank facilities.

The main components of the CSO LTCP implementation that are likely to be particularly impacted by the adaptive management approach are as follows:

- Changes in strategy or technology: The strategies and technologies available to address combined sewer overflows, and their associated costs, are constantly changing and evolving. Projects of the right type and size based on the best available information at the time should be implemented. If a new strategy is identified that achieves equal or better environmental benefits at a lower cost, then the plan should be adapted accordingly. The goal remains to provide the maximum benefit to the environment with the minimum impact to the citizens.

- Post-Construction compliance monitoring: The post-construction compliance monitoring (PCCM) is a continuous process to determine whether the CSO controls specified in the LTCP are meeting the regulatory requirements as planned (described further in Section 12 of this report). Following the ongoing review of post construction performance data, the Village will evaluate the need for additional controls or revision of existing controls to meet WQS and will revise the LTCP to implement the appropriate controls.

While this LTCP is centered around storage tanks, the technology to address combined sewers is constantly changing. The regulatory framework also undergoes periodic changes. With respect to these changes, the Village intends to monitor potential changes in these areas, and if necessary, to work with the NJDEP to adapt the plan accordingly. The goal is to provide the required benefit to the environment with the minimum impact to the citizens of Ridgefield Park.

Should adaptive management necessitate changes to the Village's LTCP those changes will be brought to the NJDEP's attention and the permit conditions negotiated accordingly to provide equivalent environmental protections to the LTCP goals under more favorable conditions. In the case of sewer separation, the Village was able to do this between the submission of the SIAR and the issuance of a permit, possibly simplifying the adaptation process. Funding opportunities as well as other Village infrastructure needs, amplified the advantages of sewer separation. Accordingly, the Village is invoking the adaptive management process to incorporate a parallel investigation and implementation of sewer separation to reduce or eliminate the tank.

Additionally, the financial impacts of the recent SARS-CoV-2 virus Global Pandemic are yet to be fully realized and may not be fully realized for several years. These financial impacts may be due to several factors, which could be caused by a decrease in revenue or an impact on collection rates, among other items. The Village will continue to monitor these potential financial impacts and will include any negative impacts to its financial capability within the Adaptive Management Plan, which may include the need for a longer implementation schedule in order to reduce the financial burden as a result of lost revenue, a reduction in collection rates, or other financial factors.

7.4.6.7. Environmental Justice

No environmental justice issues are anticipated with the Village's LTCP. The work will result in an overall reduction in pollution and addresses the areas of highest pollutant loadings. The project work is in an industrial area, separated from residential areas by a freight railroad line and construction is not anticipated to adversely impact a less advantaged portion of the community. Since the sewer costs are incorporated into the municipal taxes, which are based on property values, there should be a progressive effect, providing some relief for lower income residents.

Environmental Justice issues for sewer separation are similarly mild. The localized disturbance due to sewer separation is short-term such that impacts to individual properties will likely only last a few weeks and the overall duration of each project will be less than one year. Following the projects, there will be no aboveground facilities except the required green infrastructure which would be considered an enhancement to the community. There will be parallel enhancements made to the local infrastructure including new roads and likely some additional infrastructure renewal in terms of utility mains such as gas and water. Ancillary improvements to curbs and sidewalk ramps are also anticipated.

7.4.7. Opinion of Cost for LTCP

Cost estimates for the CSO control alternatives have been developed as part of the LTCP process. The costs provided are meant to provide an order of magnitude estimate, referred to as Class 5 estimates, with an accuracy of -50% to +100%, and generally include a 25% contingency to reflect the planning level, with additional contingencies on items of higher uncertainty. The estimates have been developed specifically for the configurations of the alternatives that have been described. It is noted that any modifications to these alternatives or their configurations may impact the cost. The information and costs presented in this report is for planning purposes only, and all assumptions and information must be verified in subsequent planning and design stages.

The costs are presented as follows:

- Capital cost – including equipment cost, installation, training, labor, electrical and water connections, structural platforms, land acquisition, design, administrative costs, construction management, etc.
    - Design costs were assumed to be 10% of the construction cost.
    - Construction Management Costs were assumed to be 10% of the construction costs.
    - Administrative/Legal costs were assumed to be 5% of the construction cost.
- Operations & Maintenance (O&M) – annual power, chemical dosing, labor, etc. Since a 20-year planning period has been selected, it does not include any larger-scale overhauls or replacements/repairs that would be completed of the life of the facility.
- Present worth – for a period of twenty years, with a discount rate of 2.75%, as described below.

An estimate was prepared for sewer separation costs, see Table 7-7. However, the sewer separation costs will be assessed at the time of each project based on whether current funding opportunities and Village infrastructure needs and the potential reduction in CSO storage tank size make the project viable.

7.4.7.1. Present Worth Calculations

To be consistent with other permittees, guidance from the TGM was used to develop present worth costs for all alternatives, including O&M and full capital costs for each control technology. A discount rate of 2.75% was used (Rate of Federal Water Projects, NRCS Economics, Department of the Interior) with a life span of 20 years. The following equation was then utilized to calculate the present worth factor to convert from annual O&M costs to present worth.

(P/A, i%, n) = ((1+i)n-1)/((i(1+i)n)

The above was multiplied by the annual O&M costs and added to the construction costs to obtain the total life cycle cost. For the given 20-year life cycle and interest rate the P/A factor is 15.227. Salvage value was assumed to be $0, as it is assumed no resale value will result from the Control Technologies utilized.

7.4.7.2. Land Acquisition Costs

There is a great deal of uncertainty when estimating land acquisition costs, as the dramatic rise in prices leading up to 2008 and the subsequent drop in real estate values demonstrated. Currently, the impacts of COVID-19 on land values and the general economy are still being resolved. Factors such as current usage and potential future land uses also greatly impact land values. These impacts may be felt more profoundly by a residential commuter community such as Ridgefield Park. For planning purposes, land costs were based on the assessed value of the property with the true valuation ratio applied. In the case of the Marble.com property the assessed value was about $1M with a true valuation ratio of 75% this would make the value $1.33M. From this the assessed value of the building, which would not be impacted was subtracted. The result was just under $1M which was rounded up to $1M. The property would remain largely usable by the owner, given that above grade facilities will occupy only a small portion of the site. However, the value would be subject to clarification during the acquisition phase of the project.

Minimal land acquisition is expected for sewer separation projects as the majority of the work takes place in the public right-of-way, The Village may need to secure additional easements for outfall pipe.

Easement costs are highly site dependent, however, if they are even needed they are expected to be a relatively moderate cost for a project of this magnitude.

7.4.7.3. Cost Index

The costs for the LTCP were indexed to the Engineering News Record (ENR) Construction Cost Index (CCI) for March 2020 based on the 20-City Average CCI of 11,397. DEAR costs were indexed to January 2019 CCI of 11,205.

7.4.7.4. Cost Estimate

Costs were developed for the previous layout depicted in Figure 7-87-87-8 and Figure 7-97-97-9. Unit costs were developed from recent values from bid canvases. Quantities were estimated from the plans and using typical pay widths for:

- Mobilization
- Concrete
- Equipment
- Pipe quantities
- Drainage and sewer structures
- Excavation
- Temporary support of excavation
- Soil disposal
- Backfill
- Surface restoration
- Miscellaneous restoration
- Traffic Control
- Dewatering

The operation and maintenance costs for the tank were developed in two pieces. The first is the operational and maintenance costs for the storage facility which were estimated from cost curves to yield $59,000/year and the treatment costs associate with sending an additional 22 MG to the BCUA WPCF each year which were estimated to be $30,000/year for total O&M costs of $89,000.

Total capital costs and 20-year NPW costs are estimated in Table 7-67-6.

Table 7-6: Ridgefield Park LTCP Capital Cost Estimate

PROJECT: **Ridgefield Park LTCP - 0.7 MG CSO Storage Tank**
OWNER: **Village of Ridgefield Park**

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNITS	UNIT PRICE	AMOUNT
	GENERAL PROJECT COSTS				
	MOBILIZATION	1	L.S.	$200,000	$200,000
	SITE CLEARING	1	L.S.	$25,000	$25,000
	SOIL EROSION AND SEDIMENT CONTROL	1	L.S.	$15,000	$15,000
	TEST PITS	60	C.Y.	$500	$30,000
	TRAFFIC CONTROL	1	L.S.	$15,000	$15,000
	SUPPORT OF EXCAVATION	1	L.S.	$1,840,000	$1,840,000
	CSO STORAGE TANK AND PIPING				
	24" RCP	677	L.F.	$235	$159,119
	36" RCP	846	L.F.	$320	$270,784
	8" DIP	220	L.F.	$75	$16,500
	4' Manhole	10	EACH	$5,000	$50,000
	CSO STORAGE TANK	1	EACH	$1,900,000	$1,900,000
	FLUSHING GATES	1	L.S.	$225,000	$225,000
	ODOR CONTROL SYSTEM	1	L.S.	$210,000	$210,000
	AIR DUCTS - HDPE 36"	100	L.F.	$75	$7,500
	EARTH EXCAVATION	15,553	C.Y.	$30	$466,594
	DENSE GRADED AGGREGATE (DGA)	9,725	C.Y.	$30	$291,759
	CONTAMINATED SOIL DISPOSAL	18,664	Ton	$75	$1,399,783
	UNCONTAMINATED SOIL DISPOSAL	3,888	C.Y.	$30	$116,649
	PUMPING STATION				
	PUMPING STATION	1	L.S.	$150,000	$150,000
	VALVE CHAMBER	1	L.S.	$50,000	$50,000
	UTILITY PADS	10	C.Y.	$1,000	$10,000
	EMERGENCY GENERATOR	1	L.S.	$80,000	$80,000
	RESTORATION				
	PERMANENT PAVEMENT RESTORATION	1,998	S.Y.	$60	$119,906
	3/4" CRUSHED STONE	2,018	C.Y.	$40	$80,730
	BACKFILL COMPACTION	9,725	L.F.	$4	$38,901
	CONCRETE CURB	100	L.F.	$50	$5,000
	SIDEWALK	50	S. Y.	$80	$4,000
	FOR ALLOWANCES				
	ALLOWANCE FOR HAZARDOUS SOILS	1	ALLOWANCE	$250,000	$250,000
	ALLOWANCE FOR OFF-DUTY POLICE OFFICER	1	ALLOWANCE	$25,000	$25,000
	ALLOWANCE FOR UTILITY RELOCATION	1	ALLOWANCE	$100,000	$100,000
	ALLOWANCE FOR ASPHALT PRICE ADJUSTMENT	1	ALLOWANCE	$15,000	$15,000
	ALLOWANCE FOR FUEL PRICE ADJUSTMENT	1	ALLOWANCE	$10,000	$10,000
				SUBTOTAL:	$8,180,000
				25% CONTINGENCY	$2,050,000
				SUBTOTAL:	$10,230,000
				DESIGN (10%)	$1,023,000
				CM (10%)	$1,023,000
				ADMIN/LEGAL(5%)	$512,000
				LAND ACQUISITION	$1,000,000
				TOTAL	**$13,790,000**
	ANNUAL OPERATIONS AND MAINTENANCE COSTS				$89,000
	20-YEAR PRESENT WORTH OF O&M COSTS				$1,360,000
			20-YEAR NET PRESENT WORTH		**$15,150,000**

Class 5 estimate -50%/+100%. Costs indexed to March 2020 ENR CCI 11,397.

Table 7-7: Summary Sewer Separation Costs

Year	006A Phase 1	006A Phase 2	004A Phase 1	004A Phase 2	004A Phase 3	004A Phase 4	004A Phase 5	004A Phase 6	O&M	Separation Area (ac)
1	$250,000									
2	$1,000,000	$200,000								
3	$750,000	$1,650,000							$10,360	
4		$1,650,000	$100,000						$10,360	11*
5			$100,000						$27,080	33*
6			$1,200,000						$27,080	
7			$1,100,000	$150,000					$27,080	
8				$1,850,000					$36,680	43
9					$150,000				$44,280	53
10					$1,850,000				$44,280	
11						$150,000			$51,880	63
12						$1,850,000	$150,000		$51,880	
13							$1,850,000	$150,000	$59,480	73
14								$1,850,000	$67,080	83
15									$74,680	93

***Drainage Area 006A is partially separated in the existing condition. Values shown take credit for the separation of the entire combined/partially separated area.**

Costs generated by Suburban Consulting Engineering Inc., and indexed to 2023

7.5. Summary

The impact of the BCUA districtwide CSO LTCP is summarized in Table 7-87-7. This was confirmed by running the systemwide model which produced slightly lower overflow volumes.

Table 7-8: BCUA Districtwide LTCP Overflow Summary

Outfall	Overflow Events	Overflow Volume (MG)	Wet Weather Inflow (MG)	% Capture
FL-001	59	89	NA	NA
FL-002	17	10.7	NA	NA
Fort Lee/Hudson River Total	**58**	**99.7**	**682**	**85.4%**
HK-001	30	70.5	NA	NA
HK-002	23	37.5	NA	NA
Hackensack Total	**30**	**108**	**814.8**	**86.8%**
RP-001	19	6.3	NA	NA
RP-002	12	0.6	NA	NA
RP-003	45	15.4	NA	NA
RP-004	42	8.4	NA	NA
RP-005	26	0.6	NA	NA
RP-006	12	0.0	NA	NA
Ridgefield Park Total	**26**	**31.3**	**216.0**	**85.5%**
Hackensack River Basin Total	**30**	**139.3**	**1030.7**	**86.5%**
BCUA Systemwide	**58**	**239.0**	**1713**	**86.0%**

8. Financial Capability Assessment (FCA)

8.1. Introduction

Part IV G 8 of the permit requires:

> *"The permittee shall submit a construction and financing schedule in accordance with D.3.a and G.10, for implementation of Department approved LTCP CSO controls. Such schedules may be phased based on the relative importance of the adverse impacts upon water quality standards and designated uses, the permittee's financial capability, and other water quality related infrastructure improvements, including those related to stormwater improvements that would be connected to CSO control measures."*

The following sub-sections will address the permittees' financial capabilities, along with Section 9 and 10 which address the funding and schedule requirements.

In September 2020, the United States Environmental Protection Agency (EPA) announced its proposed 2020 Financial Capability Assessment guidance document, describing changes to the existing assessment to include additional considerations for economically disadvantaged communities. Updates to the EPA guidance may impact the affordability analysis, and in turn the LTCP implementation schedule presented. As such, elements of the LTCP may be revised in the future to incorporate the EPA's proposed approach.

8.2. COVID-19 Impact statement

The projections and conclusions concerning the affordability of the CSO control program proposed in this SIAR by the Permittee's financial capability analysis to finance the CSO control program are premised on the baseline financial conditions of the Permittee 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 potentially significant impacts. There are several dimensions to these potential impacts, including reduced utility revenues and household incomes.

8.2.1. 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 the Permittees, as well as municipal wastewater utilities in general, across the United States will face significant and potentially permanent declines in revenues from households unable to pay their taxes and/or sewer bills and the sudden decline in industrial and commercial demands for 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 is a 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." NACWA press release: Coronavirus Impacting Clean Water Agencies; Local Utilities and Ratepayers Need Assistance March 20, 2020

The impact of a 20% to 40% revenue loss, along with increased costs that have been and will continue to be experienced by municipalities 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 the Permittee's ability to finance them.

Most of the costs of municipal and regional wastewater systems 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 these are relatively minor when compared to other fixed costs. 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 slightly as equipment operating times may be lower, however maintenance costs are typically tied to set schedules and not necessarily to flow.

As costs do not decline proportionately to billed flow, it can be expected that user charge rates and/or taxes 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 the Permittees to fund the CSO LTCP.

8.2.2. Potential Median Household Income Impacts

The impacts of the pandemic on median household incomes of the Permittees 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. Source: Fact Sheet: Income and Poverty Across the States, 2010 Joint Economic Committee, United States Congress, Senator Robert P. Casey, Jr. Chairman.
- The U.S. unemployment rates rose from 5.0% in December of 2007 to 9.9% in December of 2009. Source: Bureau of Labor Statistics data series LNS1400000
- 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%. Source: Federal Reserve Economic Data (FRED) data series: A792RC0A052NBEA

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.

8.2.3. Implications for the Long Term CSO Control Program

The Permittees anticipate that the financial implications of the COVID-19 pandemic will continue to be reviewed and discussed with NJDEP during the review of the SIAR and as the 2021 – 2025 NJPDES permit is developed.

Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, the Permittees 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 the permittees' control. As detailed in Section 10 of the Permittees' SIAR, these provisions could include scheduling the implementation of specific CSO control measures to occur during the five year NJPDES permit cycles. Although a complete implementation schedule is being proposed as part of this SIAR, a revised affordability assessment should be performed during review of the next NJPDES permit to re-evaluate and validate financial capability and to identify any revisions to the proposed controls that may or may not be are financially feasible during that next permit period.

8.3. FCA for Fort Lee

The Financial Capabilities Assessment for the Borough of Fort Lee New Jersey, in Appendix G, presents the FCA for the Borough of Fort Lee.

8.4. FCA for Hackensack

Appendix H – Hackensack Financial Capabilities Assessment presents the FCA for the City of Hackensack.

8.5. FCA for Ridgefield Park

The Village of Ridgefield Park's financial capabilities assessment was conducted by Benecke Economics, it can be found in Appendix I.

9. Financing Plan

9.1. Introduction

Part IV G 8 a of the permit requires a financing schedule to show that it is likely the municipality has the ability to complete the LTCP within the proposed schedule. The CSO municipalities each conducted a financial capability assessment (FCA) based on guidance from the EPA's "Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development. While conducted independently each community applied the guidance to assess their community's "Permittee Financial Capability Indicator Score" to be compared to the Residential Indicator to assess the burden of the LTCP on the community.

9.2. Financing Plan for Fort Lee

The Borough's long-term CSO control capital plan spans 25 years. In each year of the plan an estimated amount of sewer separations will be completed beginning in year 3. The amount of sewer separations will begin at 1.7 acres per year and grow to 3.4 acres in year 25. The result of the sewer separation will be approximately 60 million gallons or 85% reduction in CSO. The Borough's plan is structured to allow for a reasonable amount of acres to be accomplished per year as well as allow the cost of those projects be spread out over time so that it minimizes the impact that would be felt by residents. Also, flow metering will be conducted during each phase to check on the efficiency of each project.

The long term financial plan takes the assumptions of the long-term CSO control plan and shows the financial impact of that plan. For this plan, several costs were projected forward over the projected payback period of potential debt issued to fund the project. These costs included the current wastewater treatment operating costs and debt, as well as additional operating costs associated with the CSO projects and debt service for the assumed capital costs. Current costs, including Operating costs were assumed to grow at 2% annually while the Borough's current debt service would phase out over the next 15 years. CSO operating costs were also assumed to increase over time based on the amount of CSO separations and also inflation of 2%. The capital component of the CSO control project were assumed to be funded with loans from the New Jersey Infrastructure Bank with 2.75% interest rate and a term of 20 years. These annual costs were summed up and expressed as a percent of household income. Calculating the cost of the projects as a percent of median household income was the same method used on the FCA called the Residential Indicator (RI). For this calculation median household income was assumed to grow at the 5 year average historic growth rate of 1.82%. Households were assumed to grow at 0.5% per year. The RI during the payback period of the assumed loans range from 0.29% in 2021 and fall to 0.21 by the end of the 25 year construction period, and again falls to 0.18% by the time the payback period of the loans are complete. The table below provides a breakdown by year of the long-term financial plan for implementing CSO controls.

Table 9-1: Fort Lee Financing Plan for the Long Term Control Plan

	Current WWT Annual Costs	CSO Total Annual Cost	Median Household Income	# of Households	WWT - Residential Cost	CSO - Residential Cost	WWT - Cost per Household	CSO - Cost per Household	Total - Cost per Household	WWT as % of MHI	CSO as % of MHI	Total as % of MHI
2020												
2021	$10,995,086	$14,742	$83,941	17,174	$4,123,157	$5,528	$240.07	$0.32	$240.40	0.29%	0.00%	0.29%
2022	10,938,285	52,566	85,470	17,260	4,101,857	19,712	237.65	1.14	238.79	0.28%	0.00%	0.28%
2023	10,884,605	91,221	87,027	17,347	4,081,727	34,208	235.30	1.97	237.28	0.27%	0.00%	0.27%
2024	10,834,108	130,771	88,612	17,433	4,062,790	49,039	233.05	2.81	235.86	0.26%	0.00%	0.27%
2025	10,786,858	179,291	90,227	17,521	4,045,072	67,234	230.88	3.84	234.71	0.26%	0.00%	0.26%
2026	10,742,920	228,941	91,870	17,608	4,028,595	85,853	228.79	4.88	233.67	0.25%	0.01%	0.25%
2027	10,702,361	279,749	93,544	17,696	4,013,385	104,906	226.79	5.93	232.72	0.24%	0.01%	0.25%
2028	10,665,247	331,746	95,248	17,785	3,999,468	124,405	224.88	7.00	231.88	0.24%	0.01%	0.24%
2029	10,631,648	384,962	96,983	17,874	3,986,868	144,361	223.06	8.08	231.14	0.23%	0.01%	0.24%
2030	10,601,633	455,566	98,750	17,963	3,975,613	170,837	221.32	9.51	230.83	0.22%	0.01%	0.23%
2031	10,575,276	527,834	100,549	18,053	3,965,728	197,938	219.67	10.96	230.64	0.22%	0.01%	0.23%
2032	10,552,648	601,809	102,381	18,143	3,957,243	225,678	218.11	12.44	230.55	0.21%	0.01%	0.23%
2033	10,533,825	677,537	104,246	18,234	3,950,184	254,076	216.64	13.93	230.58	0.21%	0.01%	0.22%
2034	10,518,882	755,063	106,145	18,325	3,944,581	283,149	215.26	15.45	230.71	0.20%	0.01%	0.22%
2035	10,507,898	846,424	108,078	18,417	3,940,462	317,409	213.96	17.23	231.20	0.20%	0.02%	0.21%
2036	10,500,950	939,966	110,047	18,509	3,937,856	352,487	212.76	19.04	231.80	0.19%	0.02%	0.21%
2037	10,710,969	1,035,748	112,052	18,601	4,016,614	388,406	215.93	20.88	236.81	0.19%	0.02%	0.21%
2038	10,925,189	1,133,829	114,093	18,694	4,096,946	425,186	219.16	22.74	241.90	0.19%	0.02%	0.21%
2039	11,143,693	1,234,271	116,172	18,788	4,178,885	462,852	222.43	24.64	247.06	0.19%	0.02%	0.21%
2040	11,366,566	1,350,508	118,288	18,882	4,262,462	506,441	225.75	26.82	252.57	0.19%	0.02%	0.21%
2041	11,593,898	1,455,895	120,443	18,976	4,347,712	545,961	229.12	28.77	257.89	0.19%	0.02%	0.21%
2042	11,825,776	1,542,991	122,637	19,071	4,434,666	578,622	232.54	30.34	262.88	0.19%	0.02%	0.21%
2043	12,062,291	1,632,360	124,871	19,166	4,523,359	612,135	236.01	31.94	267.94	0.19%	0.03%	0.21%
2044	12,303,537	1,724,067	127,146	19,262	4,613,826	646,525	239.53	33.56	273.09	0.19%	0.03%	0.21%

Construction Complete

Year	Current WWT Annual Costs	CSO Total Annual Cost	Median Household Income	# of Households	WWT - Residential Cost	CSO - Residential Cost	WWT - Cost per Household	CSO - Cost per Household	Total - Cost per Household	WWT as % of MHI	CSO as % of MHI	Total as % of MHI
2044	12,549,608	1,683,915	129,462	19,358	4,706,103	631,468	243.10	32.62	275.72	0.19%	0.02%	0.21%
2045	12,800,600	1,642,959	131,820	19,455	4,800,225	616,110	246.73	31.67	278.40	0.19%	0.02%	0.21%
2046	13,056,612	1,601,185	134,222	19,552	4,896,229	600,444	250.42	30.71	281.12	0.19%	0.02%	0.21%
2047	13,317,744	1,558,575	136,667	19,650	4,994,154	584,466	254.15	29.74	283.90	0.19%	0.02%	0.21%
2048	13,584,099	1,515,113	139,156	19,748	5,094,037	568,167	257.95	28.77	286.72	0.19%	0.02%	0.21%
2049	13,855,781	1,456,084	141,692	19,847	5,195,918	546,031	261.80	27.51	289.31	0.18%	0.02%	0.20%
2050	14,132,897	1,395,874	144,273	19,946	5,299,836	523,453	265.70	26.24	291.95	0.18%	0.02%	0.20%
2051	14,415,555	1,334,460	146,901	20,046	5,405,833	500,422	269.67	24.96	294.63	0.18%	0.02%	0.20%
2052	14,703,866	1,271,818	149,577	20,146	5,513,950	476,932	273.69	23.67	297.37	0.18%	0.02%	0.20%
2053	14,997,943	1,207,923	152,302	20,247	5,624,229	452,971	277.78	22.37	300.15	0.18%	0.01%	0.20%
2054	15,297,902	1,131,931	155,076	20,348	5,736,713	424,474	281.93	20.86	302.79	0.18%	0.01%	0.20%
2055	15,603,860	1,054,420	157,901	20,450	5,851,447	395,408	286.13	19.34	305.47	0.18%	0.01%	0.19%
2056	15,915,937	975,359	160,778	20,552	5,968,476	365,759	290.40	17.80	308.20	0.18%	0.01%	0.19%
2057	16,234,256	894,716	163,707	20,655	6,087,846	335,518	294.74	16.24	310.98	0.18%	0.01%	0.19%
2058	16,558,941	812,460	166,689	20,758	6,209,603	304,673	299.14	14.68	313.81	0.18%	0.01%	0.19%
2059	16,890,120	716,615	169,726	20,862	6,333,795	268,731	303.60	12.88	316.48	0.18%	0.01%	0.19%
2060	17,227,922	618,854	172,817	20,966	6,460,471	232,070	308.13	11.07	319.20	0.18%	0.01%	0.18%
2061	17,572,481	519,137	175,966	21,071	6,589,680	194,676	312.73	9.24	321.97	0.18%	0.01%	0.18%
2062	17,923,930	417,425	179,171	21,177	6,721,474	156,534	317.40	7.39	324.79	0.18%	0.00%	0.18%
Loan Payment Complete												

9.3. Financing Plan for Hackensack

It should be noted that the Court Street Stormwater Project that is included in the Draft Financing Plan is now referred to as the Green Street Combined Sewer Separation Project.

Table 9-29-2: Draft Financing Plan presents a draft financing plan for the City's LTCP based on a 20-year loan payoff period with a 2.85% interest rate, based on recent City bonds, over a 30-year implementation time. It should be noted that current NJ I-bank interest rates are estimated around 1%. However, these rates can fluctuate on a yearly basis. This table also presents the potential additional burden on the households in the City due to the LTCP implementation.

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% was utilized.

It should be noted that the Court Street Stormwater Project that is included in the Draft Financing Plan is now referred to as the Green Street Combined Sewer Separation Project.

Table 9-2: Draft Financing Plan

	Main Street Partial Sewer Separation	Green Infrastructure Program	Court Street Stormwater Project	Anderson Street Storage Tank (if needed)	Total Annual Costs for all LTCP Phases	Potential Added Wastewater Costs per Household (18817 households) in City of Hackensack	Current Estimated Annual Wastewater Costs per Household without planned future CIP Projects (not LTCP Projects) (from FCA)	Estimated Annual Wastewater Costs per Household with LTCP Loan Payback	% Increase to Wastewater Costs to Hackensack MHI ($62,215)
Planned Year for Startup	Year 1 2019	Year 3 2021	Year 4 2022	Year 20 2038					
Capital Costs + Land Costs	$ 12,300,000	$ 3,000,000	$ 66,000,000	$ 20,400,000					
Annual O&M Costs	$ -	$ 70,000	$ 1,000,000	$ 640,000					
Equivalent Annual Financing Costs (EUAC) 20-years at 2.85% Interest	$ 800,000	$ 300,000	$ 5,400,000	$ 2,000,000					
Years in Payment Drawdown Schedule									
2019	$ 800,000				$800,000	$43	$346	$389	0.6%
2020	$ 800,000				$800,000	$43	$346	$389	0.6%
2021	$ 800,000	$ 300,000			$1,100,000	$58	$346	$405	0.7%
2022	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2023	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2024	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2025	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2026	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2027	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2028	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2029	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2030	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2031	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2032	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2033	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2034	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2035	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2036	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2037	$ 800,000	$ 300,000	$ 5,400,000		$6,500,000	$345	$346	$692	1.1%
2038	$ 800,000	$ 300,000	$ 5,400,000	$ 2,000,000	$8,500,000	$452	$346	$798	1.3%
2039		$ 300,000	$ 5,400,000	$ 2,000,000	$7,700,000	$409	$346	$756	1.2%
2040		$ 300,000	$ 5,400,000	$ 2,000,000	$7,700,000	$409	$346	$756	1.2%
2041			$ 5,400,000	$ 2,000,000	$7,400,000	$393	$346	$740	1.2%
2042				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2043				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2044				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2045				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2046				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2047				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2048				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2049				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2050				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2051				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2052				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2053				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2054				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2055				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2056				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%
2057				$ 2,000,000	$2,000,000	$106	$346	$453	0.7%

9.4. Financing Plan for Ridgefield Park

The Village will pursue multiple sources of funding for the LTCP. Given its long history and Federal and State backing the state revolving fund currently known as the I-Bank is expected to be available in some form for the duration of the LTCP. At this time no reasonable assessment can be made of the availability of additional funding opportunities such as grants. The goal of this funding analysis is to demonstrate the Village may have a feasible means of funding the LTCP. Accordingly, the analysis will assume the LTCP will be funded through 20-year loans from the I-Bank, with loans closed annually for each year's expenses. It is possible that for years with smaller funding allocation the Village may be able to fund those activities from the annual revenues, rather than through loans. It is also possible that for higher outlay years the Village may elect a longer loan period such as a 30-year loan. It was assumed that O&M costs and permit costs would be funded from annual revenues rather than loans.

Note, this analysis projects historic trends into the future. Small variations in inflation and growth factors are magnified as they are compounded over long periods. The financing will need to be monitored, periodically reassessed, and potentially adjusted, as part of the adaptive management strategy to keep the project affordable.

The Village of Ridgefield Park will consider financing construction costs through a series of 20-year loans from the NJDEP I-Bank. This does not exclude the potential use of other financing sources, however, for planning purposes the I-Bank was considered the most likely source of reliable funding, using an effective interest rate of 1.5%, based on a market rate of 6% applied to 25% of the loan and 0% interest applied to 75% of the loan. Annual costs would be funded through annual taxes and would include LTCP cost relating to:

- Loss of tax revenue through property taking
- Permit maintenance costs
    - Consulting fees
    - Maintenance of CSO notification system.
    - Monthly and annual reporting.
- Post construction compliance monitoring costs
    - Collection system monitoring and modeling costs
    - Participation in NJ CSO receiving water monitoring and modeling
- Maintenance of the CSO storage facility

The estimated time distribution of these costs is shown in Table 9-39-3. It is noted that in 2038 the estimated O&M and permit compliance costs increase suddenly, this is due to the post construction monitoring costs and tank O&M costs starting at the same time. Following the post construction monitoring these costs drop to reflect the conclusion of the monitoring program. Figure 9-19-19-1 shows the cost associated with the planning design and construction of the LTCP, and how the I-Bank loan will reduce the annual impact to the Village and spread the costs over a longer period of time.

Costs for the existing combined sewer system and wastewater treatment were developed by working with the Village's CFO. The Village has a two-person crew designated as the sewer department, which is a line item in the Village's budget, along with a line item for sewer expenses. However, the expense of owning and operating a sewer is higher than these budget line items and payments to BCUA. Costs were estimated based on assuming the sewer department was an independent entity and not able to draw on the overall Village's resources and administrative services. The following items were included in the sewer costs.

- Payments to BCUA for wastewater treatment fees.
- Sewer department salaries
- Sewer expense budget line item

- Estimated additional support from DPW staff
- Estimated support from public safety
- Estimated portion of Village vehicle fleet costs
- Estimated portion of Village fuel and utility costs
- Estimated portion of capital improvement fund
- Estimated Village administrative services
- Estimated allocation of employee benefits
    - Social security costs
    - Healthcare
- Estimated allocation of insurance costs
- Estimated allocation of retirement benefits
- An allowance was included for regular capital improvement project to maintain the combined sewer system.

The impact on the average residential sewer bill and median household income was also assessed, see Figure 9-29-29-2. As can be seen the average sewer bill will experience annual increases of up to 9.0% over a number of years, these amounts fluctuate as various sewer separation phases begin, later dropping once the Village stops assuming additional debt to finance the LTCP. For the duration of the LTCP and through the amortization of the bonds, the residential household indicator remains under 2%. The residential indication of 1.7% at the completion of the LTCP falls within the Medium Burden range of the EPA Financial Capabilities Matrix for a Permittee with a Mid-Range Financial Capabilities indication Score. Ultimately, due to inflation exceeding income growth, the average sewer costs will exceed 2% of MHI, this is projected to happen after the LTCP has been completed and paid for. As noted previously there is uncertainty when projected historic trends over long periods.

The impact of the LTCP on average residential sewer bills is depicted in Figure 9-39-39-3. As can be seen the greatest differential in sewer bills with and without the LTCP is about 30% meaning that the average resident can expect their sewer bill to effectively go up by 30% as a result of the LTCP. This impact is not continuous and after the bonds are paid off, the average sewer bill would only be 3% higher than without the LTCP. The 3% is the additional cost of maintaining the permit requirements and storage facility O&M costs.

When evaluating the LTCP financial impacts it is appropriate to consider not just the median household income but the impact to various income groups. By definition, if the sewer bill is 2% of the median household income, half the households experience a cost that is higher than 2%. Accordingly, the income brackets used by the US Census were broken down into income quintiles and evaluated under 2020 conditions with an average sewer bill of $669 and in 2038 when the sewer bill is projected to be $1,867. As illustrated in Table 9-49-4 approximately 1120 households already pay more than 2% of their income for their sewer bill with some paying as high as 3.3%. For the same group, this will increase to 6.7% of household income by 2036, and the number of households paying 2% or more of their income will increase to approximately 2,100 households or approximately 40% of the Village households. It is noted that the Village currently funds its sewer through municipal property taxes which distribute costs based on property values, however this could change in the future.

The Village's residents are under a heavy burden related to high costs of living and current tax rates. The Village itself is under multiple burdens from the State which include:

- State condemnation of the Skymark redevelopment property to construct a New Jersey Transit (NJT) bus facility. The NJT facility will produce neither the tax revenue nor the economic activity that was anticipated from Skymark, resulting in a significant loss of tax revenue to the Village.

- The Village is under an affordable housing obligation, over 150 units of which was going to be addressed by Skymark. To date the Village has not been relieved of this obligation, and must now find locations for those units within the limited space remaining in the Village.
- The CSO LTCP obligations including annual operating costs and approximately $14M in capital costs.

In addition, the impact of the COVID-19 pandemic on the Village finances and demographics cannot be assessed at this time and will not be fully known for several years. It is impossible to accurately evaluate the feasibility of the LTCP on Village without including all these elements, the effects of which may take several years to manifest themselves. Due to these uncertainties, none of these can be fully reflected in the financial analysis.

The Village is deeply concerned about committing to a LTCP that it is uncertain it can complete, and which may be ruinous to the municipality. Therefore, while a LTCP start date of 2021 was used for evaluation purposes, in light of the conditions described above, the Village believes that starting the LTCP in 2021 would not be prudent. In addition, the analysis was heavily dependent on State funding and the associated favorable interest rates. Accordingly, the Village intends to negotiate with the NJDEP to select a start date based on resolution of the above items, and well as a securing an agreement from the State to provide the necessary funding.

Table 9-3: Ridgefield Park estimate of annual distribution of LTCP costs

Year	LTCP Construction Costs	LTCP Permit/O&M Costs	Total LTCP Costs	Average Sewer Rate without LTCP	Average Sewer Rate with LTCP	Average Sewer Rate Increase Due to LTCP	Residential Indicator
2021							
2022							
2023							
2024							
2025	$ 299,801	$ 48,433	$ 348,234	$ 828	$ 841	$ 13	0.99%
2026	$ 1,492,292	$ 50,321	$ 1,542,613	$ 863	$ 896	$ 33	1.04%
2027	$ 3,095,013	$ 65,826	$ 3,160,839	$ 901	$ 977	$ 76	1.11%
2028	$ 2,340,282	$ 68,393	$ 2,408,674	$ 939	$ 1,046	$ 107	1.17%
2029	$ 138,678	$ 94,653	$ 233,331	$ 979	$ 1,093	$ 114	1.19%
2030	$ 1,725,714	$ 98,344	$ 1,824,058	$ 1,020	$ 1,158	$ 138	1.24%
2031	$ 1,938,696	$ 102,180	$ 2,040,875	$ 1,064	$ 1,227	$ 163	1.29%
2032	$ 2,938,317	$ 121,358	$ 3,059,675	$ 1,108	$ 1,314	$ 206	1.35%
2033	$ 320,741	$ 138,588	$ 459,329	$ 1,155	$ 1,368	$ 213	1.38%
2034	$ 3,159,775	$ 143,993	$ 3,303,769	$ 1,203	$ 1,459	$ 256	1.44%
2035	$ 258,686	$ 149,609	$ 408,295	$ 1,254	$ 1,514	$ 260	1.47%
2036	$ 3,576,762	$ 155,444	$ 3,732,206	$ 1,306	$ 1,614	$ 308	1.53%
2037	$ 3,709,103	$ 190,251	$ 3,899,353	$ 1,360	$ 1,723	$ 363	1.61%
2038	$ 3,557,864	$ 416,685	$ 3,974,549	$ 1,416	$ 1,867	$ 451	1.71%
Construction Complete							
2039	$ -	$ 205,380	$ 205,380	$ 1,475	$ 1,887	$ 412	1.69%
2040	$ -	$ 213,389	$ 213,389	$ 1,535	$ 1,950	$ 415	1.71%
2041	$ -	$ 221,712	$ 221,712	$ 1,595	$ 2,011	$ 416	1.73%
2042	$ -	$ 230,358	$ 230,358	$ 1,657	$ 2,074	$ 417	1.75%
2043	$ -	$ 239,342	$ 239,342	$ 1,721	$ 2,140	$ 419	1.77%
2044	$ -	$ 248,677	$ 248,677	$ 1,788	$ 2,209	$ 421	1.79%
2045	$ -	$ 258,375	$ 258,375	$ 1,858	$ 2,276	$ 418	1.81%
2046	$ -	$ 268,452	$ 268,452	$ 1,930	$ 2,331	$ 401	1.82%
2047	$ -	$ 278,921	$ 278,921	$ 2,005	$ 2,367	$ 362	1.81%
2048	$ -	$ 289,799	$ 289,799	$ 2,083	$ 2,416	$ 333	1.81%
2049	$ -	$ 301,101	$ 301,101	$ 2,164	$ 2,497	$ 333	1.84%
2050	$ -	$ 312,844	$ 312,844	$ 2,248	$ 2,561	$ 313	1.85%
2051	$ -	$ 325,045	$ 325,045	$ 2,336	$ 2,625	$ 289	1.85%
2052	$ -	$ 337,722	$ 337,722	$ 2,426	$ 2,679	$ 253	1.86%
2053	$ -	$ 350,893	$ 350,893	$ 2,521	$ 2,772	$ 251	1.88%
2054	$ -	$ 364,578	$ 364,578	$ 2,619	$ 2,831	$ 212	1.88%
2055	$ -	$ 378,796	$ 378,796	$ 2,721	$ 2,932	$ 211	1.91%
2056	$ -	$ 393,570	$ 393,570	$ 2,826	$ 2,993	$ 167	1.92%
2057	$ -	$ 408,919	$ 408,919	$ 2,936	$ 3,057	$ 121	1.92%
2058	$ -	$ 424,867	$ 424,867	$ 3,050	$ 3,127	$ 77	1.92%
Loan Payments Complete							
2059	$ -	$ 441,436	$ 441,436	$ 3,169	$ 3,249	$ 80	1.96%
2060	$ -	$ 458,652	$ 458,652	$ 3,292	$ 3,375	$ 83	2.00%

Class 5 estimate -50%/+100%. Costs indexed to March 2020 ENR CCI 11,397, and inflated based on 3.7% for construction and 3.9% for operations and maintenance.

Table 9-4: Ridgefield Park LTCP Estimated Financial Impact on Income Brackets

		2017		2020			2038		
Quintiles	Households	Low	High	Average	Sewer Bill	% of Income	Average	Sewer Bill	% of Income
Quintile 1 0-20%	941	$ -	$ 33,000	$ 20,000	$ 669	3.3%	$ 28,000	$ 1,867	6.7%
Quintile 2 20420%	941	$ 33,000	$ 60,000	$ 48,000	$ 669	1.4%	$ 68,000	$ 1,867	2.7%
Quintile 3 40-60%	941	$ 60,000	$ 96,000	$ 76,000	$ 669	0.9%	$ 108,000	$ 1,867	1.7%
Quintile 4 60-80%	941	$ 96,000	$ 156,000	$ 124,000	$ 669	0.5%	$ 176,000	$ 1,867	1.1%
Quintile 5 80-100%	941	$ 156,000	NA	$ 158,000	$ 669	0.4%	$ 224,000	$ 1,867	0.8%

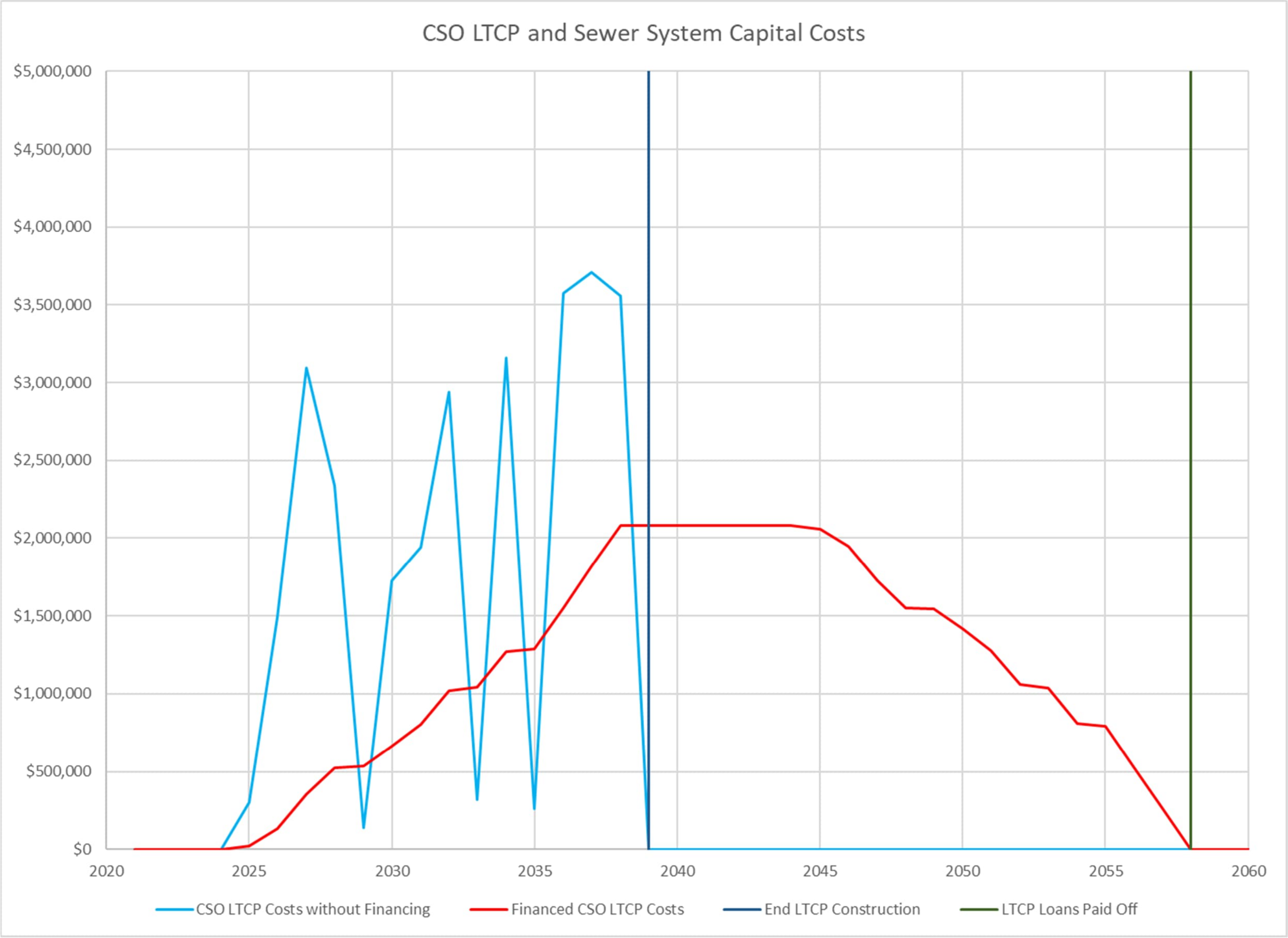


Figure 9-1: Ridgefield Park LTCP Capital Costs and Financing Costs

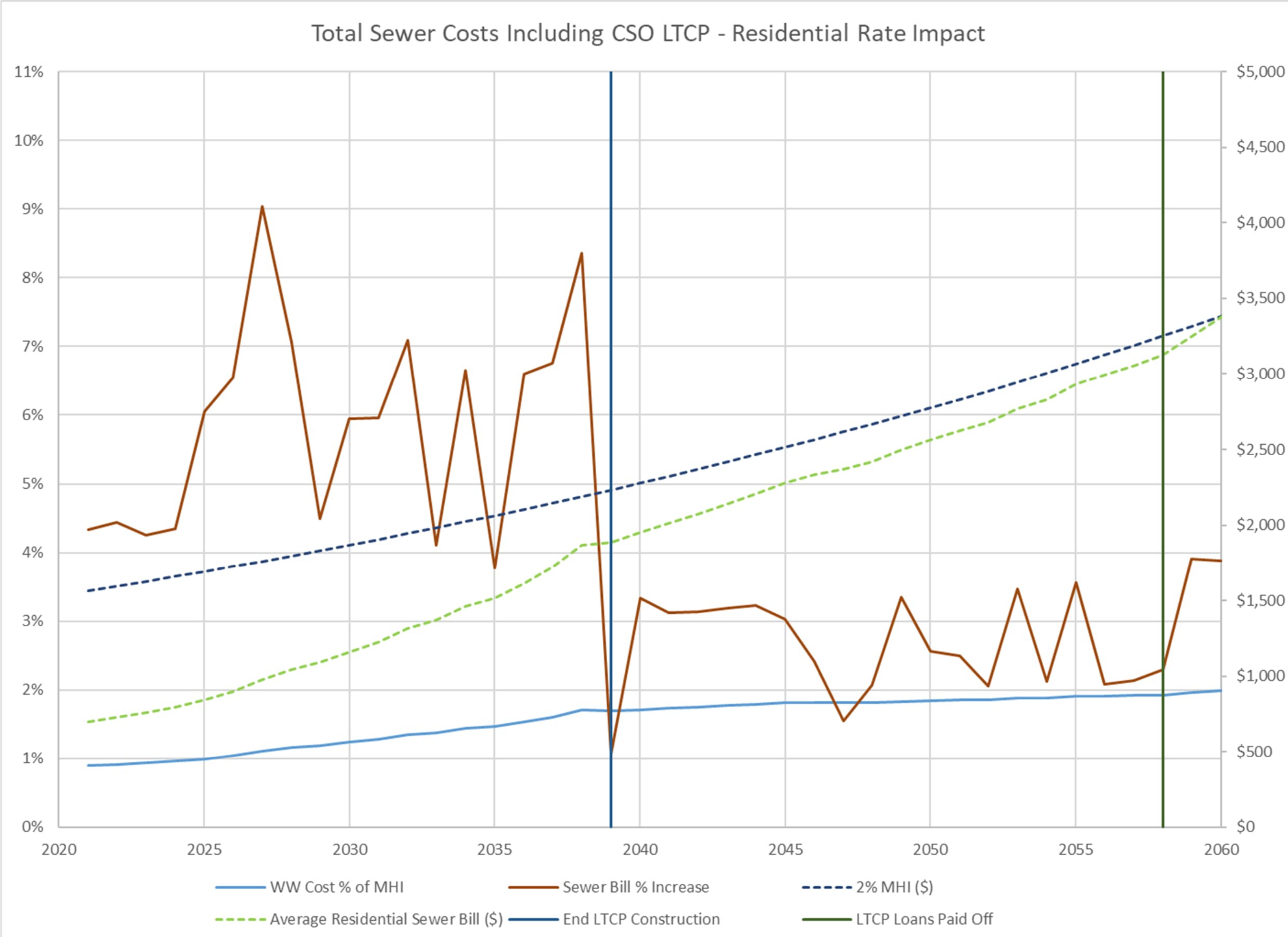


Figure 9-2: Ridgefield Park LTCP Sewer Rate Impact

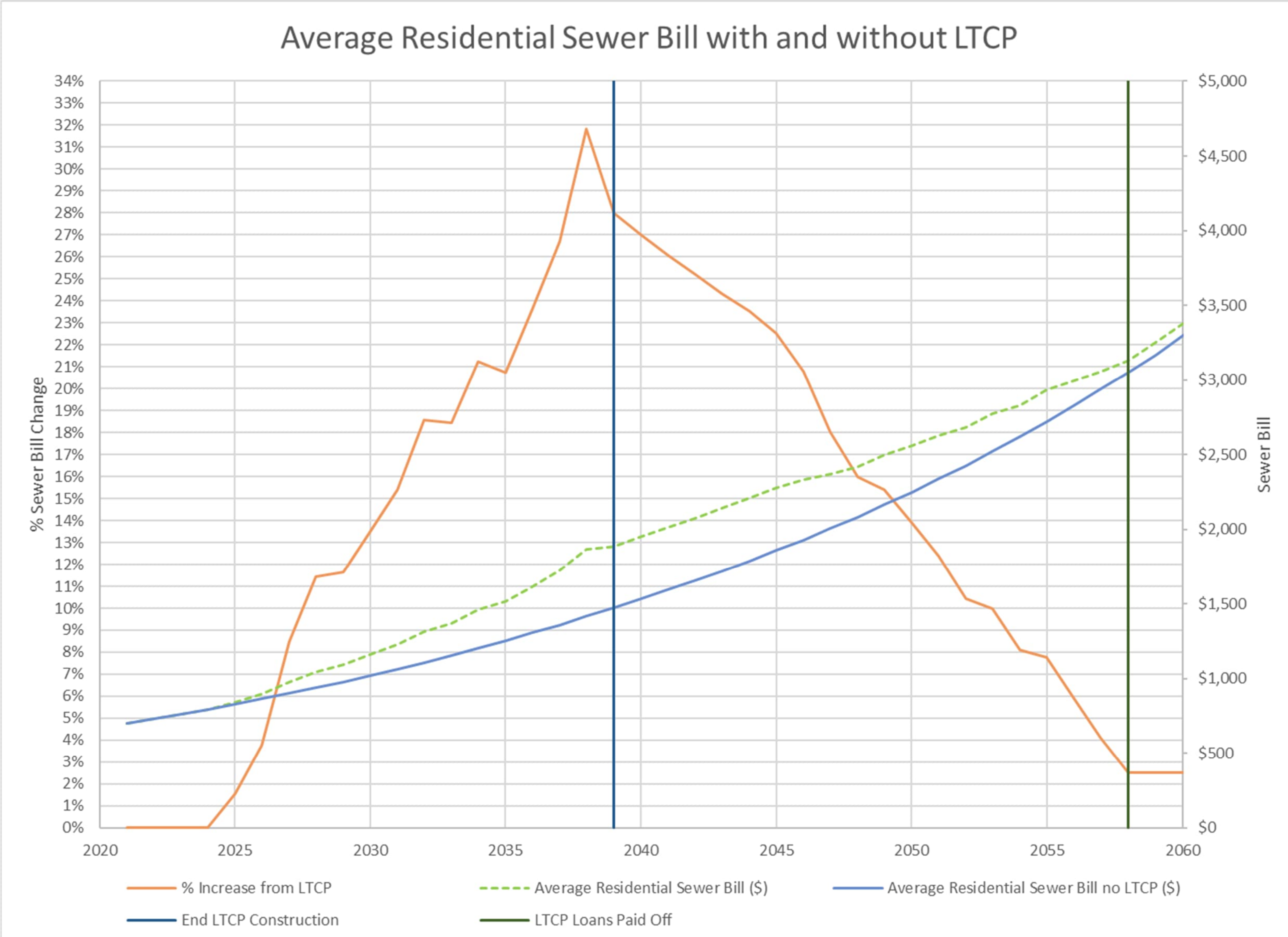


Figure 9-3: Ridgefield Park Net impact of LTCP to Sewer Rates and Bills

10. Implementation Schedule

10.1. Introduction

An implementation schedule is one the nine (9) elements of a CSO LTCP and is required under the Permit Part IV G.8. which requires:

> *"The permittee shall submit a construction and financing schedule in accordance with D.3.a and G.10, for implementation of Department approved LTCP CSO controls. Such schedules may be phased based on the relative importance of the adverse impacts upon water quality standards and designated uses, the permittee's financial capability, and other water quality related infrastructure improvements, including those related to stormwater improvements that would be connected to CSO control measures."*

Accordingly, each of the permittees has prepared a schedule as documented in the following subsections.

10.2. Implementation Schedule for Fort Lee

The Fort Lee LTCP green infrastructure and sewer separation will be in phases over 9 years. Green infrastructure is planned for the first 2 years after effective date of permit (EDP). For sewer separation, 16 acres have been separated in the two new developments, The Towers and Hudson Lights; 89 acres are proposed to be separated in the LTCP in four phases. The progression of these phases is presented in Table 10-110-1. Areas presented in this table are targets and increase as the program evolves and designs are standardized. When the plan is implemented the phases and areas maybe adjusted to optimize efficiency. Identification of the required permits will be conducted in year one and finalized during the design of the GI and sewer separation projects.

Table 10-1: Fort Lee Schedule

Condition	Schedule	Acres Separated per Year	Cumulative Acres Separated
Baseline	2015	-	
New Development(2045 Baseline)	2017	16	16
GI Projects (two proposed)	EDP + 2 Years	NA	NA
Sewer Separation Phase 1	EDP + 3 Years	24	40
Sewer Separation Phase 2	EDP + 4 Years	12	52
Sewer Separation Phase 3	EDP + 6 Years	17	69
Sewer Separation Phase 4	EDP + 7 Years	20	89

10.3. Implementation Schedule for Hackensack

The City has a multi-phase LTCP program. Figure 10-110-110-1 presents an estimated 30-year implementation schedule of the City's LTCP. The City's recommended LTCP is an extensive program that involves many different projects with costs that will place some burden on the City taxpayers. Because of the extensive nature of the program and the estimated costs of the recommended LTCP, the City is aiming for a 30-year implementation period to reduce the annual burden on the City taxpayers. The implementation schedule prioritizes the projects in the Court Street subdrainage area first. The reasons for focusing on the Court Street subdrainage area projects first are to address the flooding concerns of the public and to address the area that produces the majority of the CSO volume in the City. The estimated 30-year implementation schedule also presents the percent capture goals at the end of each milestone phase.

To summarize the estimated schedule, the LTCP phasing is as follows:

Pre-Effective Date of CSO Permit (EDP)

- Year 2019: Continue and complete the on-going Main Street partial sewer separation projects and outfall extension projects. **Main Street Projects A and B Completed.**
- Year 2021: Begin the green infrastructure project and carry through the implementation program. **In Progress.**
- Year 2022: Identify and construct additional localized partial sewer separation projects, if feasible, that are beneficial for Hackensack to undertake. **Clay Street Projects 1-3 completed, Anderson Street Project and Final Clay Street Project in progress.**
- Year 2022: Begin the design and construction of the Court Street Stormwater Project, or a project of equivalent stature. **Design of the Green Street Combined Sewer Separation Project is in progress.**

Post-Effective Date of CSO Permit (EDP)

Initial Permit Cycle

-
- Permit Year 1 (Est. 2024-2025): Commence construction of the final Clay Street Combined Sewer Separation Project; continue planning and design efforts for the Green Street Combined Sewer Separation Project; implement a green infrastructure program for the Clay Street and Green Street projects.
- Permit Year 2 (Est. 2025-2026): Begin the identification of, and planning and design efforts for, an additional local sewer separation project.
- Permit Year 3 (Est. 2026-2027): Complete construction of the final Clay Street Combined Sewer Separation Project; complete planning and design efforts for the additional local sewer separation project, advertise and award the project, and begin construction; complete the implementation of the green infrastructure program for the Clay Street project; begin the evaluation of the percent capture achieved by all projects to date.
- Permit Year 4 (Est. 2027-2028): Complete planning and design efforts for the first Contract/Phase of the Green Street Combined Sewer Separation Project, advertise and award the project, and begin construction; begin the implementation of the green infrastructure program for the additional local separation.
- Permit Year 5 (Est. 2028-2029): Complete planning and design of the green infrastructure program for the Green Street Project.

Future Permit Cycles

- Permit Cycle II (Est. 2029 – 2034)
  - Complete the construction of the additional local sewer separation project.
  - Complete the evaluation of the percent capture achieved by all projects to date.
  - Complete construction of the first Contract/Phase of the Green Street Combined Sewer Separation Project.
  - Complete planning and design efforts, as well as construction for the remaining phases of the Green Street Combined Sewer Separation Project.
  - Complete implementation of the green infrastructure program.

- Permit Cycle III (Est. 2034 – 2039)
    - Perform post construction monitoring of any partial sewer separation projects and the Green Street Combined Sewer Separation project; complete a flow monitoring program and recalibration of Hackensack's CSS model to determine the percent capture impacts of the LTCP program to date; evaluate if a storage tank is still required, and if so, what size will be required; if Hackensack is very close or at the percent capture goal, an additional localized partial sewer separation project may be constructed in lieu of a storage tank.
        - The post construction monitoring performed in this cycle will be a critical point during the City's LTCP. At this point, the City will determine the impact of the constructed alternatives prior to the design of a storage tank at the Anderson Street Outfall. Depending on the new percent capture, after the first phases of the LTCP are construction, the City will evaluate if a storage tank is still required, and if so, what size storage tank will be required. The City is hoping that the LTCP alternatives constructed to date will have a large enough impact on the percent capture that will allow the City to seek an alternate approach rather than install a large storage tank.
    - Begin design and construction of a storage tank at the Anderson Street outfall if still required, or a different project, after the post construction monitoring results, in order to achieve 85% capture LTCP goal.
- Permit Cycle IV – V (Est. 2039 – 2049)
    - Complete construction of Anderson Street Outfall Storage Tank, or a different project, if necessary, and perform final post construction monitoring for LTCP 85% capture acceptance by the Department.

It is anticipated that annual reporting will be required for the permit; as such, if a milestone, based on the estimated schedule, extends greater than the annual period, it will be reported and explained in each annual report, as required.

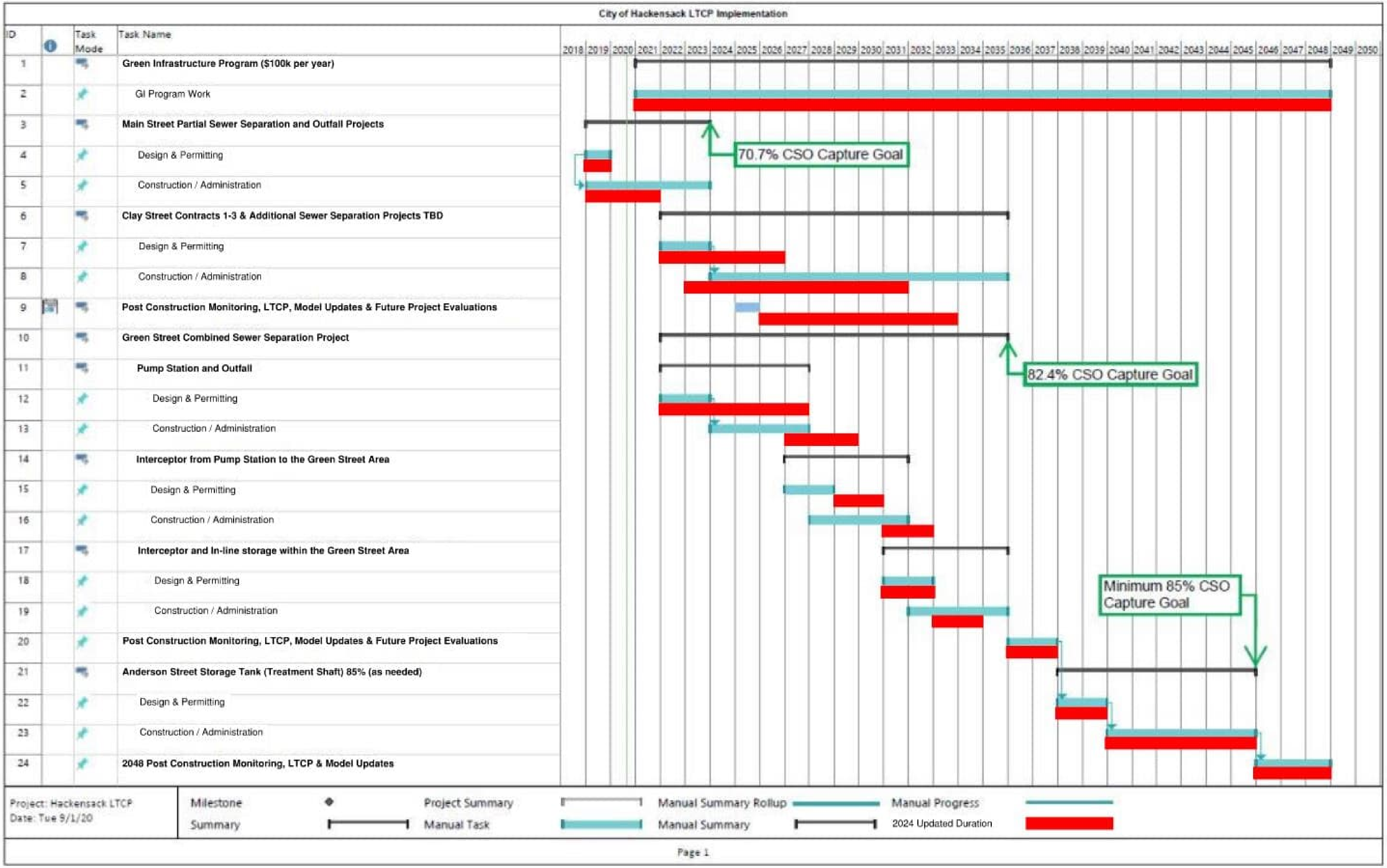


Figure 10-1: City of Hackensack Estimated 30-year Implementation Schedule

10.4. Implementation Schedule for Ridgefield Park

The EPA's "*Combined Sewer Overflow - Guidance for Financial Capabilities Assessment and Schedule Development*" (1997) does not prescribe an overall schedule duration. It does provide some "general time periods" that are "not intended to replace negotiations and deliberations necessary to balance all environmental and financial considerations that influence the site specific nature of the controls and implementation schedules" (page 46). The schedule below presents realistic timeframe to complete the recommended projects. As discussed later there may be additional negotiations based on changes to current conditions and external impacts on the Village all of which may impact the project schedule.

For scheduling purposes, it is assumed the plan will be accepted January 1, 2025, however actual schedule will be relative to effective permit date. Information on planned activities is provided in 5-year segments to align with the assumed cycle of permit renewals. The overall LTCP is based on a 16-year implementation, with follow up monitoring. It is understood that within the overall schedule the NJDEP may request some form of annual reporting to document the completion of milestones or to document progress towards milestone separated by more than one year.

Sewer separation will proceed as the primary LTCP, in parallel planning for the CSO storage tank will proceed as an alternative, adapting to the reduced size. Based on the Village's capacity to bond, obtain funding, and with consideration to community impacts, the following schedule was developed.

Outfall 004A drainage area separation is used as a surrogate for six projects, each separating approximately 10 acres, to provide a total of 60 acres of sewer separation. The actual projects may take place at other locations throughout the Village. The extents of existing sewer separation, land use characteristics and regulator configuration will impact the effectiveness of each project.

10.4.1. Sewer Separation: Years 1-5

- Year 1 – Commence Feasibility Studies to:
    - Evaluate the means and cost-effectiveness of completing sewer separation upstream of Regulator 006.
    - Evaluate the means and cost-effectiveness of eliminating direct stormwater connections from the east side of Ridgefield Park directly tributary to the BCUA Ridgefield Park Branch Trunk Sewer.
- Year 2 –
    - Begin construction of Outfall 006A Sewer Separation Phase 1
    - Begin planning, design and funding of 006A Sewer Separation Phase 2
- Year 3 –
    - Complete construction of Outfall 006A Sewer Separation Phase 1
    - Begin construction of 006A Sewer Separation Phase 2
- Year 4 –
    - Complete construction of Outfall 006A Sewer Separation Phase 2
    - Begin planning, design and funding of 004A Sewer Separation Phase 1
- Year 5 – Continue planning, design and funding for 004A Sewer Separation Phase 1

10.4.2. Sewer Separation: Years 6-10

- Year 6 –
  - Begin construction of 004A Sewer Separation Phase 1
- Year 7 –
  - Complete construction of 004A Sewer Separation Phase 1
  - Begin planning, design and funding of 004A Sewer Separation Phase 2
  - Re-evaluate tank alternative
- Year 8 –
  - Begin construction of 004A Sewer Separation Phase 2
- Year 9 –
  - Begin planning, design and funding of 004A Sewer Separation Phase 3
- Year 10 –
  - Construction of 004A Sewer Separation Phase 3

10.4.3. Sewer Separation: Years 11-15

- Year 11 –
  - Begin planning, design and funding of 004A Sewer Separation Phase 4
- Year 12 –
  - Construction of 004A Sewer Separation Phase 4
  - Begin planning, design and funding of 004A Sewer Separation Phase 5
- Year 13 –
  - Construction of 004A Sewer Separation Phase 5
  - Begin planning, design and funding of 004A Sewer Separation Phase 6
- Year 14 –
  - Construction of 004A Sewer Separation Phase 6

The schedule is graphically represented in Figure 10-210-210-2 and the reduction in overflow is represented in Figure 10-310-310-3.

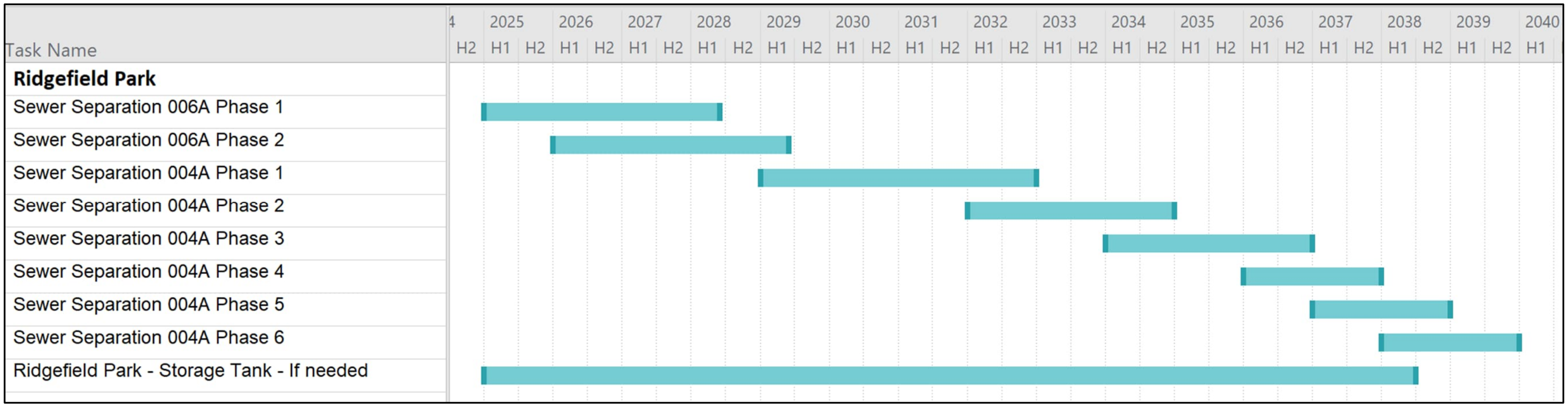


Figure 10-2: Ridgefield Park CSO LTCP Construction Schedule

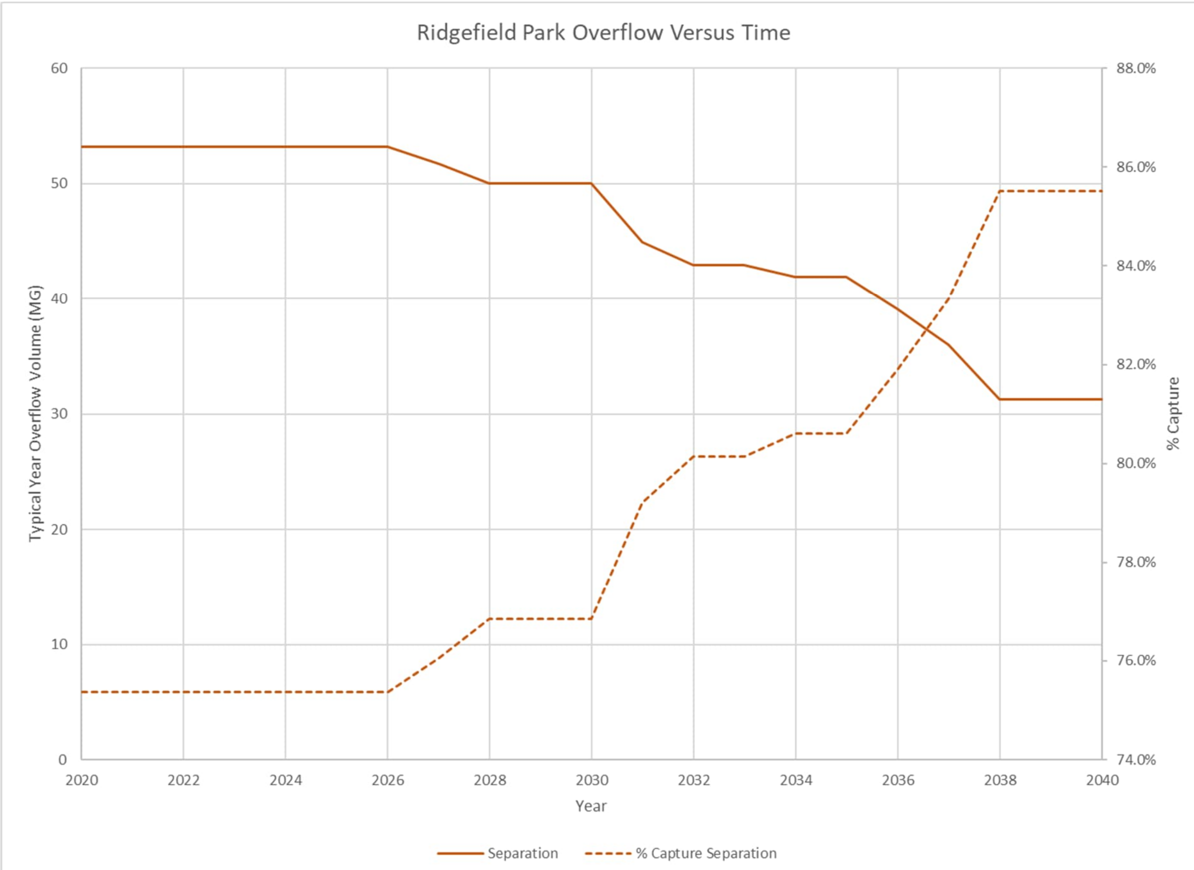


Figure 10-3: Ridgefield Park CSO Reduction Over Time

10.5. Hydraulically Connected System Implementation Schedule

An overall schedule for the regional CSO LTCP has been compiled in Figure 10-410-410-4. The reduction in CSO volumes over time with a CSO storage tank is depicted in Figure 10-510-510-5, and 10-6 reflects the benefits of sewer separation in Ridgefield Park instead.

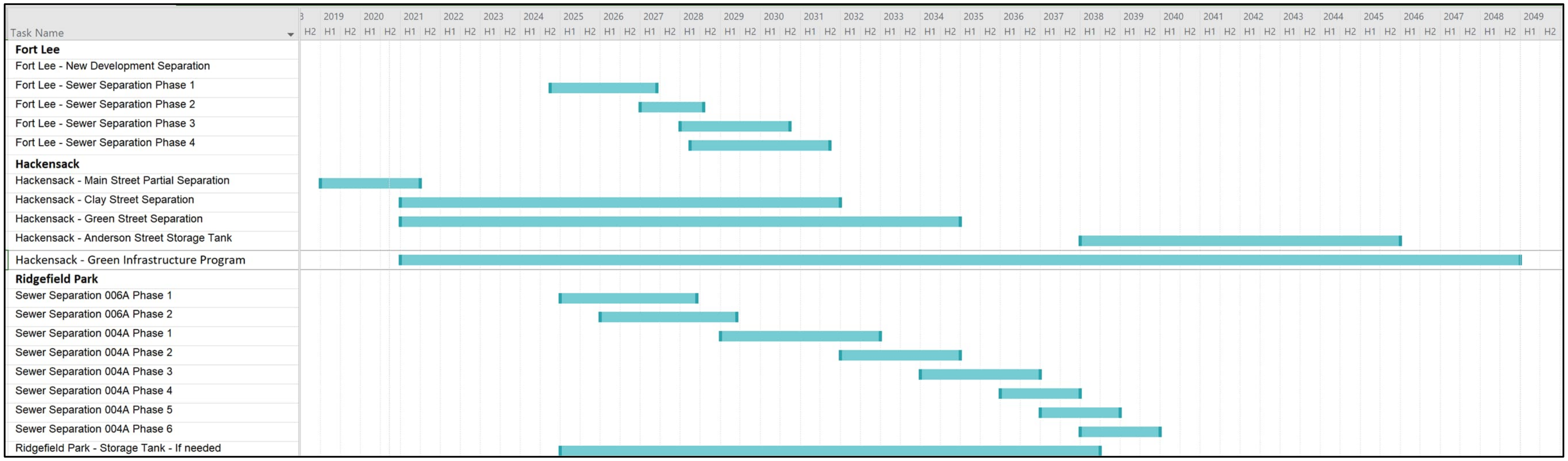


Figure 10-4: BCUA Districtwide CSO LTCP Schedule

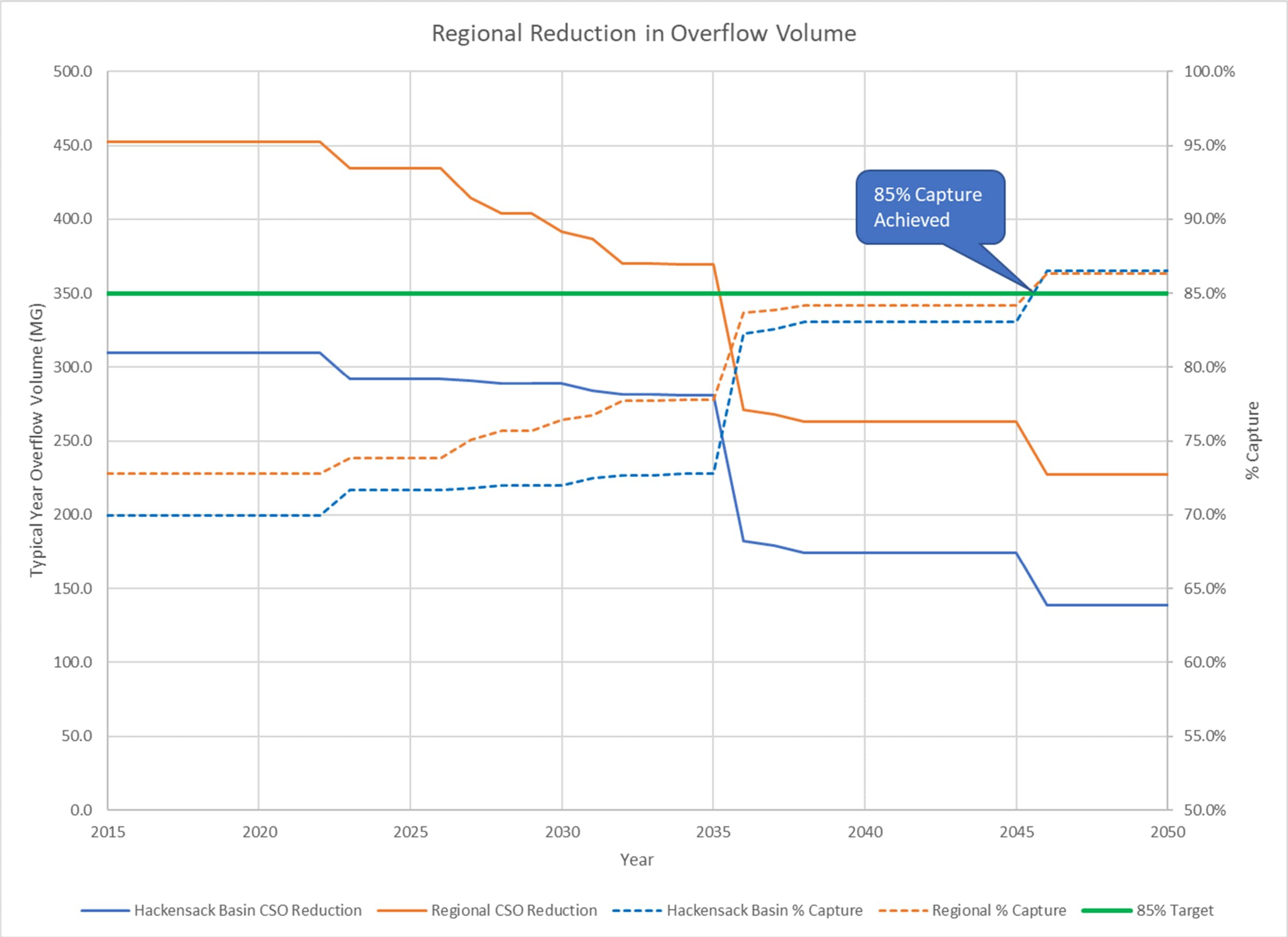


Figure 10-5: Regional CSO Volume Reduction Over Time

11. Operational Plan

11.1. Introduction

Part IV G 6 requires that the municipalities update their combined sewer system operation and maintenance manuals to "to address the final LTCP CSO control facilities and operating strategies, including but not limited to, maintaining Green Infrastructure, staffing and budgeting, I/I, and emergency plans". Since the LTCP facilities will be constructed over a period of decades the manuals cannot be updated until the facilities are completed. Accordingly, each municipality had identified the need for their LTCP facilities to be maintained and to update their manuals and that they understand the additional responsibilities.

11.2. Operational Plan for Fort Lee

The operational and maintenance plan for Fort Lee's LTCP will be similar and incorporated into the existing plan. Tables and maps will be updated each year for the newly separated areas as required by the CSO permit and O&M plans for the constructed green infrastructure projects will be added. In accordance with Part IV G 6 of the CSO permit which requires that municipalities update their combined sewer system operation and maintenance manuals to address the final LTCP CSO control facilities and operating strategies, Fort Lee will review their combined sewer system operation and maintenance manuals annually and incorporate features of the LTCP as they are implemented. At a minimum the operations and maintenance manuals will address the following to ensure effective performance:

- Operation and maintenance of LTCP facilities including sewers separated as part of the plan
- Emergency Plan
- Asset Management Plan
- Adequate funding
- Adequate staffing and training
- Inspections and maintenance as per O&M manual
- Green infrastructure operations and maintenance plan

Annual review and update of O&M Plans, Asset Management Plans, and Emergency Plans will document phases of the LTCP as it is implemented.

11.3. Operational Plan for Hackensack

Upon approval of the LTCP, the recommended LTCP will also provide the required Operations Plan in accordance with G.6. of the CSO permit, "Operational Plan". This Plan will describe the O&M program that would need to be added to the City's existing O&M Manual to address the final LTCP CSO control facilities in the approved LTCP. The Operational Plan for the LTCP, including the Emergency Plan and Asset Management Plan, will address, at a minimum, the following items:

- Emergency Plan and Asset Management Plan
- Operating strategies for the newly constructed LTCP alternatives
- Effectiveness of performance of the constructed LTCP alternatives
- Adequate funding and budgeting
- Adequate staffing and training

- Effective management including regularly scheduled inspections and maintenance
- Adequate laboratory and process control planning
- Green Infrastructure maintenance plans for each type of GI

The City's O&M manual will continue to be reviewed annually and updated as future permits may require.

11.4. Operational Plan for Ridgefield Park

The Village currently has an operations and maintenance manual for its combined sewer system. In accordance with Part IV G 6 of the CSO permit , the Village understands that the proposed LTCP facilities will require operation and maintenance, including the disposal of captured solids and floatables. It is the intent of the Village to require a system operation manual as well as equipment operations and maintenance manual be provided and that training for Village personnel would be required under the construction contract. Elements of the Village's sewer manual to be updated are:

- Operation and maintenance of LTCP facilities
- Emergency Plan
- Asset Management Plan
- Adequate funding
- Adequate staffing and training
- Inspections and maintenance as per O&M manual

It is also understood that on a less frequent basis specialized contract services may be required to inspect the interior of the tank and to overhaul equipment. The storage facility operations and maintenance manuals will be incorporated into the Village's overall CSS O&M manual. Budgetary estimates for operations and maintenance costs have been incorporated into the funding plan in Section 9.4.

Operation and maintenance responsibilities will include:

- Sediment and floatable capture system
- Flushing system
- Pumping station
- Odor control system
- CSO storage tank
- Telemetry system with BCUA SCADA system

12. Compliance Monitoring Plan

12.1. Background

The members of the BCUA CSO Group are required under Section G.9 of their NJDPES permits to develop a compliance monitoring plan (CMP) that is "adequate to: verify baseline and existing conditions, the effectiveness of CSO controls, compliance with water quality standards, and protection of designated uses. This CMP shall be conducted before, during and after implementation of the LTCP and shall include a work plan to be approved by the Department that details the monitoring."

The portion of the CMP conducted after implementation of the LTCP is specifically referred to as the Post Construction Compliance Monitoring Plan (PCCMP) and is the focus of this section. The monitoring plan proposed in this section satisfies the requirements of the Permittees' NJDPES permits and is consistent with and informed by National CSO Control Policy and USEPA's CSO Post Construction Compliance Monitoring Guidance, May 2012. The main elements of the PCCMP include the following:

- A process to determine whether the CSO control measures are meeting the Performance Criteria established in Section 5.5.
- A monitoring schedule, regulator monitoring locations, receiving water sampling locations, and rain gauge locations.
- The approach for analysis of the PCCMP data for assessing the performance of CSO control measures and for reporting progress to regulatory agencies and the general public.
- A Public Notification System to notify the public of the occurrence of Combined Sewer Overflows for each receiving water body.

12.2. Overview of Approach

Upon completion of the CSO projects described in Section 7, post-construction monitoring to evaluate the incremental reduction in overflow rates and volumes as CSO Control facilities are placed into operation. For the selected presumption approach, the National CSO Policy and the NJPDES Permit requires an 85% wet weather capture on an annual systemwide basis for the Typical Year. It is anticipated that the BCUA CSO Group will work with the NJ CSO Group to complete this work. Wet weather capture will be determined on a systemwide basis using an updated H&H model that will be calibrated using post construction monitoring data and evaluated over the model Typical Year (2004), which has been previously approved by the NJDEP. This is the performance criteria that will be used for the LTCP capital projects.

Post-construction monitoring is a requirement of the NJPDES Permit and the approach provided herein has been developed for the purposes of providing enough data to evaluate the effectiveness of the CSO control measures constructed during the implementation of the LTCP. The evaluation of the control measures will be based on the Performance Criteria established in Section 5.5 and will be used to verify that BCUA members are in compliance with their respective NJPDES Permits. The general scope of the PCCMP will include the implementation of a rainfall and hydraulic monitoring program, as well as a detailed analysis and evaluation of the CSO control measures' efficacy. The program will be conducted during the LTCP implementation to corroborate that the completed CSO control measures are performing effectively, while providing sufficient data to identify and remedy underperforming control measures.

Post construction monitoring will serve its role in demonstrating that CSOs will be reduced to the levels predicted in the recommended plan based on the typical year conditions to meet the CWA requirements. Pathogen loads, contributed by the remaining CSOs, based on post construction monitoring will be compared to non-CSO loads to the receiving waters estimated in the LTCP (or Baseline Compliance Monitoring Report previously approved by NJDEP). Any reductions in non-CSO loads as a result of then-current water quality compliance requirements in the receiving waters will also be considered. This information, as developed and made available during post construction monitoring, will be used to assess CSOs compliance with the current NJPDES Permit and WQS.

As rainfall varies substantially from year to year and from storm to storm, it will require normalizing rainfall to the typical year to assess performance. The same is true for receiving water monitoring where the variables include other pollutant sources that are also driven by wet weather conditions. For these reasons and in accordance with the CSO Policy, the LTCP is based on the 2004 “typical year” conditions as previously approved by the NJDEP.

12.3. Landside monitoring

It is anticipated that receiving water monitoring and modeling will be completed thru the NJ CSO Group, however similarly to the recently completed CMP landside monitoring and modeling for the BCUA Group will be conducted by individual members and the results incorporated into the existing BCUA InfoWorks ICM model. BCUA CSO Group member will evaluate the performance of the control measures through use of the H&H model. The model output will be compared with actual CSO flow data for the post-construction monitoring period to determine whether recalibration of the H&H model is needed. Once the H&H model has been determined to be adequately calibrated, a continuous simulation of the Typical Year (2004) will be run to compare the remaining CSO discharge volume to baseline conditions and determine whether the CSO control measures have achieved the Performance Criteria.

Periodically, progress towards the CSO reduction goals will be evaluated and if necessary, the LTCP revised to keep the project on track. Each of the municipalities has scheduled system monitoring and allocated the estimated costs. It is assumed that the monitoring of the system and model recalibration will be based on a Quality Assurance Project Plan (QAPP) that will be approved by the NJDEP.

12.4. Receiving Water Monitoring

For the purposes of addressing the NJPDES Permit PCCMP ambient monitoring requirements, the BCUA CSO Group plans to utilize water quality sampling data collected by the existing NJ/NY Harbor Dischargers Group sampling program to supplement the findings of the collection system modeling and to support the water quality modeling efforts, to be performed upon the implementation of all CSO control measures to verify that the remaining CSOs are not precluding the attainment of water quality standards for pathogens. For purposes of defining the implementation of all CSO control measures, implementation of all CSO Control measures is defined as the implementation of all projects by all NJ CSO Group Permittees.

12.5. Performance Assessment

To demonstrate compliance under the Presumption Approach, members of the BCUA CSO Group will continue to update and calibrate the H&H model after the implementation of CSO control measures and post-construction monitoring phase data has been collected. The model will be used to simulate CSS performance in the BCUA system and to demonstrate compliance with the performance criteria identified, a minimum of 85% capture by volume of the systemwide, and by segment of the hydraulically connected system, wet weather volume during the Typical Year (2004). Where applicable a H&H model will also be used to assess the performance of control measures. As may be required under future permits permittees will submit a series of milestone reports to the NJDEP detailing the implementation and performance of CSO control measures. An Adaptive Management Plan shall be developed in the event that CSO control measures exceed or do not meet the Performance Criteria. The Performance Assessment approach, reporting, and adaptive management plan are outlined in the following subsections.

12.6. Adaptive Management Plan

BCUA CSO Group Permittees are confident that the CSO control measures implemented prior to the final post construction monitoring period (completion of all proposed facilities) will meet the 85% wet weather capture percentage Performance Criteria based on the simulation of the Typical Year (2004). However, should the post construction monitoring suggest the CSO control measures exceed the performance criteria or do not perform as anticipated, performance factors and deficiencies responsible for this exceedance or shortfall will be identified. Modified, reduced, or additional control measures will then be implemented to allow individual permittees to meet the 85% Performance Criteria. An Adaptive Management Plan shall be developed that details this analysis, including the implementation plan and schedule of the additional controls. This Adaptive Management Plan will include any adaptive management modification based on Post- Construction Monitoring and evaluation. The Adaptive Management Plan shall be submitted to NJDEP as may be required under future permits. It is anticipated that these reports are meant to coincide with the renewal of each NJPDES Permit, such that any required adaptive actions could then be included in the NJPDES Permit renewal, as applicable. The Adaptive Management Plan, if needed based on the performance of the implemented CSO control measures, will be included in the PCCMP.

The BCUA CSO Group permittees will consider multiple adaptive management actions for over-performing or under-performing CSO control measures, including eliminating or reducing the size of proposed facilities, revising technologies, or constructing additional grey infrastructure (i.e. storage) or green infrastructure (i.e. bioretention).

Additionally, the financial impacts of the recent SARS-CoV-2 virus Global Pandemic are yet to be fully realized and may not be fully realized for several years. These financial impacts may be due to several factors, which could be caused by a decrease in revenue or an impact on collection rates, among other items. Permittees will continue to monitor these potential financial impacts and will include any negative impacts to their financial capability within the Adaptive Management Plan, which may include the need for a longer implementation schedule in order to reduce the financial burden as a result of lost revenue, a reduction in collection rates, or other financial factors.

Upon review and approval of the Adaptive Management Plan by the NJDEP, BCUA CSO Group permittees shall implement those measures in accordance with the schedule set forth in the Adaptive Management Plan.

13. Public Participation

13.1. BCUA CSO Group

The BCUA and its hydraulically connected communities of Fort Lee, Hackensack, and Ridgefield Park agreed to complete most of the CSO work independently but to undertake a coordinated Regional approach to the establishment of the Supplemental CSO Team. Although the BCUA does not own any CSO outfalls, they guided the coordination effort, which included public outreach for the Regional BCUA CSO LTCP.

13.1.1. Summary of Public Participation prior to submittal of DEAR report

Public outreach and input are an important component of the LTCP progress, and the project team has endeavored to provide opportunities for public education and awareness, as well as to gain feedback on the CSO control alternatives. Below is a summary of activities undertaken by the BCUA CSO Group. Efforts by the individual municipalities (Fort Lee, Hackensack, and Ridgefield Park) are documented in the subsequent subsections.

A Public Participation Program (PPP) Report was submitted in June 2018 with a revision submitted in January 2019 and approved by NJDEP in June 2019. The BCUA PPP Report is summarized here, with the full report available at the NJDEP CSO website https://www.state.nj.us/dep/dwq/cso-ltcpsubmittals.htm. The Report covered only activities that were undertaken on a regional basis through January of 2019, it focused on the formation of the Supplemental CSO Team and communication to inform the public.

The purpose of the Supplement CSO Team was to advise the permittees and their consultants and act as a liaison for the general public. Specifically, the Supplemental CSO Team met periodically to review the information collected during LTCP development and provide input to the what could be done.

Members of the Team were solicited, from the general population, by an invitation on the BCUA website, but no one expressed interest. BCUA expressly invited the Hackensack River Keeper, who accepted and joined the group. In addition, each member of the BCUA CSO Group was asked to designate two members from their municipality. The list of members is contained in the Report.

The Team has met quarterly, for the most part, since June 2017. Details for each meeting such as sign-in sheets, presentations slides and meeting minutes are provided in Appendix B, in the PPP Report and posted on the BCUA website (https://www.bcua.org/index.asp?SEC=AEBEC7FF-B96F-485D-B704-7E9E888905A0&Type=B_BASIC). Mott MacDonald presented on the progress of the alternatives evaluation to the BCUA CSO Group's Supplemental Team on March 12, 2019. The presentation provided an update to the Team on the status of the overall project, alternatives to be considered, and where those alternative controls will be located. A follow up presentation providing more specifics on alternative controls and their locations and anticipated costs was presented to the Team on May 15, 2019.

Regarding communicating with the public at large, the BCUA Group does so in a variety of ways, including using their existing web sites and literature. BCUA provided content for their own and municipal websites. BCUA produced a Homeowner's Guide brochure explaining rain-derived infiltration and inflow reduction and the sanitary sewer overflow elimination program. It also provides information about the BCUA discount rain barrel program. Copies of this brochure are available to BCUA municipalities for distribution to the public at municipal buildings and/or libraries. BCUA provided handouts and a demonstration rain barrel at the Ridgefield Park celebration of Earth Day. The BCUA Group collaborated with the larger NJ CSO group to develop a web-based system that provides public notification of CSO discharges. The website is located at http://njcso.hdrgateway.com.

The Public Participation Process report was submitted to NJDEP in July 2018, revised in May 2019, and approved in January 2019. Public participation activities up to January 2019 are documented in this report. Public participation activities between January 2019 and June 2019 are summarized in the Development and Evaluation of Alternatives Report which was submitted in June 2019 and approved by NJDEP in February 2020. Public participation activities completed prior to the submission of the DEAR include:

- BCUA Supplemental CSO Team
    - Made up of two members from each CSO community in the BCUA service area, and representatives of community groups or public members.
    - Quarterly meetings, documented in the PPP:
        - June 13, 2017 – Project introduction and overview; DEP presentation
        - September 19, 2017 – Models and project scheduling
        - December 12, 2017 – Green infrastructure
        - April 10, 2018 – Sensitive areas, typical year analysis, models and Sewer System Characterization Report
        - June 12, 2018 – Results of Sewer System Characterization Study and Report
        - October 10, 2018 – Development and Evaluation of Alternatives
        - December 4, 2018 – Receiving Water and Gray Infrastructure Modeling
    - Quarterly meeting following the PPP, for minutes and presentation slides see Appendix B.
        - March 12, 2019 – Progress on Alternatives Evaluation
        - May 15, 2019 - Alternative controls, their locations and anticipated costs
- CSO Online Public Notification System: http://njcso.hdrgateway.com
- CSO Informational Newsletter
- Homeowner's Guide brochure about rain-derived infiltration and inflow reduction and sanitary sewer overflow elimination program
- Handouts and rain barrel demonstration at annual Ridgefield Park Earth Day celebrations
- All informational content, notices of meetings, meeting minutes and presentations posted on BCUA website and member communities' websites

13.1.2. Public Participation since DEAR

Below is a summary of activities specific to the BCUA CSO Group that have been conducted since the approval of the Development and Evaluation of Alternatives Report. Documentation of pubic participation events, including presentation slides, meeting minutes and sign-in sheets, between the publication of the Public Participation Report and the submission of this Selection of Alternatives Report are included in Appendix B.

13.1.2.1. Supplemental CSO Team and Public Meetings

Much of the outreach took place through quarterly meetings of the BCUA Supplemental CSO (SCSO) Team, and through the individual actions of the members. The BCUA has continued to invite members of the affected public to participate in a Supplemental CSO Team, to solicit input and share information on the LTCP development process. While the initial meetings were primarily informative and educational in nature, the latter meetings involved more participation and feedback from the team members on the evaluation and selection of CSO LTCP. The meetings since the last report submission are summarized below. A record of minutes, sign in sheets and presentation slides can be found in Appendix B, the meeting dates were as follows:

- September 10, 2019
- January 28, 2020
- July 21, 2020 – Held virtually via MicroSoft Teams

13.1.2.2. Open Public Meeting

Initially, an open public meeting was scheduled on May 5, 2020 to present and obtain feedback from the public on the selected CSO control program. However, this meeting was cancled due to the COVID-19 pandemic. It was replaced by video presentations made by the municipalites which the BCUA plans to post on thier. This was done at the suggestion of the SCSO team so as provide the content of a meeting without obligating the public to to a specific time and date.

13.1.2.3. Regional Environmental Groups

The BCUA engaged the Hackensack Riverkeeper who was represented on the SCSO Team meeting and attended the team meetings. Comments on the DEAR were provided by Sewage Free Streets and Rivers on August 23, 2019. The BCUA engaged these comments by including their comment letter and responding to the BCUA specific comments in the DEAR resubmittal.

13.1.2.4. Websites and Publications

The BCUA's website has been used as a platform to provide information about the CSO LTCP process, and post notices of upcoming meetings, copies of meeting minutes, presentation slides, and links to prior LTCP submissions to NJDEP. Notices of upcoming meetings have also been posted to the CSO member communities' websites. The BCUA's CSO webpage can be accessed at :https://www.bcua.org/index.asp?SEC=AEBEC7FF-B96F-485D-B704-7E9E888905A0&Type=B_BASIC

13.1.3. Planned Public Participation

This LTCP provides high-level recommendations for the selection of a suitable and feasible CSO control program. The BCUA will continue to coordinate public outreach through the LTCP as may be required by future permits. This outreach may be in the form of periodic meetings open to the public or selected representative community members to provide project updates, the circulation of informational flyers in the mail or on social media, or public notices posted on the BCUA website.

13.2. Fort Lee Public Participation

The Borough's CSO Permit Part IV Section G.2.b requires the affected public be given the opportunity to be involved in the LTCP process. As discussed in the report entitled Public Participation Program for the Borough of Fort Lee members of the public have been appointed to the Supplemental Combined Sewer Overflow Committee and a local committee has been formed with members of Fort Lee's Department of Public Works personnel. Meetings have been held during the LTCP process to inform the committee members and members of the public of the process and progress of the LTCP.

13.2.1. Summary of Public Participation prior to submittal of DEAR report

Public participation up to the issuance of the DEAR report has been summarized in the in the DEAR Report (https://www.nj.gov/dep/dwq/pdf/CSO_DEAR_FortLee_20190625.pdf) and the Fort Lee Public Participation Process Reports. Public meetings have been held to engage the public in the LTCP process. While member of the Supplemental Combined Sewer Overflow have attended the meetings, the public has only attended one meeting. This is not to suggest that they are not interested in the LTCP but until the actual cost impact is known the public at large will not respond.

13.2.2. Public Participation since DEAR

Since the DEAR has been issued there have been three public meetings and one Mayor and Council meeting which was also open to the public. These presentations were as follows:

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

These meeting were held to inform the public and the Mayor and Council of the progress that has been mad, the alternatives that have been selected and the estimates costs and schedule for the controls. Please refer Appendix C for the meeting summaries and presentations.

13.3. Hackensack Public Participation

Part IV Section G.2.b of the City's permit required that the affected public be actively involved through the three main steps of the LTCP process: characterization, alternative development and alternative selection. The City has documented its public participation outreach efforts throughout the LTCP process. The efforts were aided by public participation teams that included a City-focused public participation team as well as Supplemental CSO Team that attended regular meetings with the BCUA CSO Group.

For reference, a log of the Supplemental CSO Team meetings and BCUA CSO Group information can be found on the BCUA's website:

- https://www.bcua.org/index.asp?SEC=AEBEC7FF-B96F-485D-B704-7E9E888905A0&Type=B_BASIC

Additionally, full details of the public participation efforts can be found in the City's NJDEP approved Public Participation Process (PPP) Report and DEAR Report. These reports are located on the NJDEP website:

- https://www.state.nj.us/dep/dwq/cso-ltcpsubmittals.htm.

A brief summary of the publication participation efforts is described in the subsequent sections of this report.

13.3.1. Summary of Public Participation prior to submittal of DEAR report

Section 2.1 of the City's DEAR Report details public participation efforts through July 2019. As detailed in the PPP Report, Supplemental PPP Letter and DEAR report, the City established the Hackensack Public Participation Group, a team dedicated to planning public outreach efforts related to the LTCP. Prior to the submission of the DEAR report, the public participation group met on multiple occasions to arrange activities and assist public outreach in the City. The outreach efforts accomplished prior to the DEAR report consists of, but is not limited to, the following:

- Created a dedicated CSO webpage on the City's website. (www.hackensack.org/cso). This webpage is the central to housing information related to the City's LTCP efforts to date.
- Disseminated CSS information, including flyers, in the City's newsletter, 4th of July event and various public spaces throughout the City.
- Developed a CSO survey, posted on the City's website, to solicit feedback from the public.
- Presented an LTCP update on the evaluated alternatives analysis during a City Council meeting on June 11, 2019.
- Participated in the NJ CSO Group public notification website. As part of the NJCSO Group, a CSO notification website was created to alert the public of potential overflows in the regional waterbodies. A user can go to the website (https://njcso.hdrgateway.com/) and click on a CSO community via a map in order to see the latest potential CSO event dates.
- Installed CSO awareness signs at both outfall locations.

The Supplemental CSO Team attended quarterly meetings with the BCUA CSO Group in order to obtain pertinent information and assist in relaying that information within the City. Once again, information and meeting minutes from these quarterly Supplemental CSO Team meetings are located on the BCUA website.

The main public feedback received throughout the public participation process was the general concern of the flooding issues within the City. The public wanted to ensure that these issues were being considered during the selection of alternatives report.

13.3.2. Public Participation since DEAR

Since the submission of the DEAR Report, the main form of public outreach has been through the Supplemental CSO Team meetings. Additional in person internal public outreach meetings were anticipated, but the COVID pandemic altered the ability to have these meetings. However, Members of the Supplemental CSO Team and City's public attended quarterly progress meetings to provide feedback on the following dates:

- September 10, 2019 (at BCUA):
  - Presented a review of the Development and Evaluation of the Alternatives
  - Discussed the potential of how to further engage the public as the selection process was coming to its final stages.
- January 8, 2020 (at Fort Lee Municipal Building)
  - Presented the City's draft selected plan, including the Court Street Stormwater Project for the first time to the SCSO Team and NJDEP. The NJDEP and public welcomed the idea of a large stormwater project that would assist with flood mitigation as well as CSO capture.
  - A member of the public stated that green infrastructure is an alternative that is appealing to the public.
- July 21, 2020 (virtual on Microsoft TEAMs)
  - Presented the City's selected plan and proposed LTCP capital costs.
  - A member of the public stated that it would be good to summarize the LTCPs so that the potential tax increases do not come as a surprise to the municipalities.
  - A member of the public stated that additional oversight during the LTCP implementation would be ideal in order to provide updates and progress reports to the public. Annual updates in an email or on a website would be welcomed by the public.
  - A member of the SCSO Team thought that a final public outreach effort prior to the SIAR report could be completed in an email or a video that was posted to a website so that the public can view the information and provide feedback if desired.

Since the submission of the DEAR Report, the online public survey responses were fully compiled. As stated earlier, a total of 32 responses were received. 81.3% of the responses were from people who lived in the City and 46.9% of the responses were from people who worked in the City. 78.1% of the responses were from people who lived in the City for more than 10 years. Most responses indicated that the public is aware that the City operates a combined sewer system that sometimes overflows to the Hackensack River during rain events. The survey responses indicated that reducing the City's flooding problems is most important to the public. One survey response, from a resident of 35 years, added a written comment to the survey that states "the solution to street flooding should be a top priority".

A last measure to obtain final public feedback prior to receiving an approval of the City's SIAR Report from NJDEP, is to post a presentation of the City's LTCP and associated impact of costs. The presentation will be located on the City's website and the public will have a chance to review the presentation and provide feedback to the City and the City's consultant. Any feedback received will be considered, and if applicable, incorporated into the City's LTCP in the future.

13.3.3. Planned Public Participation

Public outreach efforts will continue during the next phases of the City's LTCP. Annual updates on progress and plans will be made available to the public. The public will be made aware of construction schedules, traffic disruptions and other pertinent information during the design and construction phases of the LTCP. Different methods of outreach can be used to continue the public outreach during the implementation phase of the LTCP. The City's website, flyers, emails, and meetings are among some of the methods that the City can utilize for public outreach. The City remains committed to ensure that public is adequately informed of the LTCP process moving forward.

13.4. Ridgefield Park Public Participation

In additional to public outreach activities coordinated with the BCUA and appointing representatives to the BCUA SCOS Team, the Village of Ridgefield Park has also been undertaking public outreach with its own community regarding Village-specific CSO control alternatives. The Village submitted a Public Participation Process (PPP) Report July 1, 2018 which documented public participation activities up until that date. This section will summarize activities since the PPP report. Copies of meeting minutes and presentations can be found in Appendix E.

The effort and input of the Village's Supplemental CSO Team were greatly appreciated. The members of the team were faithful in their attendance over a period of more than three years. Many members were longtime or lifelong residents of the Village and provided personal and meaningful perspectives on the Village. They shared the information they received at the meetings, with their acquaintances and provided valuable insights into the community. There were joined by Village officials and guests at the team meetings. In proportion to the Village's population they provided a higher than average representation, with generally the whole team of five individuals present, plus regular attendance by Village personnel.

13.4.1. Summary of Public Participation prior to submittal of DEAR report

The Public Participation Process report was submitted to NJDEP in July 2018, revised in May 2019, and approved in June 2019. Public participation activities up to June 2018 are documented in this report. Public participation activities between June 2018 and June 2019 are summarized in the Development and Evaluation of Alternatives Report. Specific input on the alternatives is included in Section 6.4.5. Public participation activities completed prior to the submission of the DEAR include:

- Supplemental CSO Team
  - Made up of project team as well as invitations to local school, commission, and environmental groups.
  - Quarterly meetings, documented in the PPP:
    - May 15, 2017 – Project introduction and overview; DEP presentation
    - September 11, 2017 – Collection system modeling and project scheduling
    - December 11, 2017 – Green infrastructure
    - March 12, 2018 – Sensitive areas, typical year analysis, models and Sewer System Characterization Study and Report.
    - June 11, 2018 – Results of Sewer System Characterization Study and Report
  - Quarterly meeting following the PPP, for minutes and presentation slides see Appendix E.
    - October 1, 2018 – Development and Evaluation of Alternative Controls
    - January 23, 2019 – Progress on alternatives evaluation
    - May 28, 2019 – Alternative controls, possible locations and anticipated costs

- April 4, 2019 – Presentation at Caucus Meeting - overview of combined sewers, regulatory history and prior work, current progress discussed, anticipated work and overall project schedule for upcoming decisions to be made
- CSO Online Public Notification System: http://njcso.hdrgateway.com
- CSO Informational Newsletter included in Ridgefield Park newsletter and handed out as a hard copy at Earth Day Celebration
- Distributed Homeowner's Guide brochure about rain-derived infiltration and inflow reduction and sanitary sewer overflow elimination program at Earth Day Celebration
- Signage for notices at each outfall location
- Handouts and rain barrel demonstration at annual Ridgefield Park Earth Day celebrations
- All informational content, notices of meetings, meeting minutes and presentations posted on Ridgefield Park and BCUA websites.

The DEAR included a summary of future planned outreach activities to be undertaken by June 1, 2020. These activities have mainly been completed, as noted in the following section:

- Continuation of Supplemental CSO Team meeting on approximately a quarterly basis. - Accomplished
- Continue to seek additional members for the Supplemental CSO Team - Accomplished
- Present the progress of the project to the Village Commission at two (2) meetings – Presented at April 4, 2019 and October 17, 2019 Caucus Meetings
- Hold two (2) meetings in the evening, open to the public, and in a public building such as the Municipal Building or a school – Accomplished through open SCSO Team meetings
- Include an additional article relating to CSOs in the Village's newsletter – Accomplished March 2020 Village Newsletter
- Present the project to meetings of two (2) local community groups, using suggestions from the supplemental CSO team – Events were canceled due to COVID-19, but video presentation was made available.
- Publicize the project at the Earth Day celebration in 2020 – Event was canceled due to COVID-19

13.4.2. Public Participation since DEAR

Below is a summary of activities specific to the Village of Ridgefield Park that have been conducted since the approval of the Development and Evaluation of Alternatives Report. Documentation including presentation slides, meeting minutes, sign-in sheets, and newsletters presented between the publication of the Public Participation Report and the submission of this Selection of Alternatives Report are included in Appendix E. Specific input on the selection of alternatives is recorded in Section 7.4.3.

13.4.2.1. Supplemental CSO Team and Public Meetings

Much of the outreach took place through quarterly meetings of the Village of Ridgefield Park Supplemental CSO (SCSO) Team, and through the individual actions of the members. The Village has continued to invite members of the affected public to participate in a Supplemental CSO Team, to solicit input and share information on the LTCP development process. While the initial meetings were primarily informative and educational in nature, the latter meetings involved more participation and feedback from the team members on the evaluation and selection of CSO LTCP. The meetings since the DEAR report submission are summarized below.

- September 24, 2019 – Covered the requirements for the SIAR, and the alternatives.

- February 5, 2020 – Covered water quality modeling, potential community impacts, and financial capabilities assessment.

- July 30, 2020 – Presented tentatively selected LTCP and costs

These meetings evoked numerous comments and questions which are documented in Appendix E.

13.4.2.2. Village Caucus Meeting

An overview of the LTCP to date including the regulatory background and alternatives was presented to the Village Commission at the October 17, 2019 caucus meeting. Discussion was also provided on the affordability analysis. The presentation slides are included in Appendix E.

13.4.2.3. Public Meeting

The Village held a public meeting on September 29, 2020 to solicit comments from the public. The meeting was advertised in the Bergen Record. Prior to the meeting a video regarding the project was posted on the Village website. The same slides form the video were used at the public and are included in Appendix E. While the meeting was advertised no members of the public attended and there were no comments.

Additional comments received from the public, if any, will be incorporated into the report in the future as part of any revisions/response to comments from NJDEP.

13.4.2.4. Regional and Watershed Based Partnerships

The permittee continues to recognize the value in collaboration with regional groups focused on CSO issues and they have and will continue to actively participate in events hosted by the local community and regional groups such as Jersey Water Works and the NJ CSO Group. Through these meetings, permittees are sharing resources, obtaining feedback from peers on challenges with CSO mitigation and the LTCP process, and reviewing techniques on public messaging.

As noted, the Village is also an active participant in the regional BCUA Supplemental CSO Team, and provides presentations and seeks feedback at these meetings.

Comments on the DEAR were provided by Sewage Free Streets and Rivers on August 23, 2019. The Village engaged these comments by including the comment letter and responding to the Ridgefield Park specific comments in the DEAR resubmittal.

The Village has also partnered with the Hudson River Foundation New York-New Jersey Harbor Estuary Program to work with the EPA in using their Climate Resilience Evaluation and Awareness Tool (CREAT) to assess the Village's combined sewer system vulnerability to the impacts of climate change. The Village participated in three training webinars, and a two-day site visit. A memo was also prepared for delivery to the Village's Director of Public Works on how the CREAT tool may be utilized by the Village. The CREAT tool was used to assess the potential impact of sea level rise on the Outfall 001A regulator basin, to evaluate the resilience of selected CSO control alternatives, and to identify potential additional analyses and data that would be useful for future climate change impact assessments. The Village collaborated with the EPA, to present the trial work done with the EPA CREAT tool at two workshops on July 27th and 29th.

13.4.2.5. Websites and Publications

The Village of Ridgefield Park's municipal website has been used as a platform to provide information about the combined sewers and the CSO LTCP process, and post notices of upcoming meetings, copies of meeting minutes, presentation slides, and links to prior LTCP submissions to NJDEP.

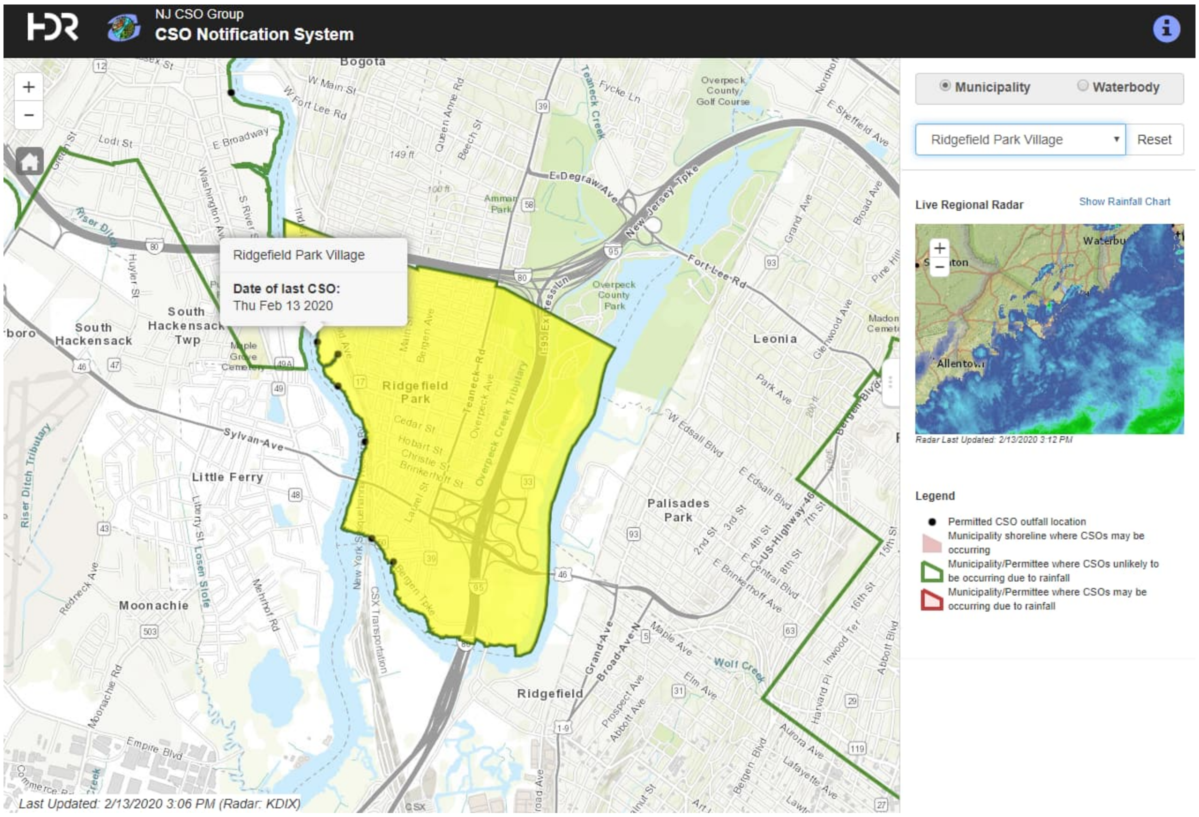
Since the DEAR an additional article about CSOs was included in the Ridgefield Park "Village Newsletter", providing information on combined sewers, the development and evaluation of CSO control alternatives, , cost and community impacts of alternatives. A section of the Village newsletter from March 2020 can be found in Appendix E.

13.4.2.6. CSO Identification Signs

The Village has continued to maintain signs at each CSO outfall to educate the public of the potential hazards associated with water contact during and following wet weather.

13.4.2.7. CSO Notification System

One of the Nine Minimum Control Requirements is "Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts". As part of NJ CSO Group, the Village has continued to utilize the online CSO notification system (https://njcso.hdrgateway.com/) as a public information tool advising on the status of CSO occurrences in the Village and certain other communities participating in the NJ CSO Group.



13.4.3. Planned Public Participation

This LTCP provides high-level recommendations for the selection of a suitable and feasible CSO control program. The Village will continue to conduct public outreach through the detailed design and implementation phases for the selected CSO control program, in order to provide information on construction schedules, anticipated community impacts, and to gain public input on items such as the selection of specific sites around the Village. This outreach may be in the form of periodic meetings open to the public or selected representative community members to provide project updates, the circulation of informational flyers in the mail or on social media, or public notices posted on the Village website. The Village is committed to ensuring that members of the public are provided with information as well as an opportunity to comment throughout the duration of planning and implementation of the selected CSO control program.

14. References

Greely and Hansen, New Jersey CSO Group Baseline Compliance Monitoring Report, June 2018, https://www.state.nj.us/dep/dwq/pdf/CSO_ComplianceMonitoring_Baseline_PVSC_21_20180630.pdf

EPA, Combined Sewer Overflows – Guidance for Financial Capabilities Assessment and Schedule Development, February 1997.

PVSC, Calibration and Validation of the Pathogen Water Quality Model (PWQM) Report, September 2020.

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
Phone: (609) 292-4860 / Fax: (609) 984-7938

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

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

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

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	

<u>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:</u>

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

C: Marzooq Alebus, Bureau of Surface Water Permitting
Dwayne Kobesky, Bureau of Surface Water Permitting
Joe Mannick, Bureau of Surface Water Permitting
Nancy Kempel, Bureau of Non-Point Pollution Control
Shaza Rizvi, Bureau of Surface Water Permitting

Distribution List

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

Susan Banzon
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

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

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 <u>system-wide total of 0, 4, 8, 12 and 20 overflows per year</u>, 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. <u>The system wide percent capture equation used to calculate the percent capture for the baseline (and all evaluated alternatives) is as follows:</u>

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

<u>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.</u>

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.

2

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
Joe Mannick, Bureau of Surface Water Permitting
Shaza Rizvi, Bureau of Surface Water Permitting

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

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

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

<u>Distribution List</u>

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

Direct: (201) 807-5801
Fax: (201) 641-5356
Email: RLaux@bcua.org

BERGEN COUNTY UTILITIES AUTHORITY

Box 9, Foot of Mehrhof Road, Little Ferry, New Jersey 07643

ROBERT E. LAUX
Executive Director

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

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

Permittee: 4/24/20

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

Date

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

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

Permittee: 4/28/2020

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

Date

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 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.	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 when 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 idication 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

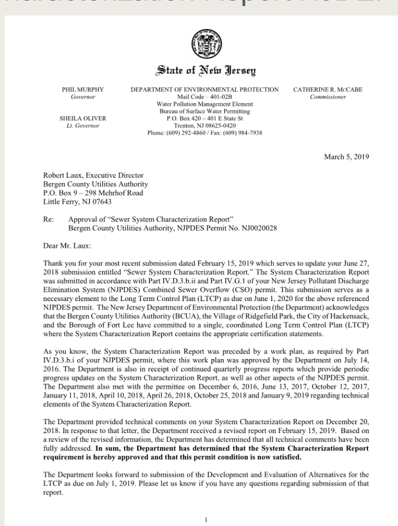
Public Participation Report – Key Comments

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
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

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

Mott MacDonald | Presentation 13 12 March 2019

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

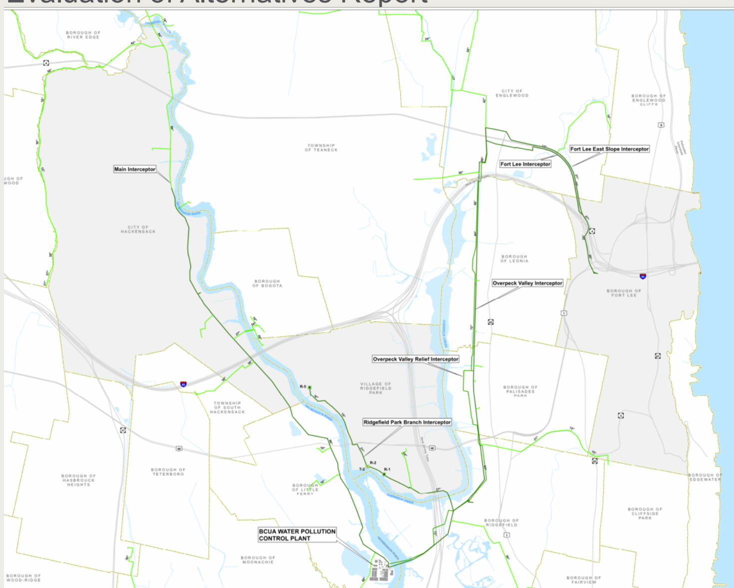
Village of Ridgefield Park

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

Mott MacDonald | Presentation 14 12 March 2019

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report



Mott MacDonald | Presentation

12 March 2019

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

Mott MacDonald | Presentation

16

12 March 2019

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

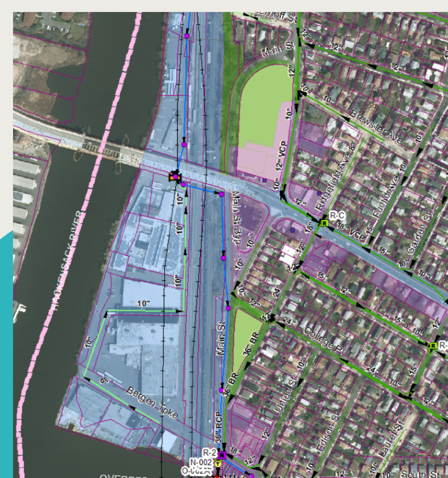
Ridgefield Park

Development and Evaluation of Alternatives Report - Siting

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

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

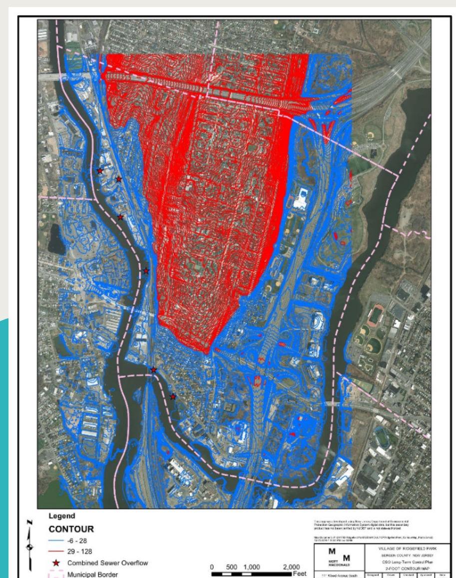
- Aerial Imagery and Land Use Classification
  - Structures vs. Paved vs. Vegetated
  - Open Space, Industrial, and Commercial vs. Residential and Transportation Corridors
  - Green Acres – NJDEP Approval – Propose GSI
- Parcel Data
  - Public vs. Private Ownership
- Soil Type
- Topography
  - Difference 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
  - 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



Ridgefield Park

Development and Evaluation of Alternatives Report – Example Site

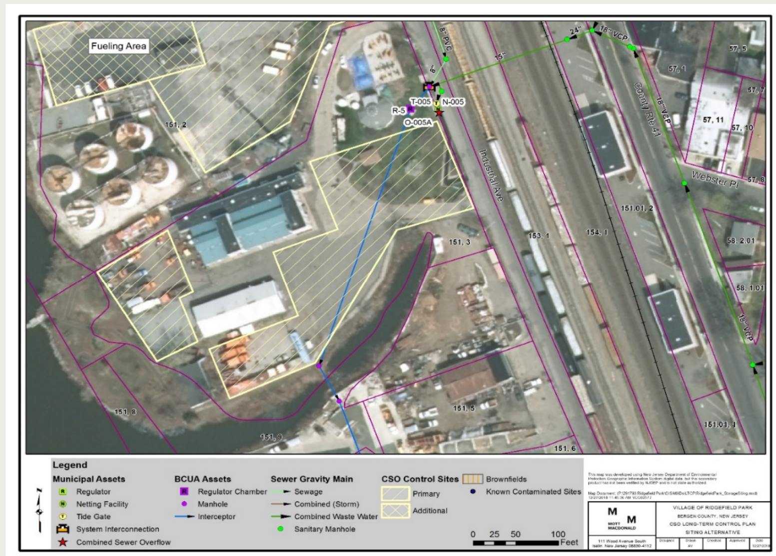
Area available: 0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations

BCUA Interceptor



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*

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

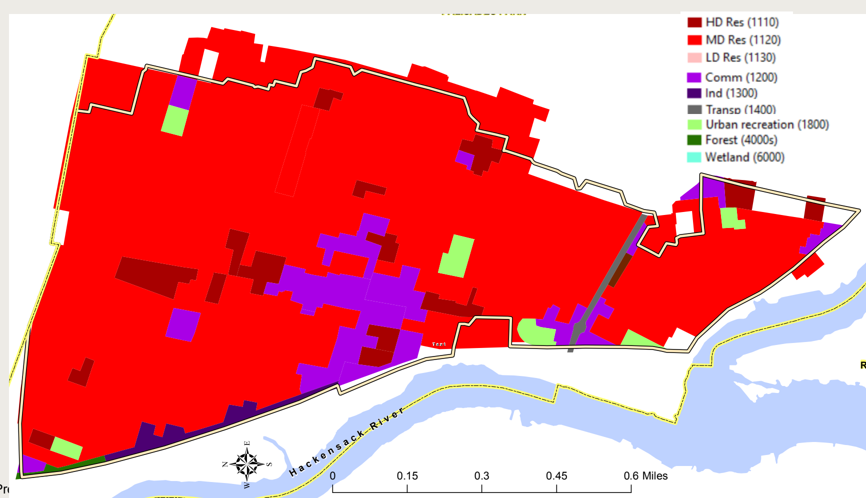
Analysis using GIS (mapping) data, including:

- 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

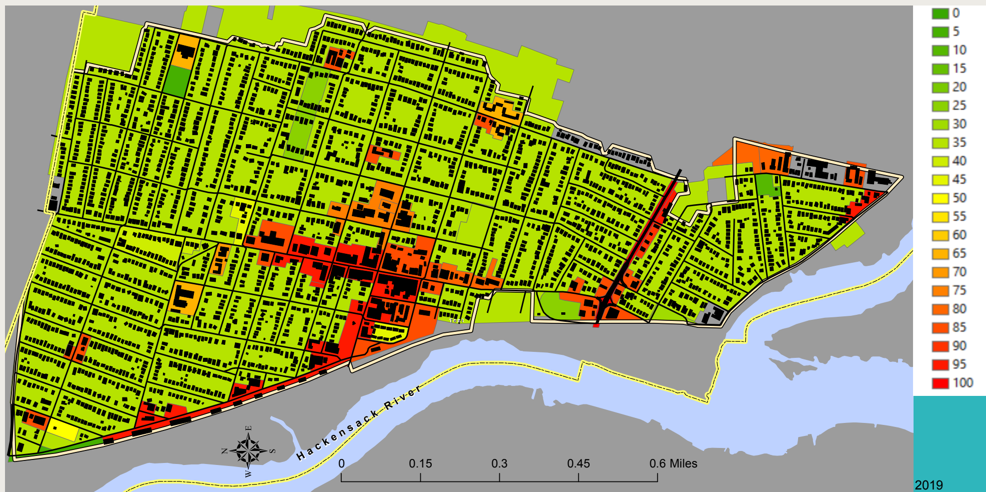


RJJ6

Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

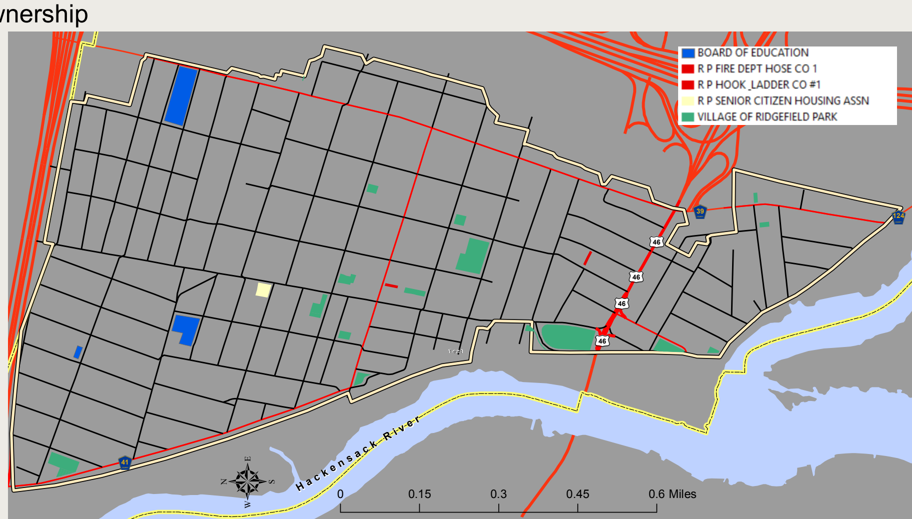
- Building footprints
- Impervious area



Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

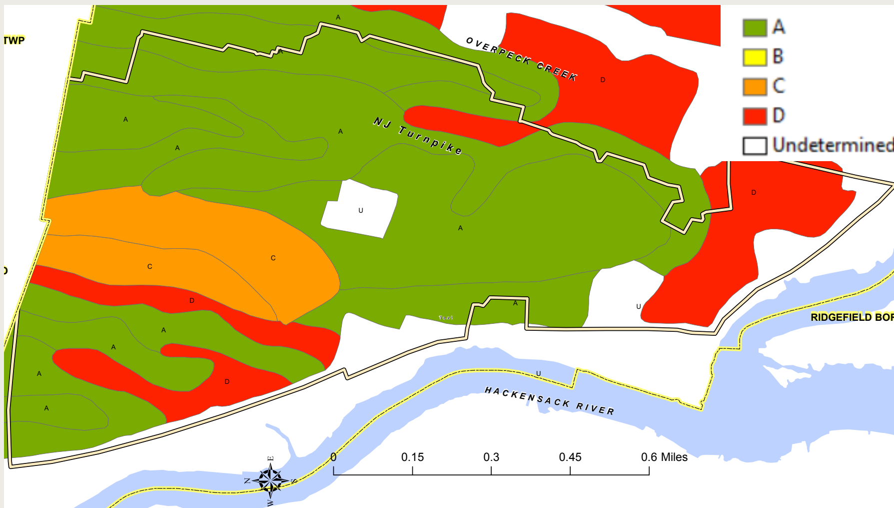
- Property Ownership



Ridgefield Park

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

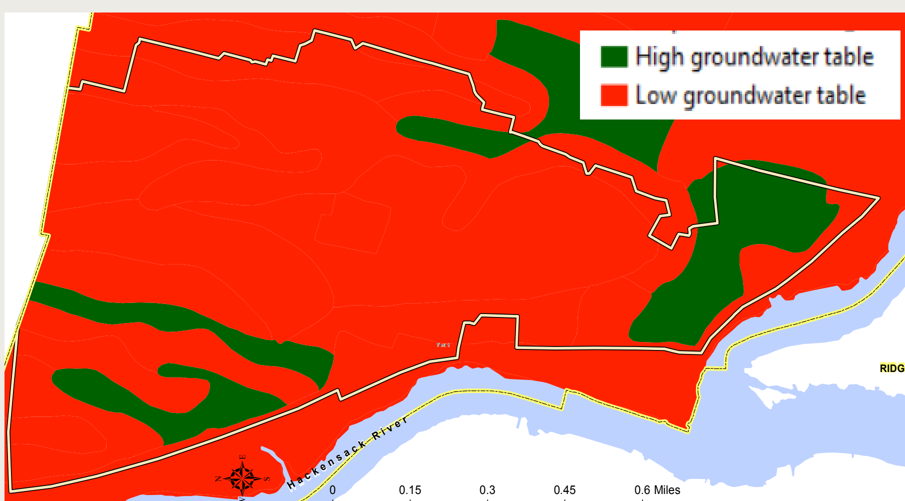
- Soil Type



Ridgefield Park

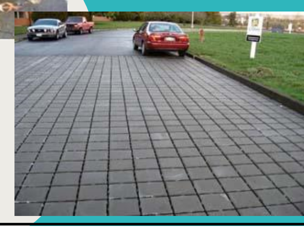
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- 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

Mott MacDonald | Presentation 33

Ridgefield Park

Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity

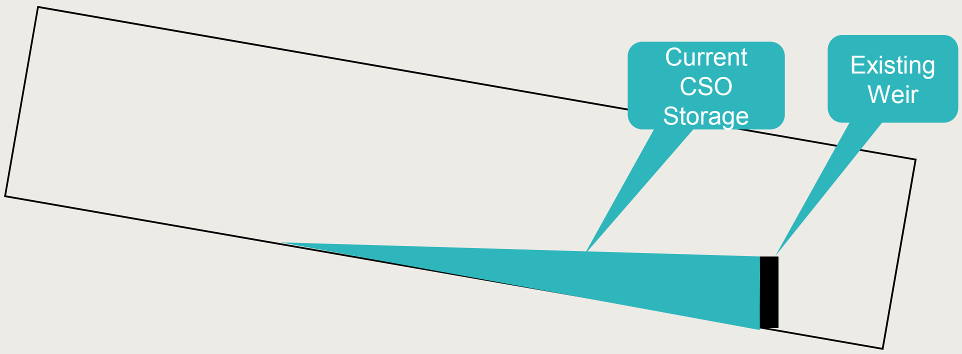
Works best with large flat pipes, which are not typical in Ridgefield Park

Mott MacDonald | Presentation 34 12 March 2019

Ridgefield Park

Development and Evaluation of Alternatives Report – Inline Capacity

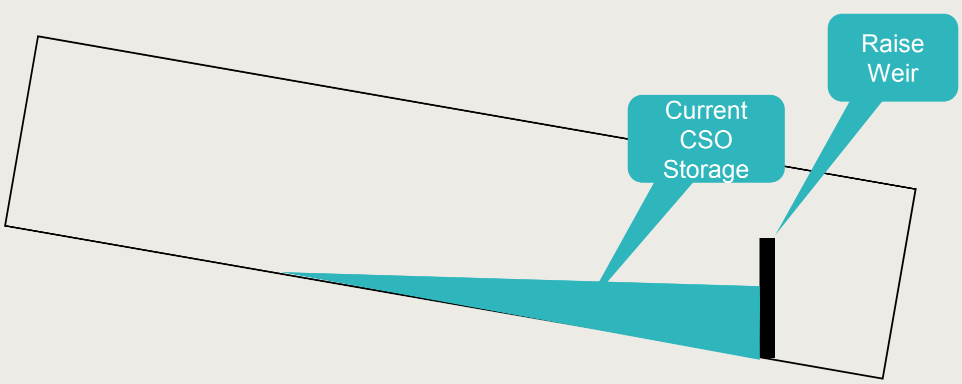
Maximize inline storage capacity by raising overflow weir elevation



Ridgefield Park

Development and Evaluation of Alternatives Report – Inline Capacity

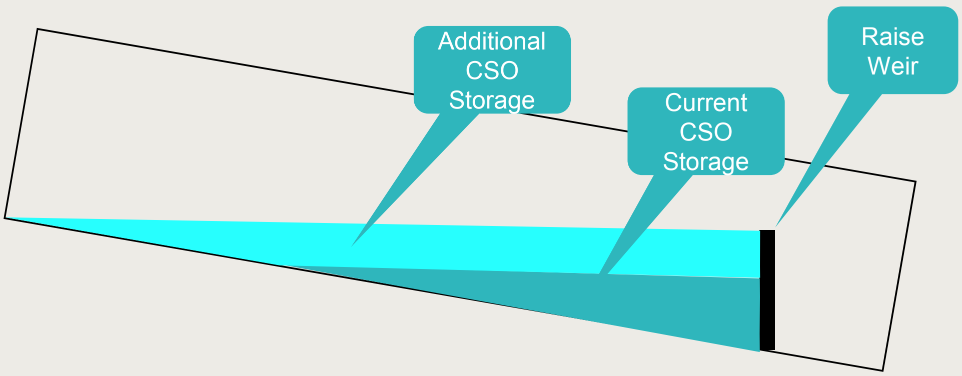
Maximize inline storage capacity by raising overflow weir elevation



Ridgefield Park

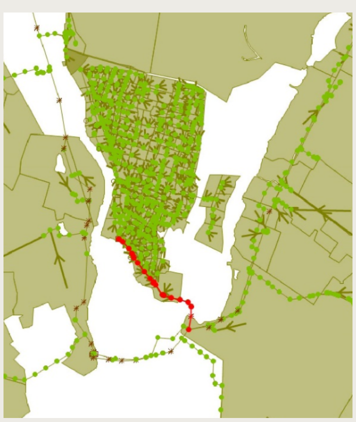
Development and Evaluation of Alternatives Report – Inline Capacity

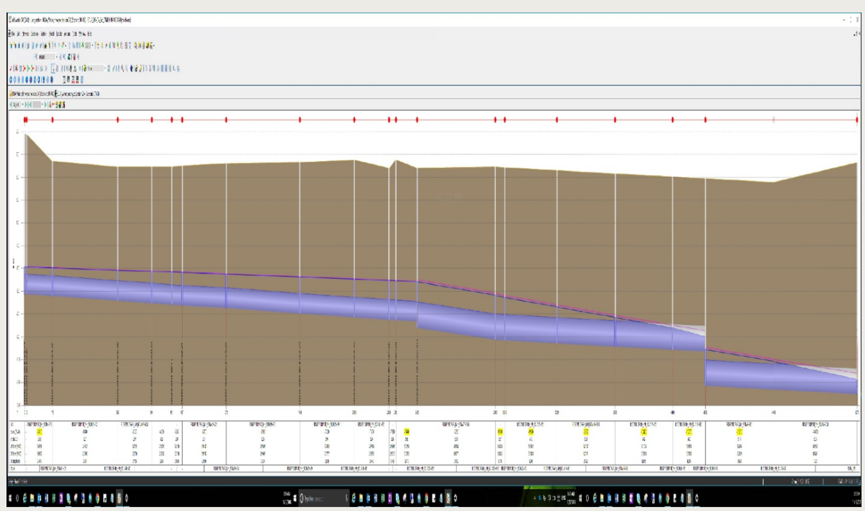
Maximize inline storage capacity by raising overflow weir elevation



Ridgefield Park

Development and Evaluation of Alternatives Report – Maximize Conveyance to WWTP

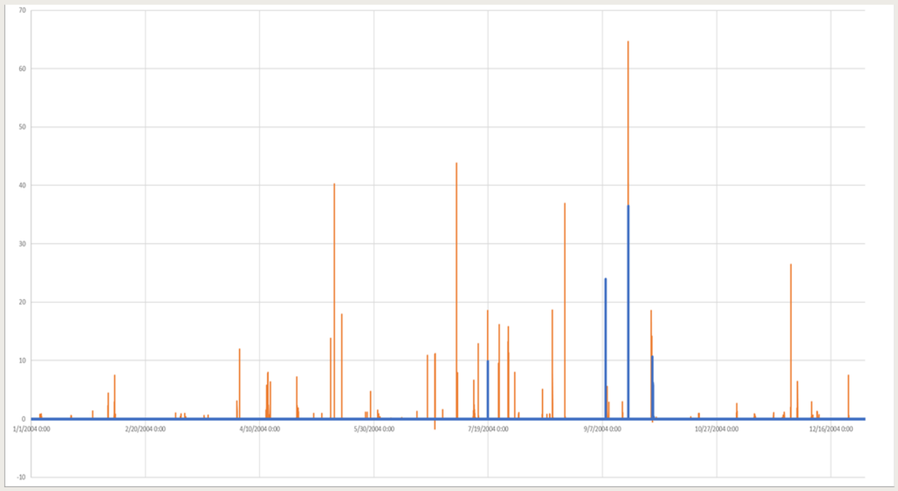




Ridgefield Park

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

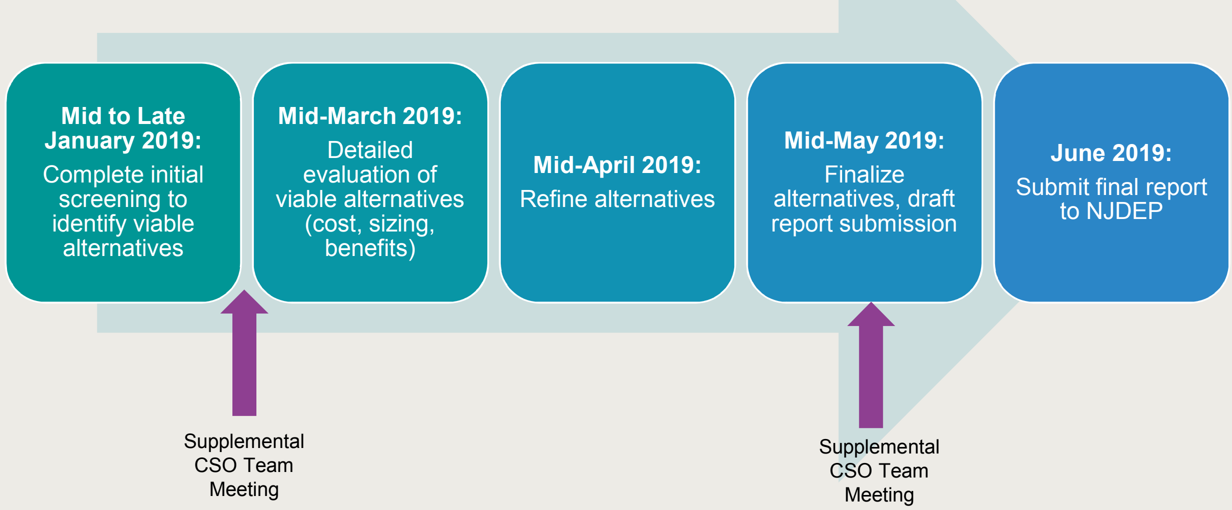
BCUA CSO Group Supplemental CSO Team

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?

Thank You?

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	SQ
Bob Applebaum	Borough of Fort Lee	Bappelbaum@aol.com	
Jan Goldberg	Borough of Fort Lee	j-goldberg@fortleenj.org	JG
Captain Bill Sheehan	Hackensack Riverkeeper	captain@hackensackriverkeeper.org	
Michelle Langa	Hackensack Riverkeeper, attorney	legal@hackensackriverkeeper.org	
Alan O'Grady	Ridgefield Park	aog560@aol.com	AOG
Del Bove, Mark	Arcadis	Mark.DelBove@arcadis.com	MDB
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
Susan Banzon	Hackensack	sbanzon@hackensackdpw.org	
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	JAM
Stephanie Farley	Mott Mac.		
Mo Kinberg	NJ Future	mkinberg@NJFuture.org	
Bernie Sobolewski	Little Ferry	sobolewski bernard@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.

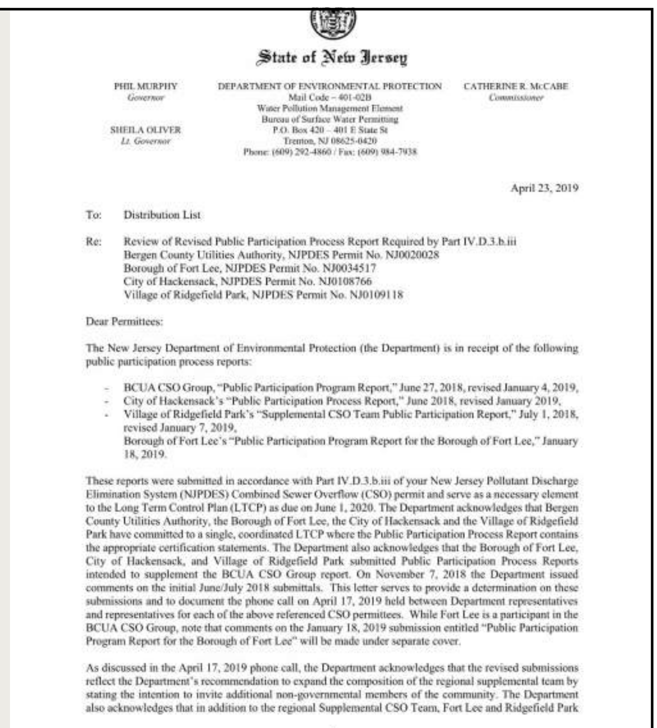
- **System Characterization Reports**: comment letter dated 12/17/2018, Revised Report submitted 2/15/19. NJDEP **Approval** letter dated 03/05/19

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
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

1

Public Participation Comment Letter

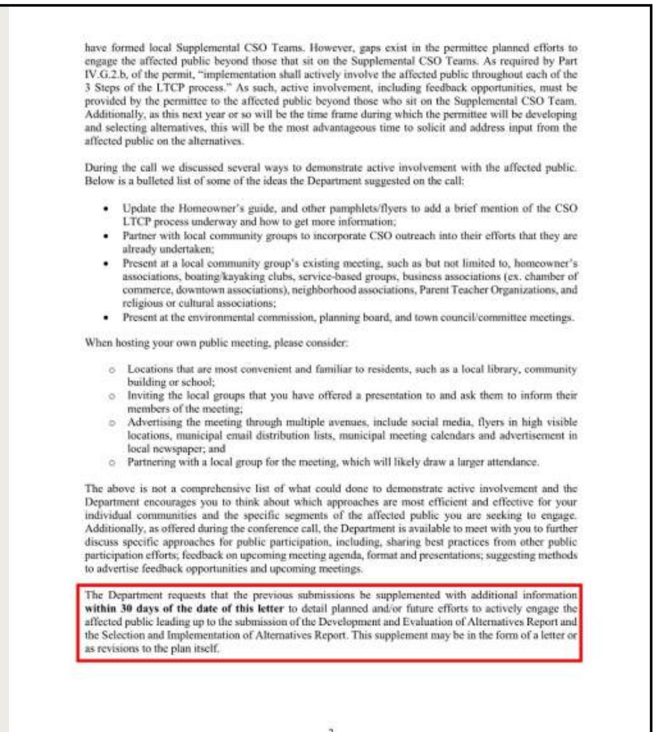
Response Due May 23, 2019

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 <u>reasonable range</u> of CSO control alternatives that <u>will meet the water quality-based requirements of the CWA</u>

The Development and Evaluation of Alternatives Report shall include <u>a list of control alternative(s)</u> 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 <u>practical</u> and <u>technical feasibility</u> 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 <u>Demonstration or Presumption</u> 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:

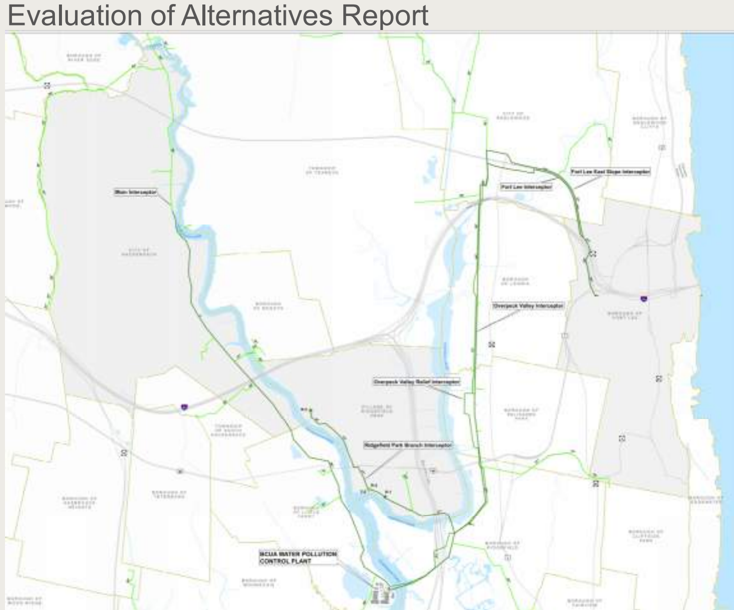
Borough of Fort Lee
- Overpeck Trunk Sewer, and
- Overpeck Relief Sewer

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

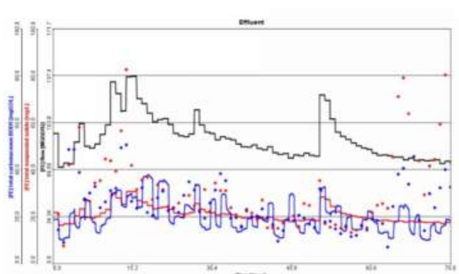


Figure 3. LF WPCF Model Wet Weather Output Comparison

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

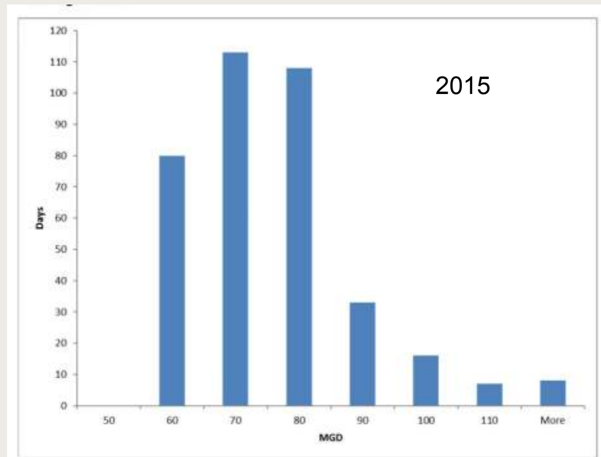
- TSS
- cBOD

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

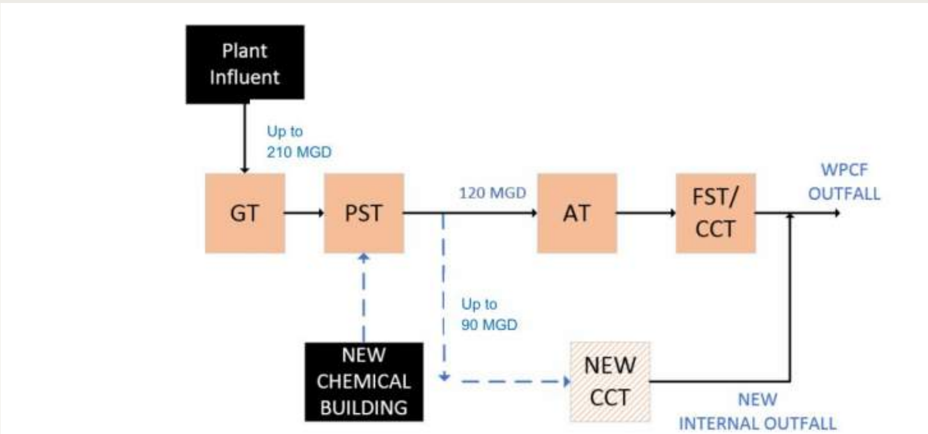


Figure 6. CEPT Alternative Block Flow Diagram

Chemically Enhanced High Rate Treatment

Chemically Enhanced High Rate Treatment

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

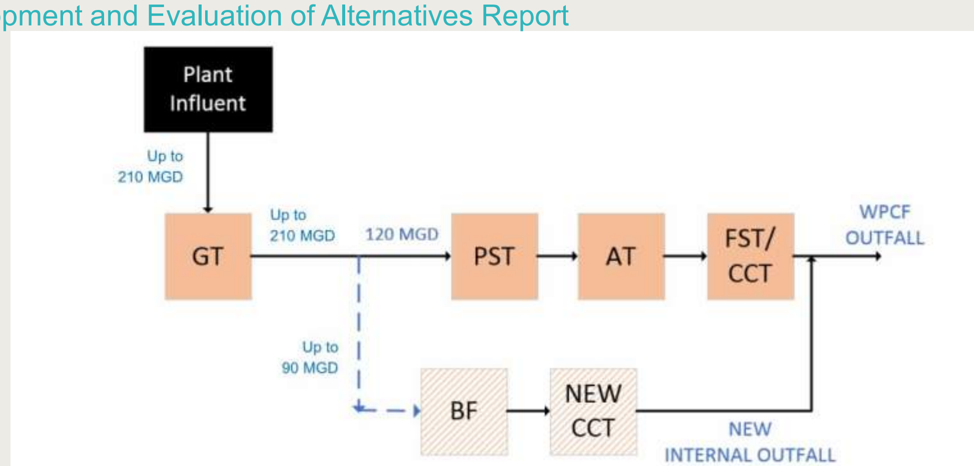


Figure 7. Ballasted Flocculation Alternative Block Flow Diagram

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

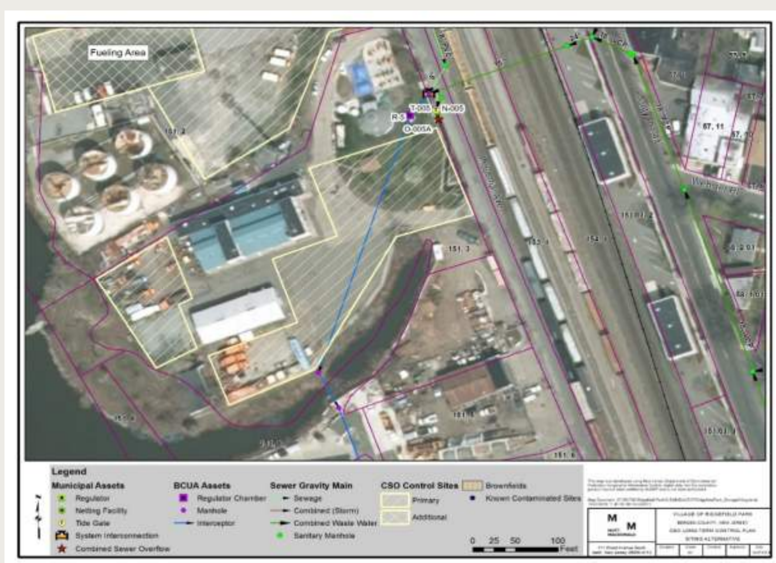
Area available:0.8 Acres

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:

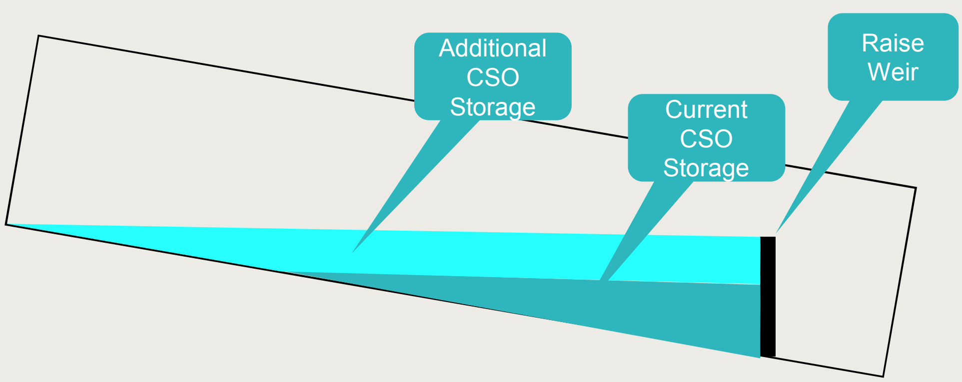
- City right-of-way – curb strip
- City right-of-way – shoulder in non-parking locations
- City public and school properties
- Parking lanes
- Parking lots
- Roofs – dry wells

Ridgefield Park

Development and Evaluation of Alternatives Report – Screening

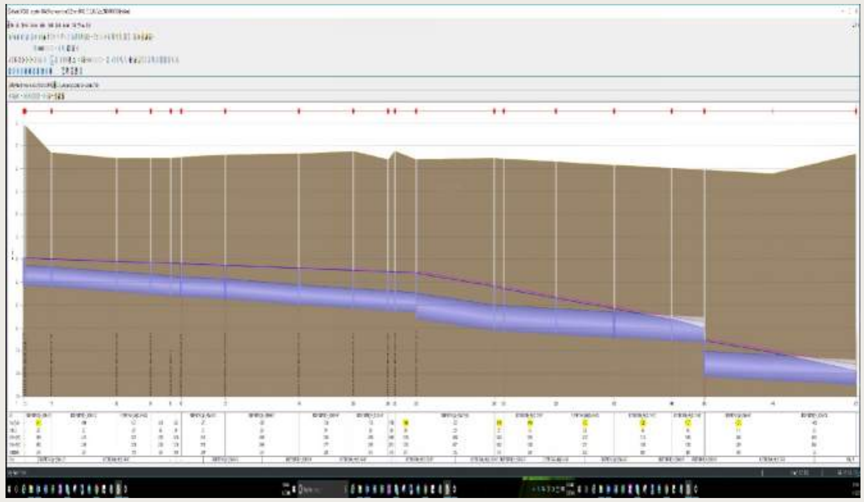
Maximize inline storage capacity

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



Ridgefield Park

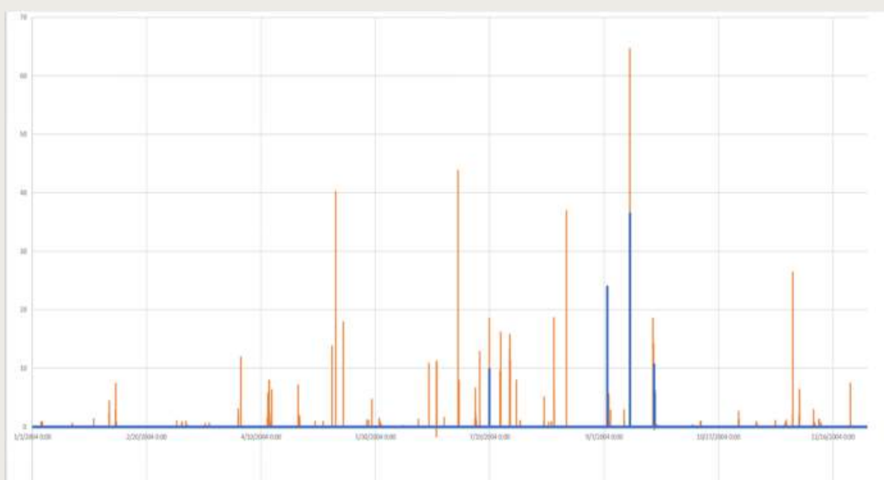
Development and Evaluation of Alternatives Report – Screening Process



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

Top 4 Storm Events by Overflow
Top 8 Storm Events by Overflow
Top 12 Storm Events by Overflow
Top 20 Storm Events by Overflow

Rank	Event	Total CSO (MG)	Start	End
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
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
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
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

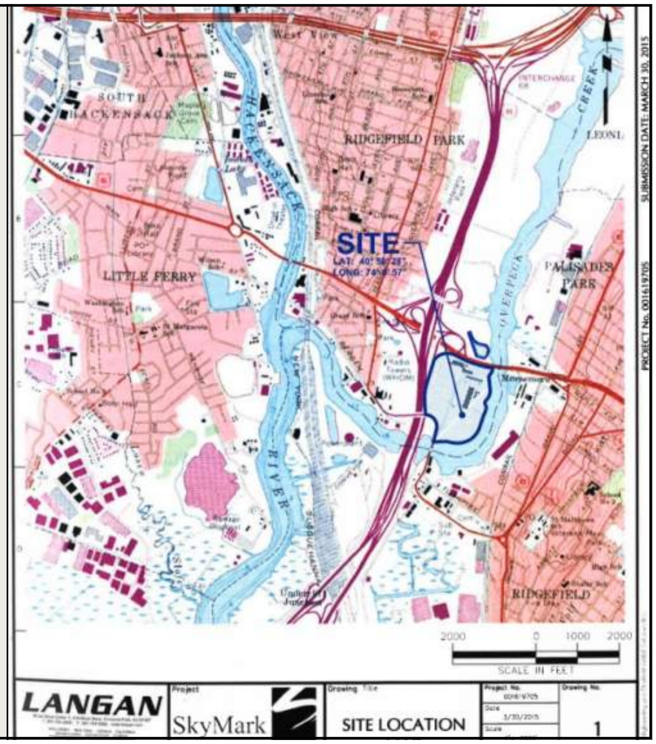
Future Baseline Conditions

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

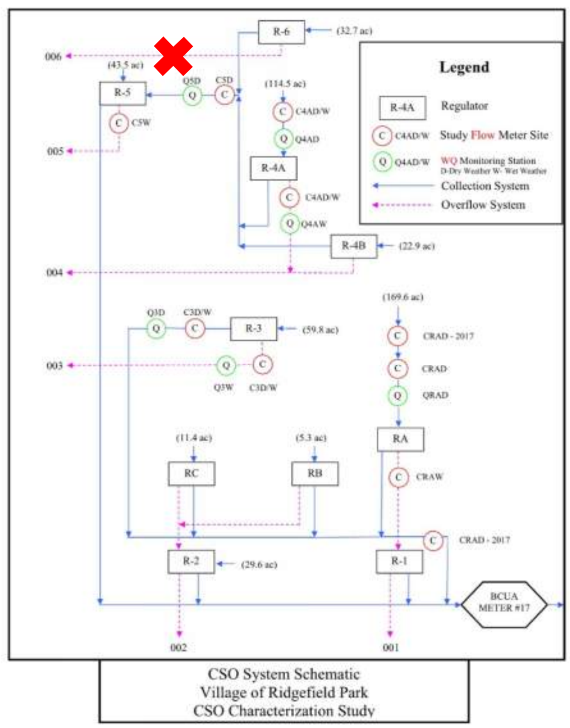
- Future growth associated with Skymark and outside of combined area.



Ridgefield Park

Control Programs

- Eliminate Regulator 006



Ridgefield Park

Control Programs

- Eliminate Regulator 006

Ridgefield Park

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators

Ridgefield Park

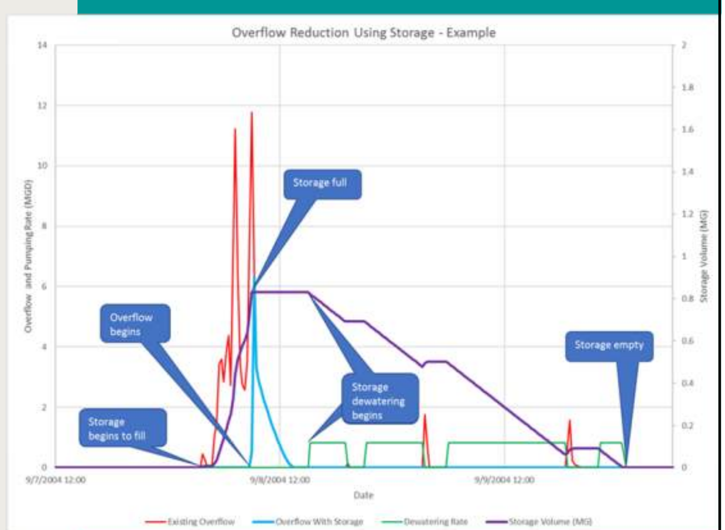
Control Programs

- 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

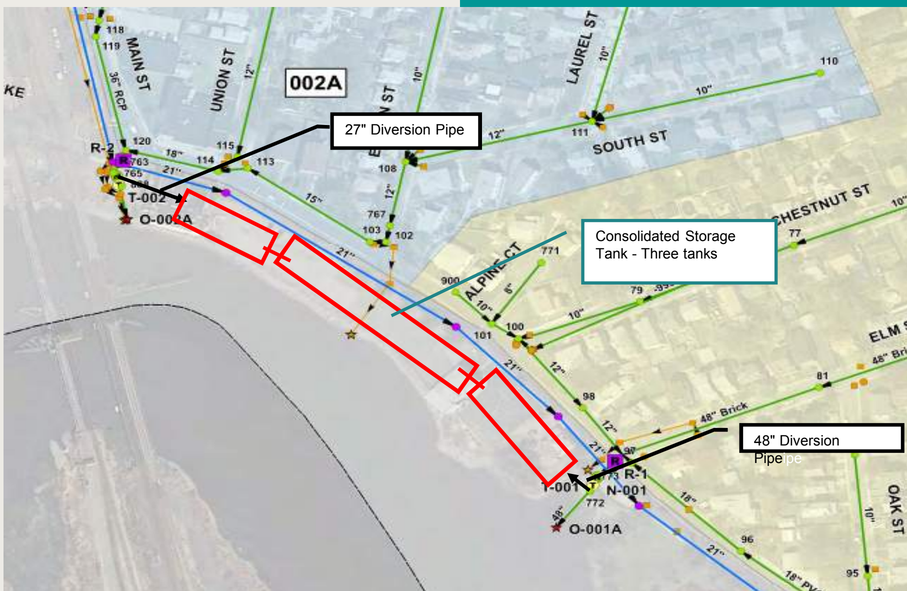
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage

Ridgefield Park

Control Programs

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

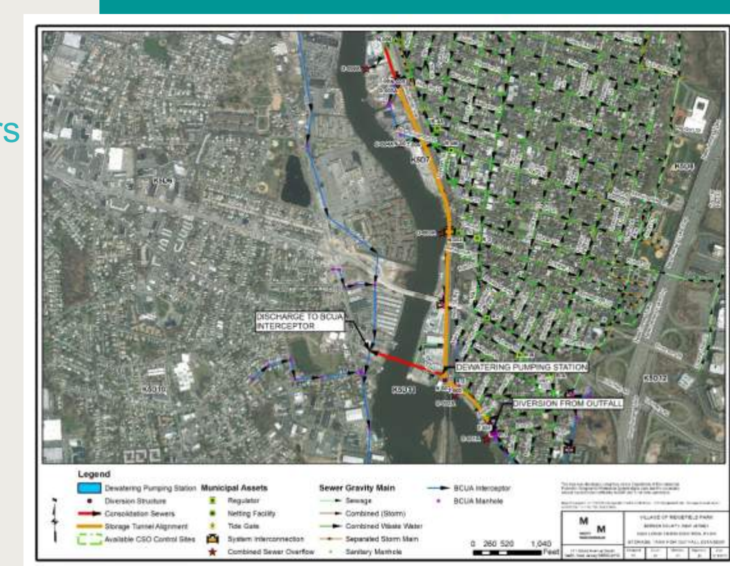
Ridgefield Park



Ridgefield Park

Control Programs

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



Ridgefield Park

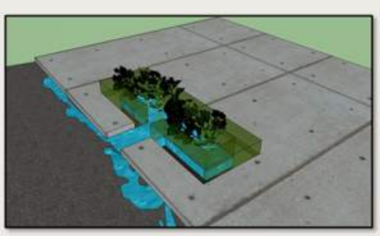
Control Programs

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

AGENDA

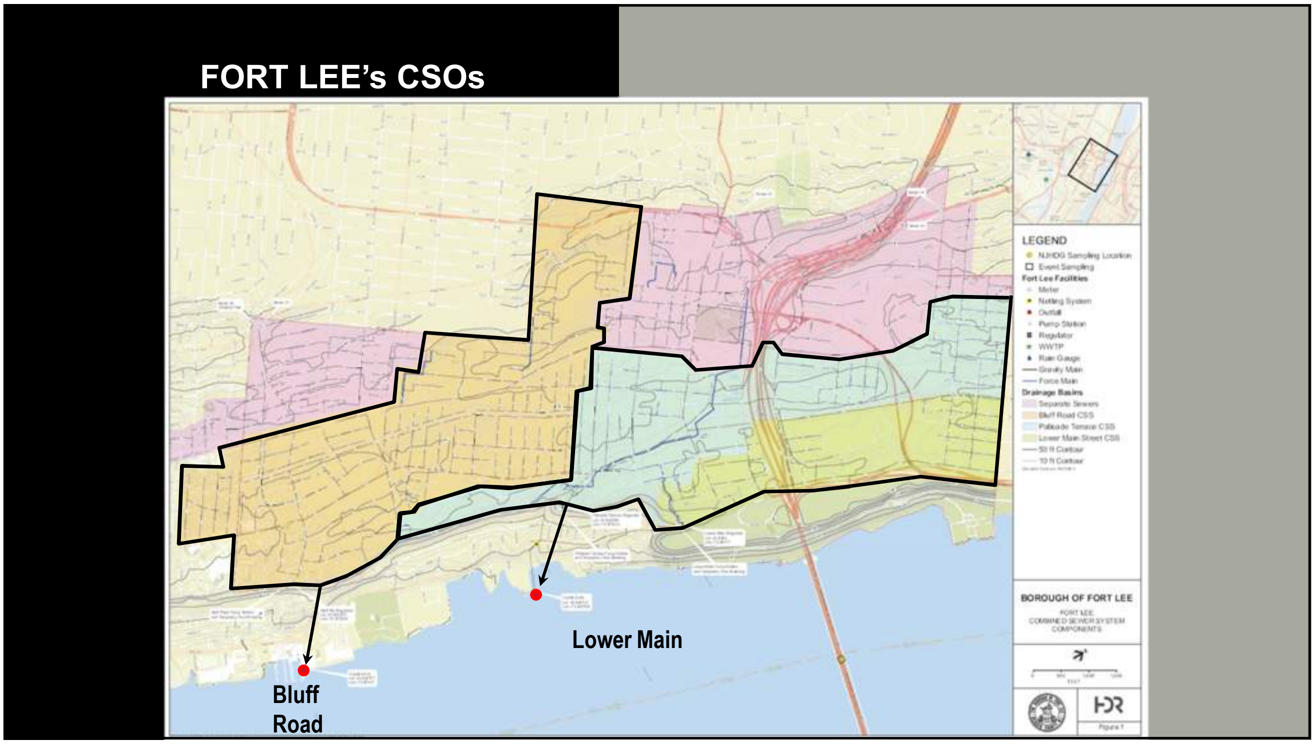
- Introductions
- Long Term Control Plans
- Fort Lee's CSOs
- Modeling
- CSO Controls
- Preliminary Costs
- Remaining CSO Permit Requirements

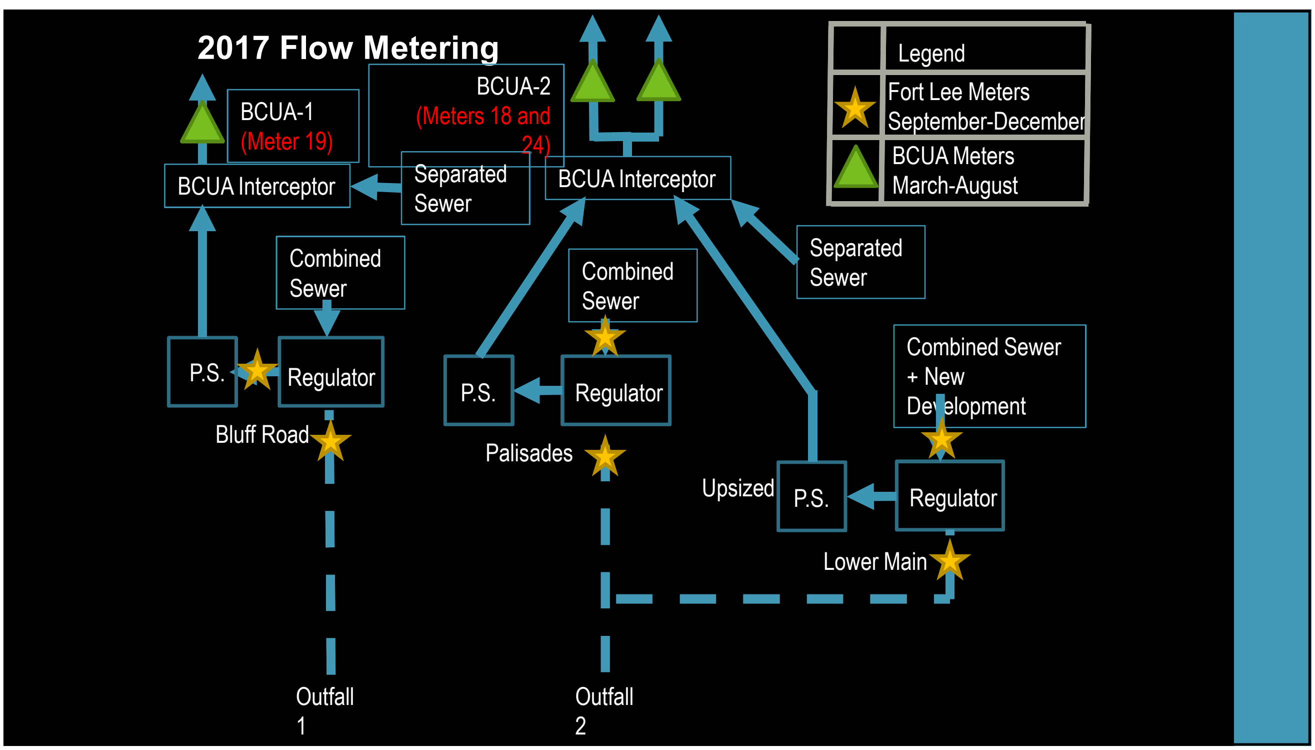
INTRODUCTIONS

- **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
Lower Main
Bluff Road
LEGEND
BOROUGH OF FORT LEE


2017 Flow Metering
BCUA-1
(Meter 19)
BCUA-2
(Meters 18 and 24)
Legend
Fort Lee Meters September-December
BCUA Meters March-August
BCUA Interceptor
Separated Sewer
BCUA Interceptor
Separated Sewer
Combined Sewer
Combined Sewer
Combined Sewer + New Development
P.S.
Regulator
Bluff Road
P.S.
Regulator
Palisades
Upsized
P.S.
Regulator
Lower Main
Outfall 1
Outfall 2

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

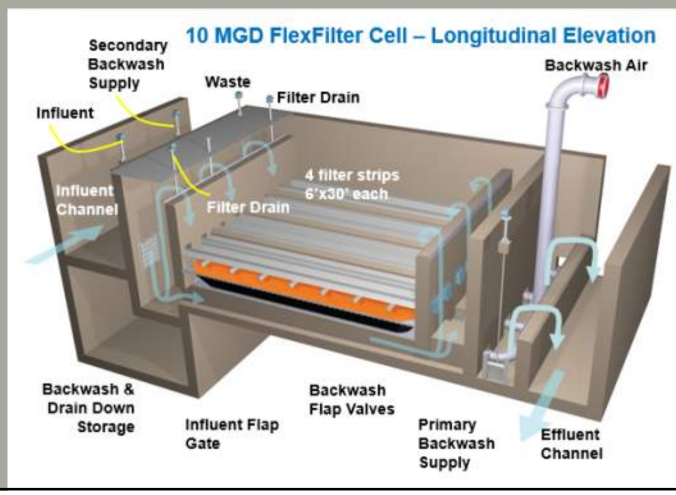
Storage Technologies

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

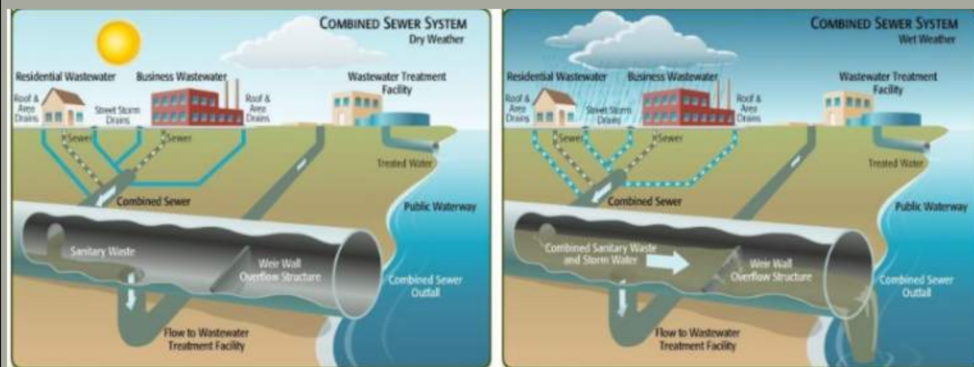
Flex Filter



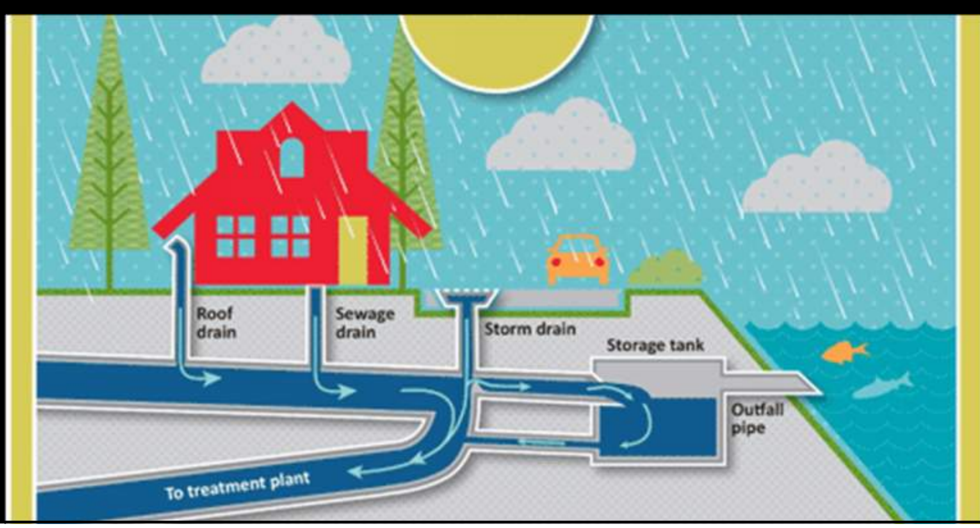
PAA Disinfection

- 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

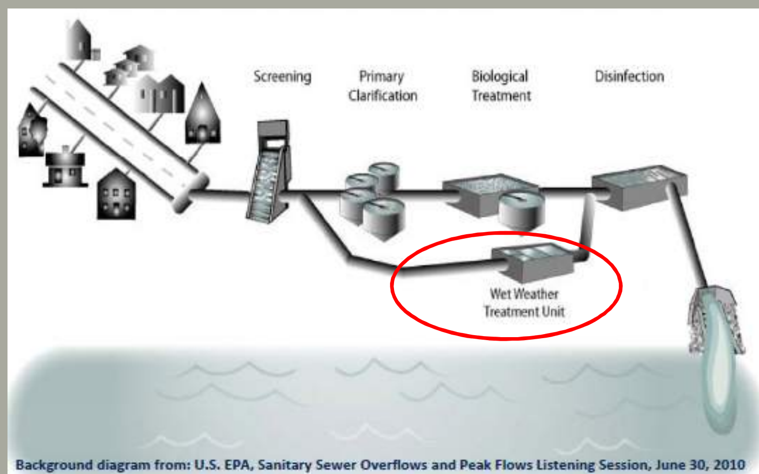
Planter Boxes

Bioswales

Permeable Pavements

Green Streets and Alleys

Auxiliary Treatment at a WWTP (Blending)



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

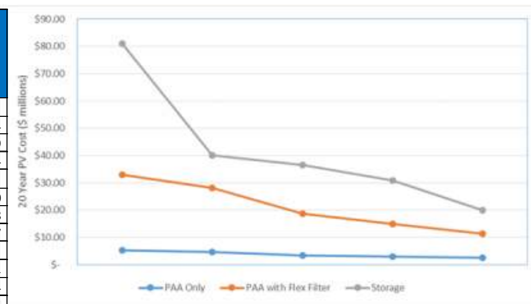
GI Alternatives

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)

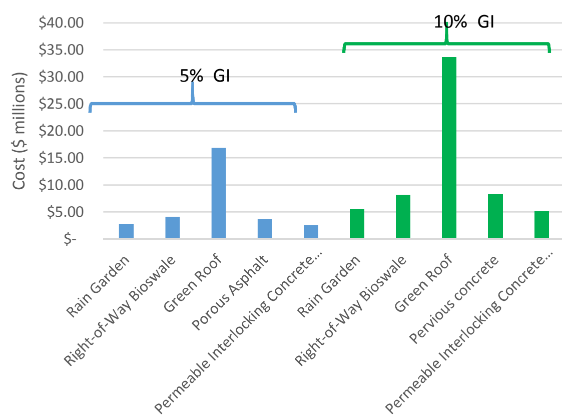
	PAA Only	PAA w/ FlexFilter	Tanks
0 CSOs per year			
Capital Cost ($M)	$ 1.35	$ 28.95	$ 50.64
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80	$ 30.29
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97	$ 80.94
4 CSOs per year			
Capital Cost ($M)	$ 1.27	$ 24.67	$ 22.60
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51	$ 17.48
Total 20 yr 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

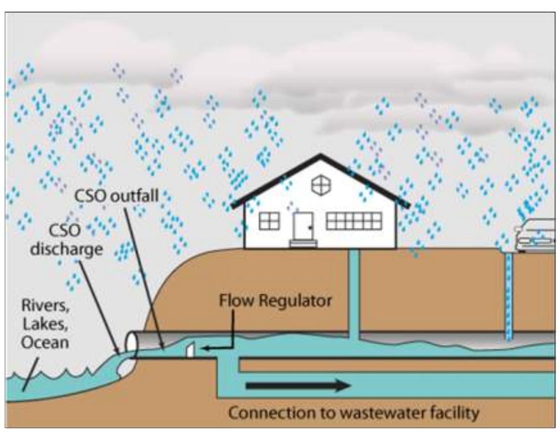
72

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

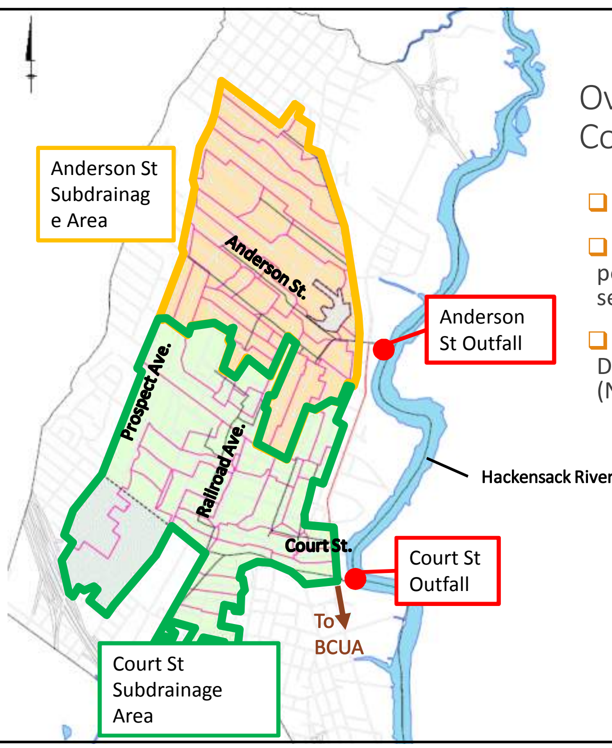
- ❑ What is a Combined Sewer Overflow (CSO)?



Overview of Hackensack Combir Sewer System

Court Street Outfall

75



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 Combined 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 e Analysis Report
- New storm sewers in the CSS

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

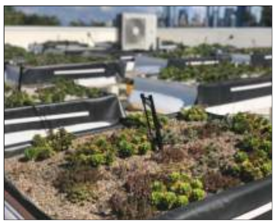
- Potential lower costs for disinfection alone
  - Unsure if disinfection alone will satisfy water quality requirements

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

Development and Evaluation of Alternatives

LID Control Editor

Bioretention Basin Default Configurations

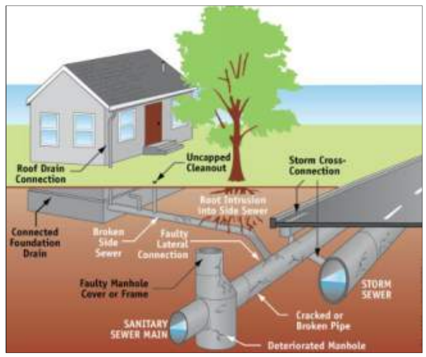
Surface		Soil Layer		Storage Layer		Underdrain	
Beam Height (in)	9	Thickness (in)	21	Thickness (in)	15	Drain Coef. (in/hr)	1.5
Vegetation volume (fraction)	0.05	Porosity (Vol. Fraction)	0.26	Void Ratio	0.7	Drain Exponent	0.5
Surface roughness (Manning's n)	0.25	Field Capacity (Vol. Fraction)	0.09	Seepage 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%

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



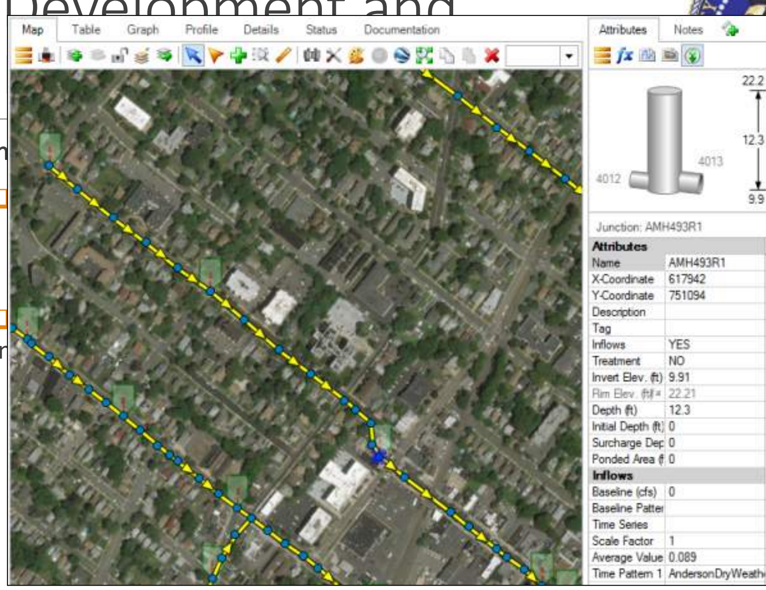
83

Development and

In

(IG)

nment



84

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

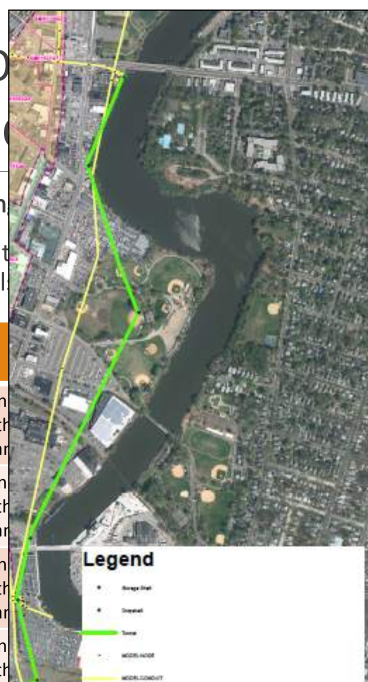
85

Develop Evaluati ves

Storage Prescreenin son to Court

- Large conduit wit WM model with pump back control

	pture tem)
Tun with Diar	
Tun with Diar	
Tun with Diar	
Tun with Diameter	

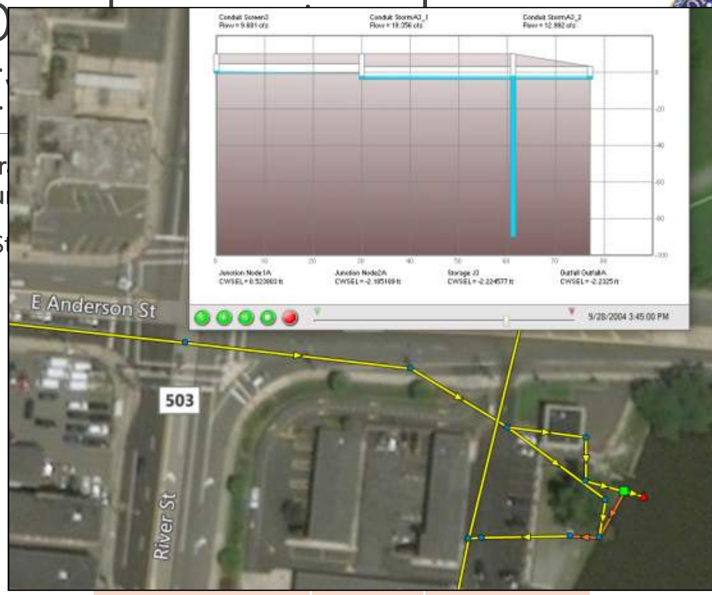


86

D
E

Stor ar
Cou

❑ S s



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

89

Questions?

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

ARCADIS Design & Consultancy for natural and built assets

90

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

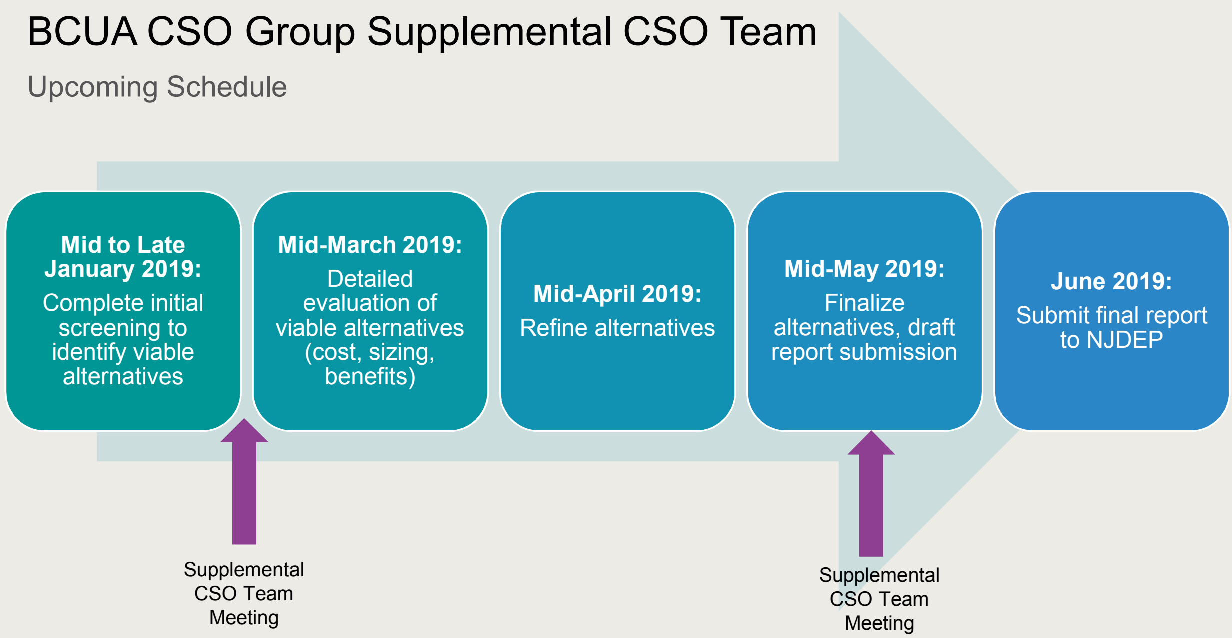
BCUA CSO Group Supplemental CSO Group

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	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
Susan Banzon	Hackensack	sbanzon@hackensackdpw.org	
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	Fort Lee	Njlas128@aol.com	SP
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

40^{o}F 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

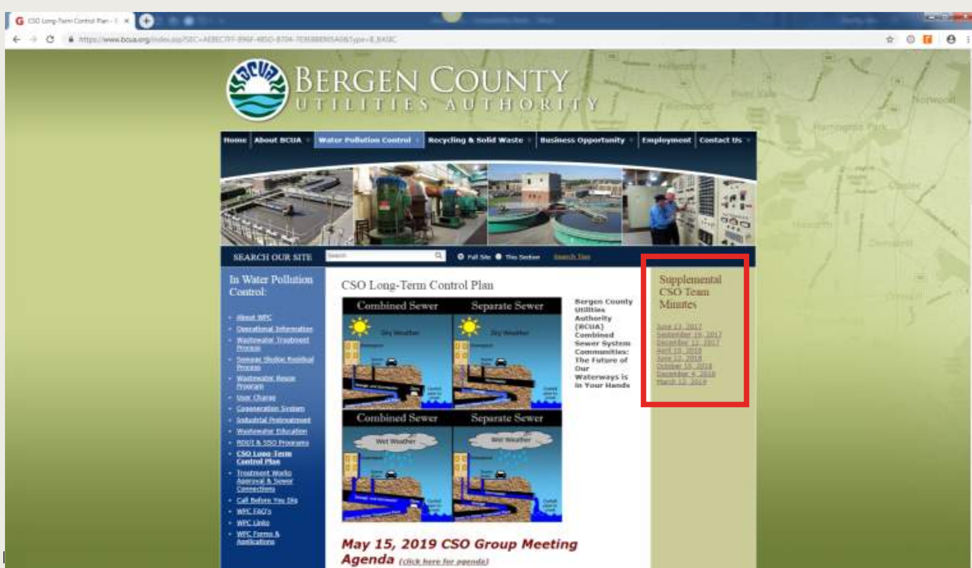
Refresher – In meeting #9 we covered:

- 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

No Significant Impact

Significant Indirect Users

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

BCUA CSO Group Supplemental CSO Team

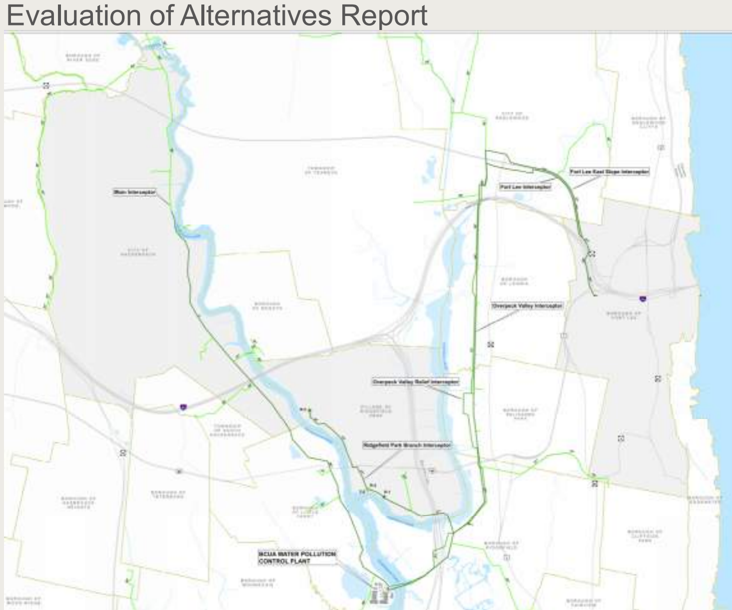
Development and Evaluation of Alternatives Report

BCUA Facilities

- Transport
- Treatment

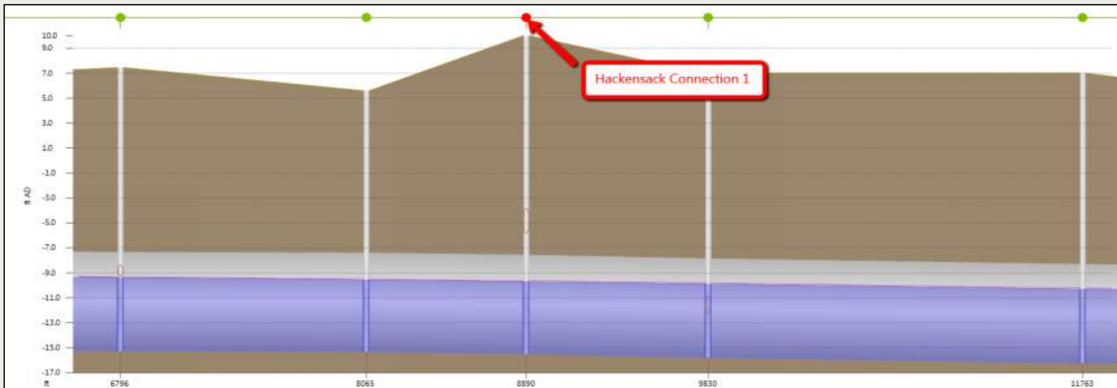
BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report – Typical Year Capacity

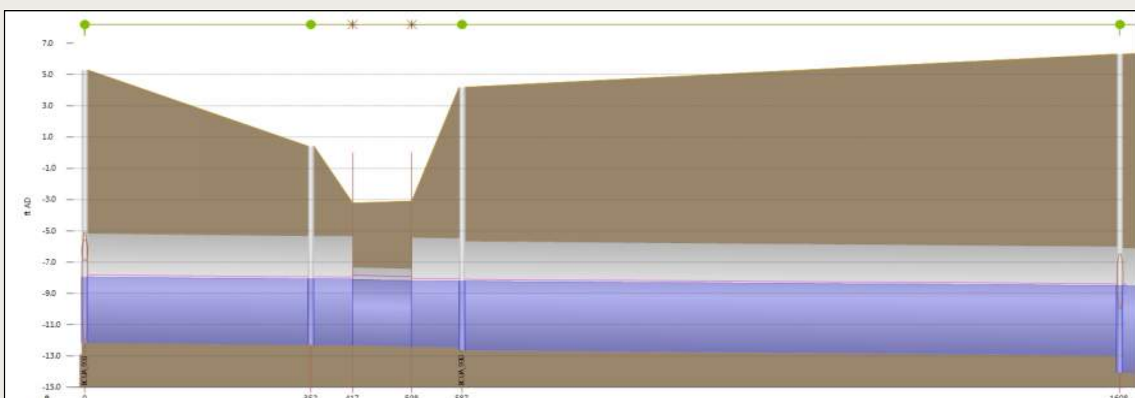


Link BCUA_924.1	BCUA_Break_190.1	BCUA9C.1	HACKENSACK_MH_BCUANode1.1	HACKENSACK_MH_BCUA9B.1
height (in) 0	96.0	96.0	96.0	96.0
us inv (ft AD)	-15.280	-15.350	-15.500	-15.810
ds inv (ft AD)	-15.350	-15.500	-15.810	-16.260
grad (%) 008	0.006	0.018	0.033	0.023
pfc (MGD) 40	43.79	73.79	99.43	83.52
DS flow (MGD)	63.3267	63.3686	67.7521	71.9133
DS depth (ft)	5.766	5.773	5.899	5.931

Node: BCUA_Break_190 | BCUA9C | HACKENSACK_MH_BCUANode1 | HACKENSACK_MH_BCUA9B | HACKENSACK_MH_BCUA

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report – Typical Year Capacity

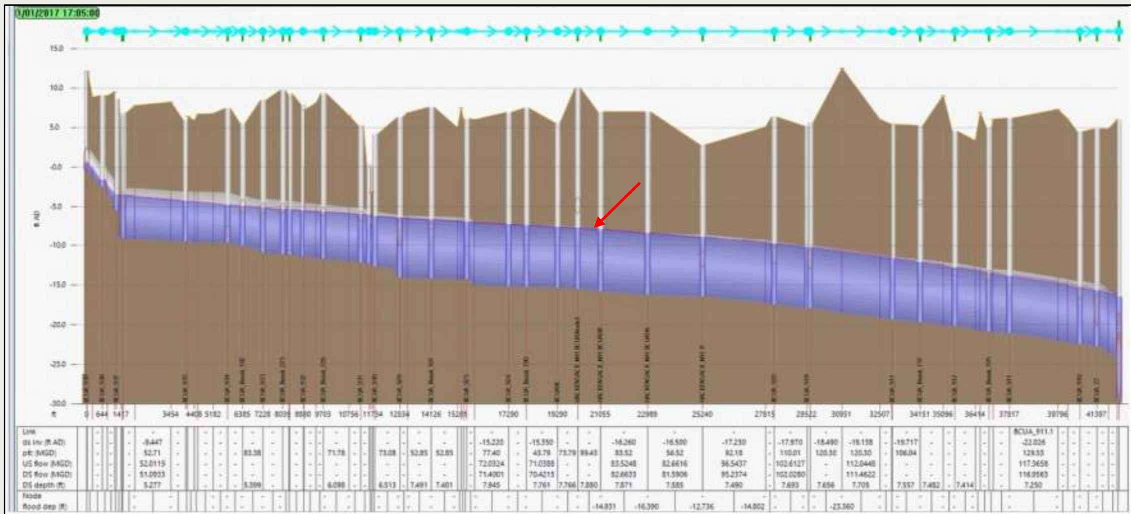


Link	BCUA_931.1	-	-	-	BCUA_930.1
height (in)	84.0	84.0	60.0	84.0	84.0
us inv (ft AD)	-12.150	-12.300	-12.300	-12.400	-12.650
ds inv (ft AD)	-12.300	-12.300	-12.400	-12.450	-12.970
grad (%)	0.043	0.000	0.109	0.064	0.031
pfc (MGD)	85.30	0.00	55.62	104.30	73.08
DS flow (MGD)	49.6003	49.6018	49.6027	49.6042	49.6265
DS depth (ft)	4.221	4.196	4.197	4.220	4.461

Node: BCUA_931 | BCUA_Facility_91 | - | - | BCUA_930 | BCUA_929

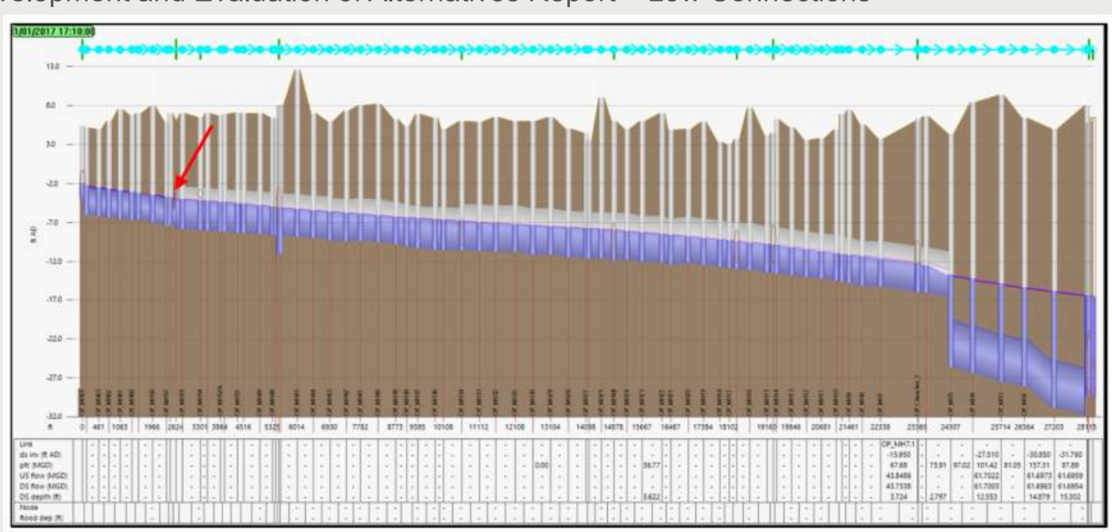
BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report – Design Storm



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report – Low Connections



BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

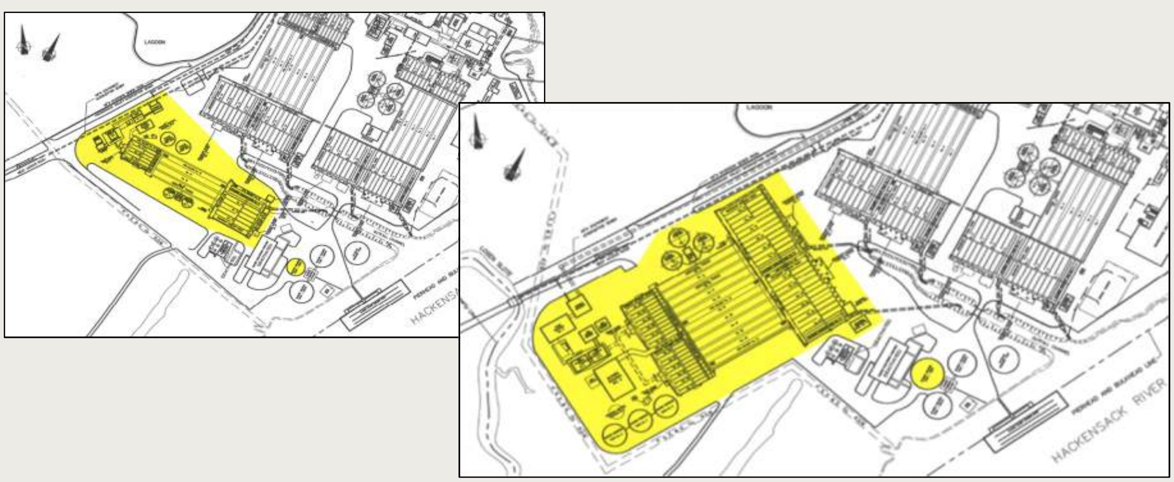
InfoWorks ICM Model was Used to Estimate Sewer Flow Capacity near WPCF:

Trunk Sewer	Estimated Max Flow (mgd)*
Main Trunk Sewer	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

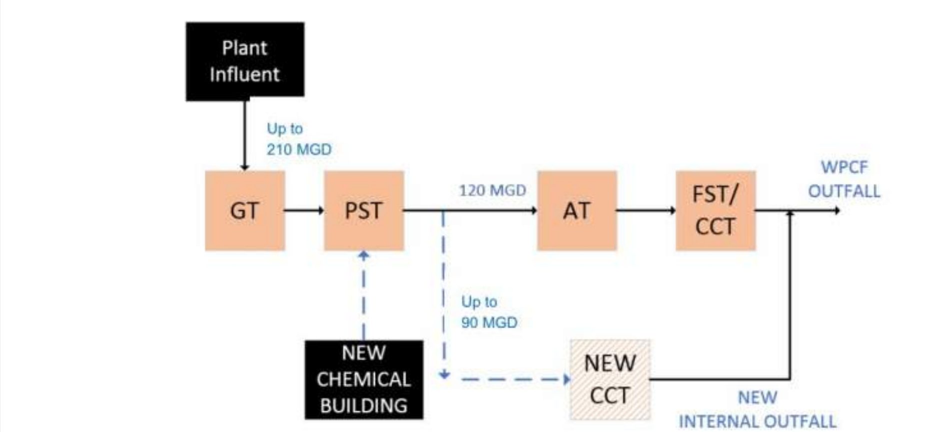


Figure 6. CEPT Alternative Block Flow Diagram

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

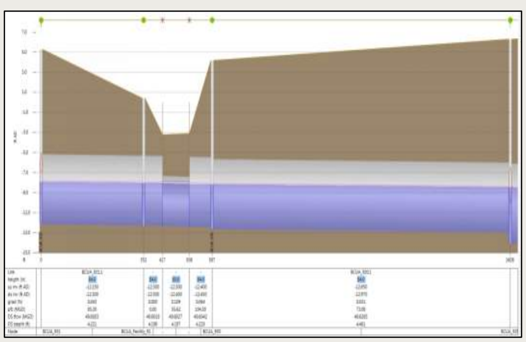
Treatment Rate [5-min] (MGD)	Required Storage Volume (MG)
120	40
140	7.9
160	0.5
180	0

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

ARCADIS Design & Consultancy for natural and built assets

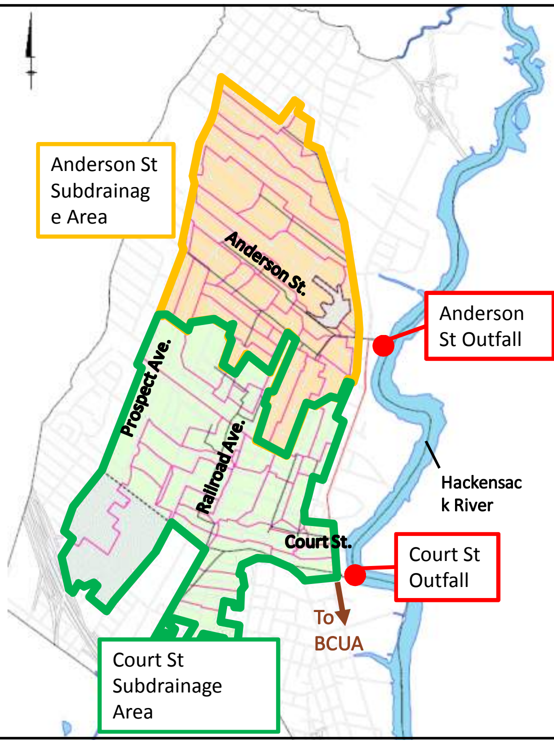
27

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

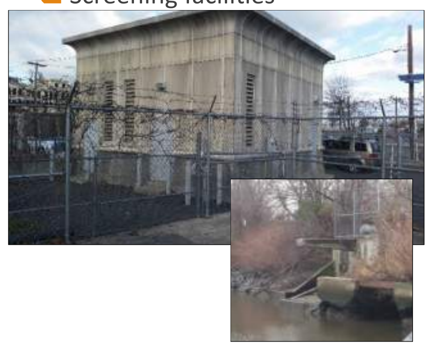
ARCADIS Design & Consultancy for natural and built assets

28



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

ARCADIS Design & Consultancy for natural and built assets

30

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

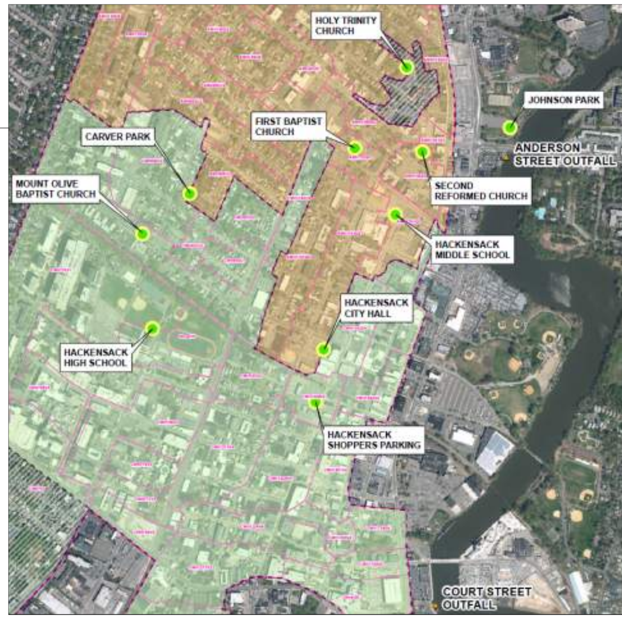
Green infrastructure (GI) – stores, absorbs, and uses storm water runoff

- ❑ 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



ARCADIS Design & Consultancy for natural and built assets

33

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.

ARCADIS Design & Consultancy for natural and built assets

34

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

Report

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

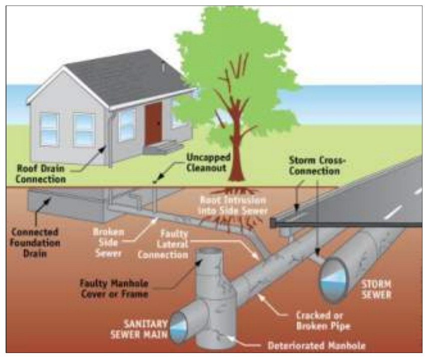
- Potential lower cost for disinfection alone
  - Unsure if disinfection alone will satisfy water quality requirements

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.

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



ARCADIS Design & Consultancy for natural and built assets

37

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

ARCADIS Design & Consultancy for natural and built assets

38

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

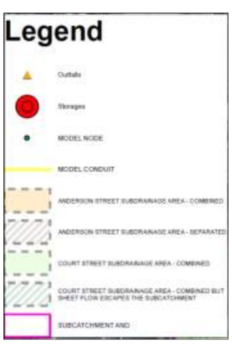
Storage Tunnel from Anderson to Court Results Summary:

Name of Alternative	Percent of Capture	No. of Overflows	Reduction of Overflow Volume from Baseline (%)	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.

ARCADIS Design & Consultancy for natural and built assets

41

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



ARCADIS Design & Consultancy for natural and built assets

42

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 condItions 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.

ARCADIS Design & Consultancy for natural and built assets

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

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

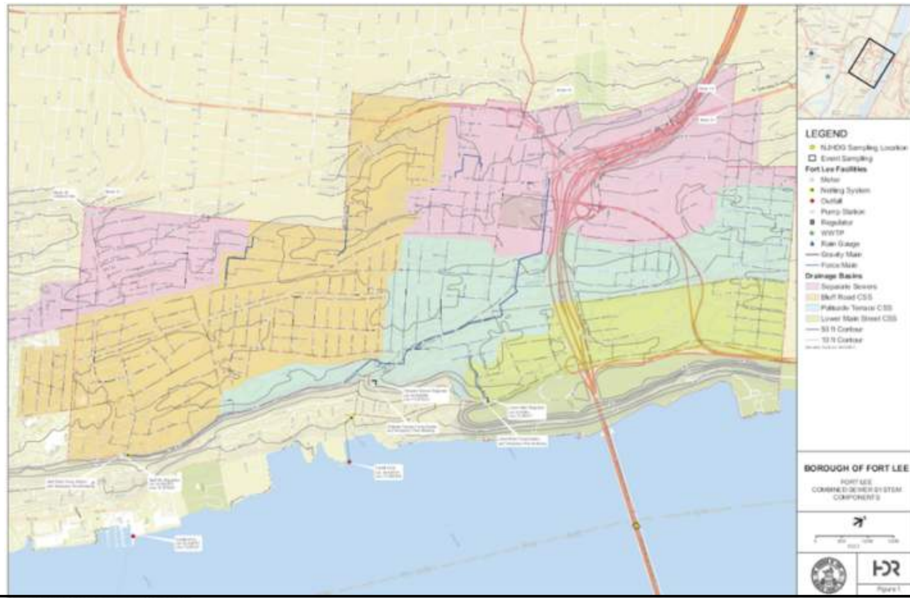
ARCADIS Design & Consultancy for natural and built assets

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

ARCADIS Design & Consultancy for natural and built assets

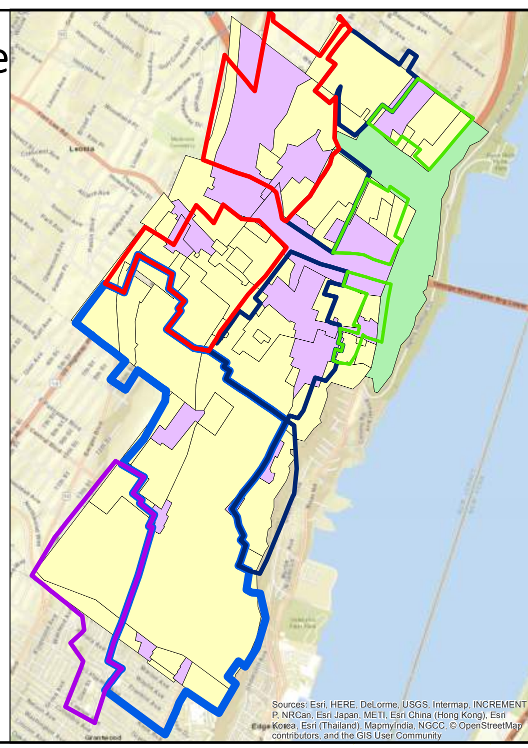
Fort Lee - NJPDES Permit No. NJ0034517
Development of Alternatives



2007 Land Use Type and Drainage Area

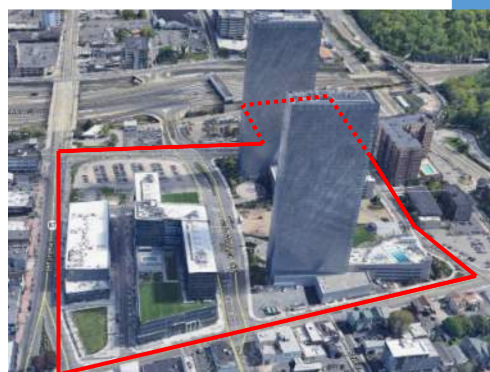
Regulator
- BCUA-1
- BCUA-2
- Bluff Rd
- Lower Main
- Palisades

Land Use
- Residential
- Commercial
- Park



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

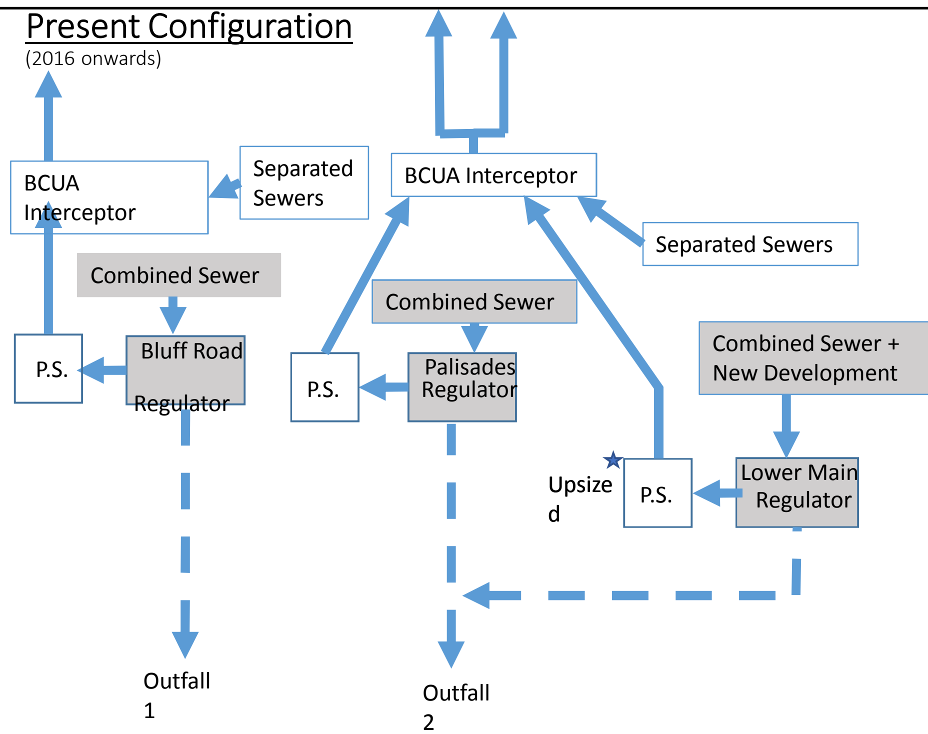
2012



2019

Present Configuration

(2016 onwards)

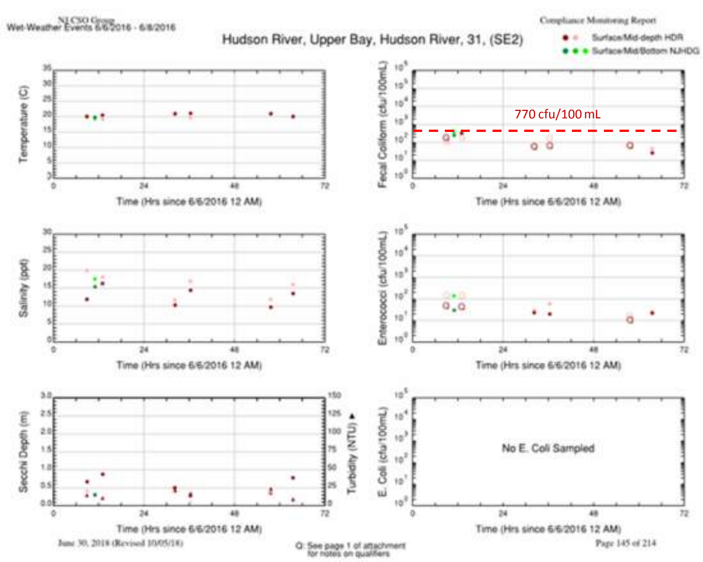


Projected Overflows for 2004 Typical Year

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 <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> ……."

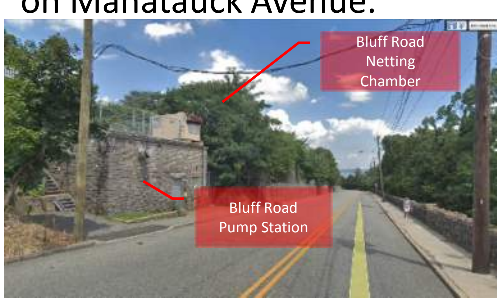
i. No more than an average of four overflow events per year...

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>

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

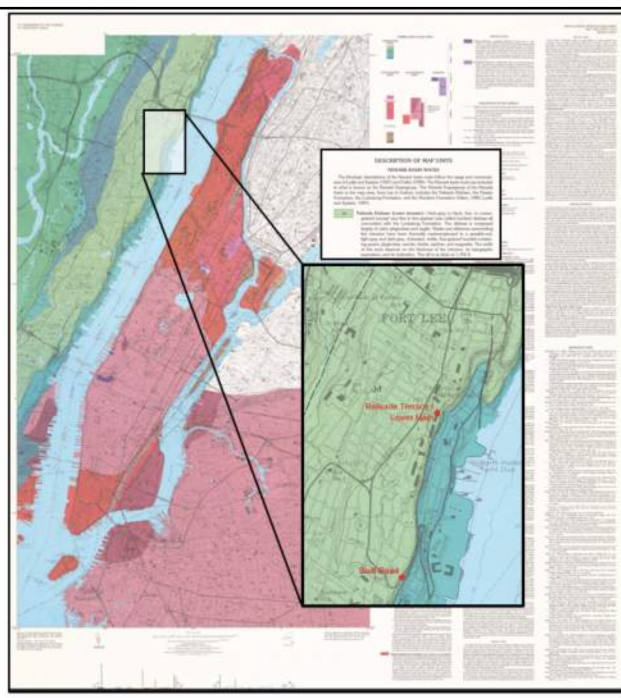
GI Alternative								
	Baseline		5% GI-Bluff Road			10% GI-Bluff Road		
Outfall	CSO Volume	CSO Events	CSO Volume	CSO Events	Volume Reduction	CSO Volume (MG)	CSO Events	Volume Reduction
FL-001	82.5	58	79.8	57	3%	77.0	58	7%

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

HDR

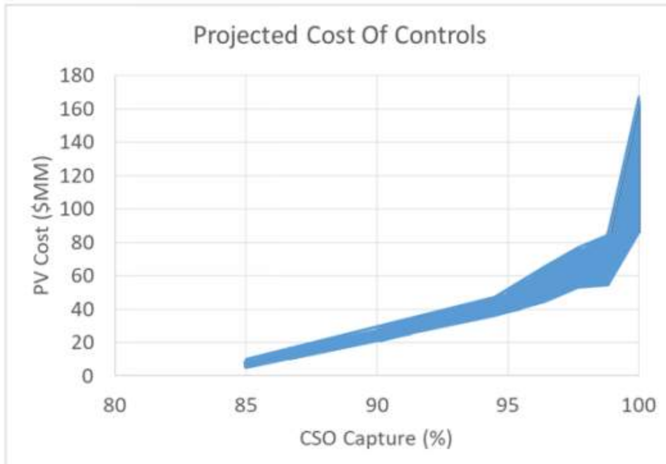


Ft Lee is underlain by Palisade bedrock which will impede recharge.

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

HDR

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?

Gary Grey
HDR Inc.
gary.grey@hdrinc.com

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

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

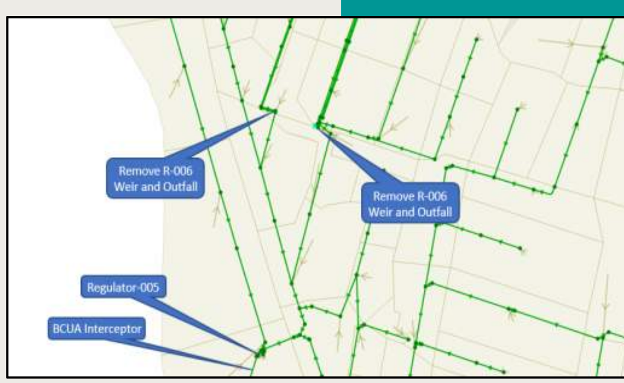
Alternatives Analysis

Alternatives Evaluation

Control Program 1 - Elimination of Outfall 006A

Small overflow volume at 006A

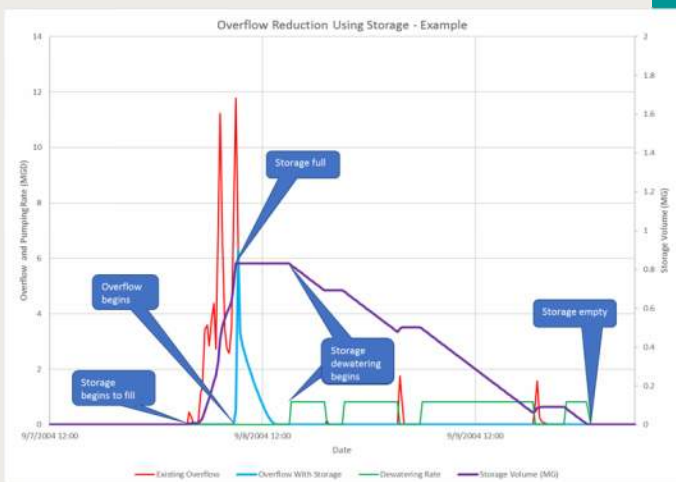
- Feasible to combine 005A and 006A to reduce burden on other alternatives
- Model shows additional upgrades required to the system if 006A is eliminated
- No water quality benefit to elimination, but extra costs



Alternatives Evaluation

Storage – Tanks and Tunnels

Temporary storage tunnels and tanks reduce and delay overflows



69

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

70

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

71

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

72

Alternatives Evaluation

Control Program 3 –
Consolidated Tunnel Storage Contd.

Consolidated
Tunnel Map

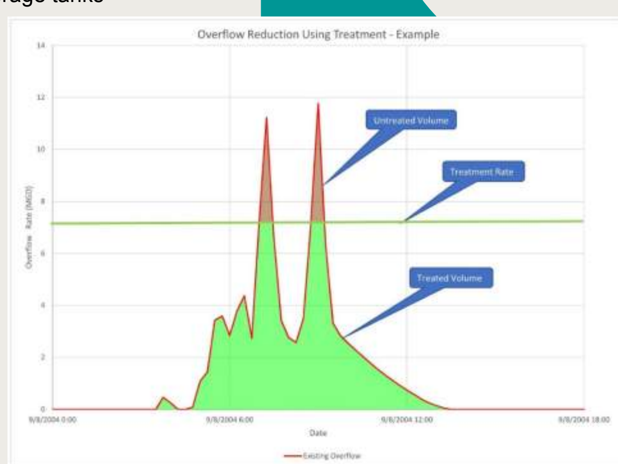
73

Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

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

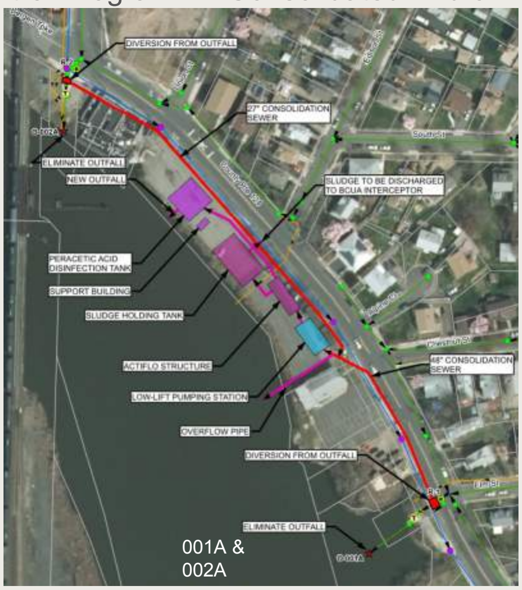
- Treatment capacity governed by flow, not volume like the storage tanks
- Treatment process:
  - Fine Screening for floatable and course particles
  - Pump Station
  - High-rate primary treatment (i.e. ActiFlo)
  - Disinfection by peracedic acid
- Similar pros and cons to consolidation as storage
-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



74

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%

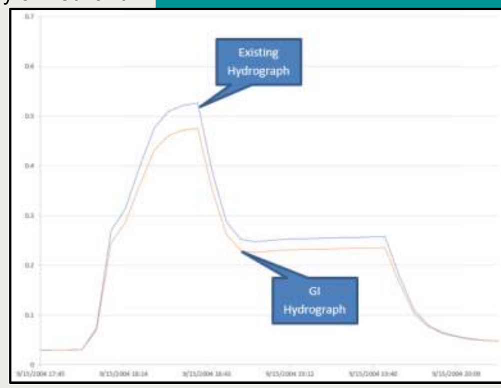
76

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



77

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%	

78

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:
    - $(P|A, i\%, n) = ((1+i)^n-1)/((i(1+i)^n)$

79

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	

80

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

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%

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

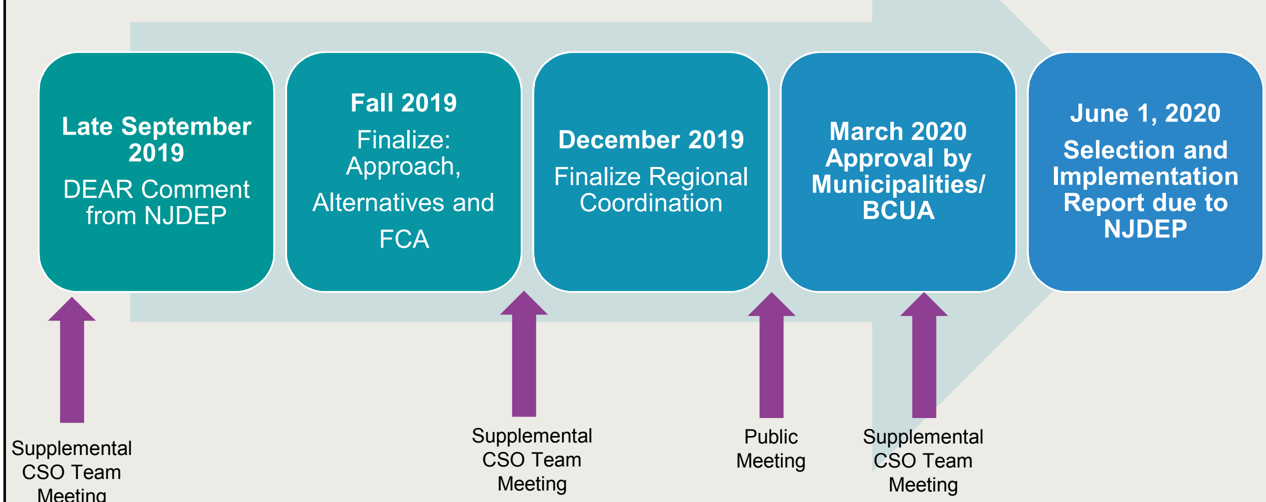
- Location
- Time
- Project phase

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	MO
~~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	
Alan O'Grady	Ridgefield Park	aog560@aol.com	AOG
Del Bove, Mark	Arcadis	Mark.DelBove@arcadis.com	MDB
Dominic DiSalvo	BCUA	ddisalvo@bcua.org	
Mike McAloon	Suburban Consulting	mmcaloon@suburbanconsulting.com	MKM
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
Susan Banzon	Hackensack	sbanzon@hackensack[illegible].org	SB
Ryan Westra	Hackensack	rwestra@hackensack[illegible].org	RW
~~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	SR
~~Dwyane Kobesky~~	~~NJDEP~~	~~Dwyane.kobesky@dep.nj.gov~~	
Sal Pagano	Fort Lee	Njlas128@aol.com	SP
~~Marco Alebus~~	~~NJDEP~~	~~Marzooq.alebus@dep.nj.gov~~	
Ricky Figueroa	Fort Lee	p-ferrara@fortleenj.org	R.F.
Pat Ferrara	Fort Lee	r-figueroa@fortleenj.org	P.F.
Gary Terzano	Hackensack	garyterzano@gmail.com	
John McRae	Fort Lee	jam924@verizon.net	JM
Andrew Holt	Hackensack	AHolt@[illegible].com	AH
Sherry Preisig	NJDEP	sherry.preisig@dep.nj.gov	SP
Sabina Martyn	Mott MacDonald	sabina.martyn@mottmac.com	SM
Jennifer Schneider	AmeriCorps NJ Watershed Ambassador	ambassador@hackensackriverkeeper.org	JAS
Al Restaino	Fort Lee	a-restaino@fortleenj.org	AR
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

Mott MacDonald | Presentation 2 28 January 2020

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

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

Mott MacDonald | Presentation 4 28 January 2020

4

BCUA CSO Group Supplemental CSO Team

Meeting No. 10 Minutes Posted

5

MOTT MACDONALD

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

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.

MOTT MACDONALD

The Village of Ridgefield Park Settled in 1685

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	

11

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

12

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%

Mott MacDonald | Presentation 13 28 January 2020

13

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

14

14

DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage

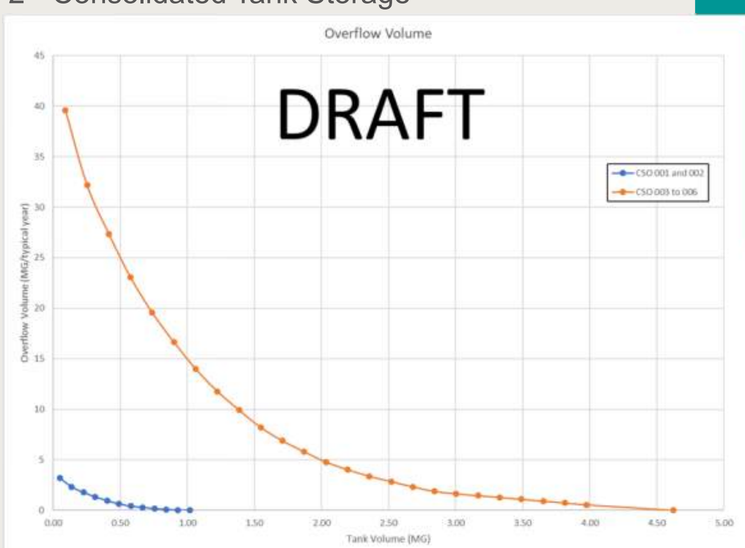
RECOMMEND – RETAIN, BEST RATING AND LESS COMPLEX

15

15

DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage

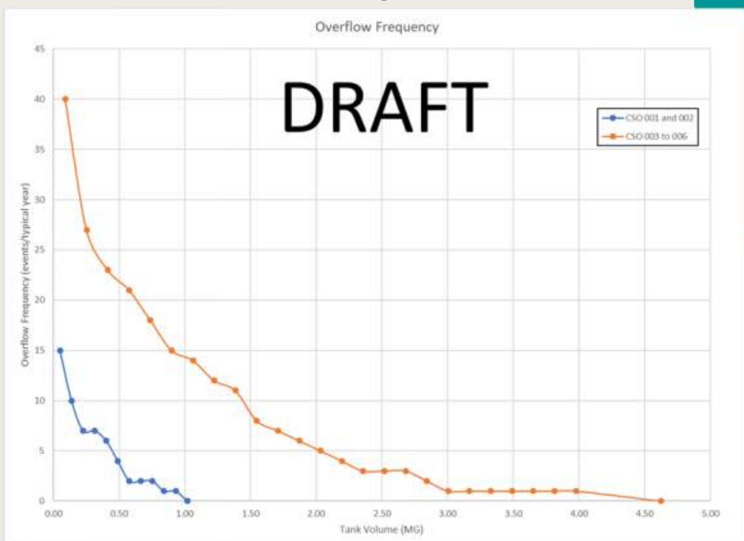


Mott MacDonald | Presentation 16 28 January 2020

16

DRAFT - Preliminary Alternatives Selection

Control Program 2 - Consolidated Tank Storage



Mott MacDonald | Presentation 17 28 January 2020

17

DRAFT - Preliminary Alternatives Selection

Control Program 3 –
Consolidated Tunnel Storage

RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

Mott MacDonald | Presentation 18 28 January 2020

18

DRAFT - Preliminary Alternatives Selection

Control Program 4 - Consolidated End of Pipe Treatment

RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

Mott MacDonald | Presentation 19 28 January 2020

19

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%

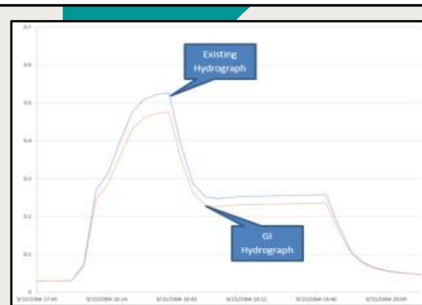
RECOMMEND - ELIMINATE DUE TO COST AND DISRUPTION
FUTURE WATER QUALITY CONCERNS

Mott MacDonald | Presentation 20 28 January 2020

20

DRAFT - Preliminary Alternatives Selection

Control Program 6 - Green Infrastructure



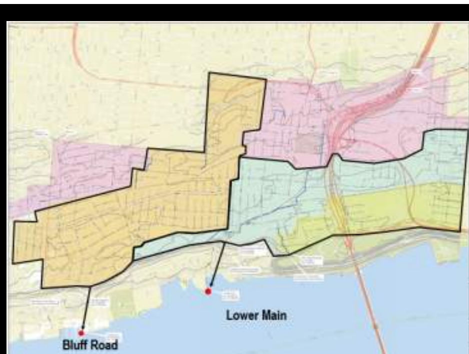
Distributed storage or detention throughout the village

- 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

Mott MacDonald | Presentation 21 28 January 2020

21



Borough of Fort Lee
CSO Team Meeting
Long Term Control Plan

December 10, 2019

HDR

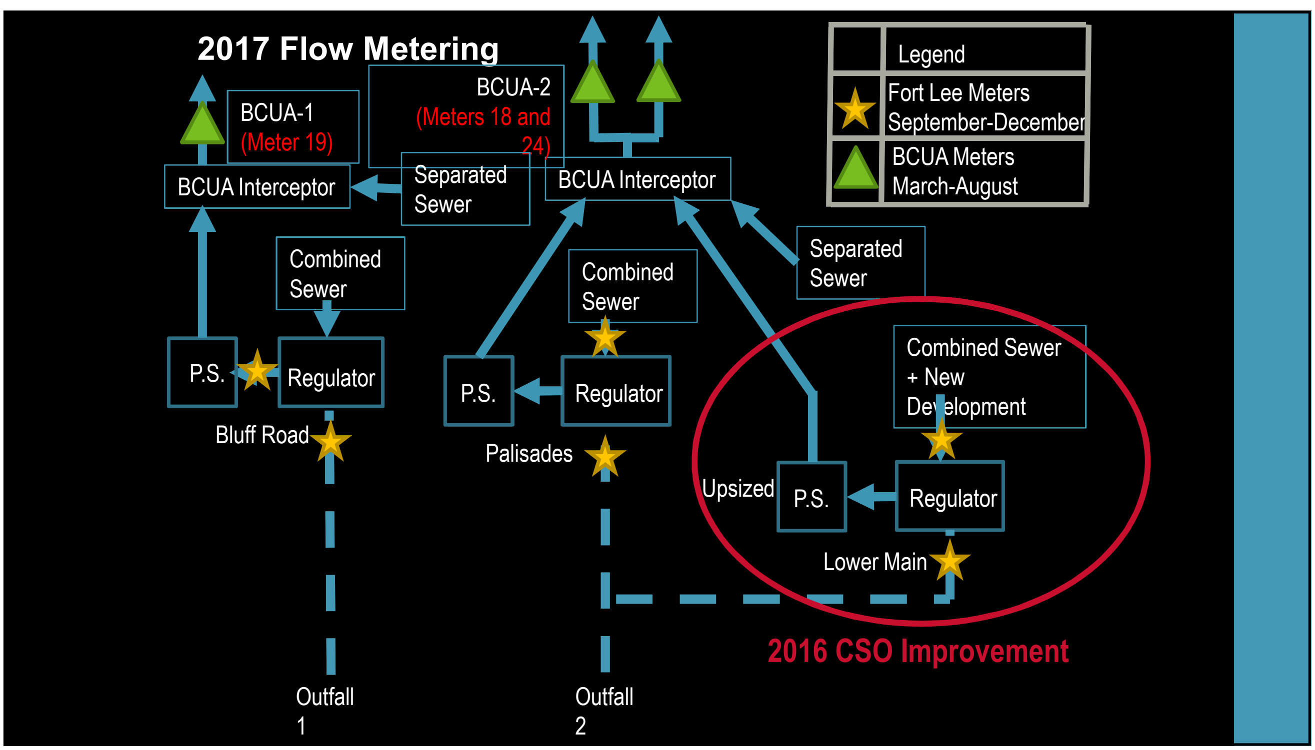
22

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.

23



24

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

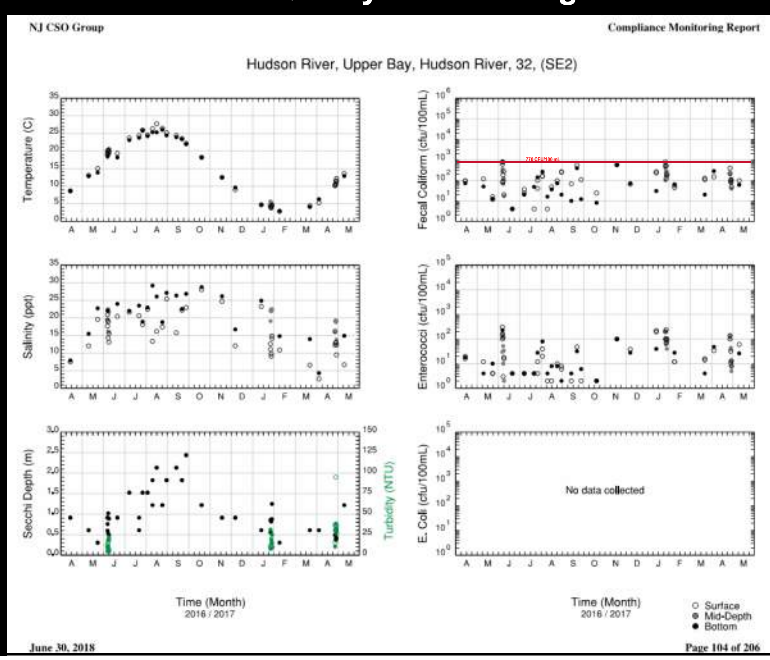
After Model Update

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

25

Hudson River Water Quality at GW Bridge



26

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

27

CSO CONTROLS

Bluff Road will require improvements to control flooding

28

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

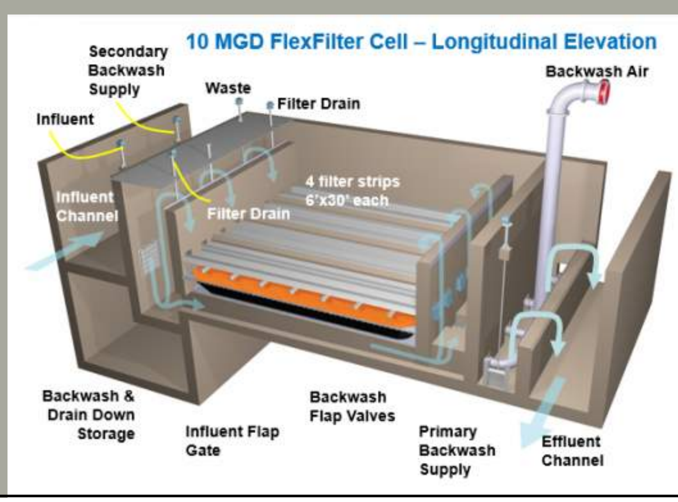
Above and below ground storage tanks, storage tunnels

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

29

Flex Filter



30

PAA Disinfection

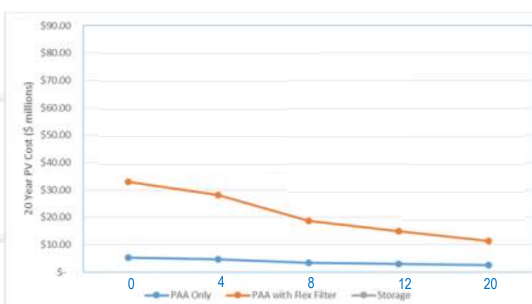
- Peracetic Acid (PAA)
  - Acetic Acid and Hydrogen Peroxide solution
- Common Elements
  - 275 gallon totes or 55 gallon drums
  - Feed pumps
  - Mixers / diffusers
  - Instrumentation (flow, TSS)
  - Sampling equipment
  - Pressure relief
  - Temperature monitoring

31

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.

32

Green Infrastructure

Rain Gardens

Bioswales

33

Green Infrastructure

Permeable Pavements

34

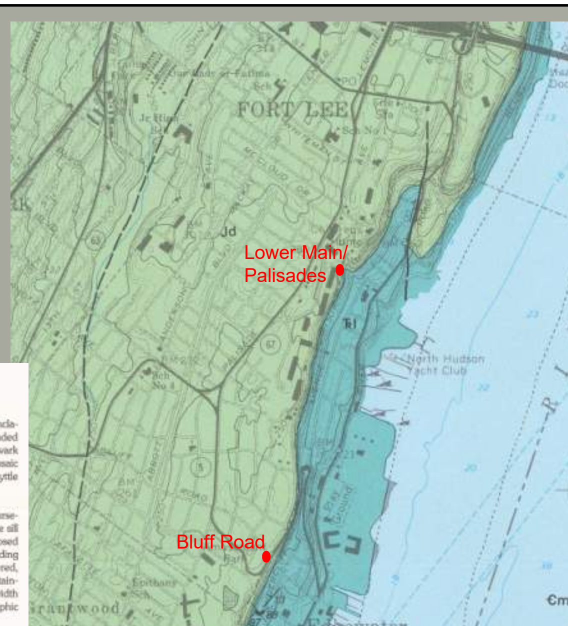
Bedrock constrains green infrastructure in Fort Lee

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



35

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% Captur e

+0.6% Captur e

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.

36

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%

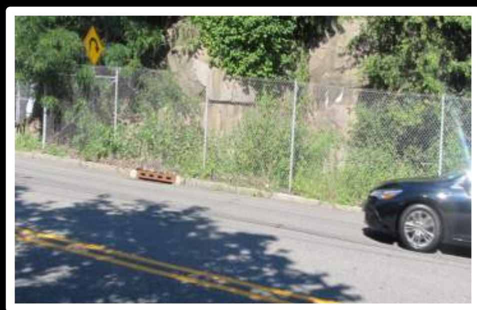
37

Preliminary Costs –

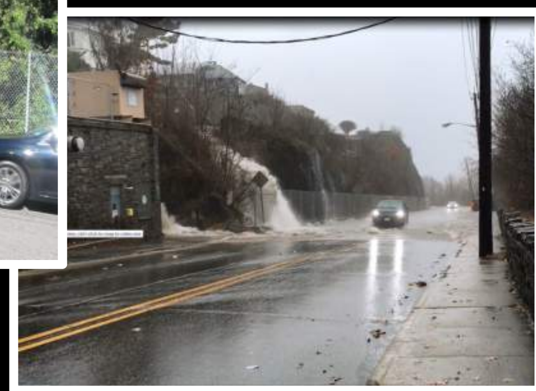
Alternative	Capture	Present Worth Cost
Baseline	84.7%	$0
Gray – 20 OF per Year	90.1%	$2.44 to 11.4 M
Green – Rain Garden, Bioswale or Porous Pavement	85%	$2.6 to 4.1 M

38

Repair of the Netting Facility



Good Day



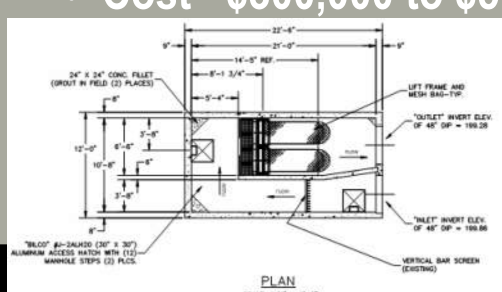
Bad Day
(twice in 2019)

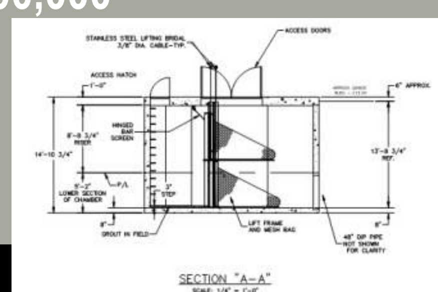
Traffic Hazard on Route 5

39

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





40

Questions

Comments

Discussion

41

City of Hackensack

COMBINED SEWER SYSTEM
LONG TERM CONTROL PLAN

PROGRESS UPDATE

SUPPLEMENTAL CSO TEAM MEETING

JANUARY 28, 2020

ARCADIS Design & Consultancy for natural and built assets

42

42

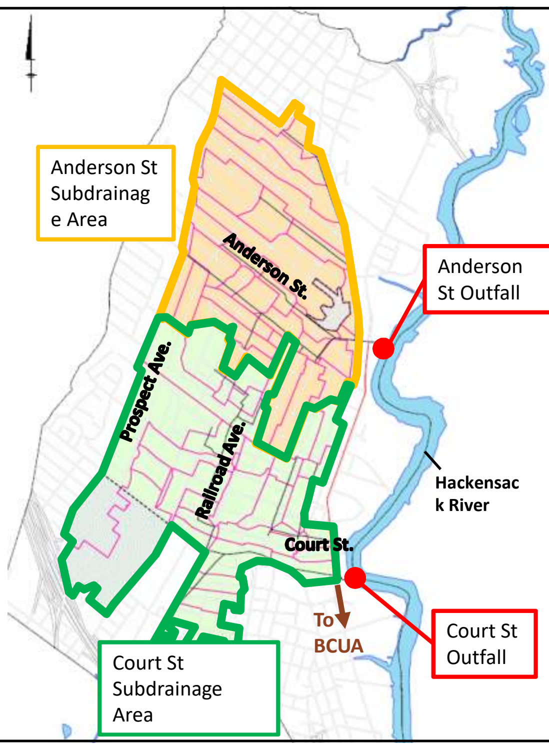
Agenda

- ❑ 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

ARCADIS Design & Consultancy for natural and built assets

43

43



Overview of Hackensack Combined Sewer System

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

44

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

ARCADIS Design & Consultancy for natural and built assets

45

45

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

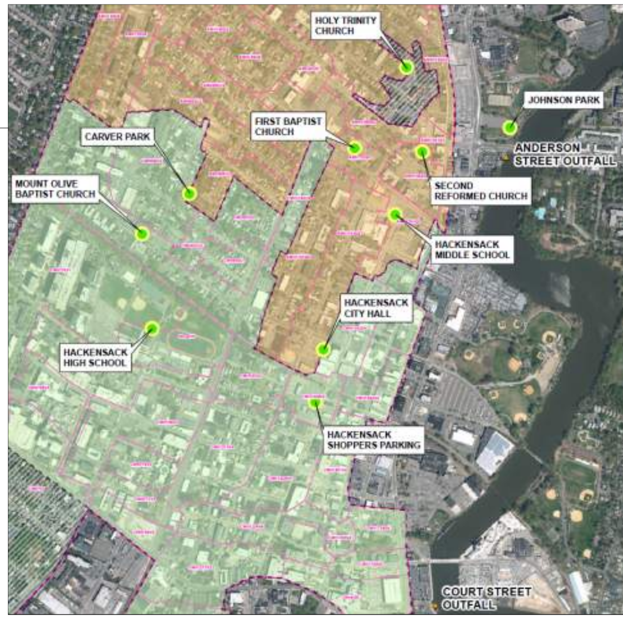
- Storage alternatives also evaluated for 0, 4, 8, 12 and 20 overflows scenarios

ARCADIS Design & Consultancy for natural and built assets

46

46

Possible GI Location Map




Bioswale


Rain Garden

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

[Dearborn, Michigan: http://www.we-technologies.com/wastewater-projects.php](http://www.we-technologies.com/wastewater-projects.php)

ARCADIS Design & Consultancy for natural and built assets

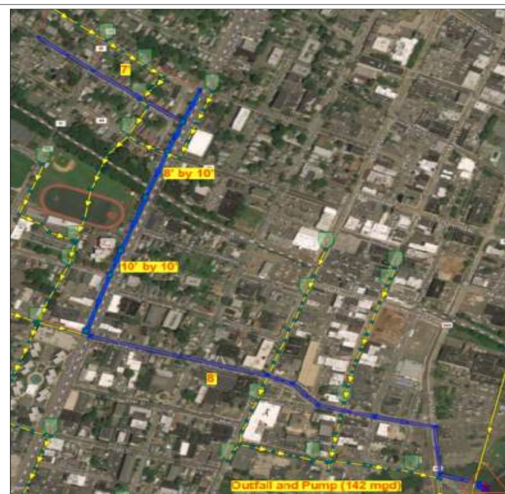
Additional Alternative: Court Street Stormwater Study

- 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

ARCADIS Design & Consultancy for natural and built assets

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



ARCADIS Design & Consultancy for natural and built assets

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

ARCADIS Design & Consultancy for natural and built assets

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%

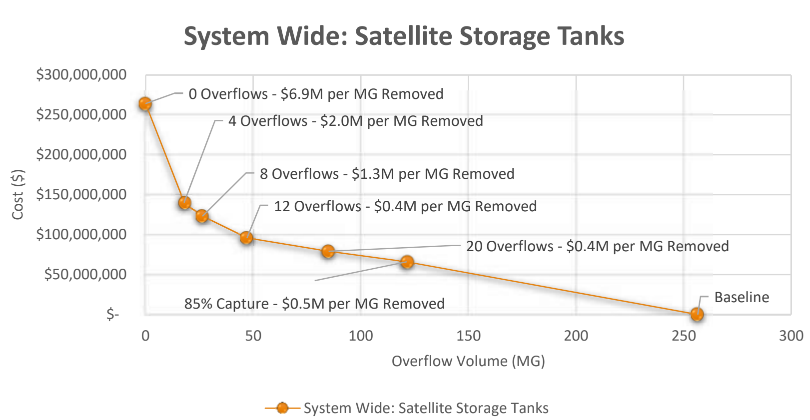
ARCADIS Design & Consultancy for natural and built assets

53

53

Selection and Implementation of Alternatives

- “Knee-of-the-curve” Analysis – Satellite Storage Tanks



ARCADIS Design & Consultancy for natural and built assets

54

54

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

ARCADIS Design & Consultancy for natural and built assets

55

55

BCUA CSO Group Supplemental CSO Team

Development and Evaluation of Alternatives Report

Water Quality Modeling

Mott MacDonald | Presentation 56 28 January 2020

56

Models

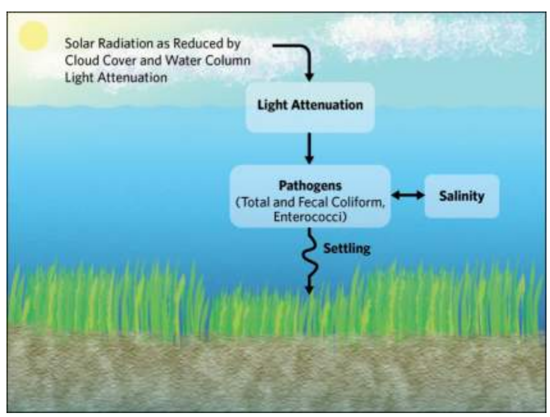
- Hydrodynamic Model (ECOMSED)
  - Water Elevation
  - Currents
  - Temperature
  - Salinity
- WQ Model (RCA)
  - Salinity
  - Tracer
  - E. coli
  - Fecal coliform
  - Enterococci
- Both models are run on the same grid (segmentation)
  - 10 vertical layers

57

Pathogen Model

Factors that affect bacteria

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



58

Required Hydrodynamic Model Inputs

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

59

Landside Pathogen Concentration Stations

Figure 10 – Ridgefield Park Village (BCUA)

60

Landside Pathogen Concentration Stations

Figure 11 – Borough of Fort Lee (BCUA)

61

WQM Component Analysis

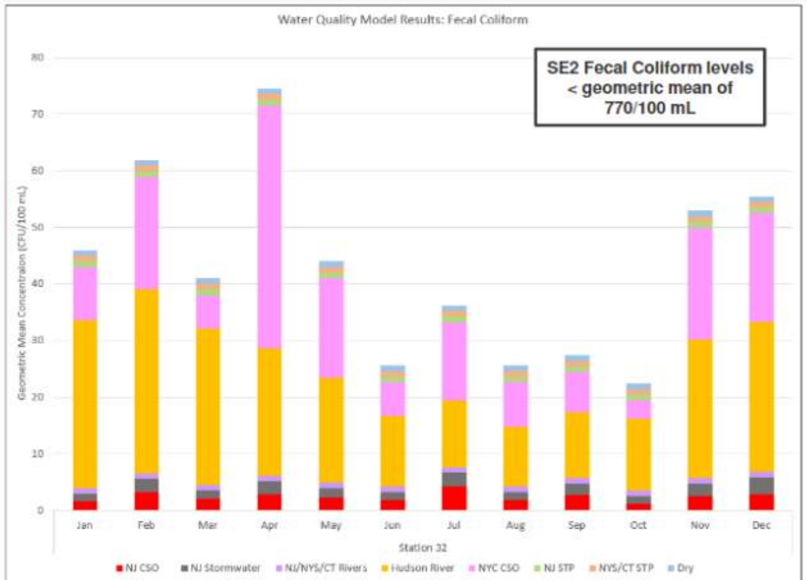
- WQ Component Analysis:
  - E. coli
  - Fecal
  - Enterococci
- Components:
  - NJ CSO
  - NJ SW/Runoff
  - NJ STP
  - NJ/NY/CT Rivers
  - Hudson River
  - Dry-weather
  - NYC CSO+SW
  - NY/CT STP

CLEAN WATERWAYS
Healthy Neighborhoods

7

62

WQM Component Analysis – Fecal Coliform-Hudson River



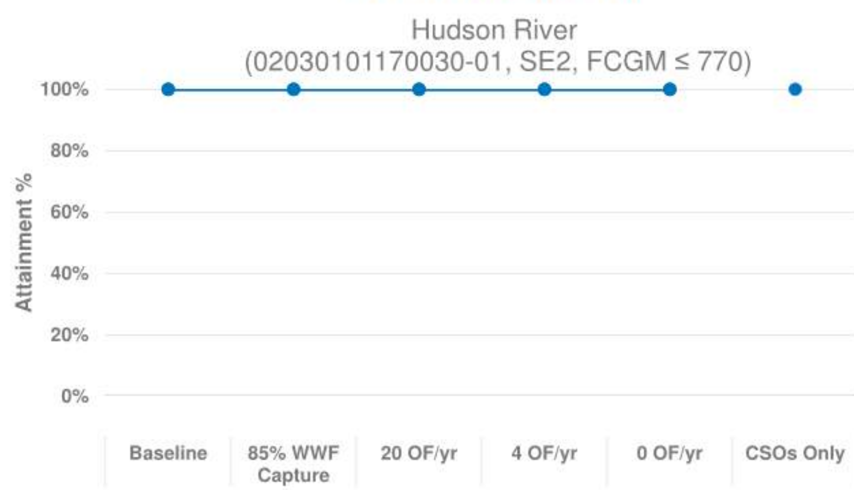
CONFIDENTIAL: THIS DOCUMENT CONTAINS ADVISORY, CONSULTATIVE AND/OR DELIBERATIVE MATERIAL. NOT SUBJECT TO DISCLOSURE UNDER THE NEW JERSEY OPEN PUBLIC RECORDS ACT OR THE COMMON LAW.

CLEAN WATERWAYS
Healthy Neighborhoods

15

63

WQM Attainment



Mott

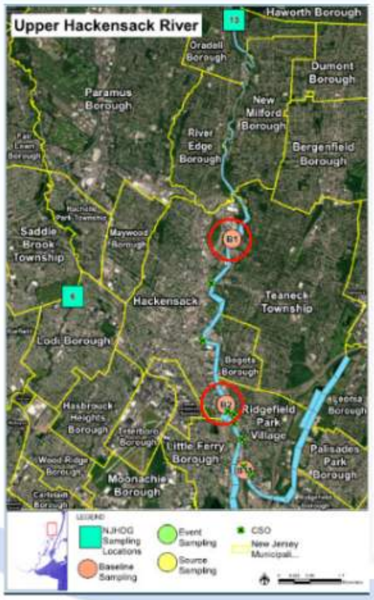
CONFIDENTIAL: THIS DOCUMENT CONTAINS ADVISORY, CONSULTATIVE AND/OR DELIBERATIVE MATERIAL. NOT SUBJECT TO DISCLOSURE UNDER THE NEW JERSEY OPEN PUBLIC RECORDS ACT OR THE COMMON LAW.

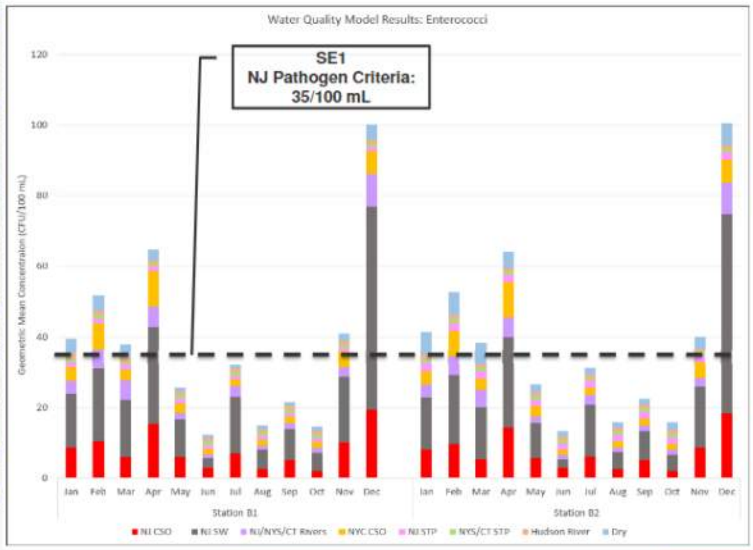
CLEAN WATERWAYS
Healthy Neighborhoods

2020

64

WQM Component Analysis – Upper Hackensack River -Enterococci



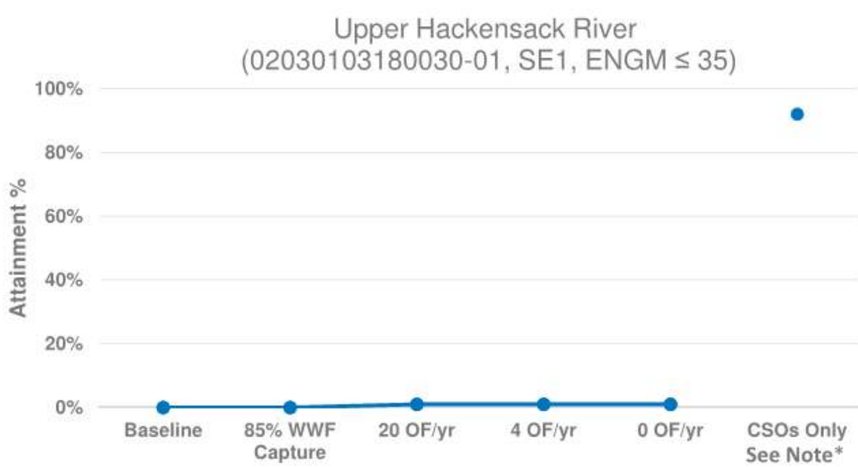


18

CLEAN WATERWAYS
Healthy Neighborhoods

65

WQM Attainment



Mott MacD

CLEAN WATERWAYS
Healthy Neighborhoods

uary 2020

66

BCUA CSO Group Supplemental CSO Team

Public Outreach Opportunities

BCUA CSO Group Supplemental CSO Group

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?

BCUA CSO Group Supplemental CSO Group

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

BCUA CSO Group Supplemental CSO Team

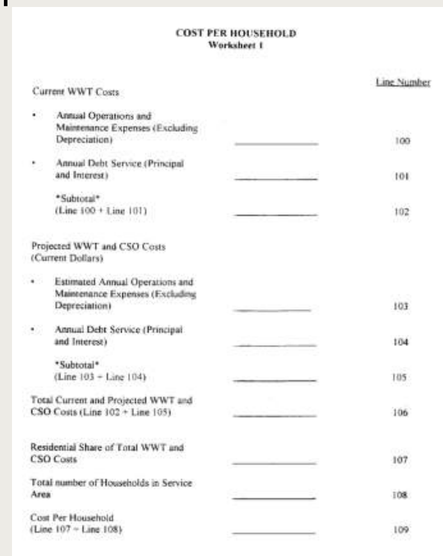
Financial Capability Assessment

BCUA CSO Group 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

BCUA CSO Group Supplemental CSO Group

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

BCUA CSO Group Supplemental CSO Group

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

73

BCUA CSO Group Supplemental CSO Group

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

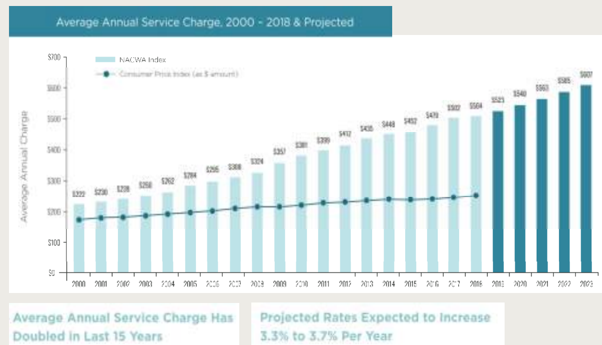
Financial Capability Matrix Category	Implementation Period
Low Burden	Normal Engineering/Construction
Medium Burden	Up to 10 years
High Burden	Up to 15 Years*
	*(Schedule up to 20 years based on negotiation with EPA and state NPDES authorities)

74

BCUA CSO Group Supplemental CSO Group

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

Mott MacDonald | Presentation 75 January 23, 2020

75

BCUA CSO Group Supplemental CSO Group

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?

Mott MacDonald | Presentation 76 28 January 2020

76

BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

So what is this all about?

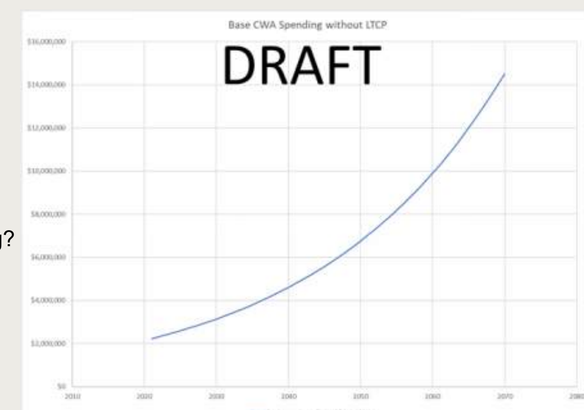
- So now we turn it into a LTCP
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is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

Mott MacDonald | Presentation 77 28 January 2020

77

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?
  - 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 78 28 January 2020

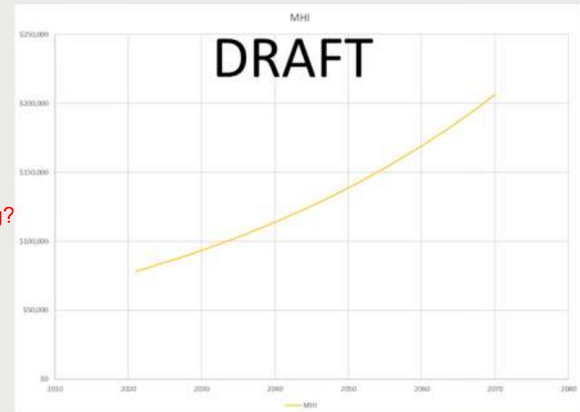
78

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?
  - 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?

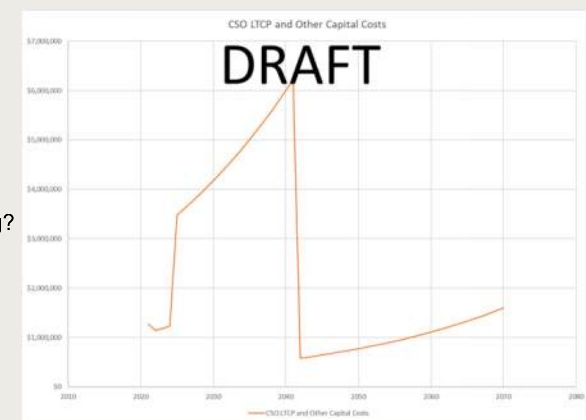


BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

So what is this all about?

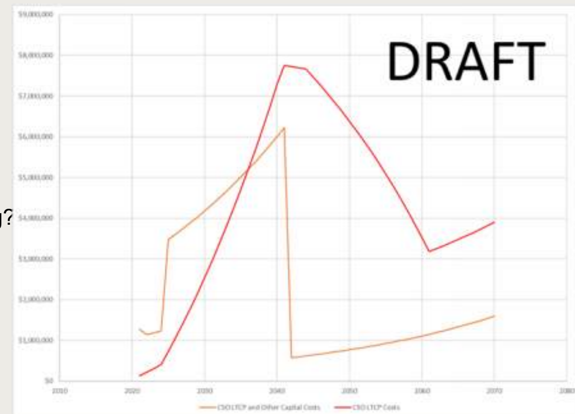
- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is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



BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

So what is this all about?



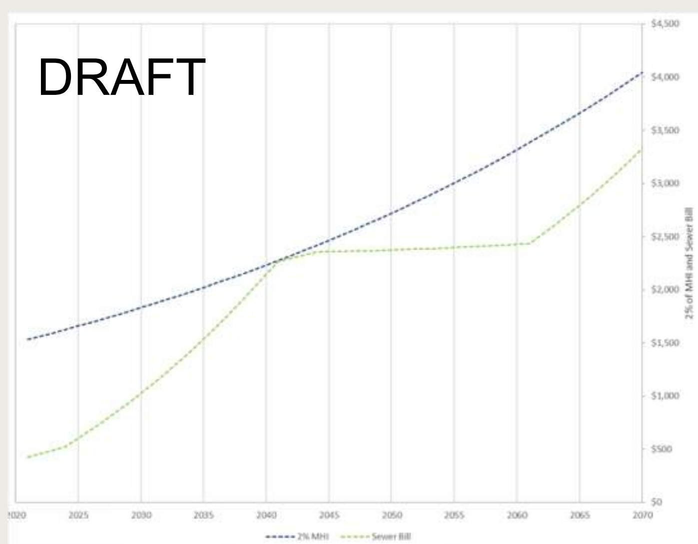
- So now we turn it into a sewer
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is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

81

BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

What is the impact to me?

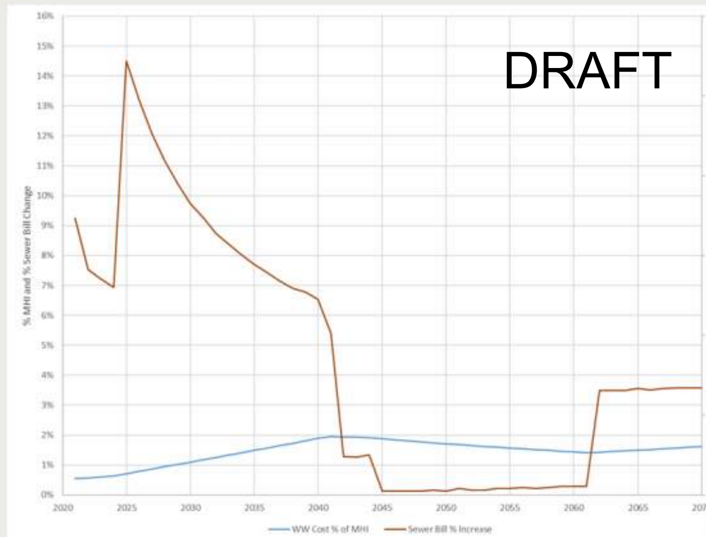


82

BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

What is the impact to me?



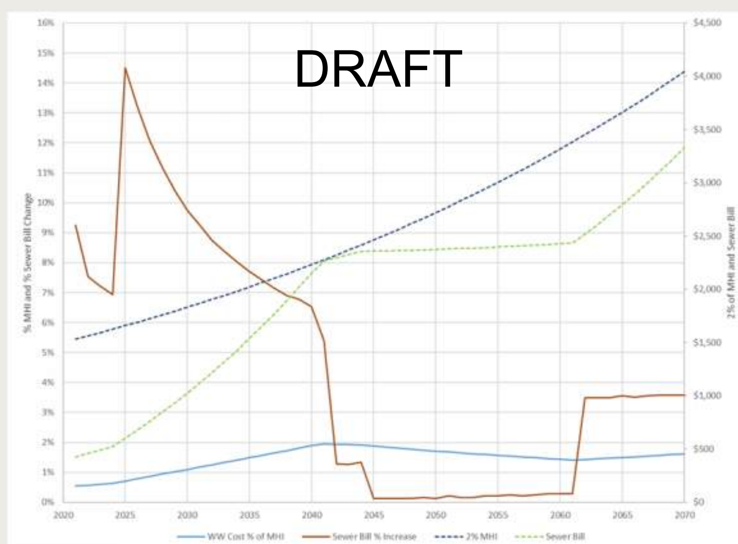
Mott MacDonald | Presentation 83 28 January 2020

83

BCUA CSO Group Supplemental CSO Group

Financial Capabilities Assessment

What is the impact to me?



Mott MacDonald | Presentation 84 28 January 2020

84

BCUA CSO Group Supplemental CSO Team

Selection and Implementation of Alternatives Report

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

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

87

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

88

BCUA CSO Group Supplemental CSO Team

Schedule

Mott MacDonald | Presentation 89 28 January 2020

89

BCUA CSO Group 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

Supplemental CSO Team Meeting

Supplemental CSO Team Meeting (Working Session?)

Public Meeting

Mott MacDonald | Presentation 90 28 January 2020

90

Final Questions?

Thank You?

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

BCUA Update
Support of Alternatives

BCUA CSO Group Supplemental CSO Team Meeting #12

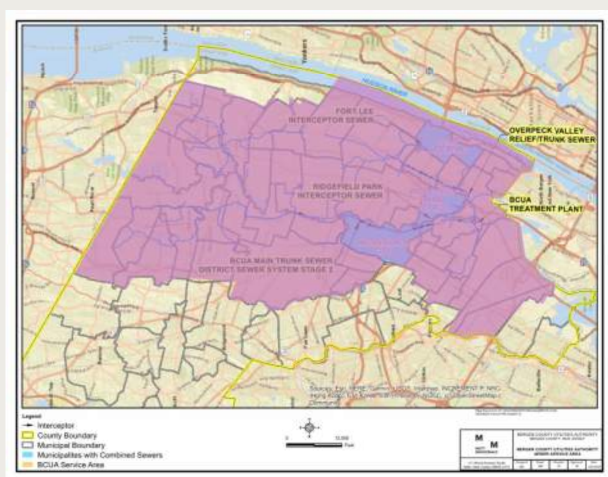
July 21, 2020

5

BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

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



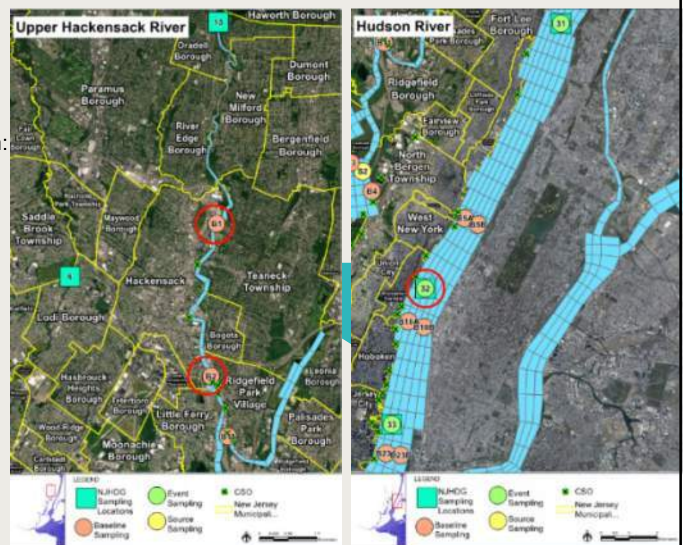
6

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



7

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

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

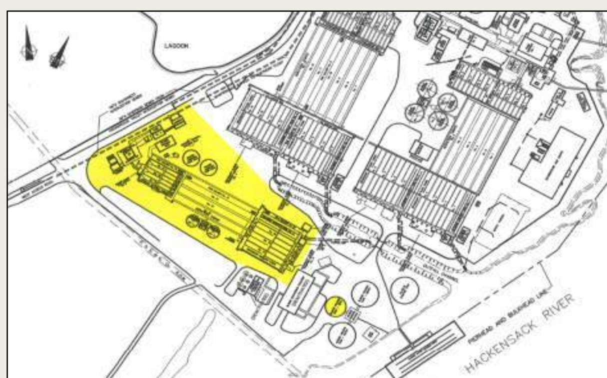
Supplemental CSO Team Meeting #12 9 July 21 2020

9

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



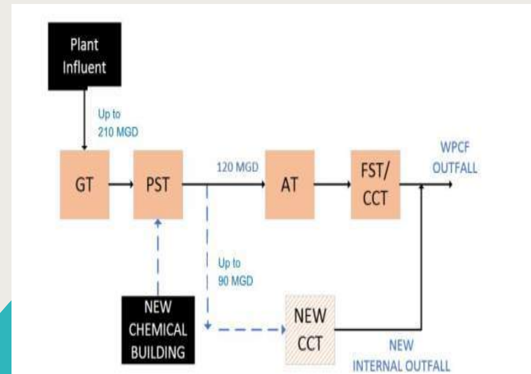
Supplemental CSO Team Meeting #12 10 July 21 2020

10

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



BCUA CSO Group Supplemental CSO Team

BCUA Support of Alternatives

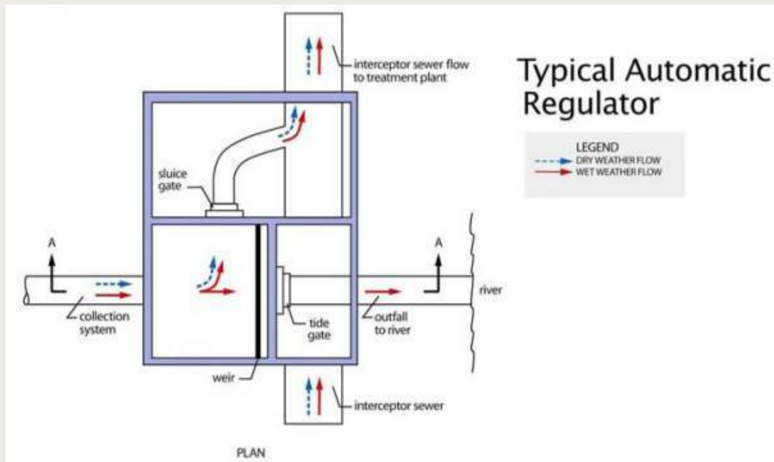
- BCUA is not implementing alternatives
  - Providing support for municipalities
- Evaluated:
  - Plant Design Capacity – 120 MGD wet weather.
  - Interceptor Capacity – 210 MGD
  - Increased full treatment to add 29-115 MGD capacity
    - $310M to $730M
  - High rate primary treatment with secondary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

July 21 2020

BCUA CSO Group Supplemental CSO Team

Additional Analysis

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



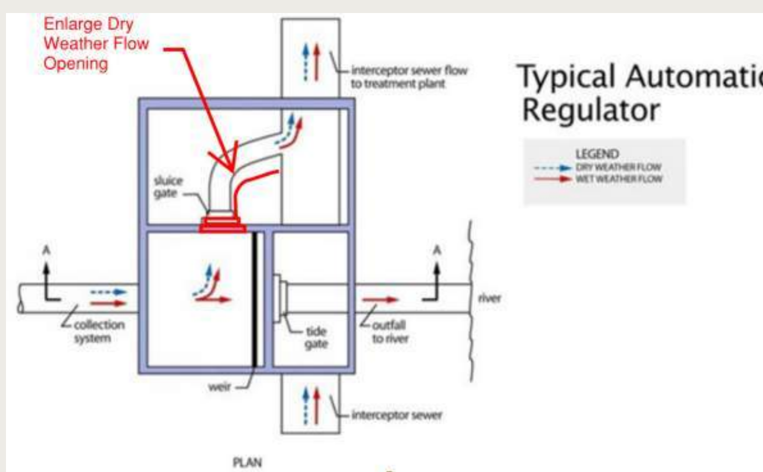
Supplemental CSO Team Meeting #12 13 July 21 2020

13

BCUA CSO Group Supplemental CSO Team

Additional Analysis

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



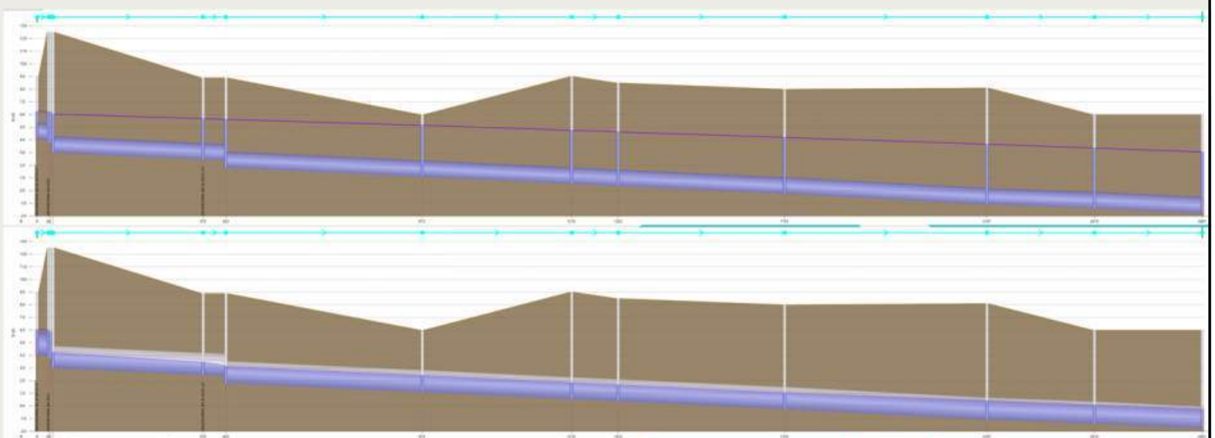
Supplemental CSO Team Meeting #12 14 July 21 2020

14

BCUA CSO Group Supplemental CSO Team

Additional Analysis

- Convey and Treat Additional Flow
  - Phase 2 modify interceptors

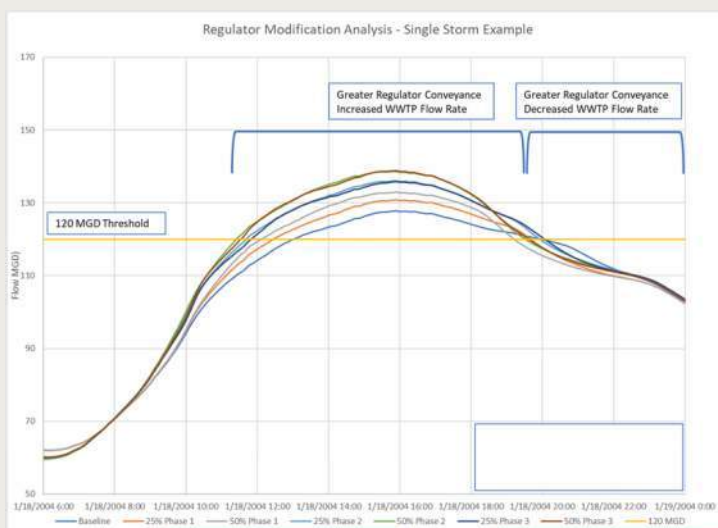


15

BCUA CSO Group Supplemental CSO Team

Additional Analysis

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

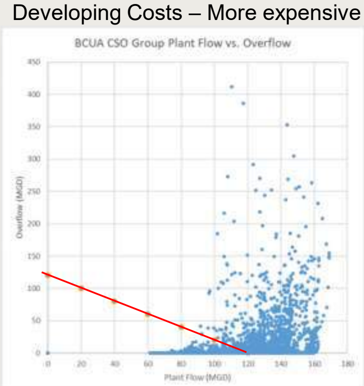


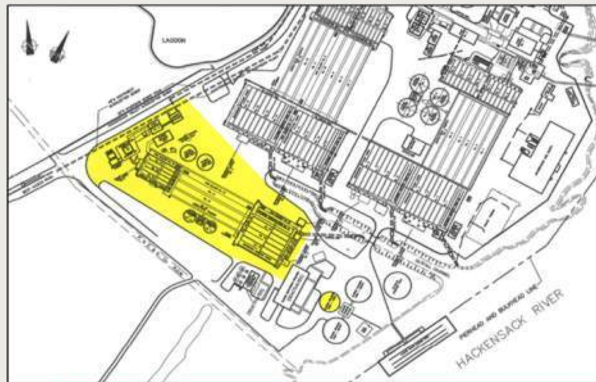
16

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





Supplemental CSO Team Meeting #12 17 July 21 2020

17

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

Supplemental CSO Team Meeting #12 18 July 21 2020

18

Ridgefield Park – Tentative LTCP

Outline

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

Supplemental CSO Team Meeting #12 19 July 21 2020

19

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

Supplemental CSO Team Meeting #12 20 July 21 2020

20

Alternatives Evaluation

Control Programs Evaluated

~~1. Treatment Plant Expansion~~

2. Complete Sewer Separation

3. Satellite Storage Facilities

4. Tunnel Storage and Secondary Controls

5. Satellite CSO Treatment Facilities

6. Green Infrastructure

7. Infiltration / Inflow Reduction

Range of alternatives, different levels of control and combinations

July 21 2020 Supplemental CSO Team Meeting #12 21

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%

Supplemental CSO Team Meeting #12 22

22

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:

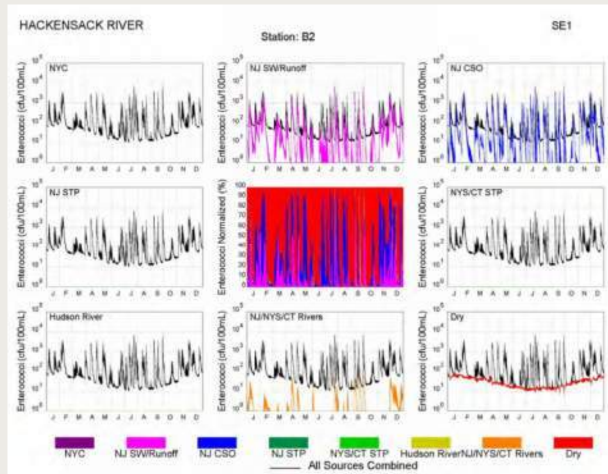


Figure 6-3. Component Analysis for Enterococci at Station B2

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)

- 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

SELECTED as best balance between permit compliance, water quality benefit and allocation of municipal funds.

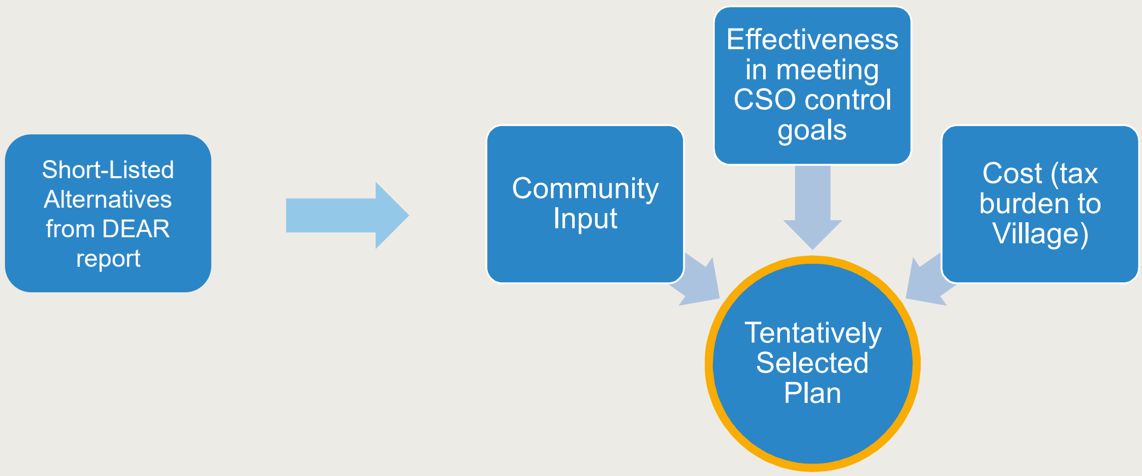
Demonstration Approach
(water quality based)

- Use receiving water model to identify control level needed to meet WQ-based requirements

NOT SELECTED: WQ modelling not very insightful in demonstrating WQ improvements in receiving waters.

Tentatively Selected Plan

Presumption Approach Targeting 85 Percent Capture



27

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.

28

Short-Listed Alternatives

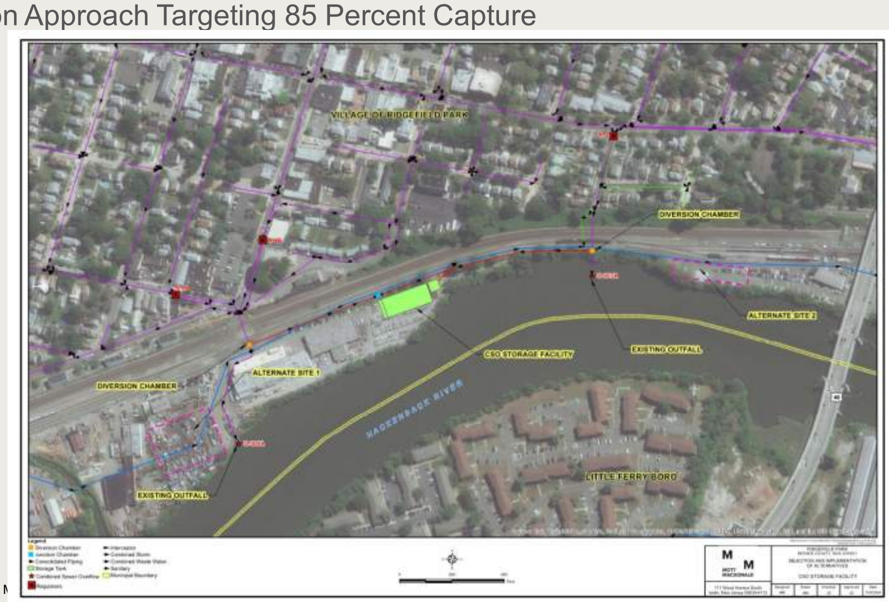
Presumption Approach Targeting 85 Percent Capture

- 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

29

Tentatively Selected Plan – Subject to Change

Presumption Approach Targeting 85 Percent Capture



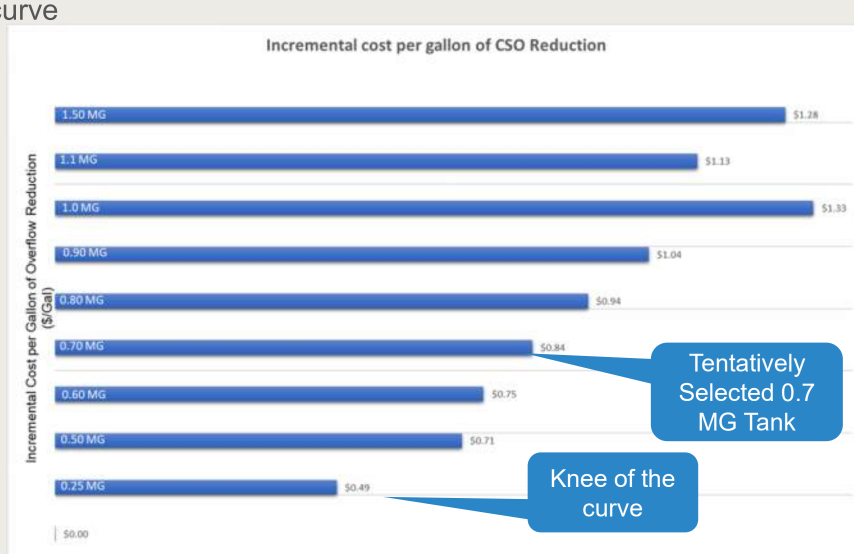
30

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

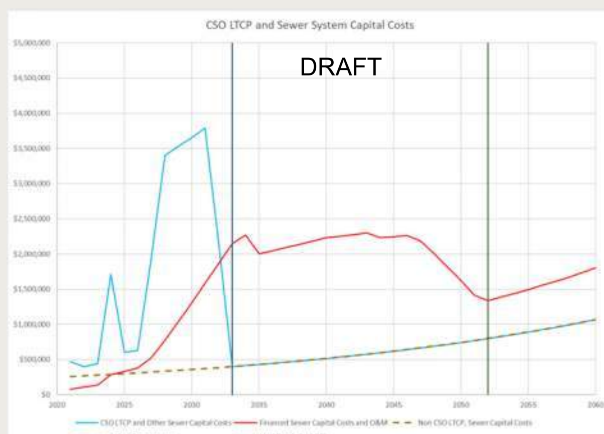
Years 15+
- O&M

NJDEP Quarterly Status Meeting 33 June 25, 2020

33

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

34

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.

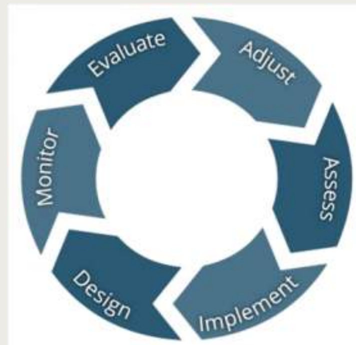
2. CSO facilities performance

- 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.

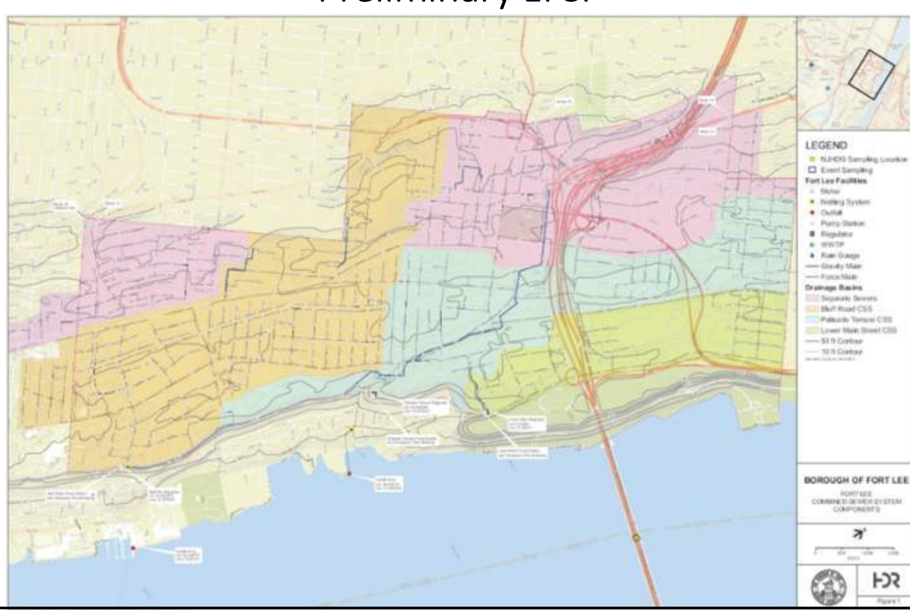
36

Adaptive Management

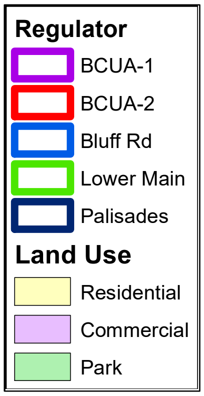
- **Adaptive management** to be included in LTCP
  - COVID-19 Impacts
  - Re-assess affordability throughout implementation schedule, based on emergent economic conditions beyond permittees' control
  - Include provisions to re-evaluate, revise and/or reschedule CSO controls as appropriate to reflect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

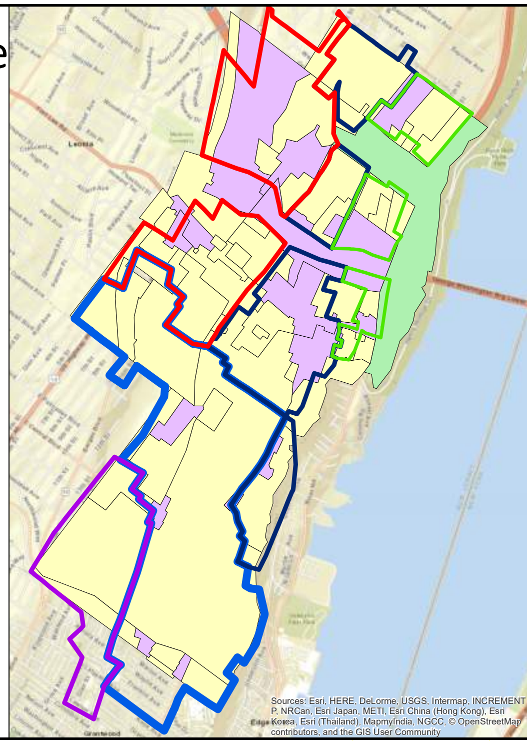


Fort Lee - NJPDES Permit No. NJ0034517
SCSO Meeting – July 21, 2020
Preliminary LTCP



2007 Land Use Type and Drainage Area





39

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...

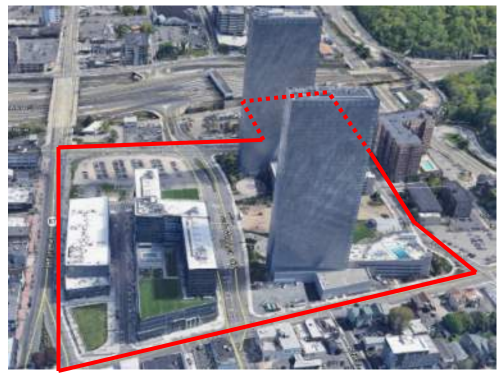
ii. <u>The elimination or the capture for treatment of no less than **85% by volume of the combined sewage collected** in the CSS during precipitation events on a system-wide annual average basis</u>...

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

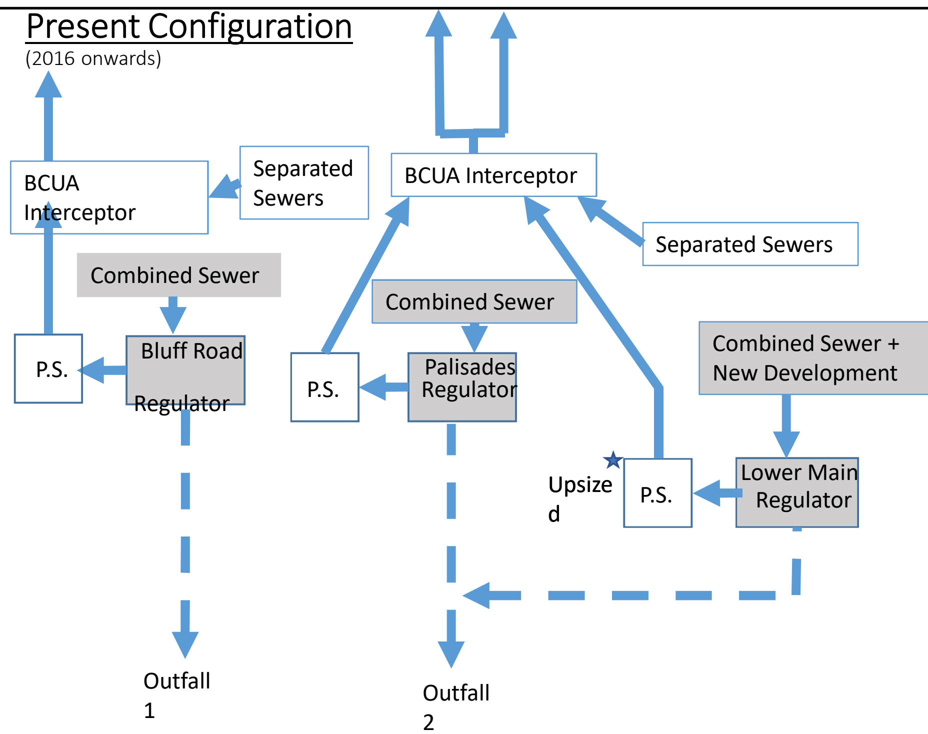


2019

41

Present Configuration

(2016 onwards)



42

Projected Overflows for 2004 Typical Year

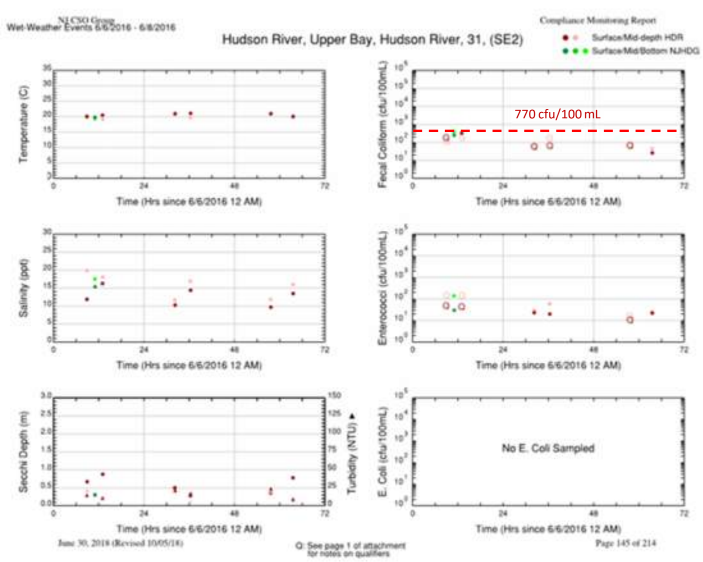
Condition	Outfall 001 (Bluff Road)		Outfall 002 (Palisade Terrace)		
	Overflows	Volume	Overflows	Volume	CSO Capture
2015 InfoWorks ICM (Baseline)	58	124.5	35	25	**74.5%**
2017 InfoWorks ICM (The Towers Separated)	58	124.5	25	18.8	**76.3%**
2045 InfoWorks ICM (The Towers and Hudson Lights separated)	59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

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

Break the LTCP to ~4 Phases

43

Water Quality Sampling Results



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

44

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

45

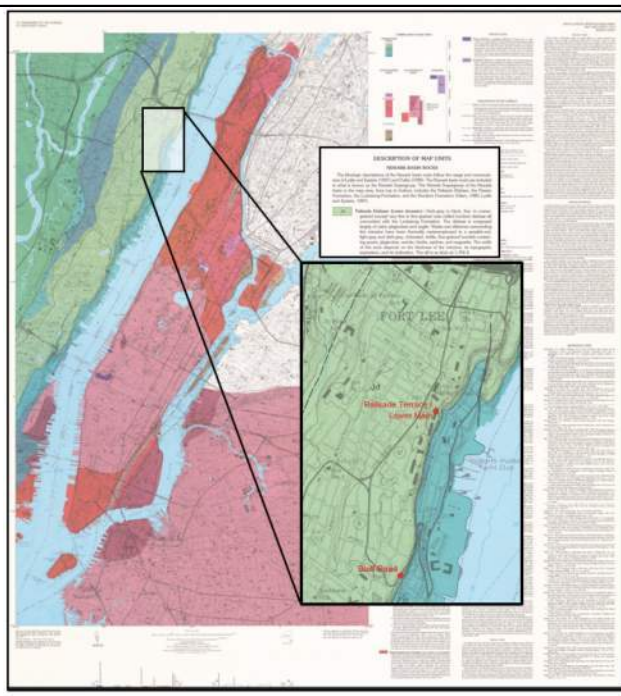


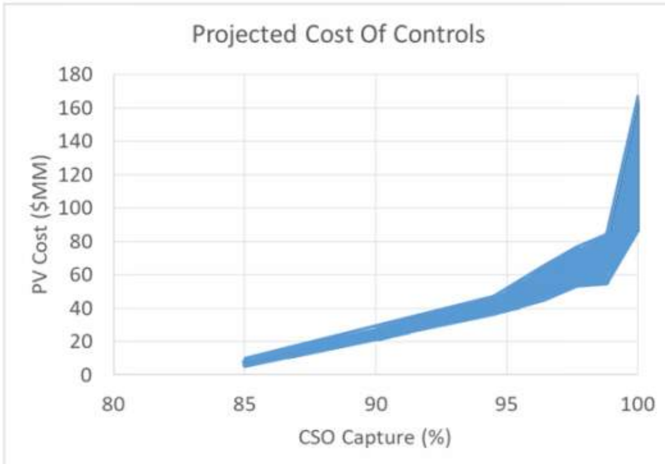
Figure 6-3. Bedrock Map of New York and Parts of Kings and Queens Counties, New York and Bergen and Hudson Counties, New Jersey

Green Infrastructure

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

46

Cost Range of CSO Controls



47

Preliminary LTCP to get to 85% Control

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

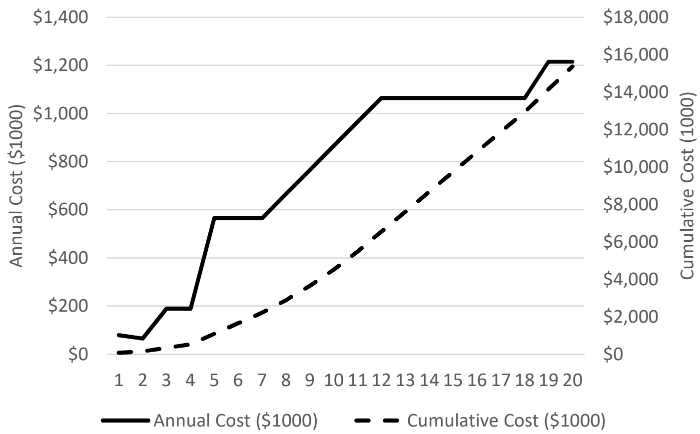
- Construct two pilot scale green infrastructure CSO alternatives (pervious pavers and bioswale) to see how effective they are ($250K)

- 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)

48

Preliminary LTCP Costs Schedule



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

49

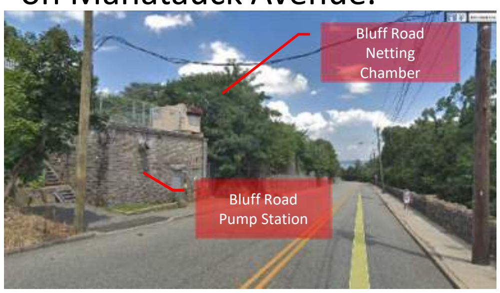
Gary Grey
HDR Inc.
gary.grey@hdrinc.com

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

50

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.



51

CITY OF HACKENSACK

Combined Sewer System LTCP

Selected Plan Update

Supplemental CSO Team Meeting, July 21, 2020

52

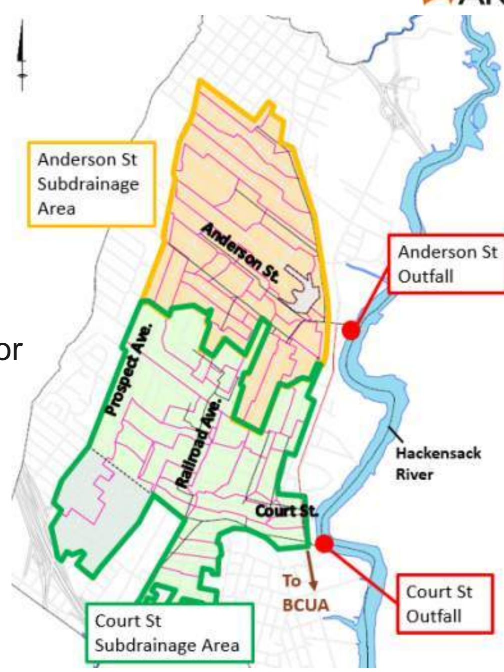
Agenda

- 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

53

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



54

DEAR Control Alternatives Review

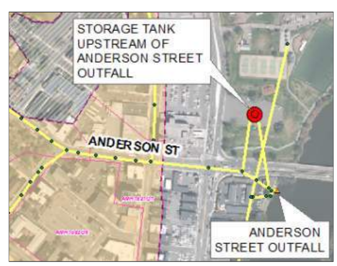
- Development and Evaluation of Alternatives Report (DEAR)
  - Submitted to NJDEP on June 30, 2019
  - Approved by NJDEP on February 12, 2020

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

55

DEAR Control Alternatives Review

- Storage Tank Alternative

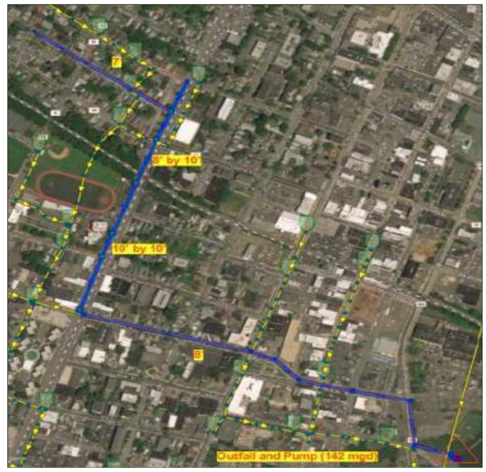


Dearborn, Michigan: http://www.we-technologies.com/wastewater-projects.php

56

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



57

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%

58

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

59

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

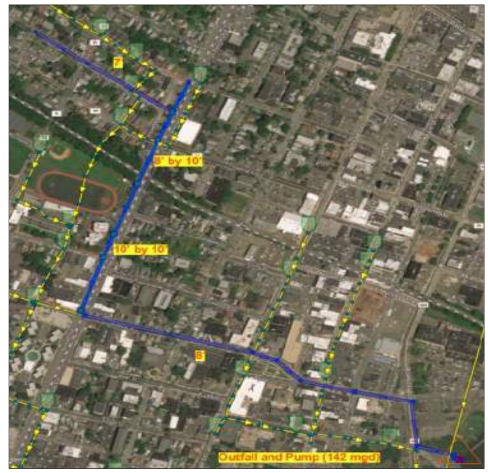
Rain Garden

60

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%



61

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

62

SIAR Selected CSO Control Plan

- **Localized Sewer Separation Projects:**

Design courtesy of Suburban Consulting Engineers, Inc.

63

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

64

ARCADIS

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

65

ARCADIS

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.

66

ARCADIS Design & Consultancy for natural and built assets

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

67

ARCADIS Design & Consultancy for natural and built assets

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

© Arcadis 2020

68

MOTT MACDONALD

ARCADIS

HDR

BERGEN COUNTY UTILITIES AUTHORITY

Preliminary Selection and Implementation of Alternatives

BCUA CSO Group Supplemental CSO Team Meeting #12

Virtual Meeting

July 21, 2020

The Village of Ridgefield Park Settled in 1685

69

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

70

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

71

Tentative CSO LTCP Schedule for Completion

July 2020: Tentative selection of CSO control plan

August 2020: Refine selected CSO control plan and regional coordination

September 2020: Incorporate/address comments and finalize selected CSO control plan

October 2020: Selection and Implementation Report due to NJDEP

- August 18th: Public Meeting
- Late August: Release draft LTCP report to SCSO Team
- Early September: Next SCSO meeting
- September 11th: SCSOTeam Comments on LTCP Report due
- October 1st: Submit LTCP to NJDEP

72

Questions?

73

Thank You!

74

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

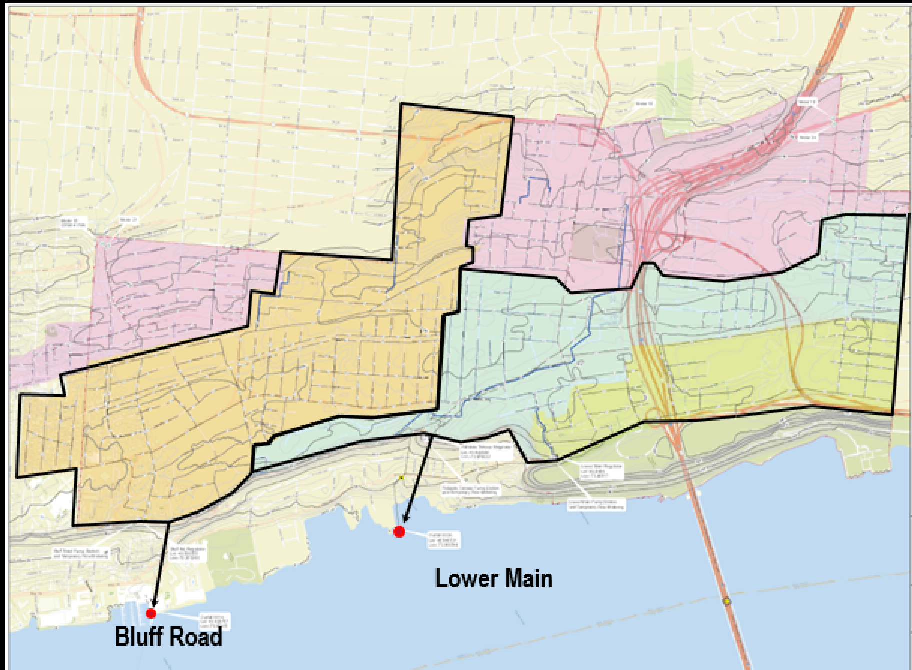
Sal Pagano – Member Supplemental CSO Team

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

AGENDA

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

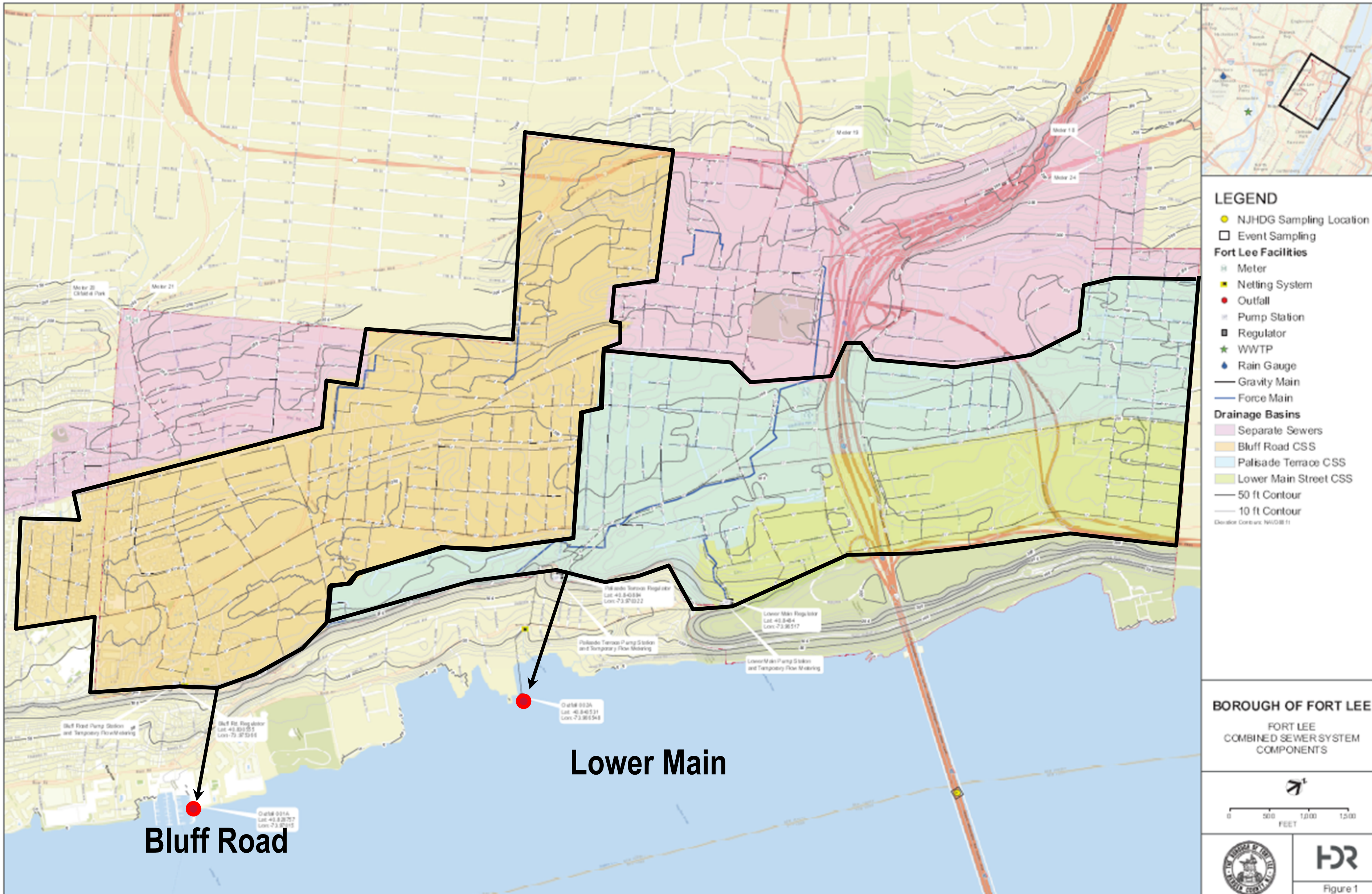
INTRODUCTIONS

- **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.**

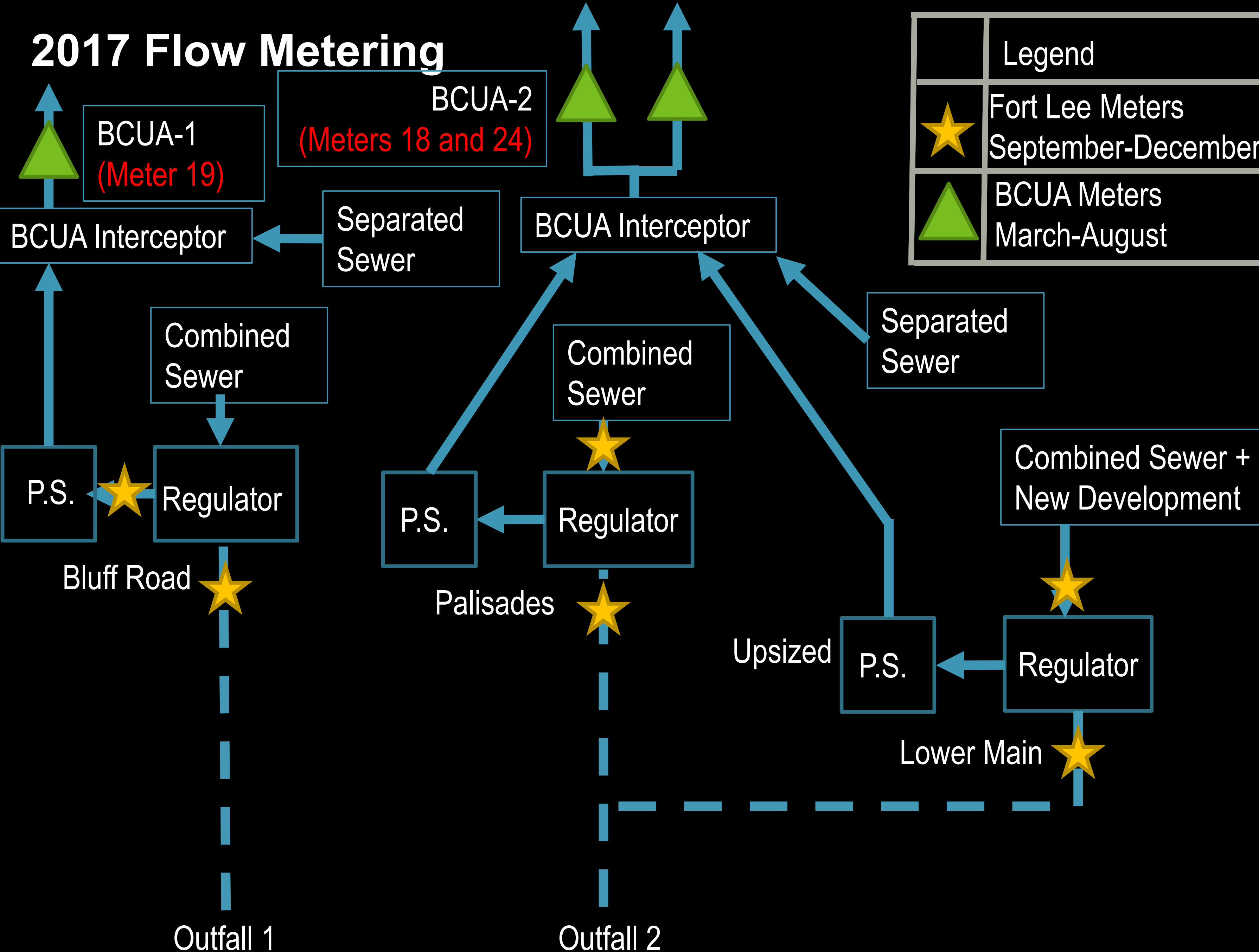
Long Term Control Plan

- 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

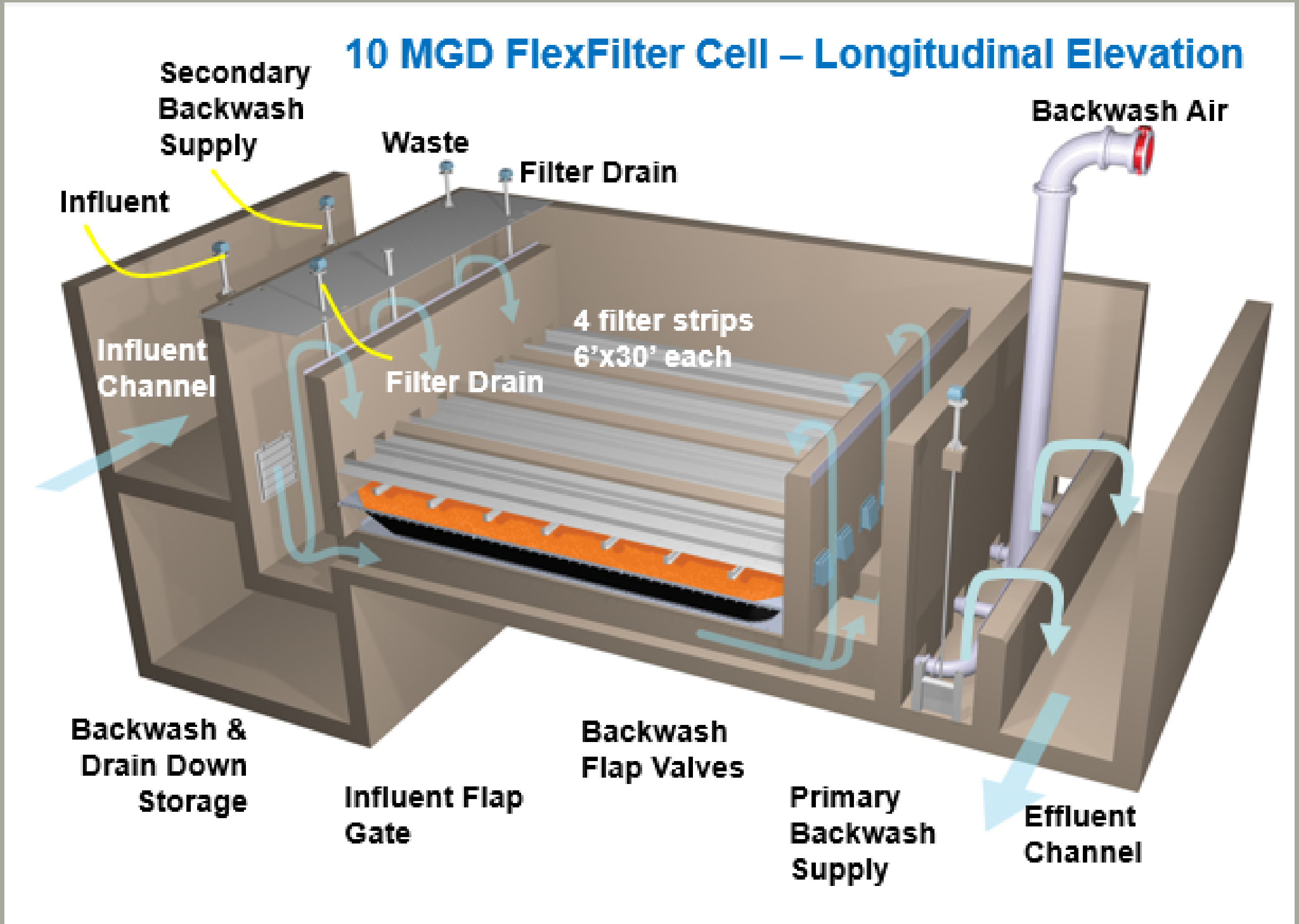
Storage Technologies

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



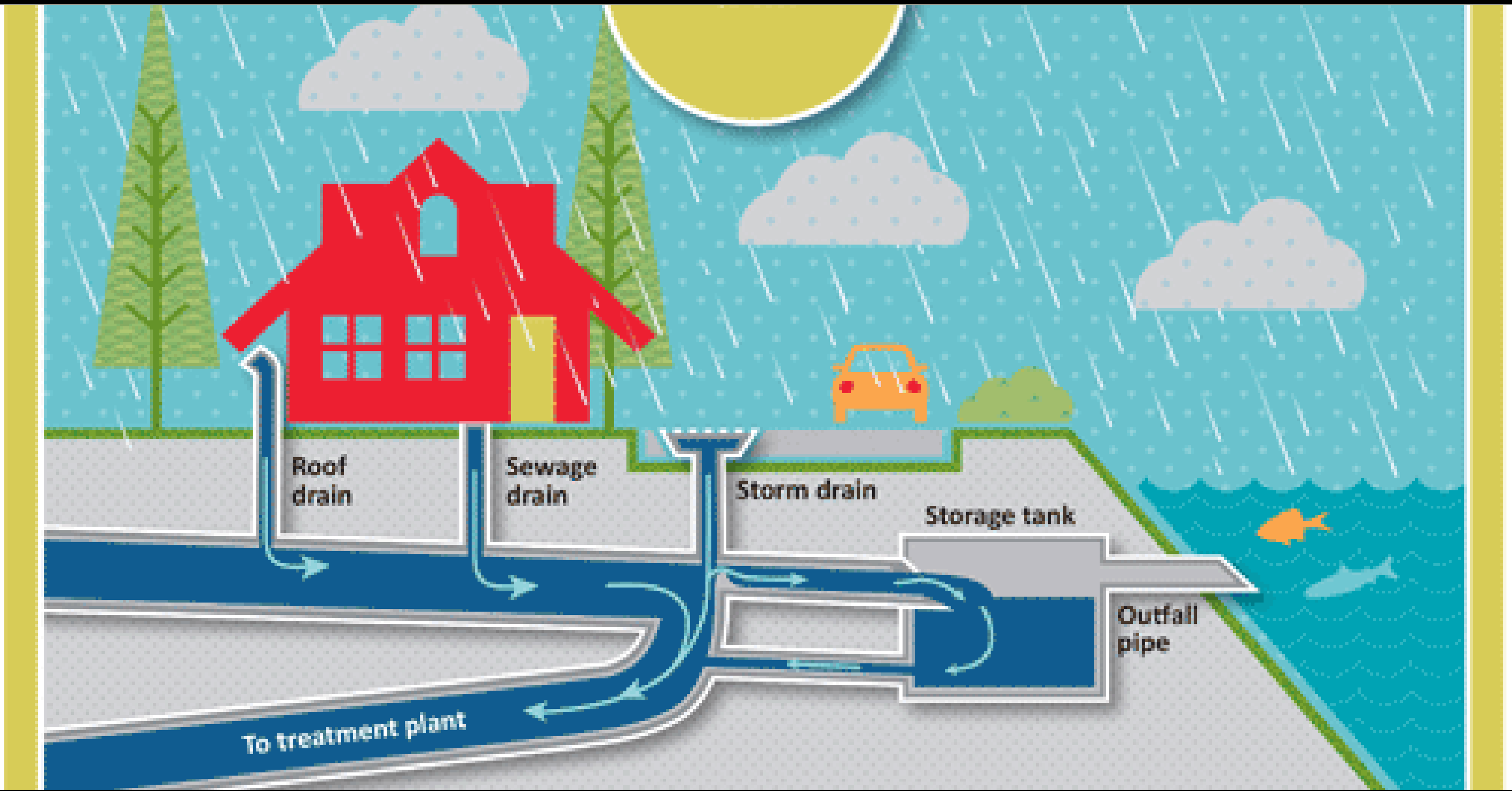
10 MGD FlexFilter Cell – Longitudinal Elevation
Secondary Backwash Supply
Influent
Waste
Filter Drain
Backwash Air
Influent Channel
Filter Drain
4 filter strips 6'x30' each
Backwash & Drain Down Storage
Influent Flap Gate
Backwash Flap Valves
Primary Backwash Supply
Effluent Channel

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

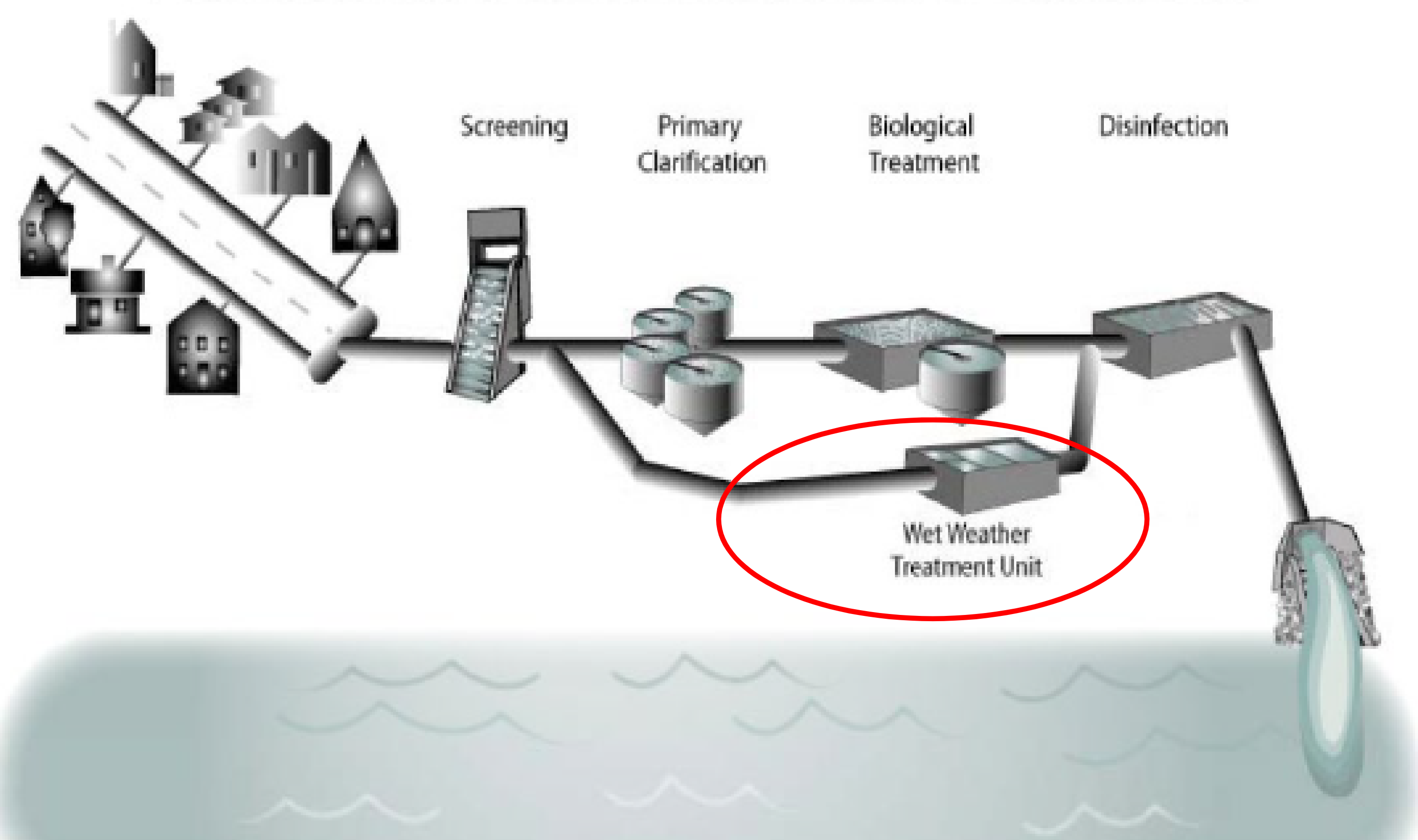
Planter Boxes

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')

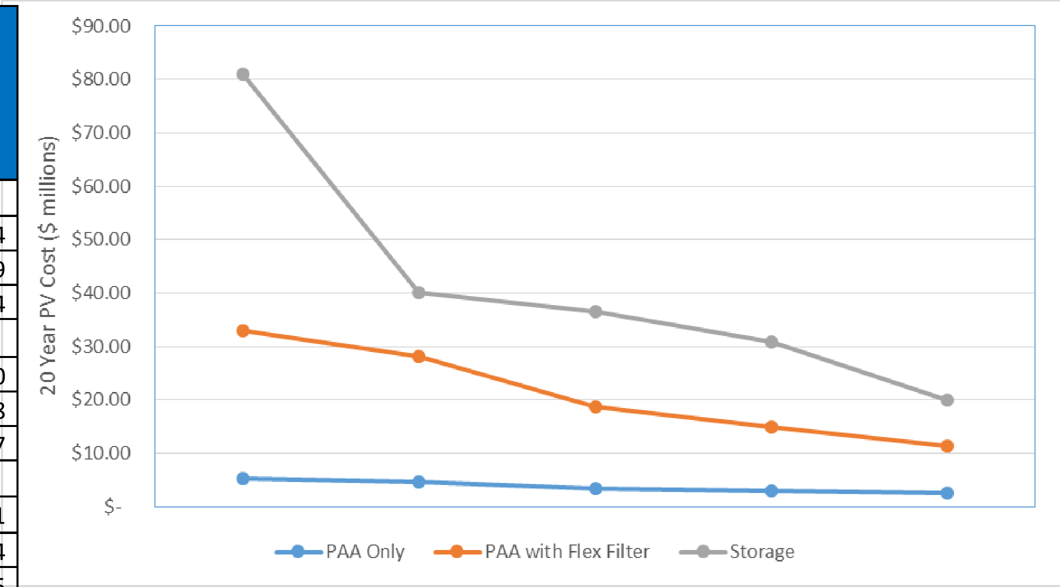
(1) Cannot dewater within 3 days for zero CSO events at FL-001

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)

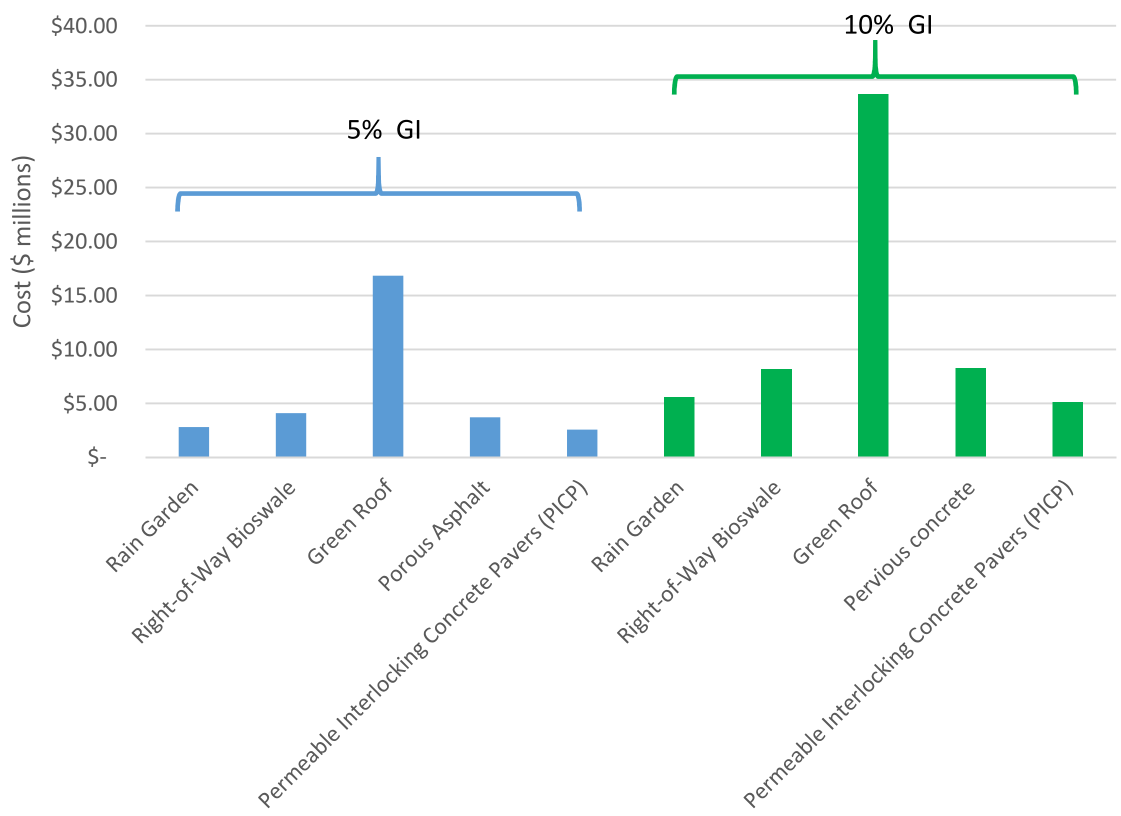
	PAA Only	PAA w/ FlexFilter	Tanks
0 CSOs per year			
Capital Cost ($M)	$ 1.35	$ 28.95	$ 50.64
20 yr PV O&M Cost ($M)	$ 3.90	$ 7.80	$ 30.29
Total 20 yr PV Cost ($M)	$ 5.25	$ 32.97	$ 80.94
4 CSOs per year			
Capital Cost ($M)	$ 1.27	$ 24.67	$ 22.60
20 yr PV O&M Cost ($M)	$ 3.40	$ 3.51	$ 17.48
Total 20 yr 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

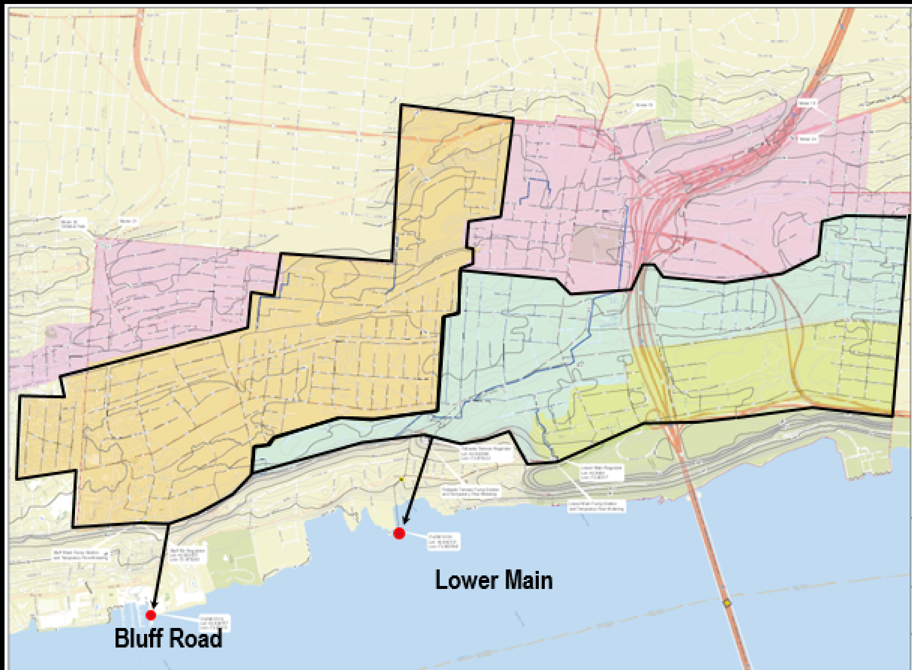
Sal Pagano – Member Supplemental CSO Team

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

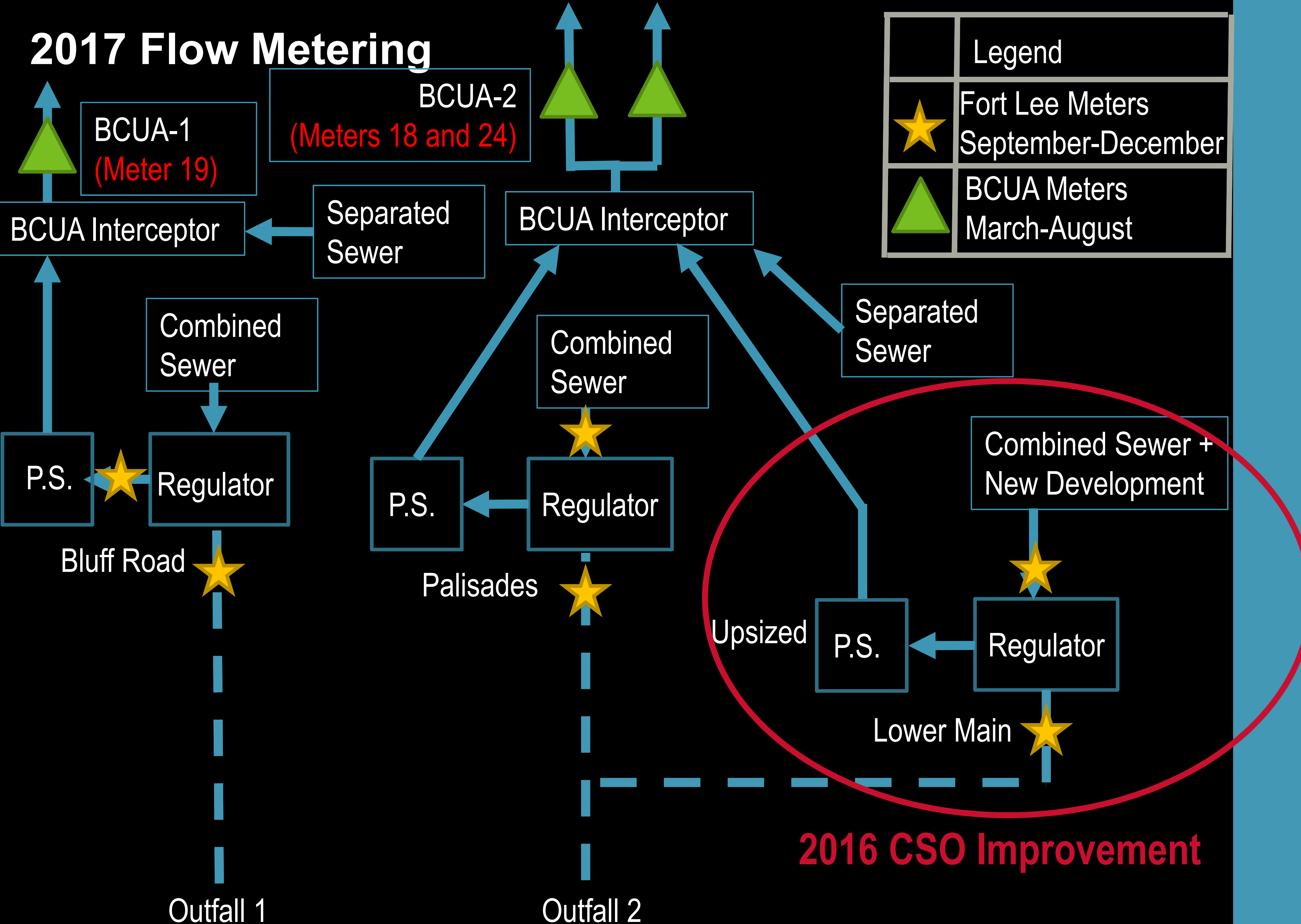
HDR

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.

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

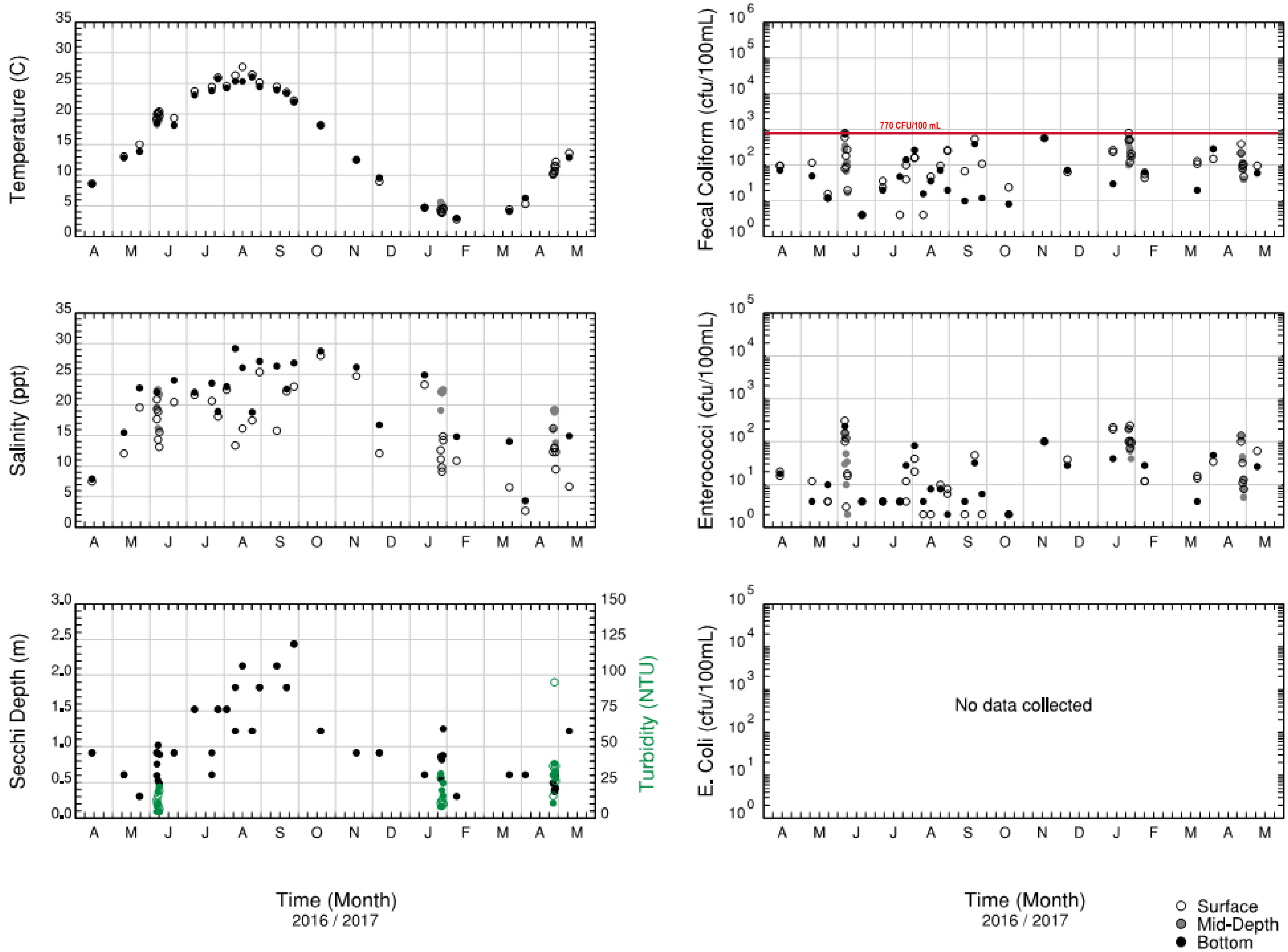
After Model Update

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**

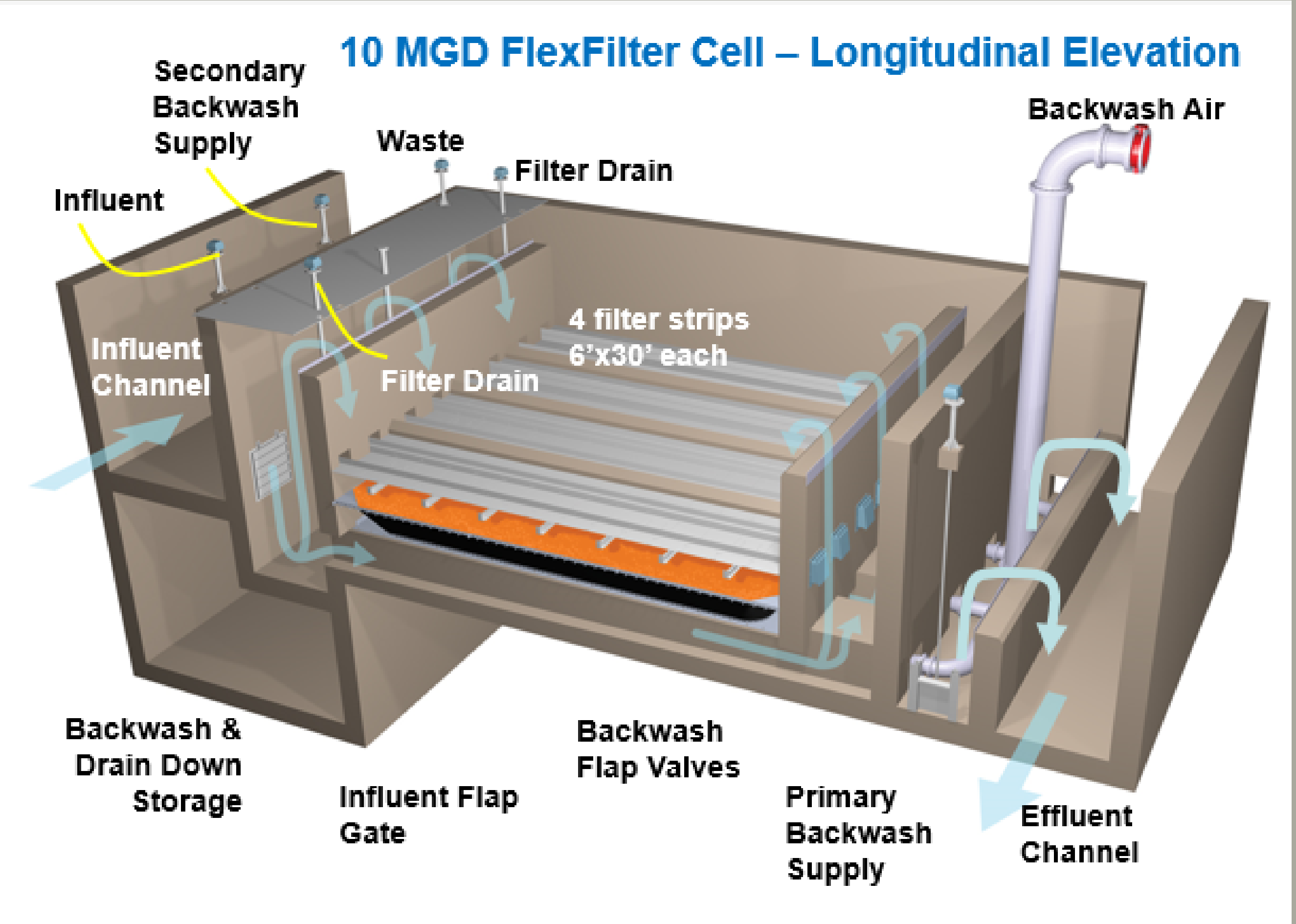
Storage Technologies

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

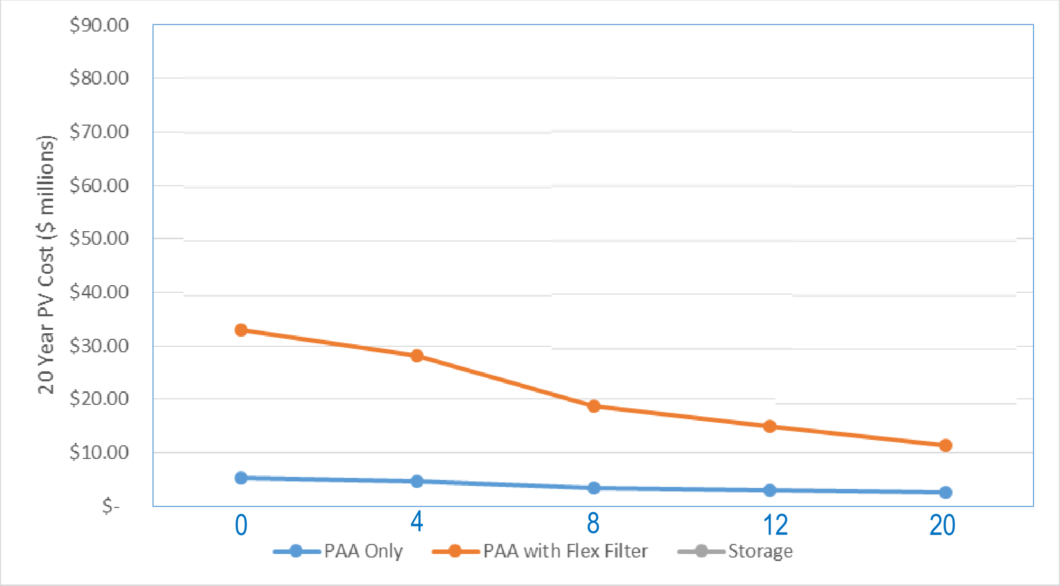
PAA Disinfection

- 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

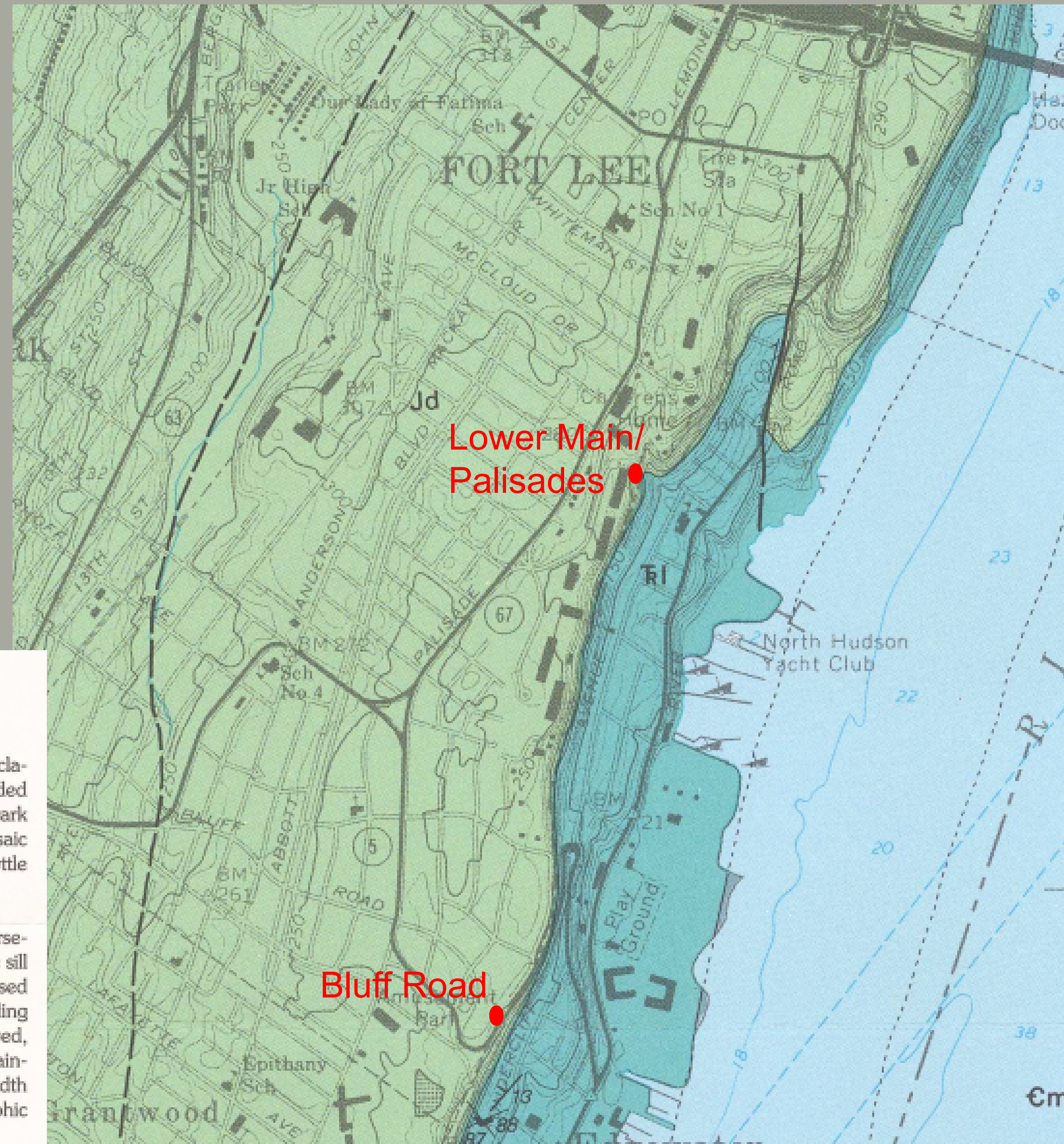
Rain Gardens

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		
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

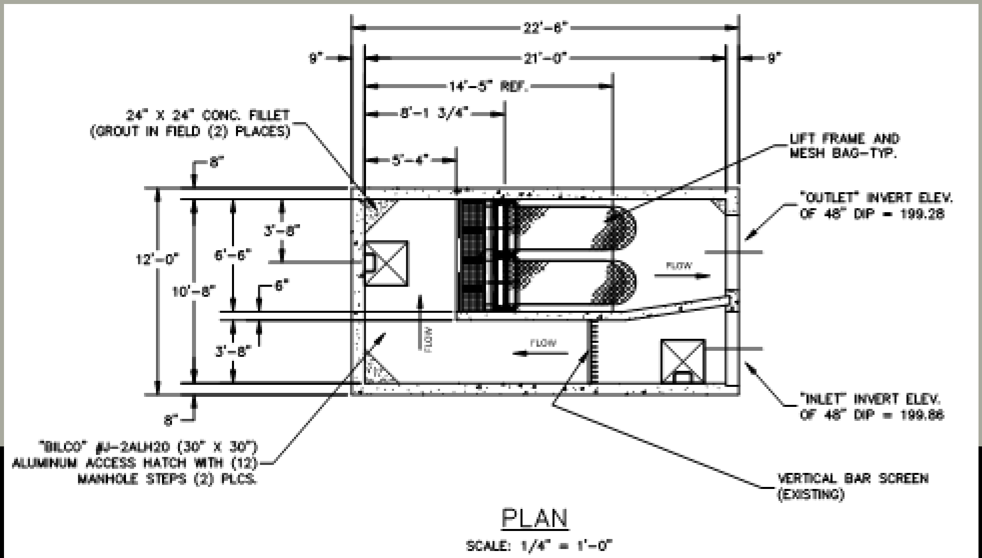
Good Day

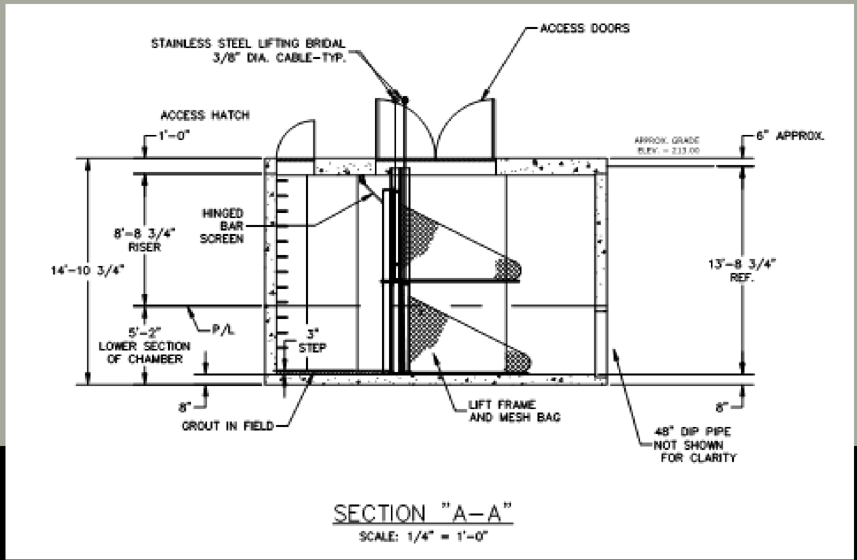
Bad Day
(twice in 2019)

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

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

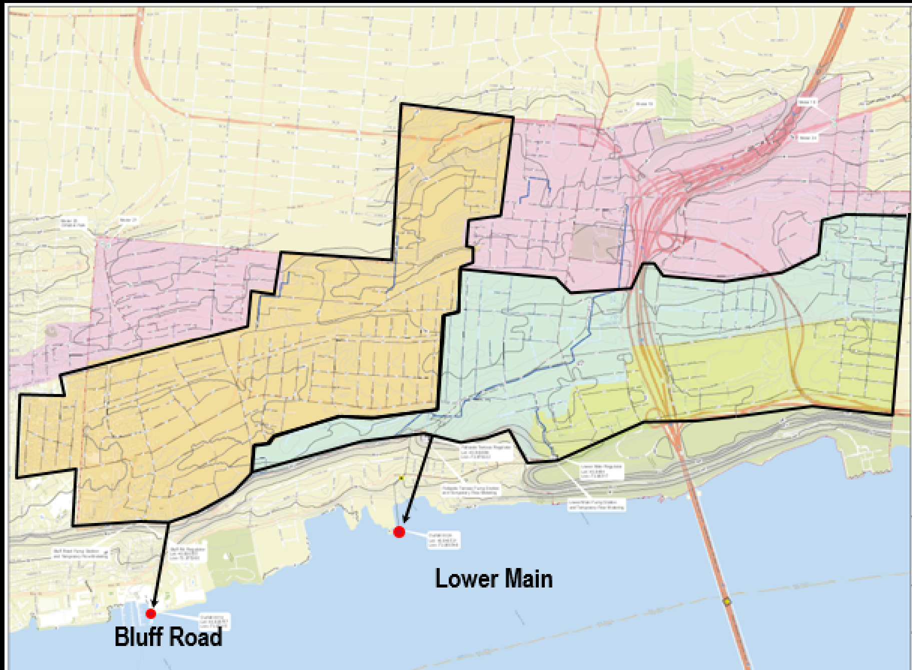
Sal Pagano – Member Supplemental CSO Team

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

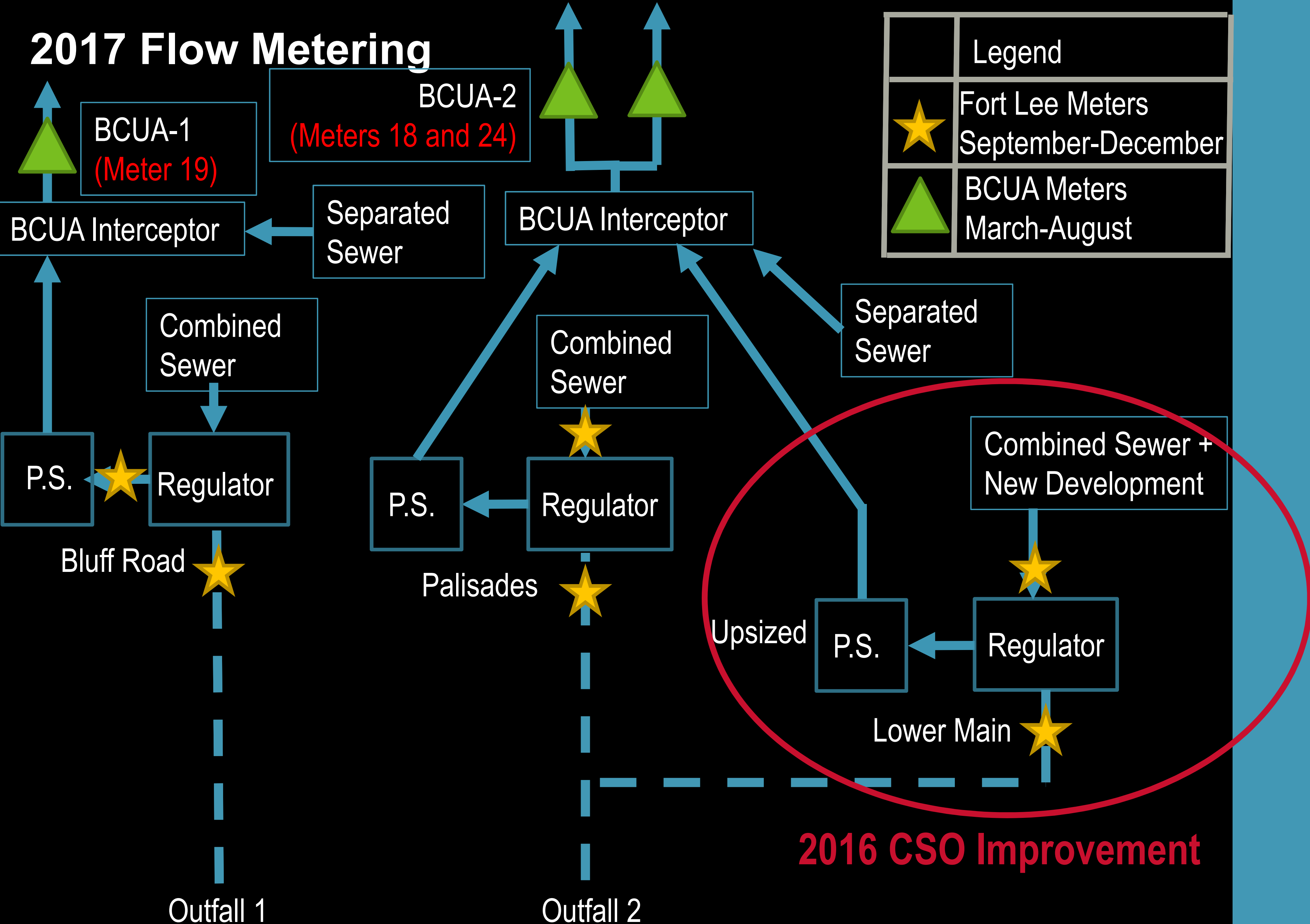
HDR

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.

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

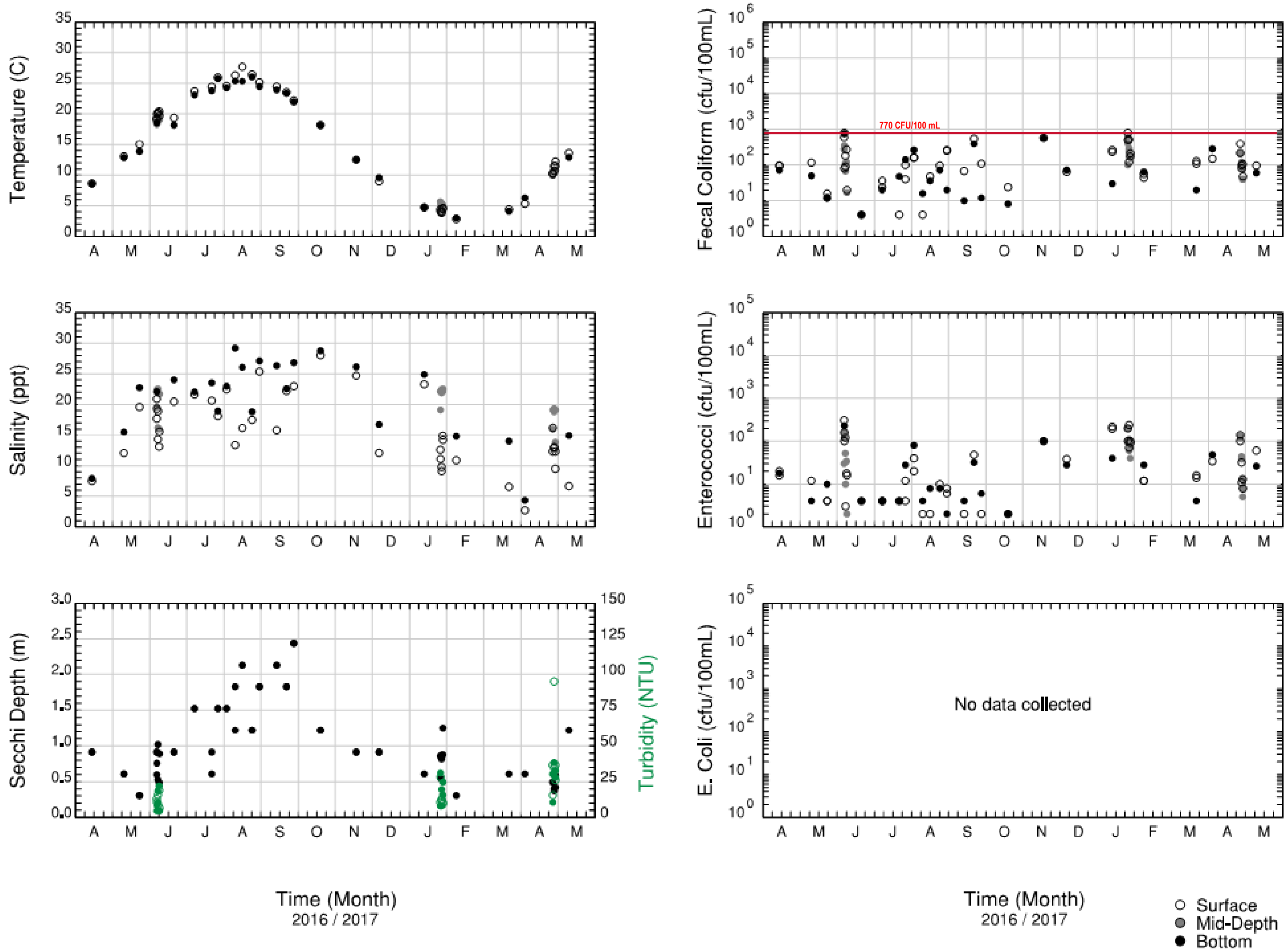
After Model Update

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

<u>Source Controls:</u>

<u>Green infrastructure</u>, *I&I Reduction*, Sewer separation, BMPs, **<u>Nine Minimum Controls</u>**

<u>Collection System Controls</u>

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

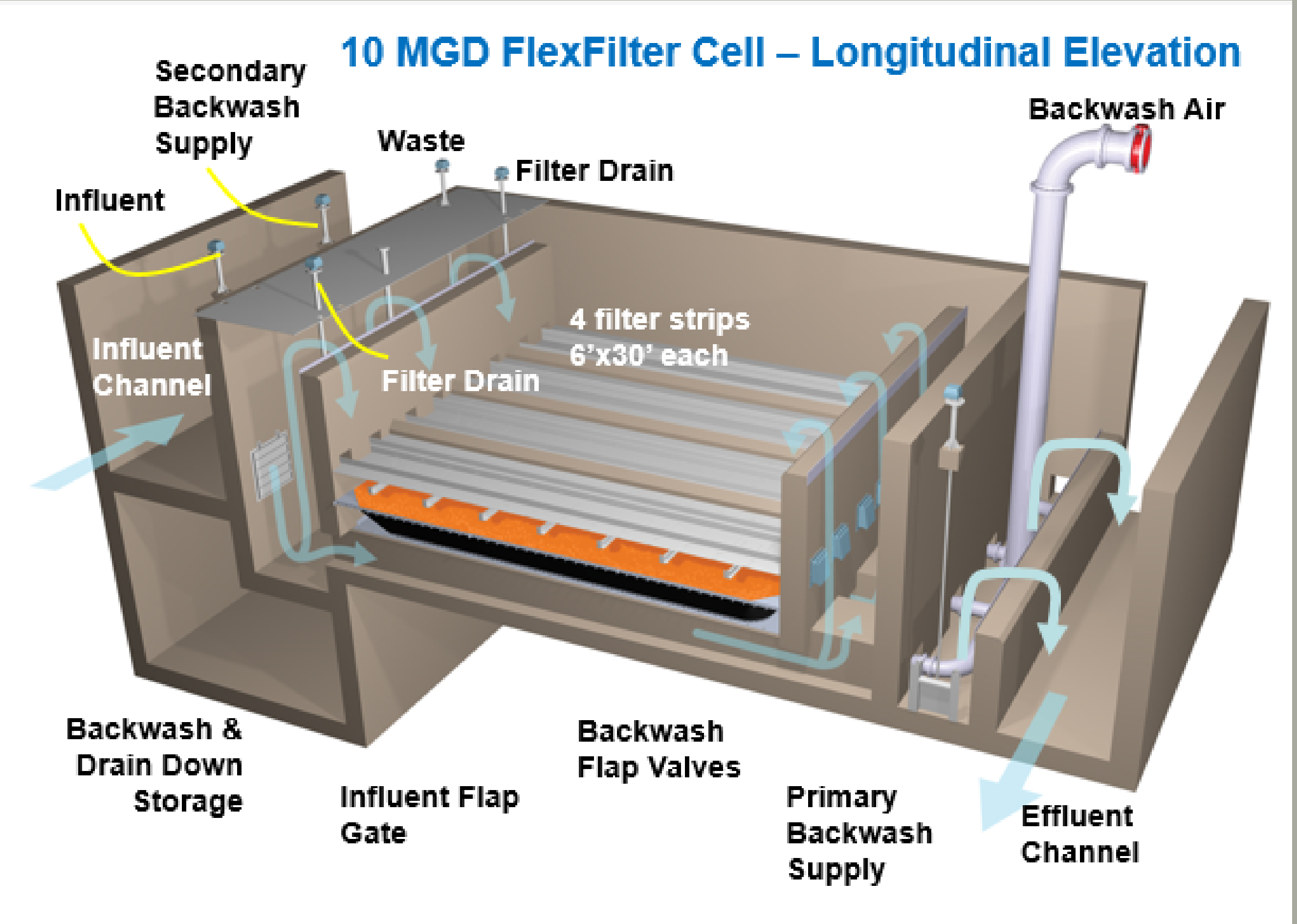
<u>Storage Technologies</u>

Above and below ground storage tanks, storage tunnels

<u>Treatment Technologies</u>

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

Flex Filter


10 MGD FlexFilter Cell – Longitudinal Elevation
Secondary Backwash Supply
Waste
Filter Drain
Influent
Backwash Air
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

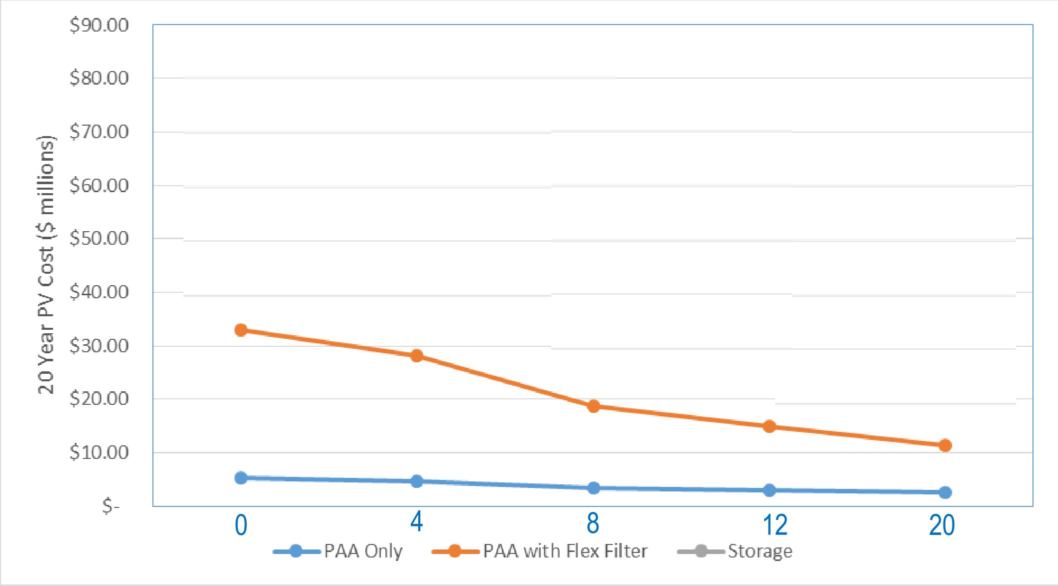
PAA Disinfection

- 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

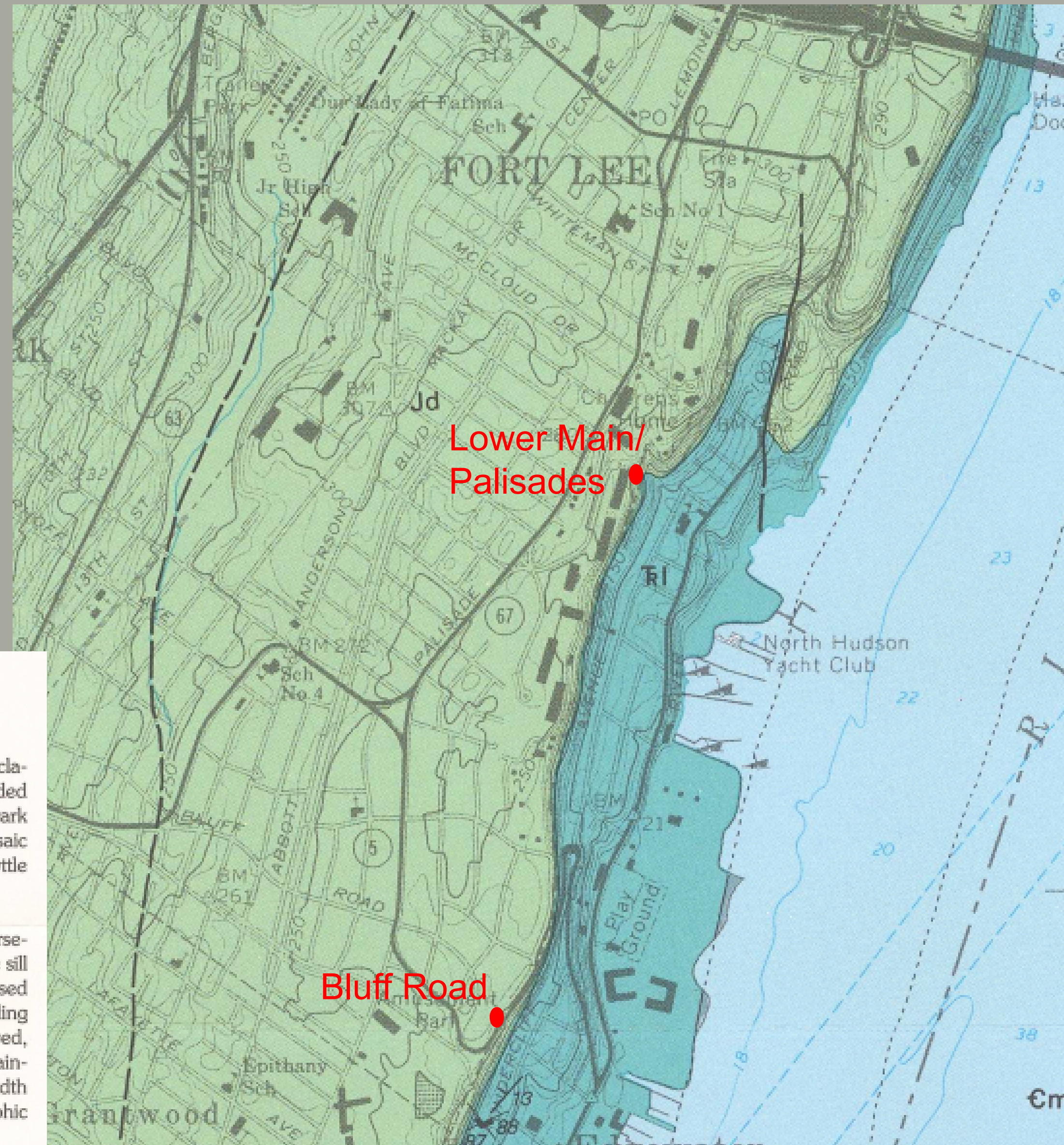
Rain Gardens

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

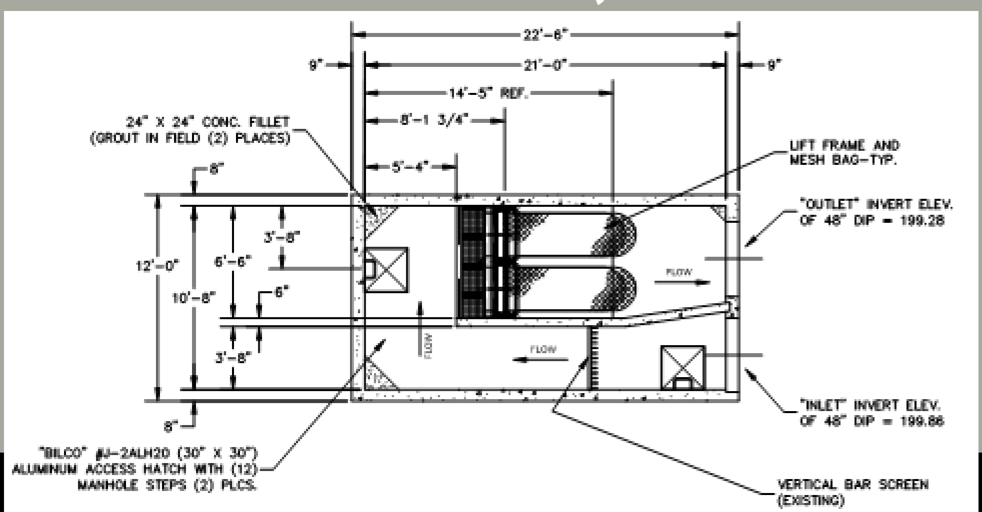
Good Day

Bad Day
(twice in 2019)

Traffic Hazard on Route 5

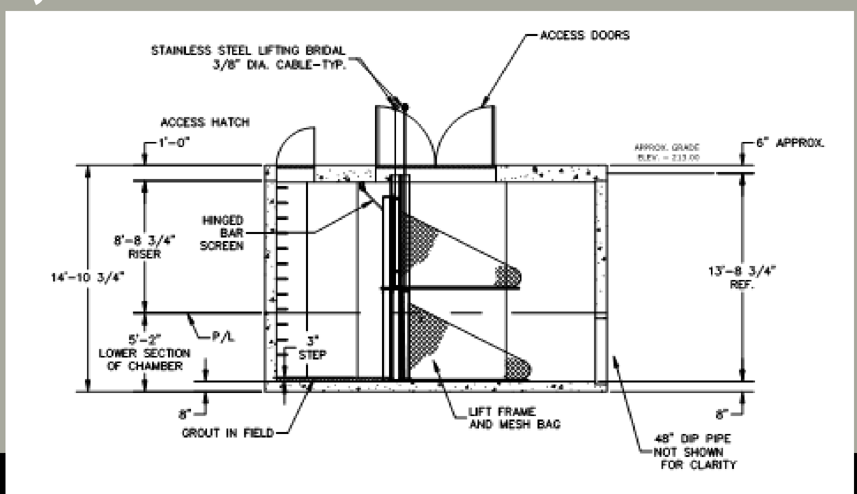
Planned Improvements for Bluff Road Netting Facility

- 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



PLAN

SCALE: 1/4" = 1'-0"



SECTION "A-A"

SCALE: 1/4" = 1'-0"

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**

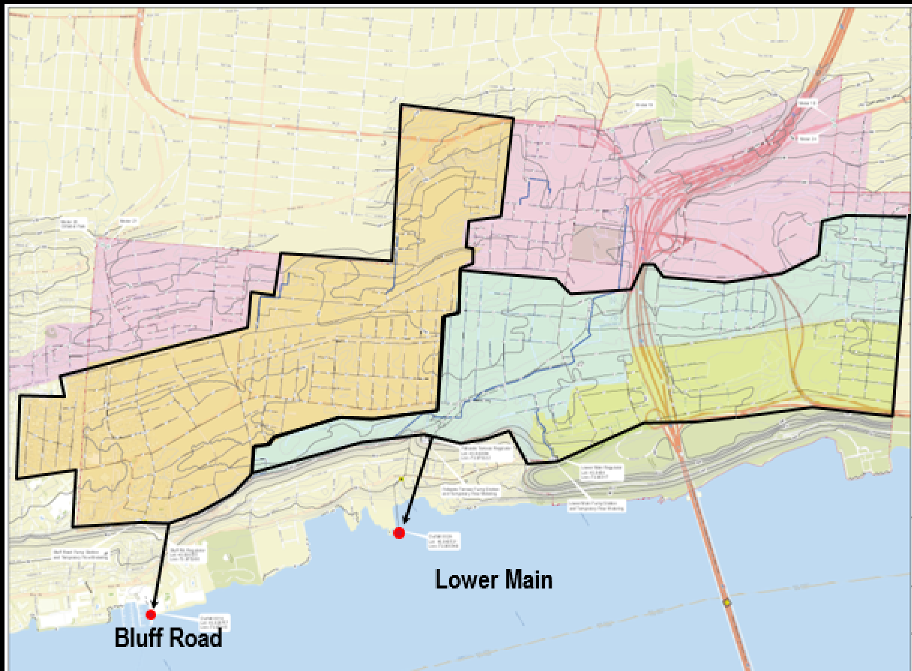
IV. **ORDINANCE PUBLIC HEARINGS SCHEDULED AUGUST 13, 2020**
None

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**

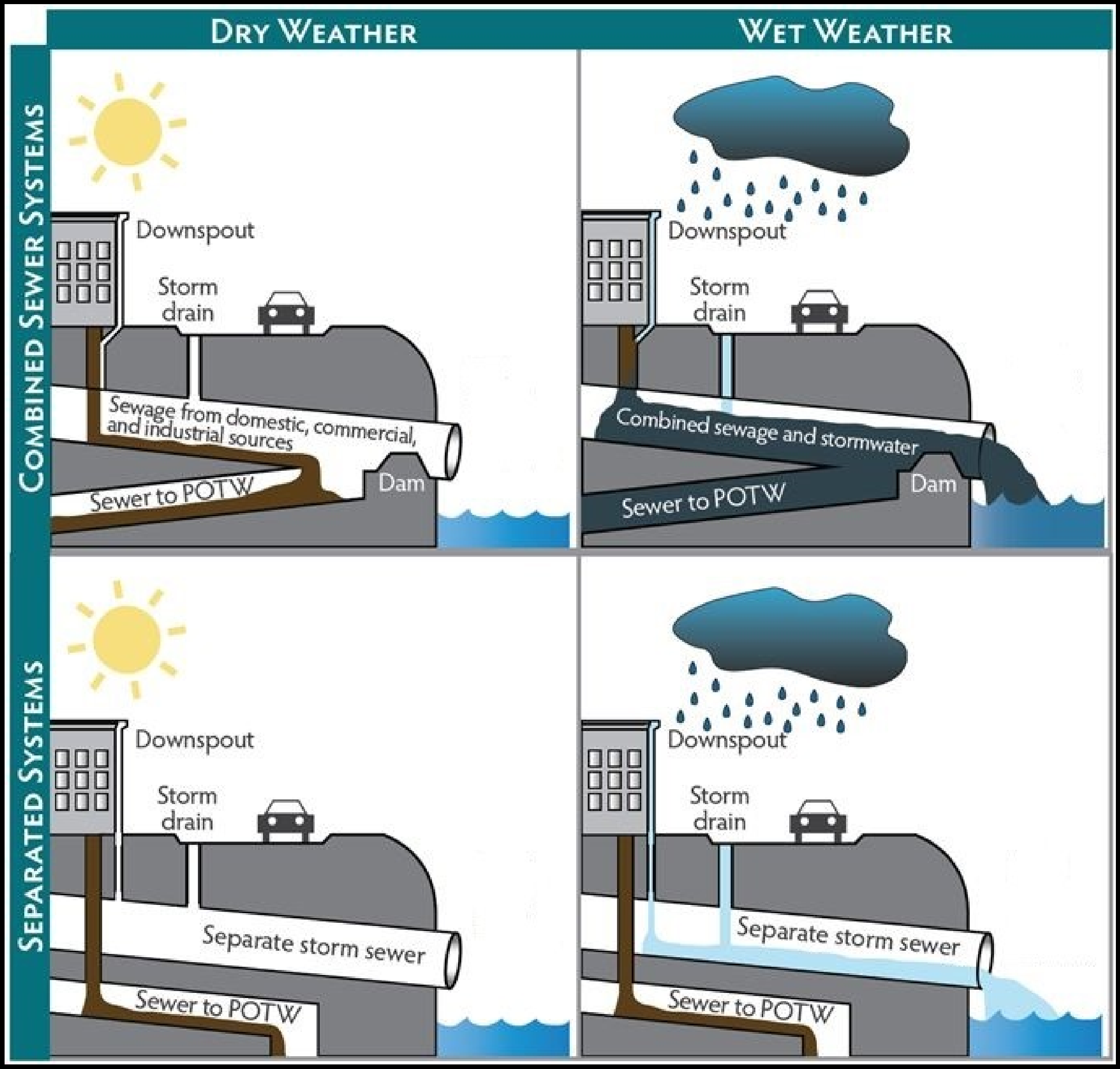


Borough of Fort Lee CSO Team Meeting Long Term Control Plan

August 13, 2020

HDR

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

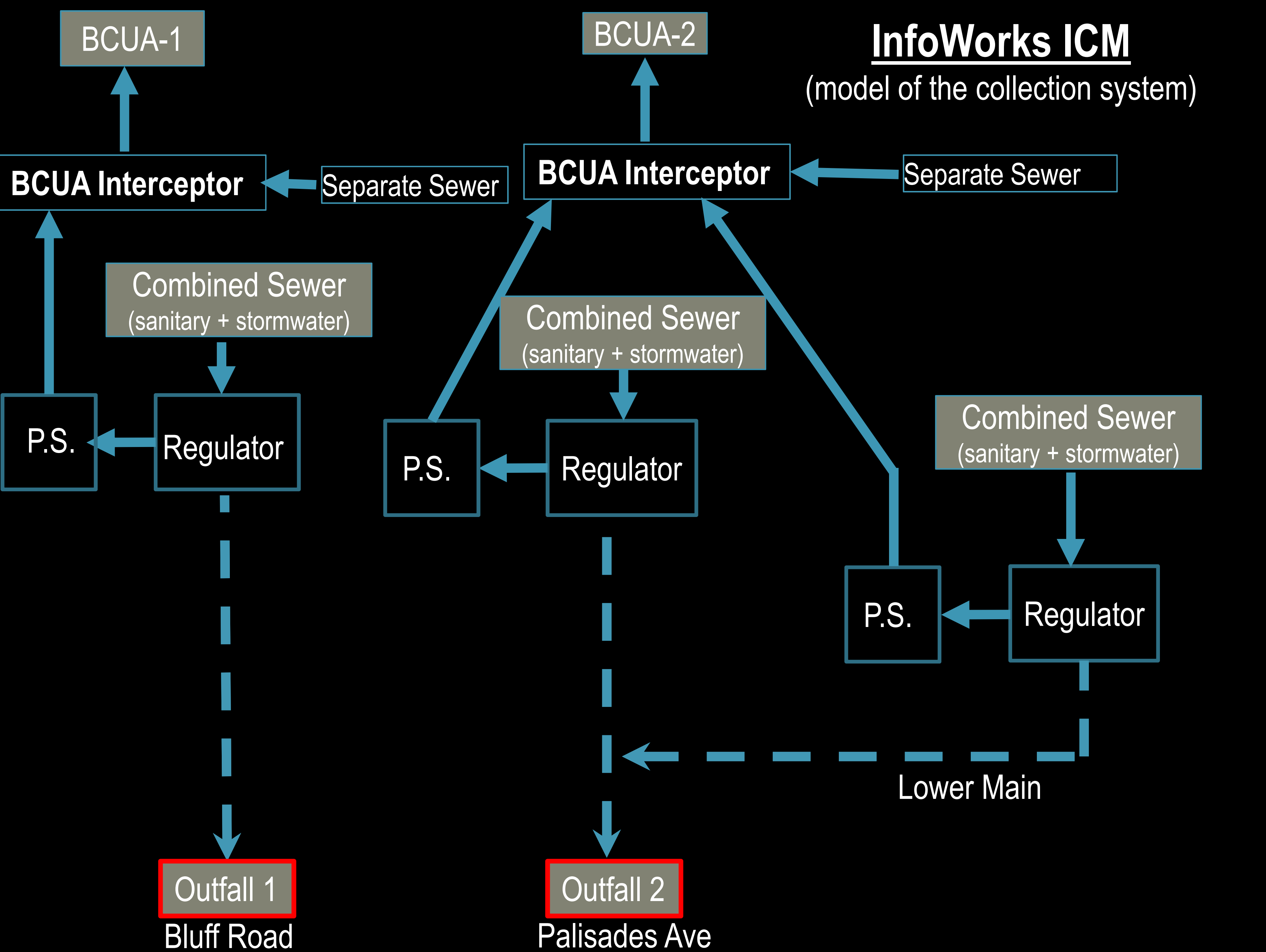
(Terms, conditions and provisions attached hereto)

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.

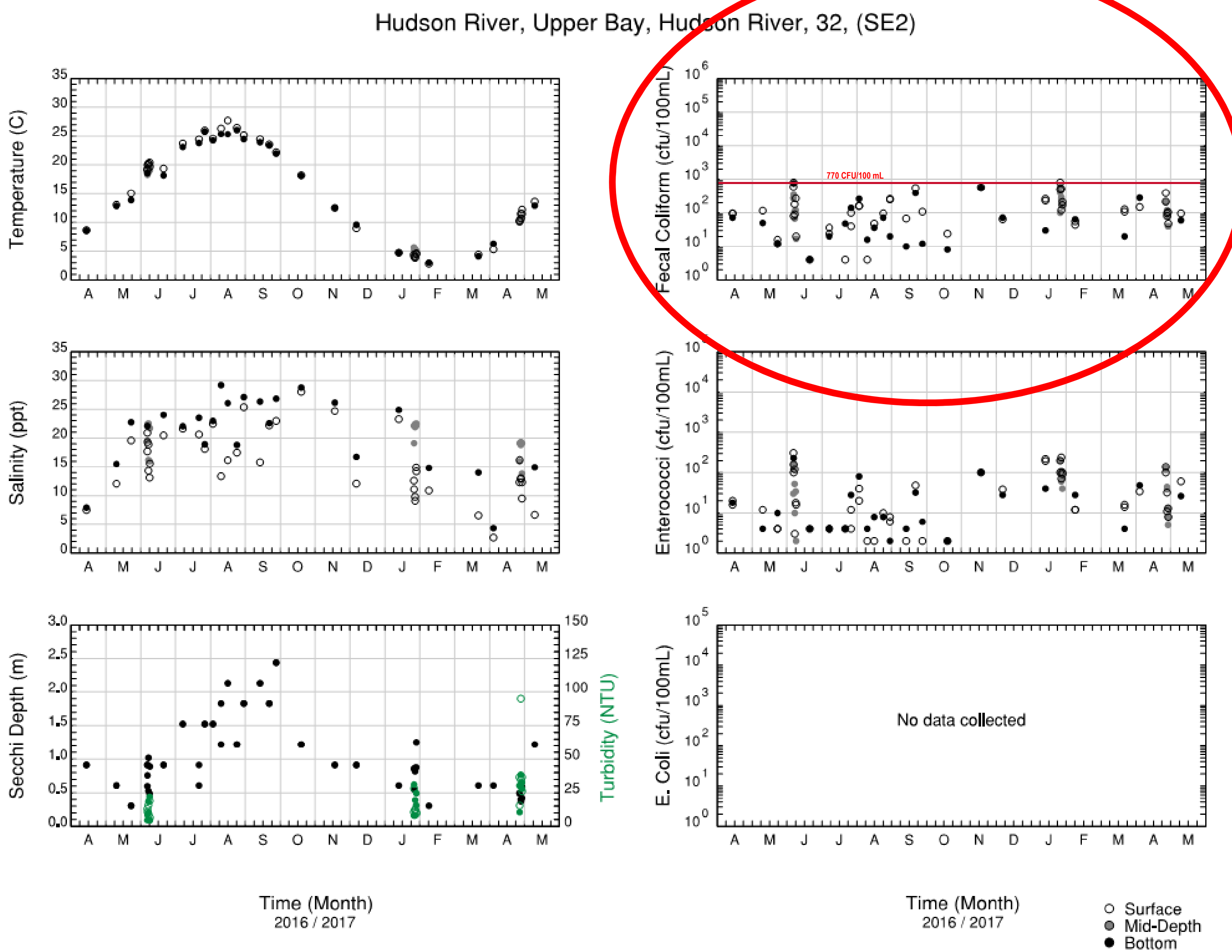

InfoWorks ICM
(model of the collection system)
BCUA-1
BCUA-2
BCUA Interceptor
Separate Sewer
BCUA Interceptor
Separate Sewer
Combined Sewer
(sanitary + stormwater)
Combined Sewer
(sanitary + stormwater)
Combined Sewer
(sanitary + stormwater)
P.S.
Regulator
P.S.
Regulator
P.S.
Regulator
Lower Main
Outfall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

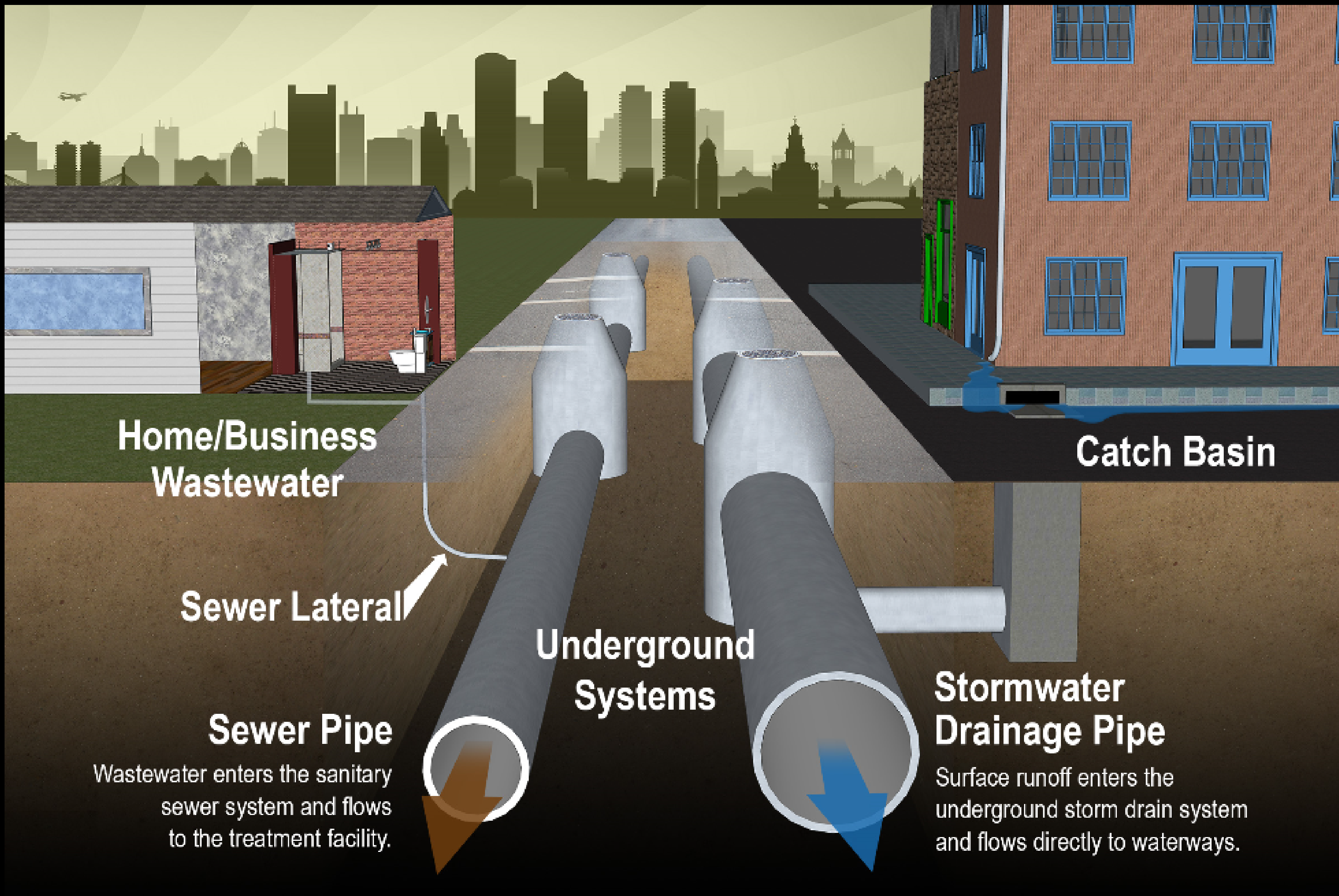
Storage Technologies

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

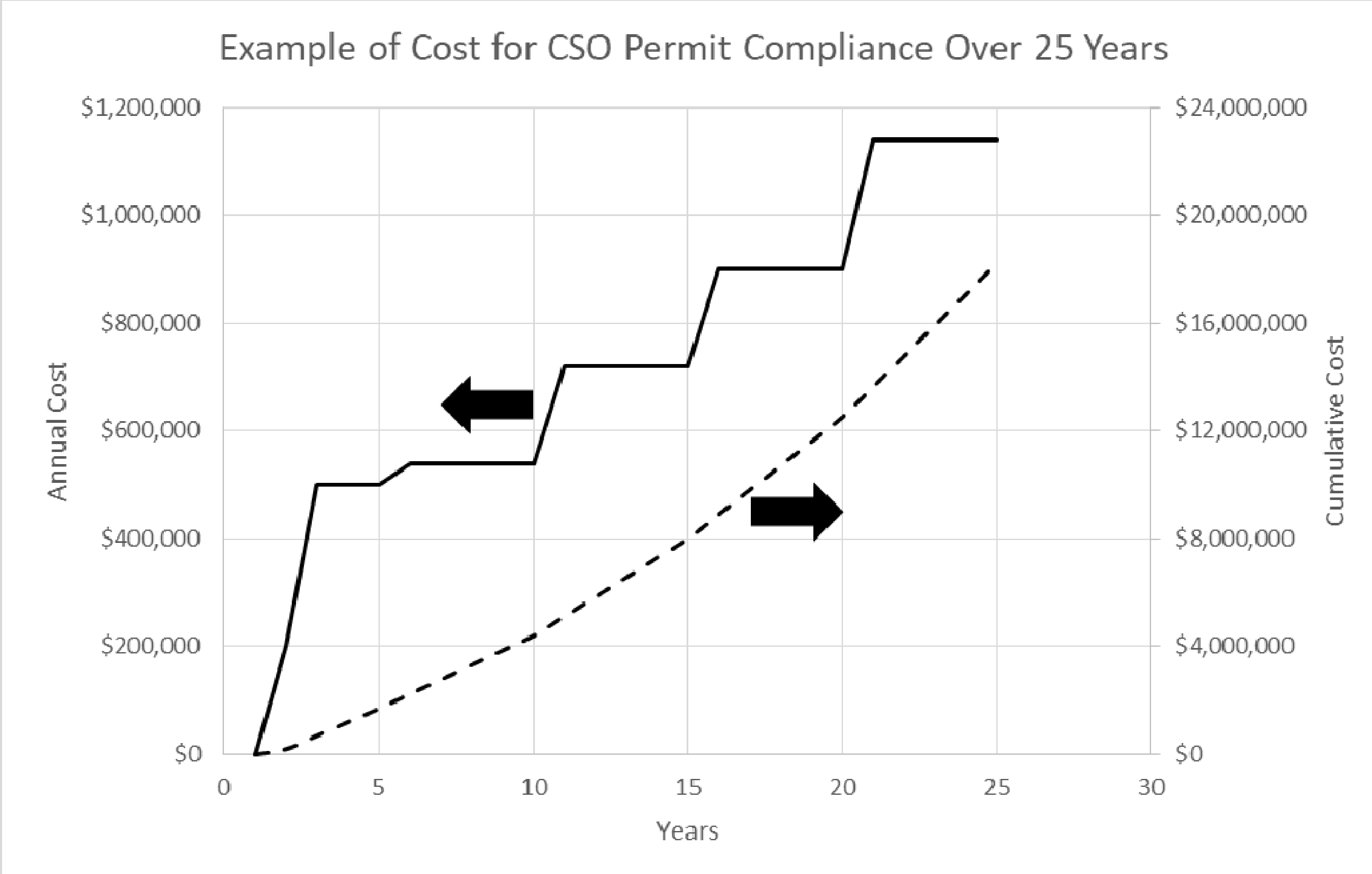
Costs will be incurred over 20 to 30 years in 4 or 5 phases. New flow meters will be installed and monitored to check the program at 85% CSO Control.
Gray infrastructure costs are based on a cost of $300,000 per acre.

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

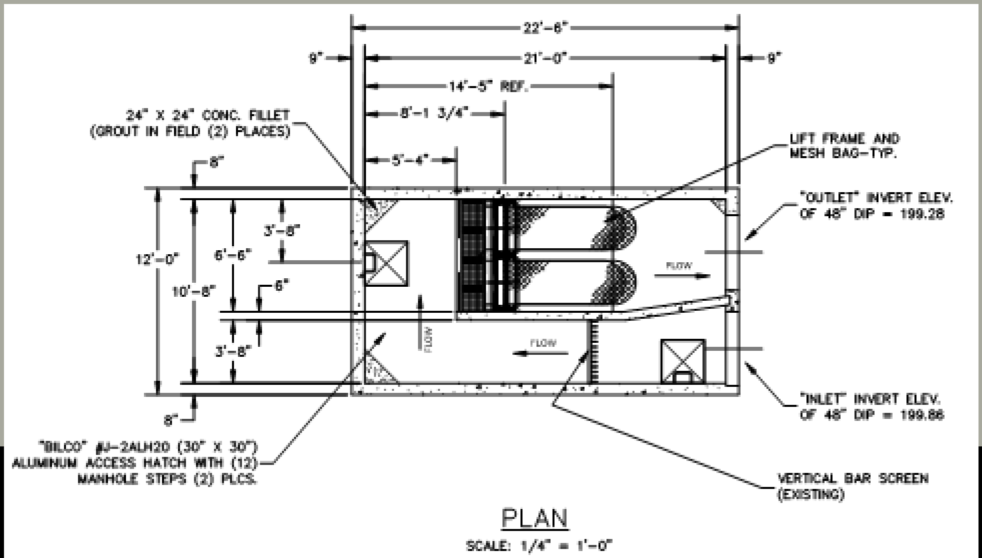
Bad Day
(None in 2020 and twice in 2019)

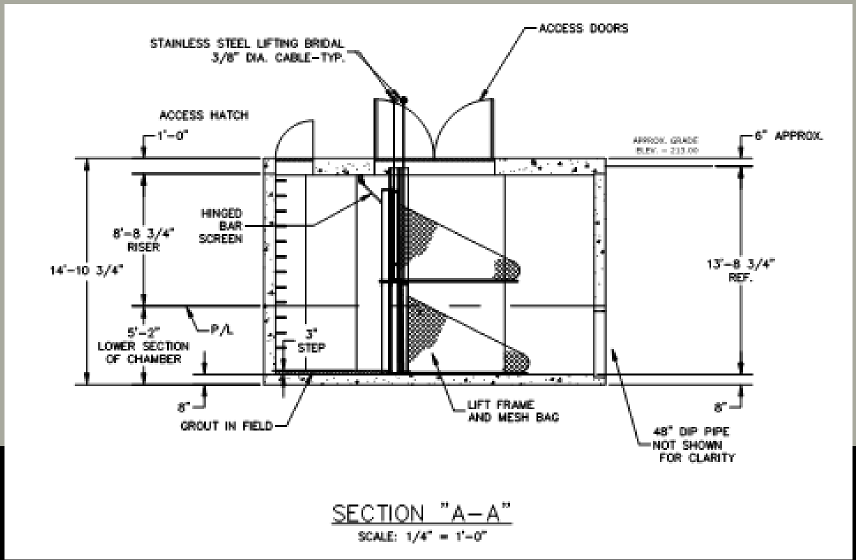
Bluff Road Netting Chamber

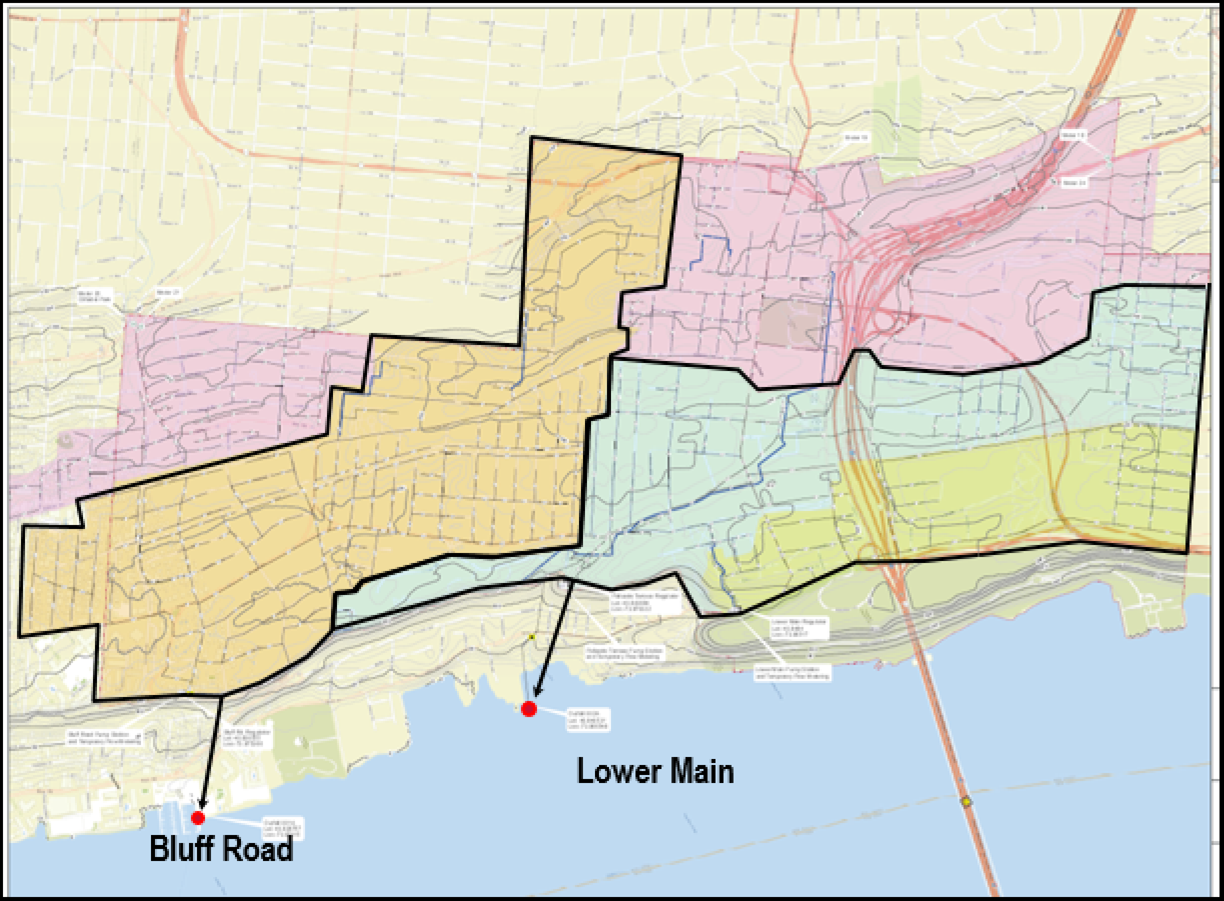
- Expand the facility capacity
- Perform regular maintenance (confined space entry is required)

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

CITY OF HACKENSACK

CSO Permit – Public Participation Group Meeting

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

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) • One other interested member of Hackensack public
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

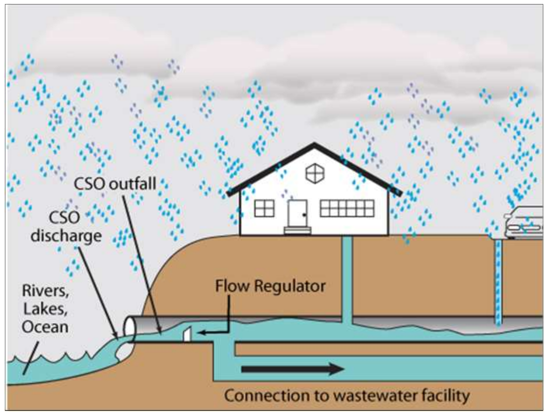
- Overview of Hackensack's Combined Sewer System
- Overview of the NJDEP permit requirements
  - Development and Evaluation of Alternatives - upcoming deliverable
- Coordination and Public Participation goals
- Summary

2

2

Overview of Hackensack Combined Sewer System

❑ What is a Combined Sewer Overflow (CSO)?



3

3

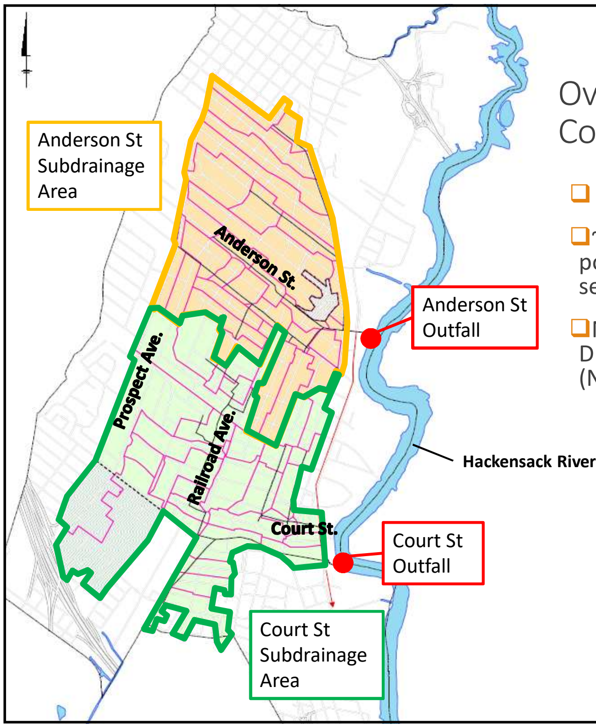
Overview of Hackensack Combined Sewer System

❑ 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

4

4



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

5

Overview of Hackensack Combined Sewer System

- Screening facilities

Bar screens

Court Street Screening Facility

6

6

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

7

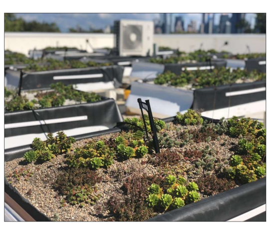
7

Development and Evaluation of Alternatives

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

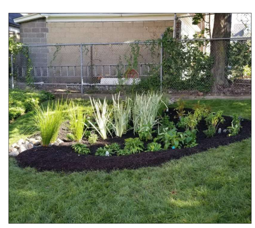
- Positives – lower capital cost, can assist in reducing flooding, streetscape
- Negatives – higher maintenance cost, site specific, low impact on CSOs

Green Roof



Bioswale

Rain Garden



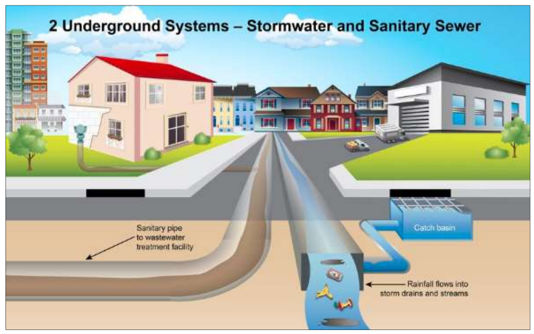
8

8

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



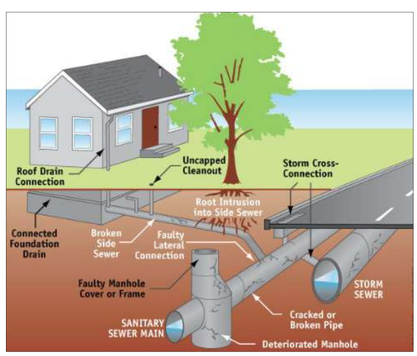
9

9

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



10

10

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

11

11

Development and Evaluation of Alternatives

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

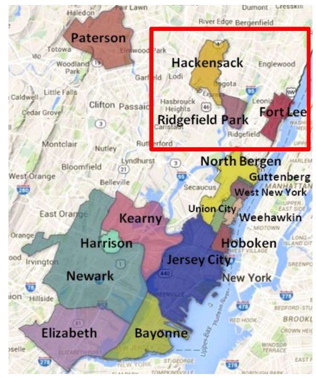
- In-line storage – there is no additional capacity to store combined sewer flow in the current sewer system
- Off-line storage – storage tanks near the outfalls
  - Positives – eliminates or reduces overflow discharges, reduces sewer backups, improves the efficiency of existing treatment capacity
  - Negatives – lack of real estate, high cost

12

12

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

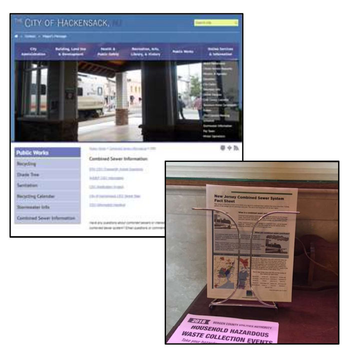


13

13

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



14

14

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

15

15

Questions?

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

16

16

City of Hackensack

COMBINED SEWER SYSTEM
LONG TERM CONTROL PLAN

DEVELOPMENT AND EVALUATION
OF ALTERNATIVES SUMMARY RESULTS

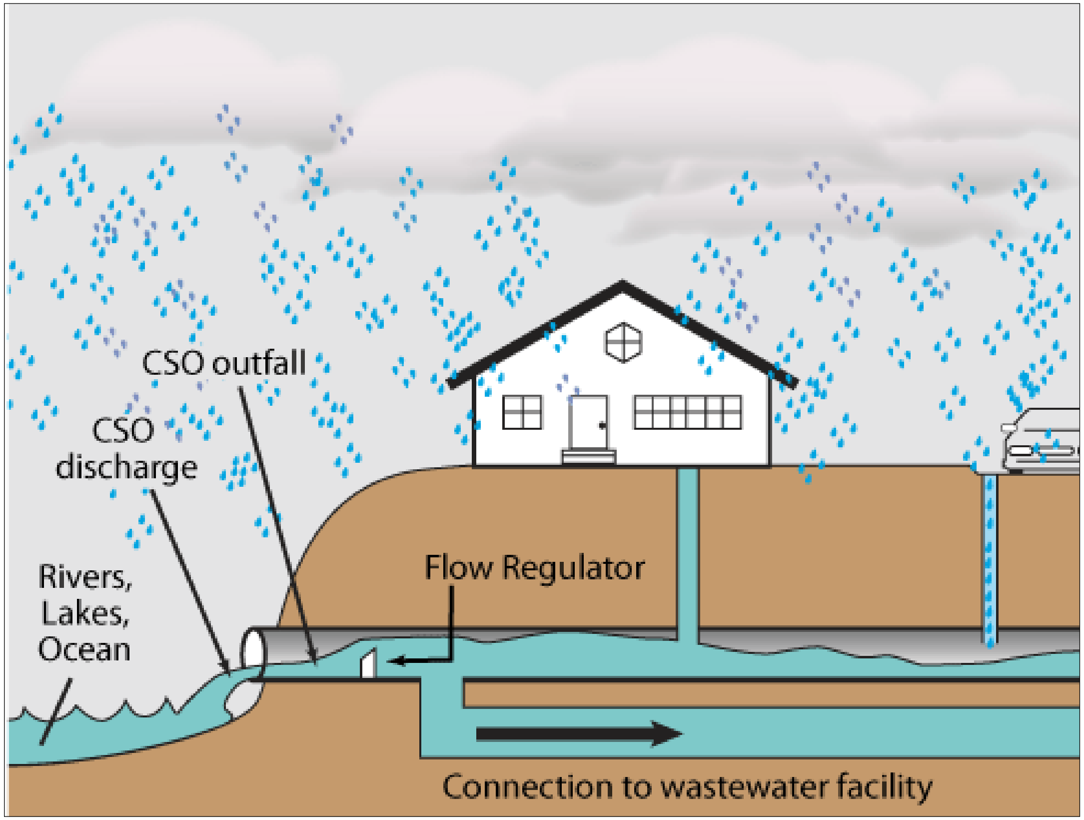
JUNE 11, 2019

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

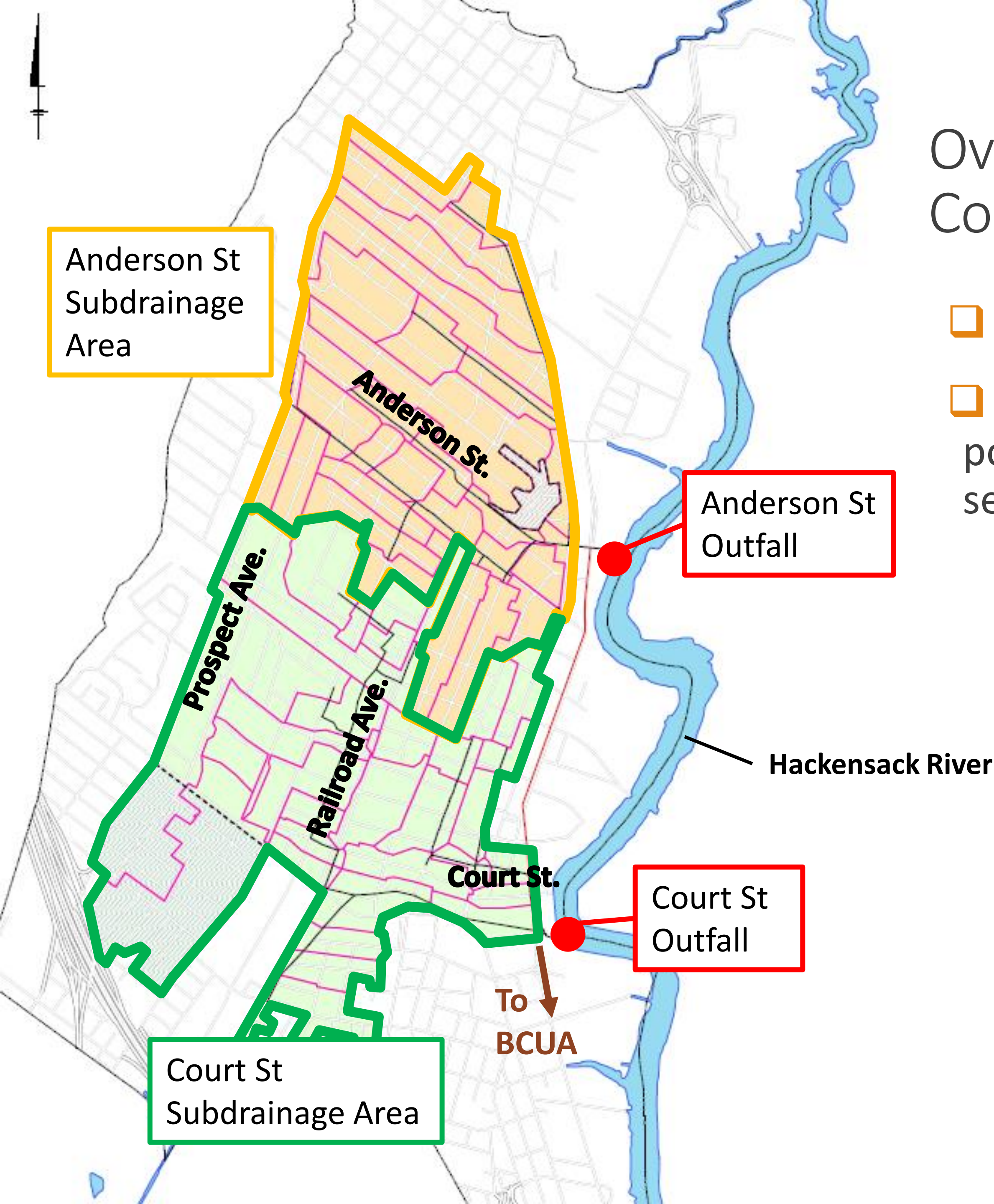
Overview of Hackensack Combined Sewer System

- 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

Bar screens

Court Street Screening Facility

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

ARCADIS Design & Consultancy for natural and built assets

CSO Control Alternatives

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

ARCADIS Design & Consultancy for natural and built assets

Development and Evaluation of Alternatives

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

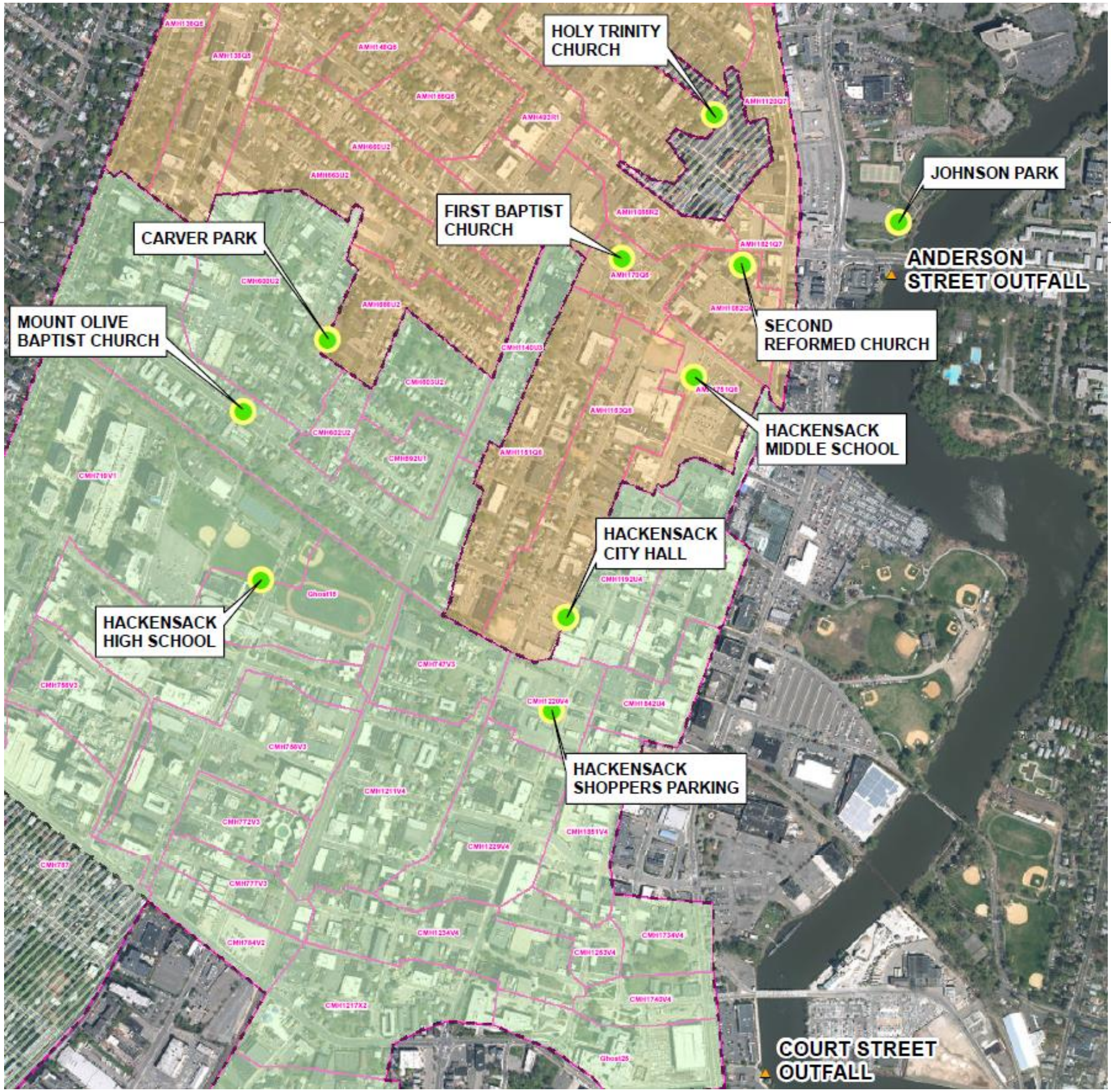
- Positives – lower capital cost, can assist in reducing flooding, streetscape
- Negatives – higher maintenance cost, site specific, low impact on CSOs

Bioswale

Rain Garden

ARCADIS Design & Consultancy for natural and built assets

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.

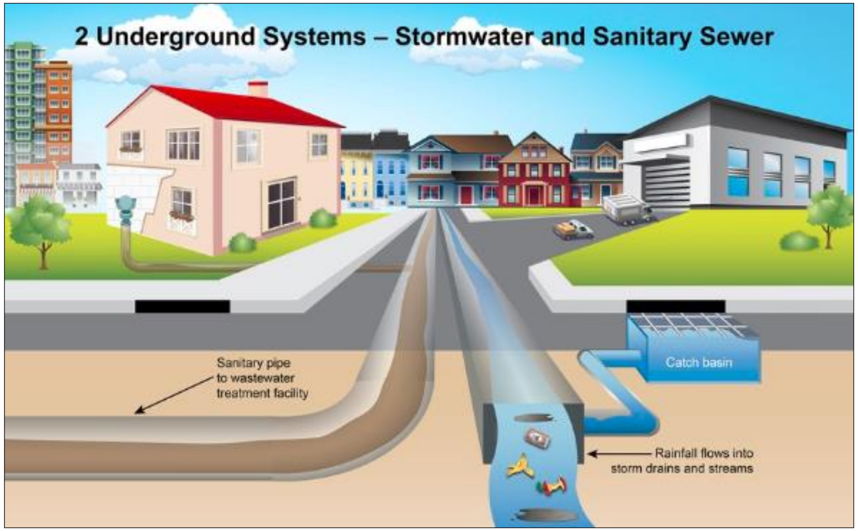
Development and Evaluation of Alternatives

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

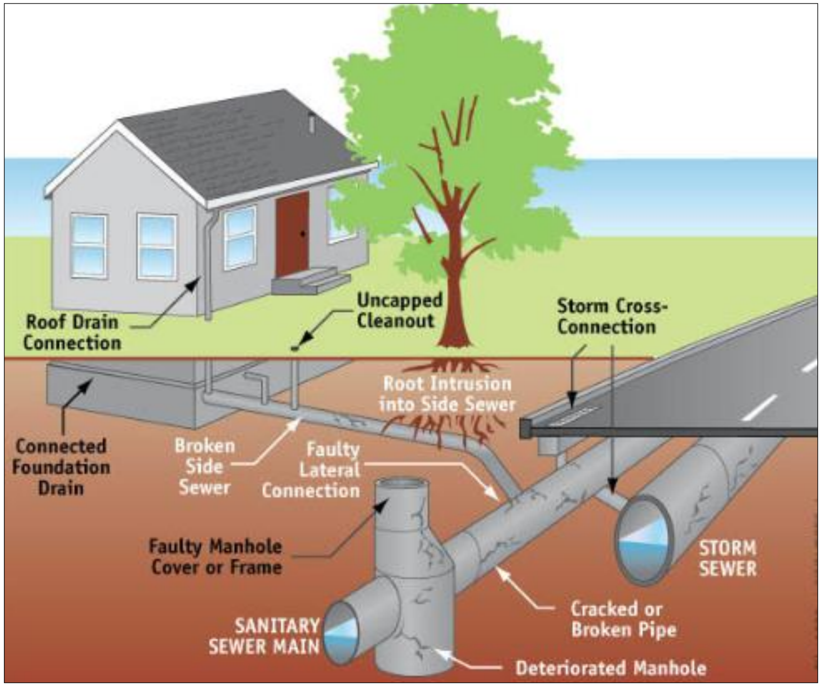
Alternative prescreening – still under consideration

- 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 condItions 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

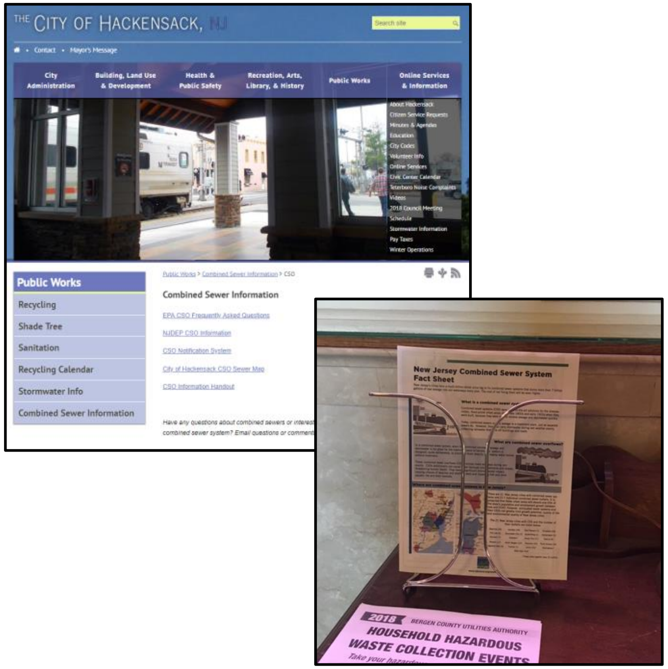
Development and Evaluation of Alternatives

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 condItions 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](http://www.we-technologies.com/wastewater-projects.php)

CITY OF HACKENSACK

Combined Sewer System LTCP

Selected Plan Update

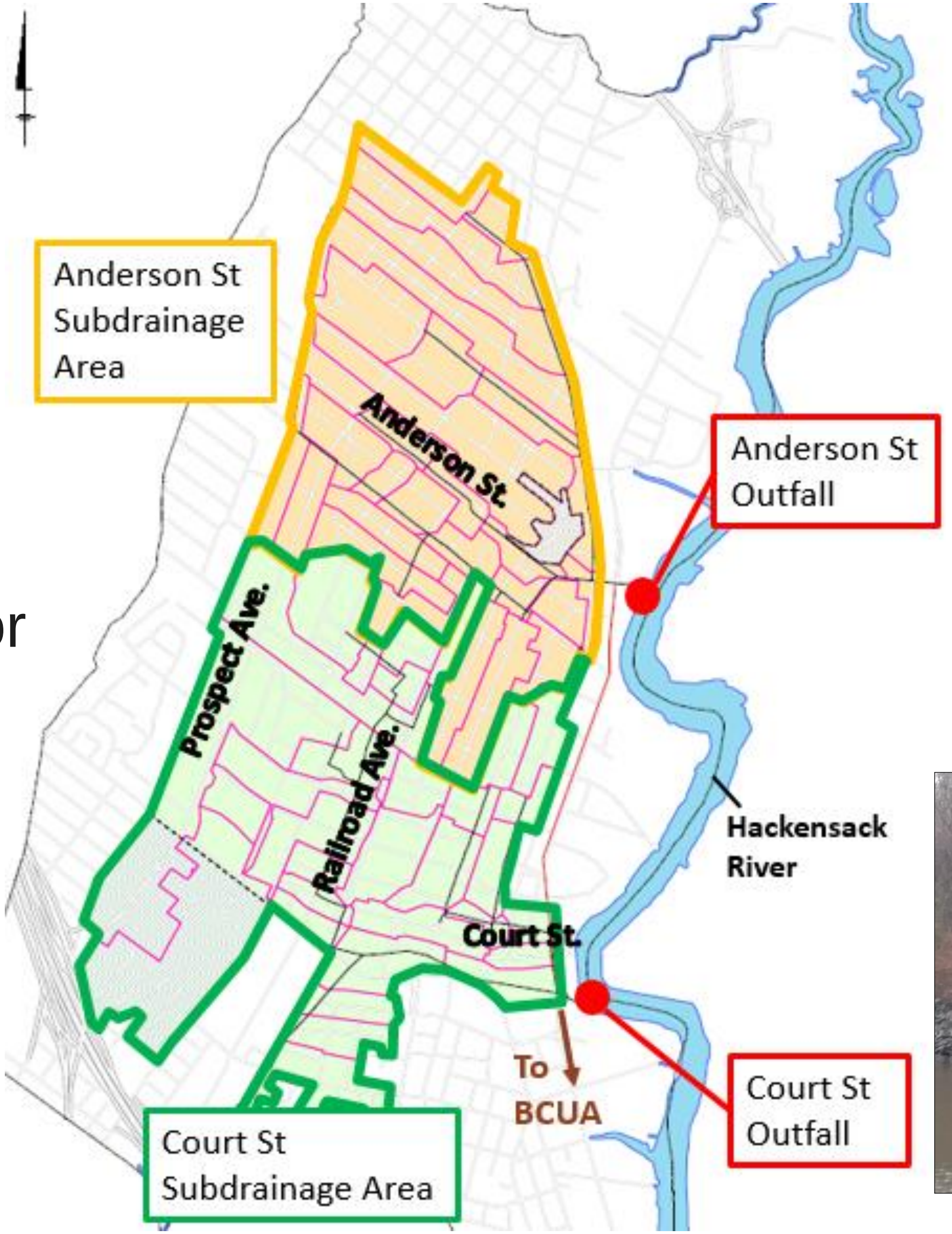
Supplemental CSO Team Meeting, July 21, 2020

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

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

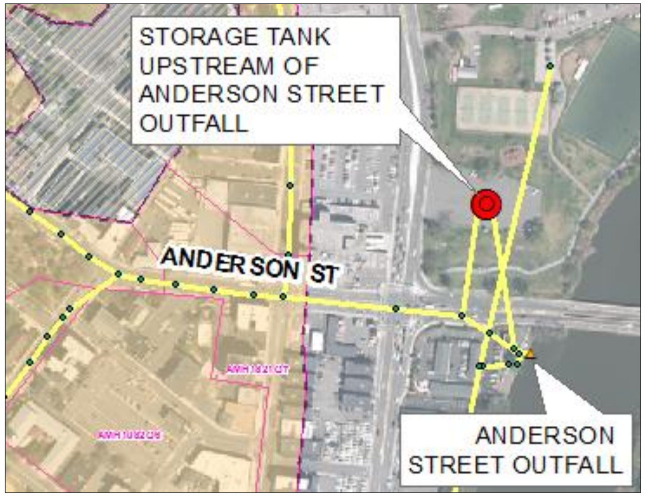
- Development and Evaluation of Alternatives Report (DEAR)
  - Submitted to NJDEP on June 30, 2019
  - Approved by NJDEP on February 12, 2020

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

DEAR Control Alternatives Review

- Storage Tank Alternative

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



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

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%

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

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

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%

SIAR Selected CSO Control Plan

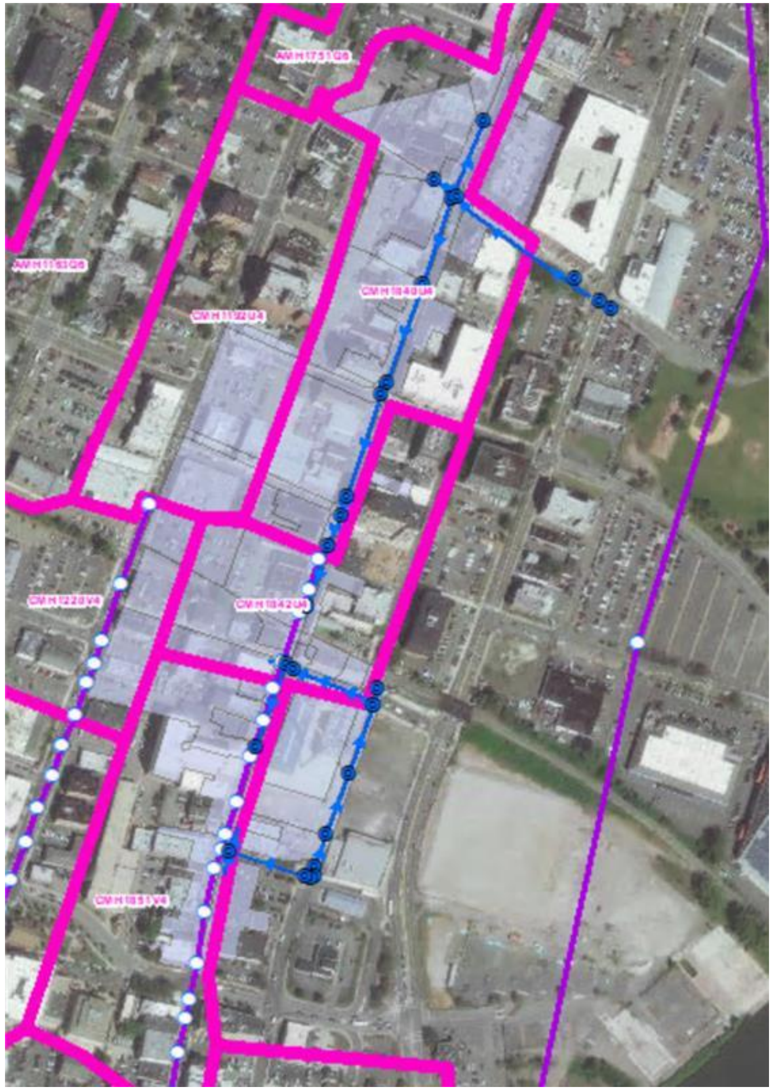
- **Localized Sewer Separation Projects:**
  - The City currently has two sewer separation projects in construction on Main Street
  - These projects will contribute to localized sewer separation projects noted in the City’s LTCP
  - Approximately 22 acres* of contributing runoff area reduced from the 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

Design and figures courtesy of Suburban Consulting Engineers, Inc.

SIAR Selected CSO Control Plan

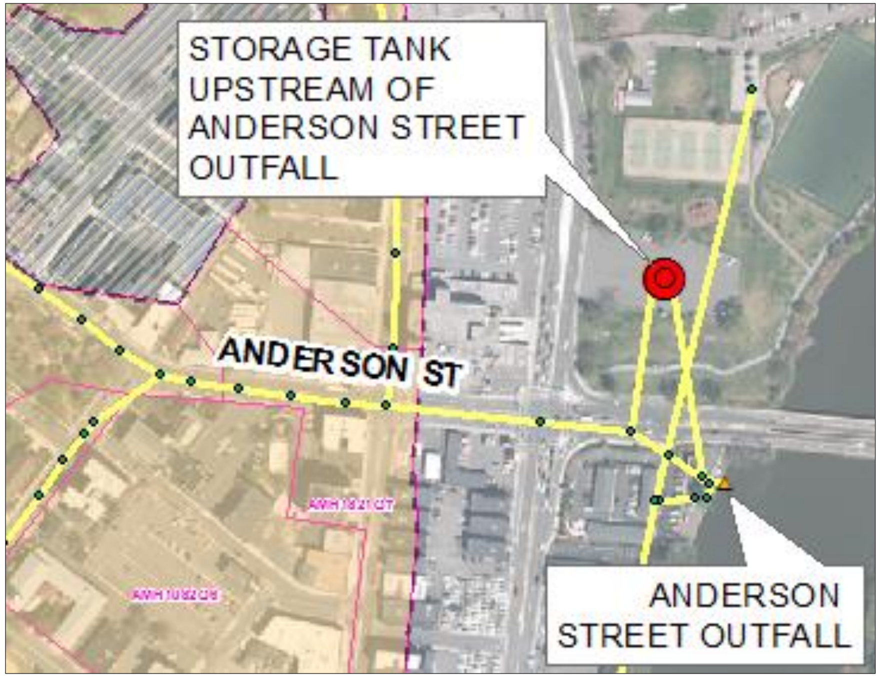
- **Localized Sewer Separation Projects:**



Design courtesy of Suburban Consulting Engineers, Inc.

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



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

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.

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

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

City of Hackensack CSO Survey

Questions Responses 32

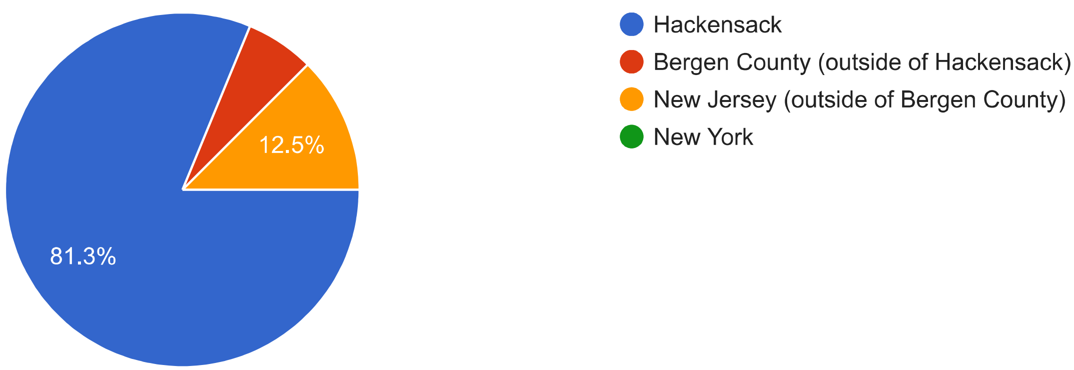
32 responses

Accepting responses

Summary Question Individual

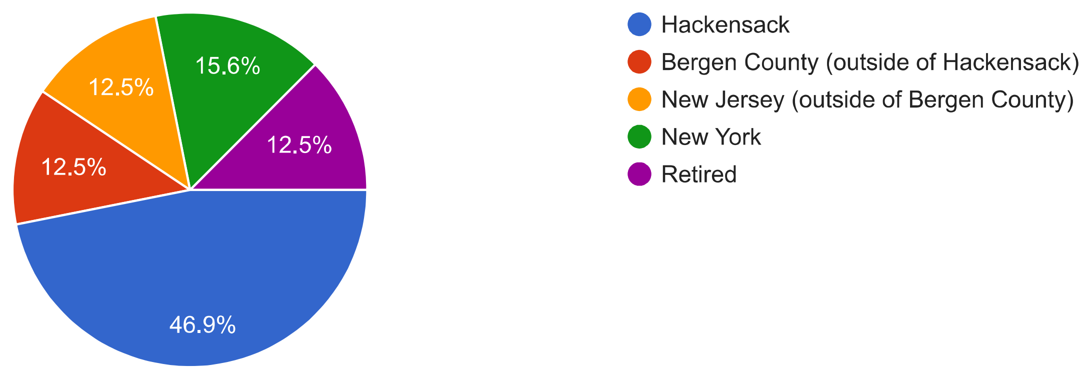
Where do you live?

32 responses



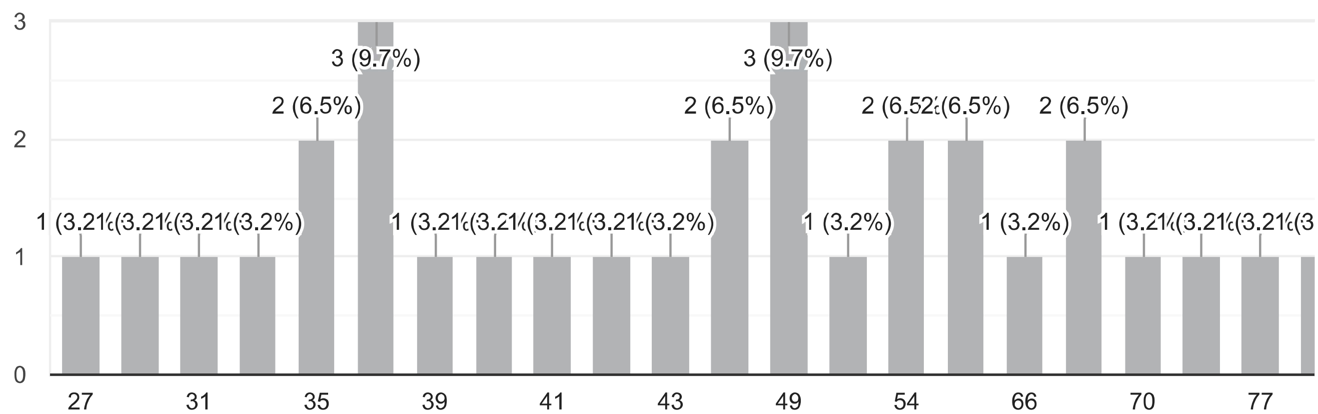
Where do you work?

32 responses



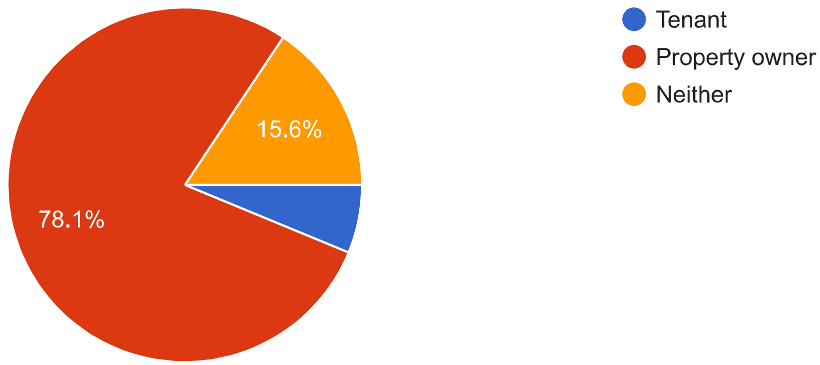
How old are you?

31 responses



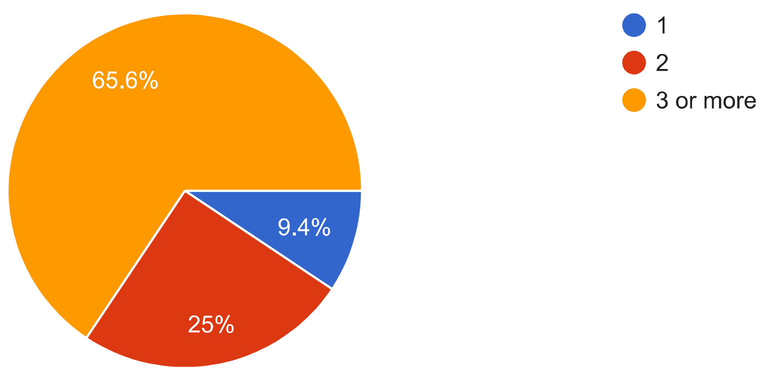
Are you a tenant or a property owner in Hackensack?

32 responses



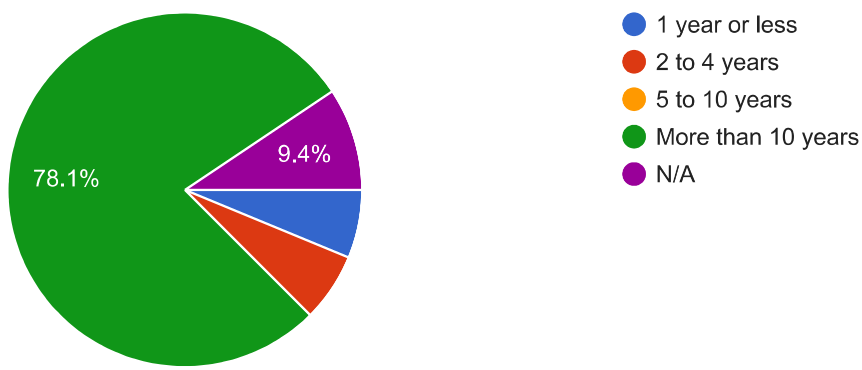
How many people live in your household (including yourself)?

32 responses



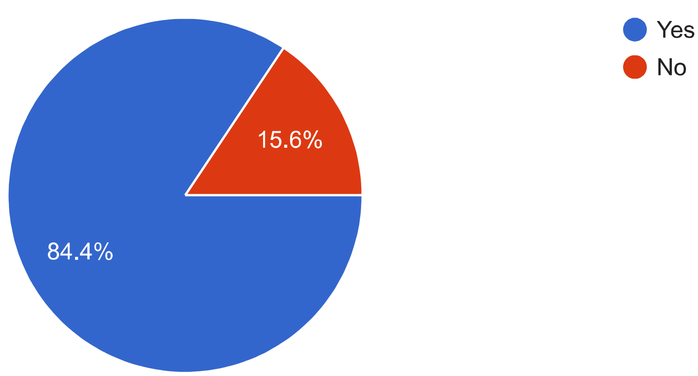
How long have you lived or worked in Hackensack?

32 responses



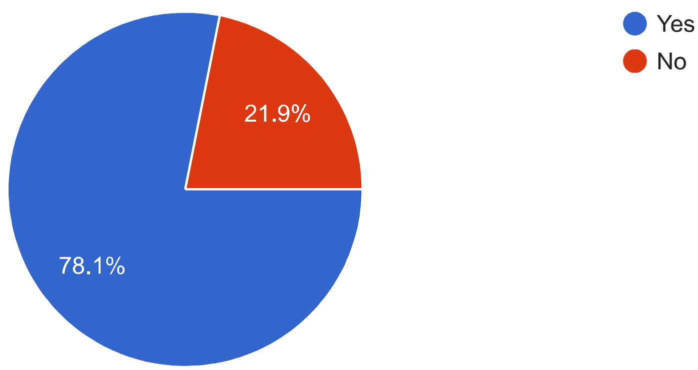
Do you know that a portion of Hackensack has a combined sewer system (stormwater and sanitary sewage enter into a single pipe system)?

32 responses

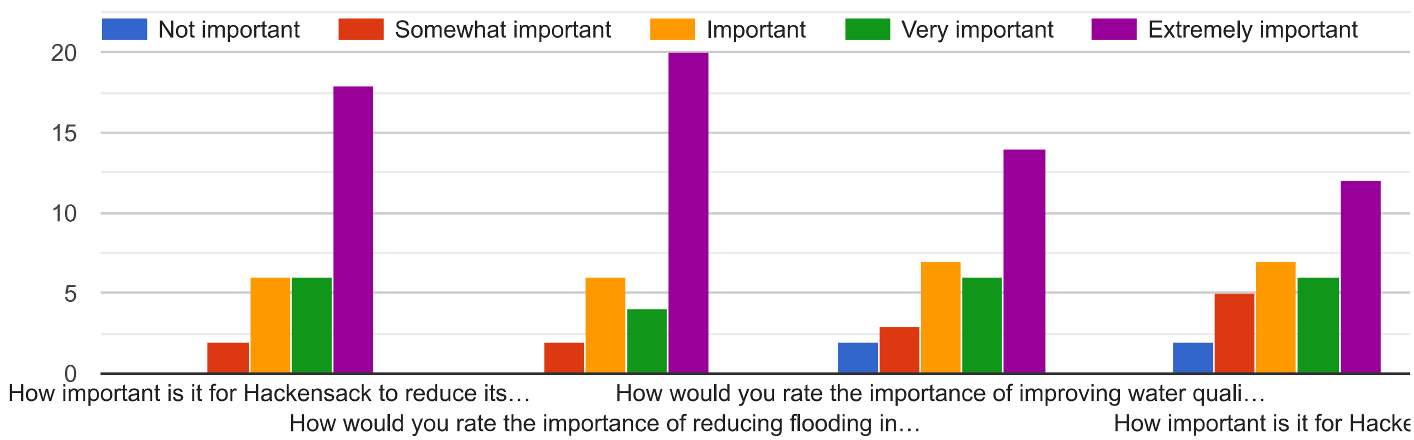


Do you know that the combined sewer system sometimes overflows to the Hackensack River during rain events?

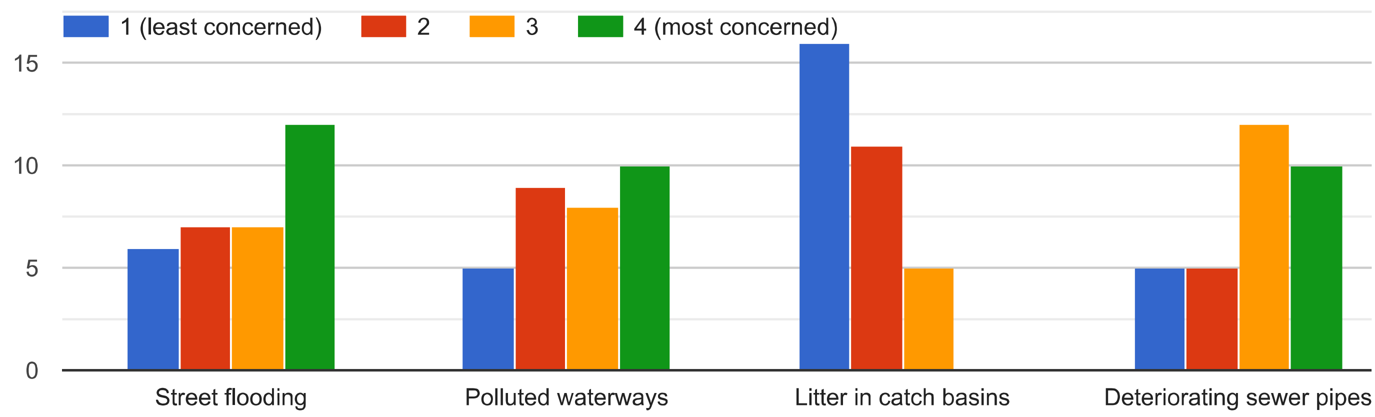
32 responses



Please rate the importance of the following:

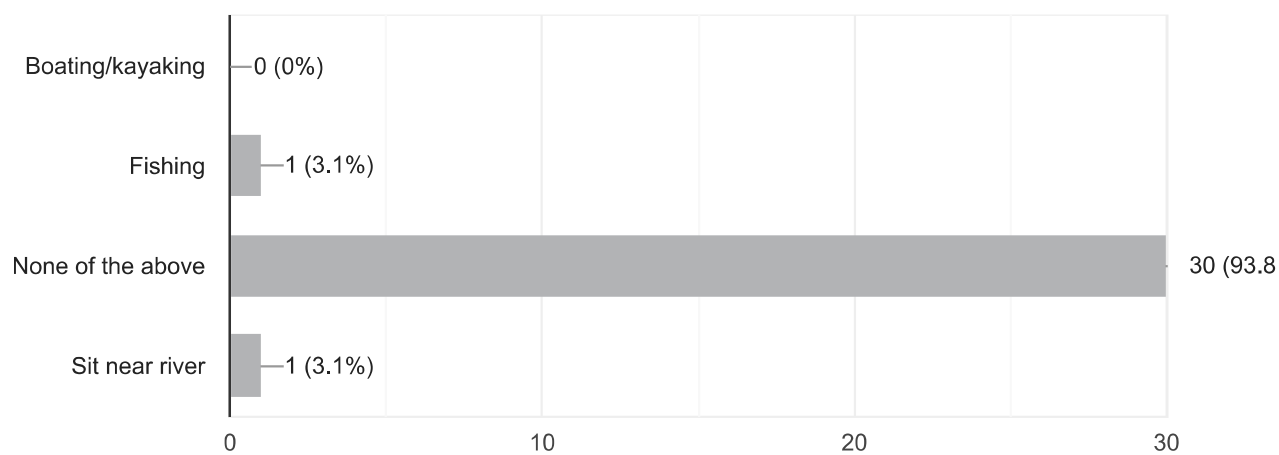


Please rank your concerns from 1 to 4 (1=least concerned, 4 = most concerned):



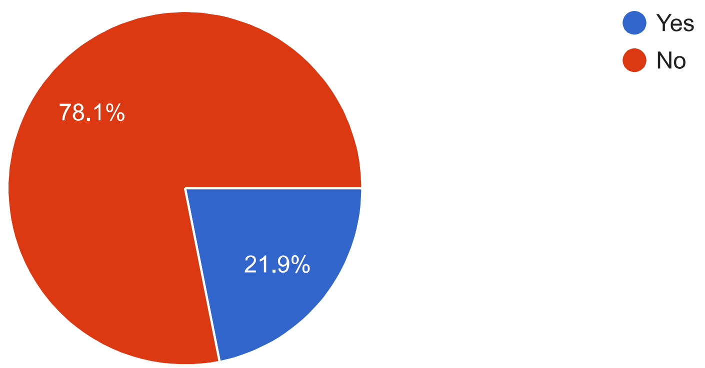
Do you use the Hackensack River for any of the following activities?

32 responses



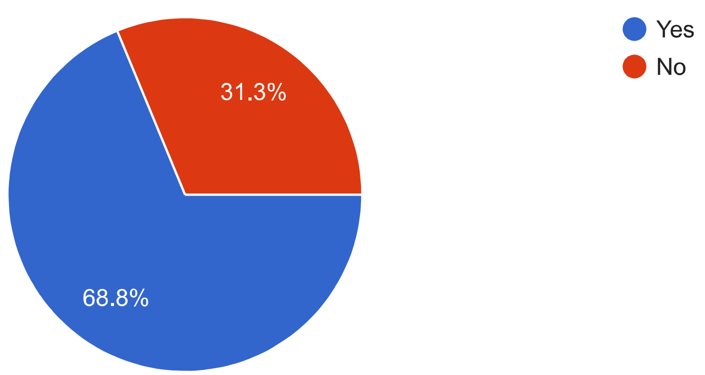
Are you interested in joining a committee to help plan public outreach about combined sewer overflows and to provide input on combined sewer overflow infrastructure projects?

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

Search

Select Language

Powered by Google Translate

News

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
Website Disclaimer
Government Websites by CivicPlus ®

Login

The Village of Ridgefield Park
Settled in 1685

Search

Select Language
Powered by Google Translate

About Us Departments Boards & Committees Public Organizations
Help Center

Home

Ridgefield Park: The Future of our Waterways is in Your Hands

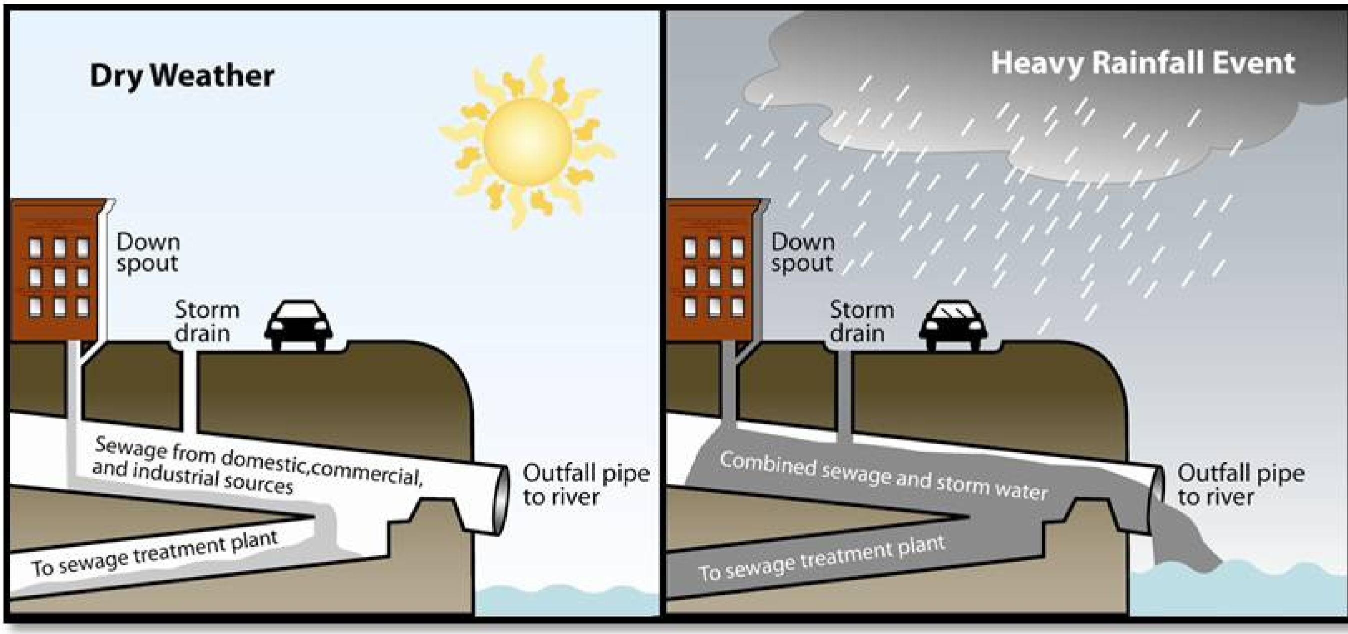
Meeting Minutes

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
234 Main St, Ridgefield Park, NJ 07660
Phone: 201-641-4950 Fax: 201-641-1248

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 further 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%

MOTT MACDONALD

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

5

Ridgefield Park CSO Long Term Control Plan

Update

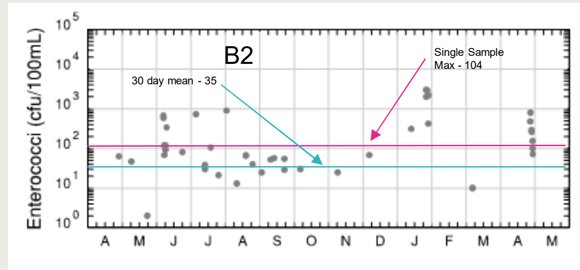
Class	Bacterial Standards	Monthly Mean	Single Sample Max	Protected Uses
SE1	Entero	35	104	Primary Contact
SE2	Fecal	770	NA	Secondary Contact
FW2	Ecoli	126	235	Primary Contact Public Water Supply

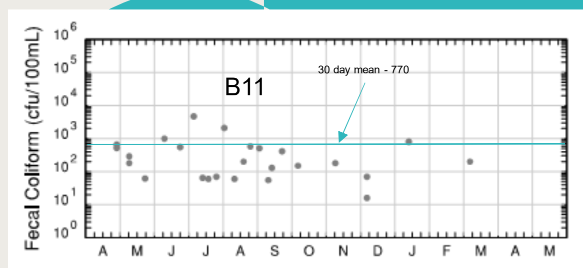
6

Ridgefield Park CSO Long Term Control Plan

Update

Hackensack River
- Dry Weather Monitoring
- B2 & B11

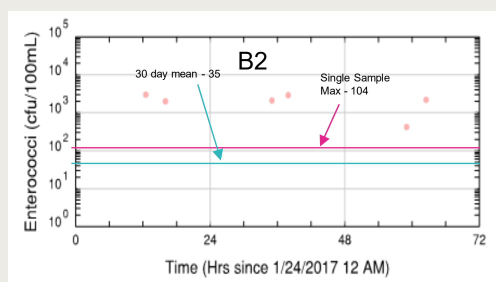


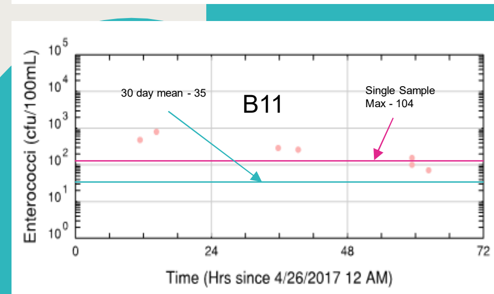


Ridgefield Park CSO Long Term Control Plan

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

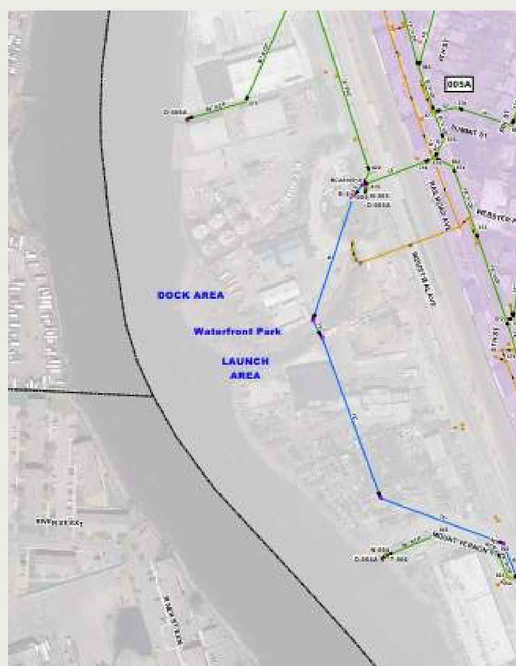
Primary Contact Recreation Waters

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 <u>Considers</u> Kayaking Primary
Contact

There are no other known potential Primary
Contact Areas in and around Ridgefield Park.



4/4/2019 Update

10

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

Update 11 4/4/2019

11

Ridgefield Park CSO Long Term Control Plan

Update

What does the permit say?

The permittee shall evaluate a <u>reasonable range</u> 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 <u>list of control alternative(s) evaluated for each CSO</u> enabling the permittee, …to select the alternatives to ensure the CSO controls will <u>meet the water quality-based requirements of the CWA</u>

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

The permittee shall select either the Demonstration or Presumption Approach

Update 12 4/4/2019

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)

Update 13 4/4/2019

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

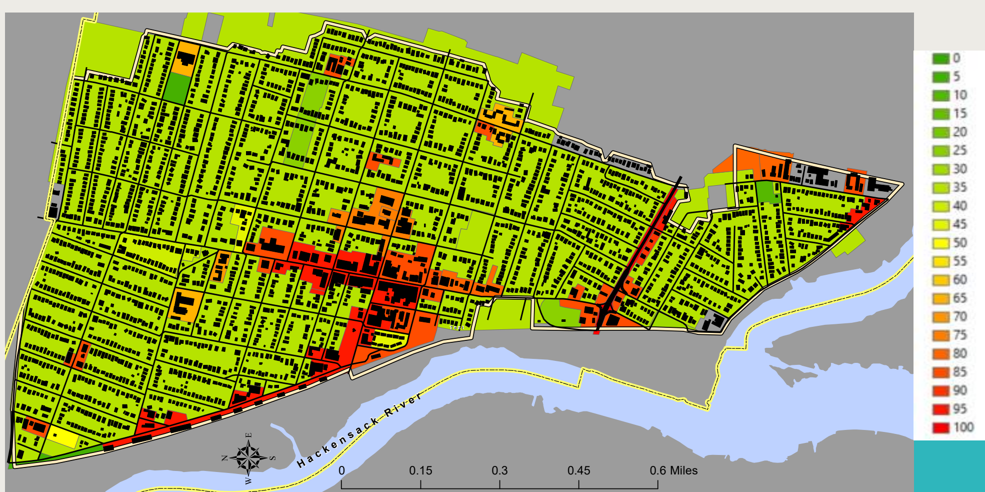
Green infrastructure (GI) = practices which reduce stormwater volume or flow rate by allowing the stormwater to infiltrate, to be treated by vegetation or by soils, or to be stored for reuse

- 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*

15

Ridgefield Park CSO Long Term Control Plan
Update

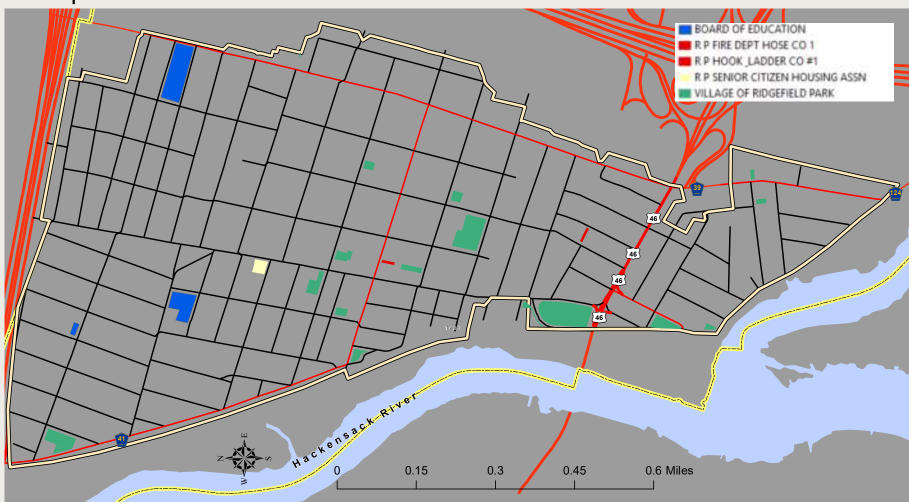
- Building footprints
- Impervious area



16

Ridgefield Park CSO Long Term Control Plan
Update

- Property Ownership



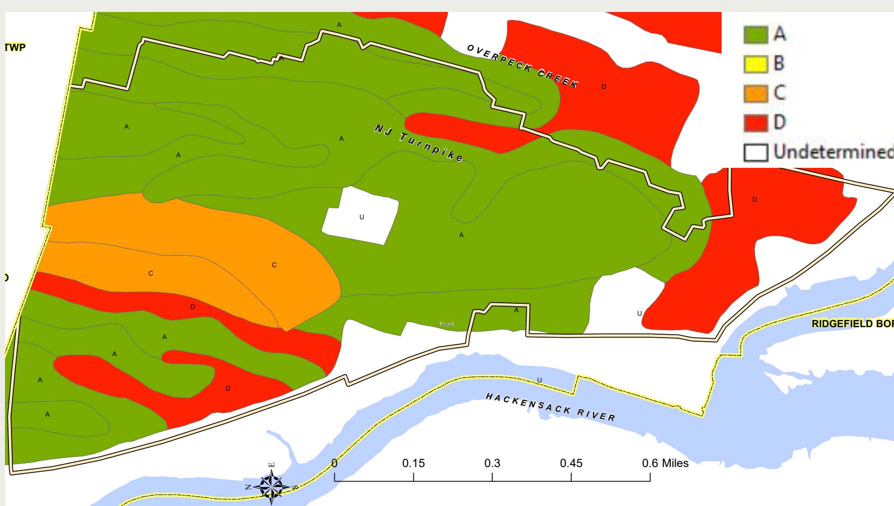
Update

4/4/2019

17

Ridgefield Park CSO Long Term Control Plan
Update

- Soil Type



Update

18

4/4/2019

18

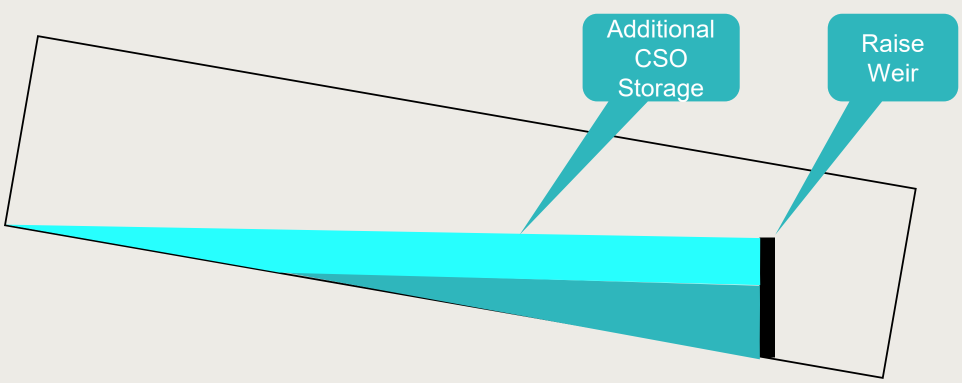
Increased Storage Capacity

- 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



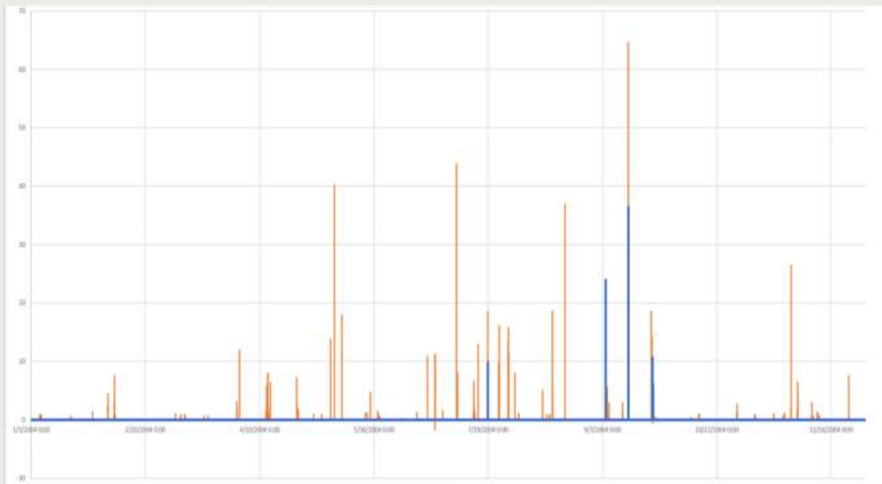
Update 20 4/4/2019

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



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

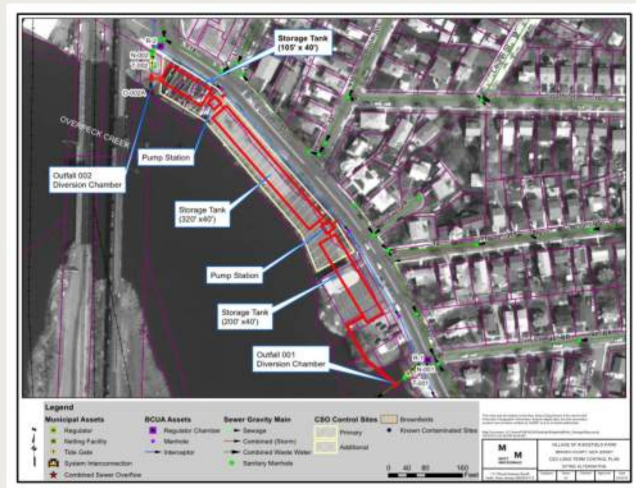
Total Inflow Volume	230.4MG
Total Overflow Volume	61.07MG
Current Percent Capture	**73.50%**
Total Inflow Volume	230.4MG
Total Overflow Volume Required for 85%	34.56MG
Additional Annual Capture Required	**26.51MG**

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

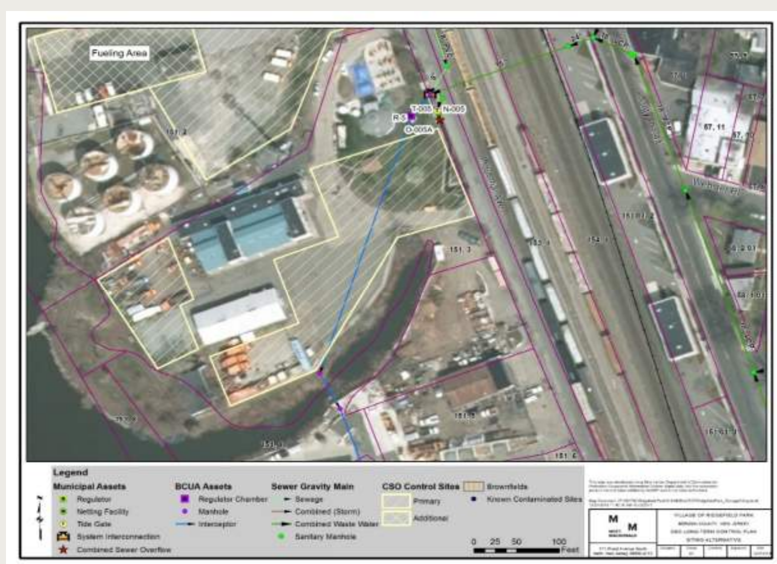
Evaluation of Other Sites

Area available:0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations



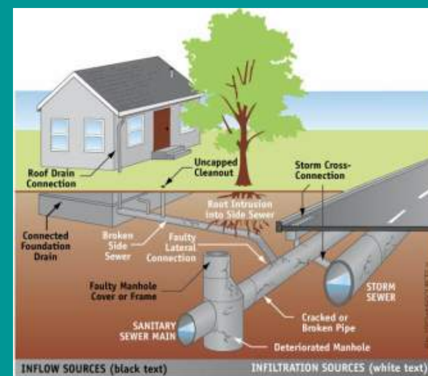
Update

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.

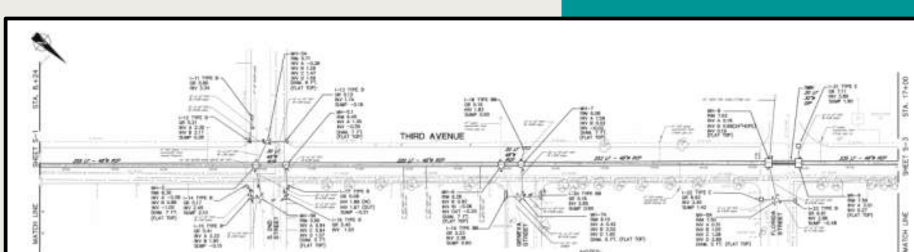


25

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.

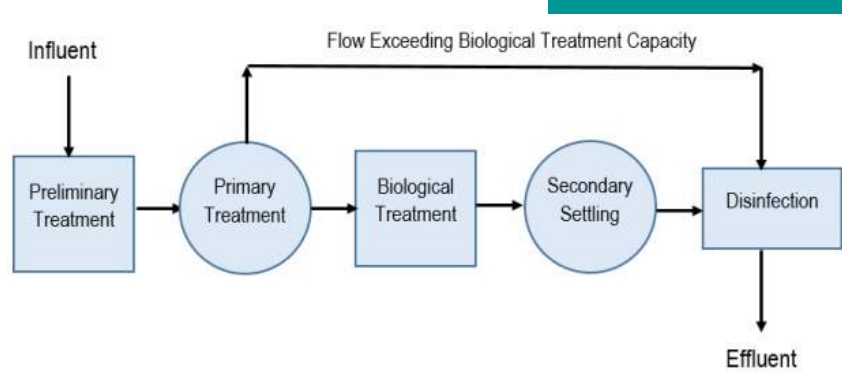
NJDEP is looking for primary treatment and disinfection.

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

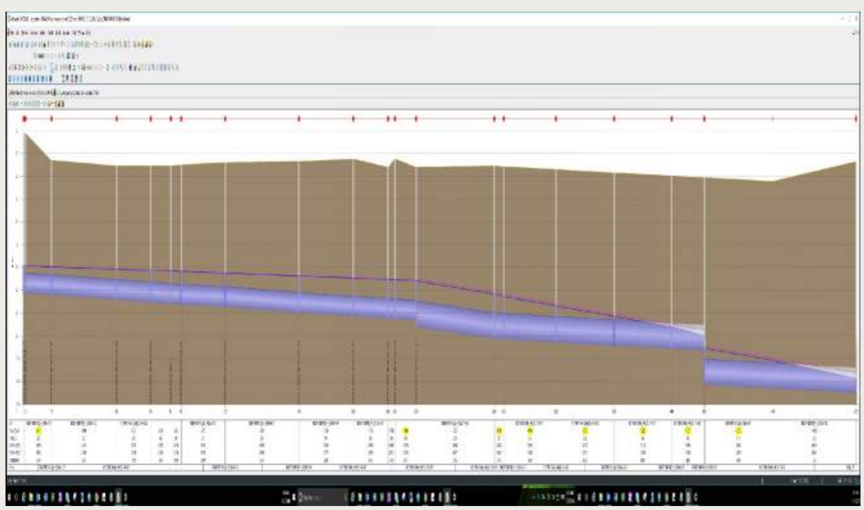
- Increased conveyance to plant
- Full treatment expansion
- Wet weather facility

Issue – Transport Capacity
in Trunk Sewers

29

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

32

Final Questions?

33

Thank You?

34

MOTT MACDONALD

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

Mott MacDonald

2

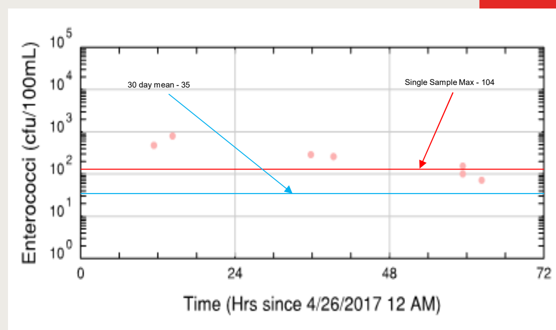
October 17, 2019

2

Introduction

What we talked about last time. (4/4/2019)

- Permit schedule
- Receiving waters standards and quality



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

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

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

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

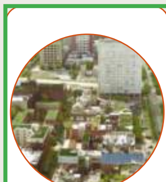
The permittee shall evaluate the practical and technical feasibility of the proposed CSO control alternative(s), and water quality benefits and give the highest priority to controlling CSO discharges to sensitive areas

The permittee shall select either the Demonstration or Presumption Approach

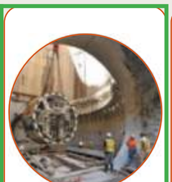
7

Introduction

Range of Alternatives



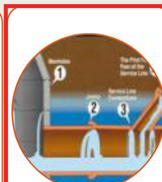
Green Infrastructure



Storage

BCUA

Treatment Plant Expansion



Infiltration / Inflow Reduction

Sewer Separation

End-of-Pipe Treatment

BCUA

WWTP Bypass

Range of alternatives, different levels of control, numerous combinations

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**

Mott MacDonald

11

October 17, 2019

11

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:
    - $(P|A, i\%, n) = ((1+i)^n-1)/((i(1+i)^n)$

Mott MacDonald

12

12

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.

Mott MacDonald

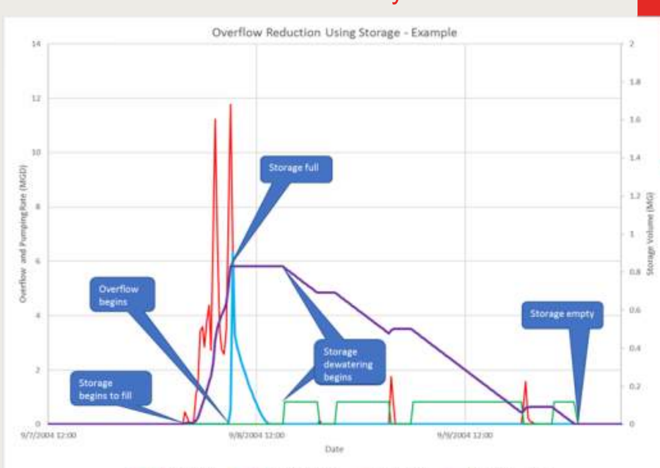
October 17, 2019

13

Alternatives Evaluation

Storage – Tanks and Tunnels

Temporary storage tunnels and tanks reduce and delay overflows



Mott MacDonald

October 17, 2019

14

14

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

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

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.

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

Alternatives Evaluation

Control Program 3 – Consolidated Tunnel Storage Contd.

Consolidated Tunnel Map

19

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.

20

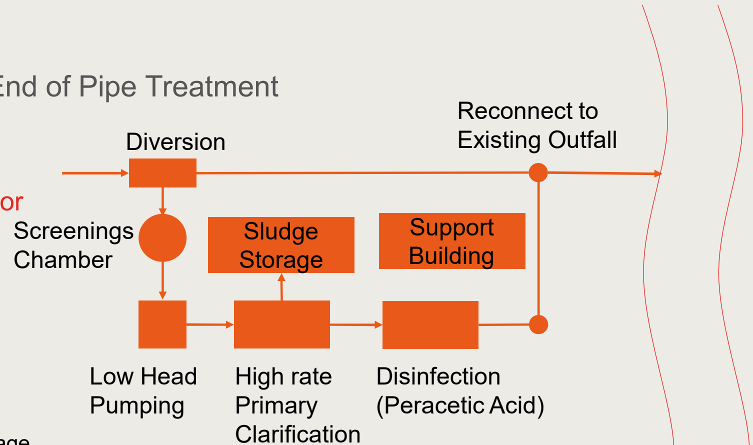
Alternatives Evaluation

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

Mott MacDonald

October 17, 2019

21

Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.

Mott Ma

r 17, 2019

22

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.

Mott MacDonald

25

October 17, 2019

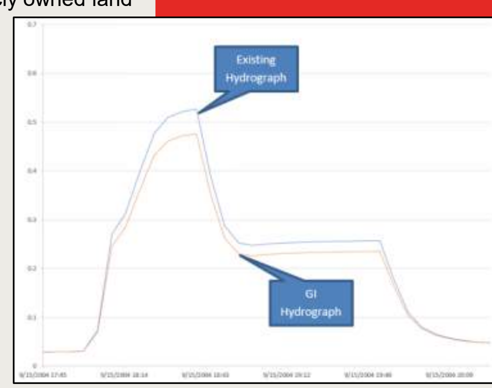
25

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



Mott MacDonald

26

26

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

Mott MacDonald

29

29

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%

Mott MacDonald

30

30

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

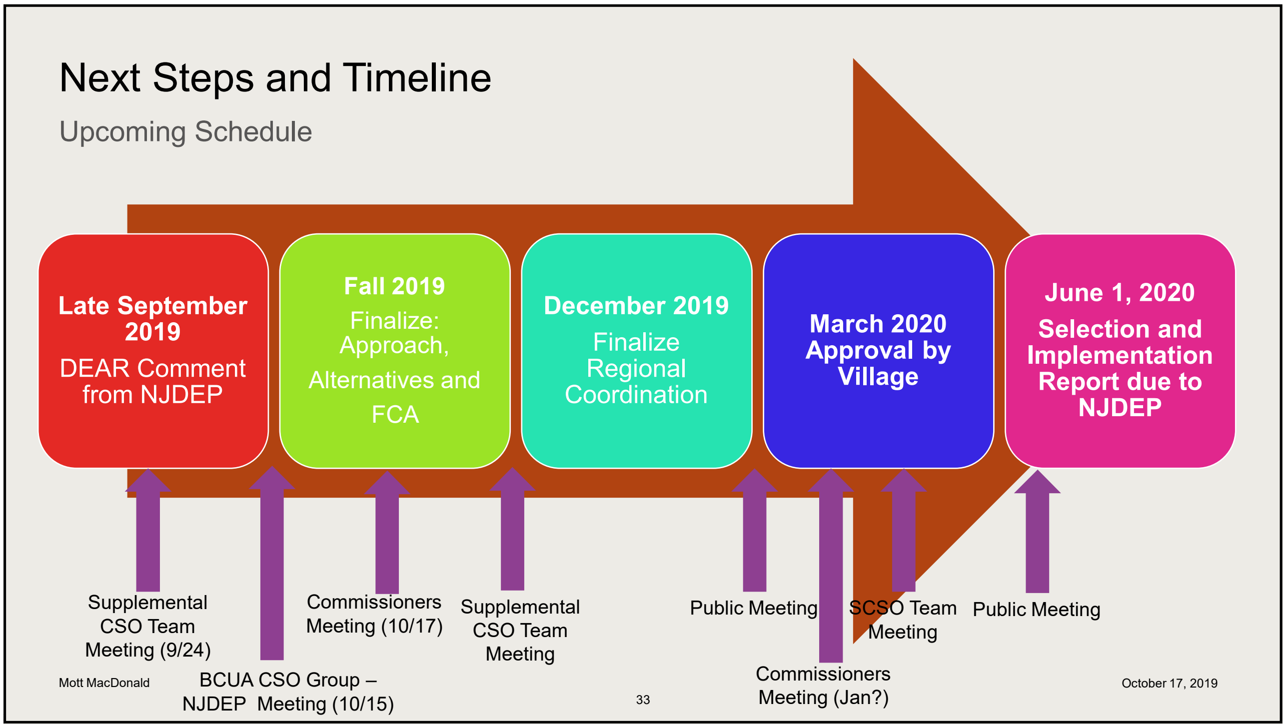
31

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!

32



33

Questions?

34

MOTT MACDONALD

Thank you

35

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 ANLIAN	R.P.	Johnanlian@yahoo.com
WILLIAM G. GERKEN	R.P. COMMISSIONER	WGERKEN@RIDGEFIELDPARK.ORG
John Dening	Mott MacDonald	john.dening@mottmac.com

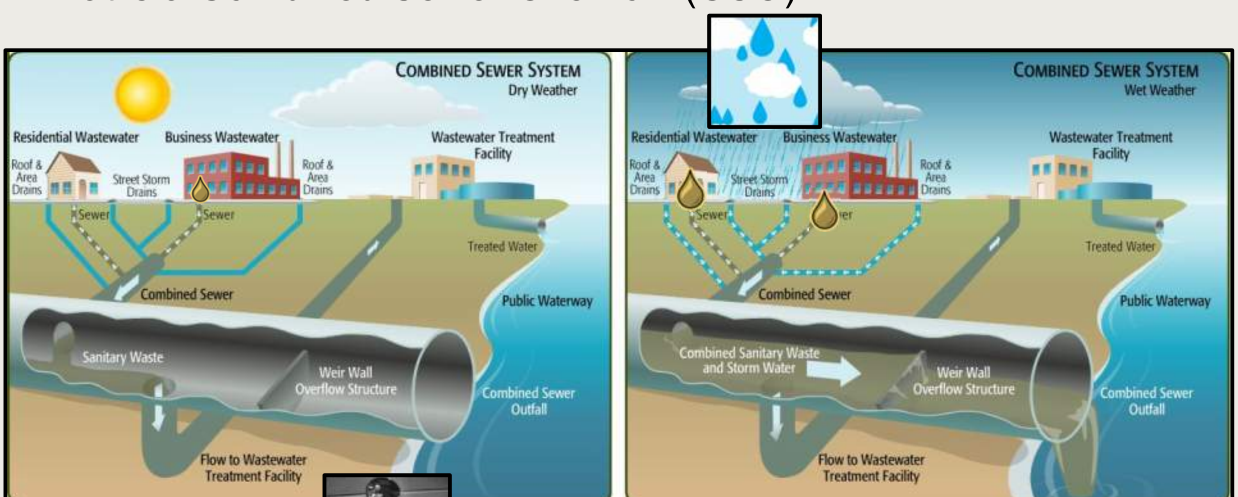
MOTT MACDONALD

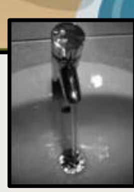
Combined Sewer Overflow (CSO)
Long Term Control Plan Overview
Village of Ridgefield Park

The Village of Ridgefield Park
Settled in 1685

1

What is a Combined Sewer Overflow (CSO)?

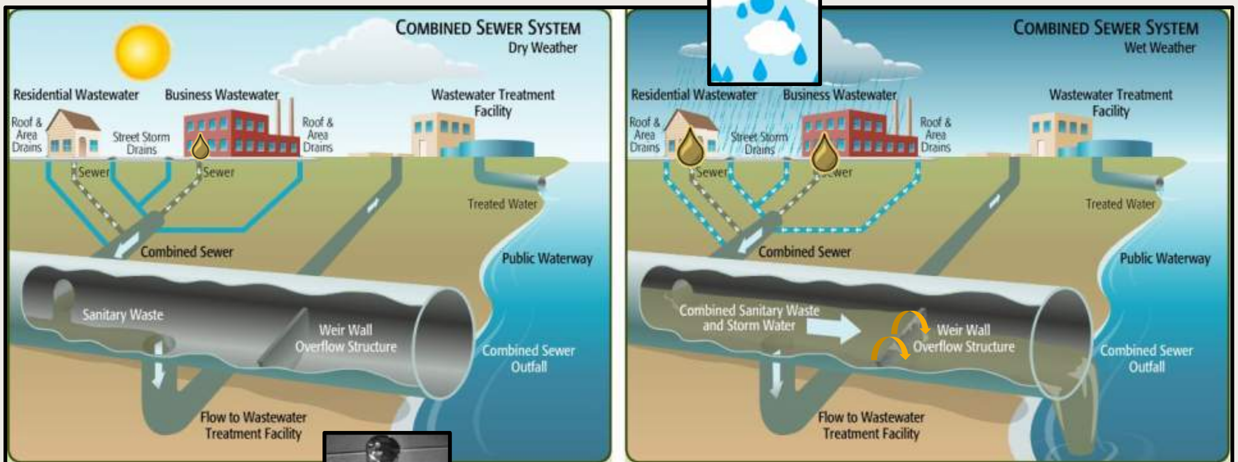


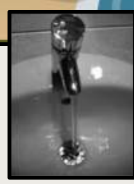


2

2

What is a Combined Sewer Overflow (CSO)?





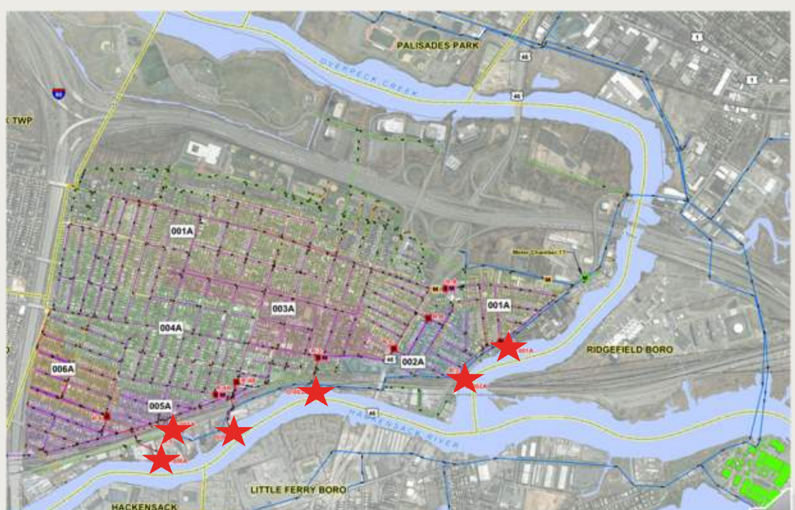
- CSOs provide hydraulic relief during wet weather, but are sources of water pollution

3

3

CSOs in Ridgefield Park

- 6 Outfalls
- 55 Overflow per Year
- 53 Million Gallons of Overflow

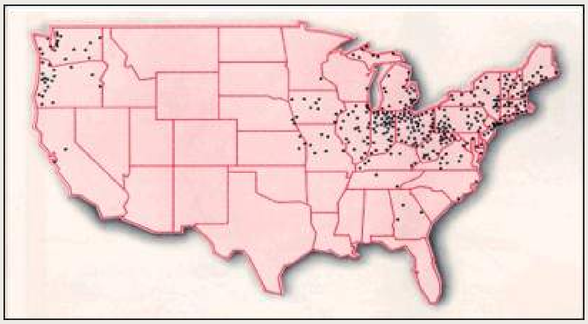


4

4

The Village is not Alone

- 860 communities in US
- 21 communities in NJ
    - Over 200 Outfalls



5

5

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

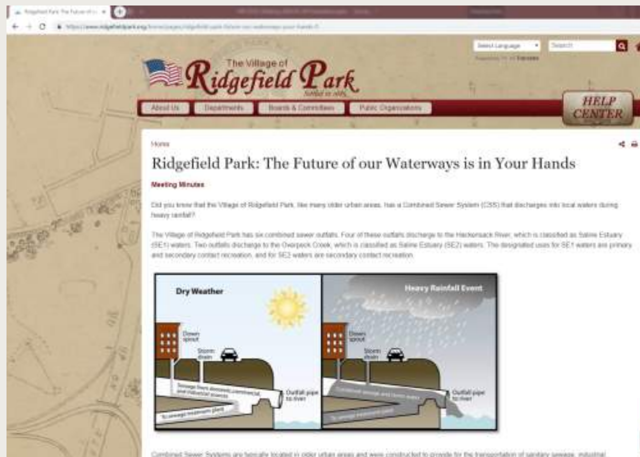
(Extension from June 1 to October 1 due to COVID-19)

6

6

Public Involvement is Essential!

- Supplemental Combined Sewer Overflow Team
- Articles in Village Newsletter
- Literature Distribution
- Village Website page
- Village Caucus Meetings
- This Presentation



7

7

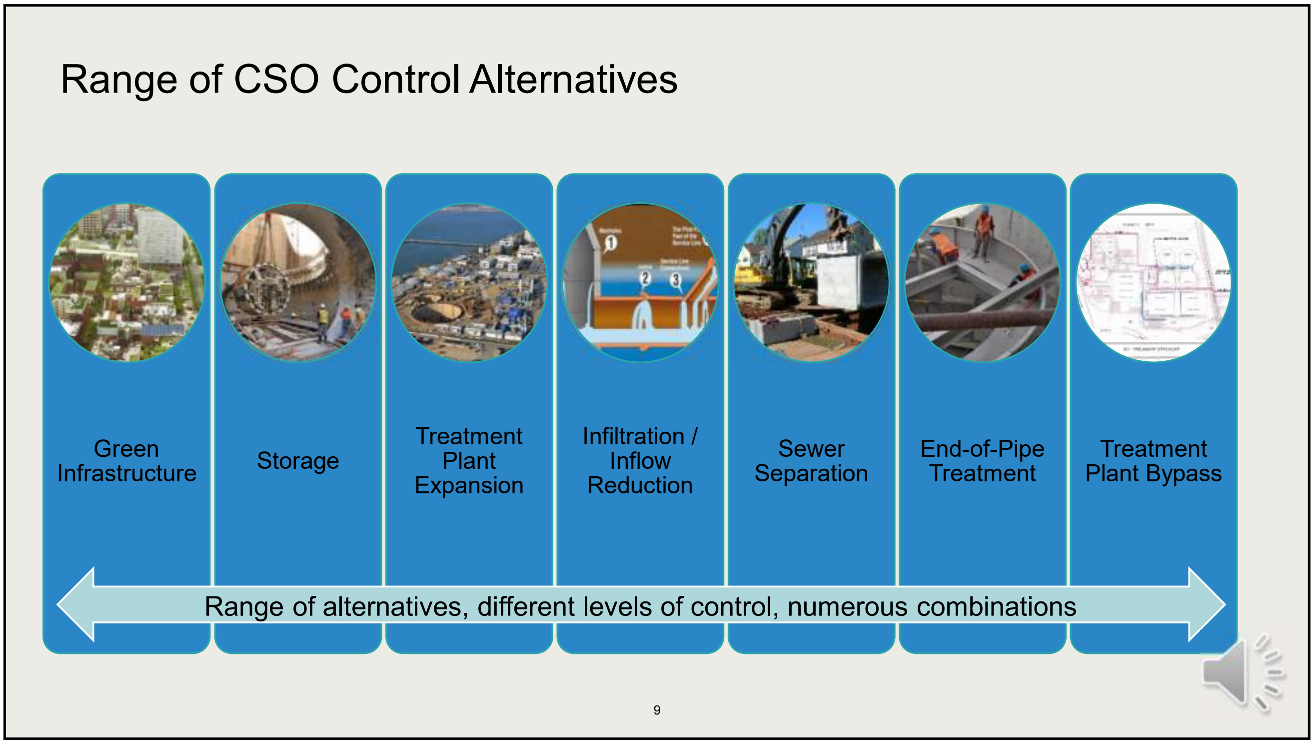
What does the Village have to do?

Presumption Approach Targeting 85 Percent Capture

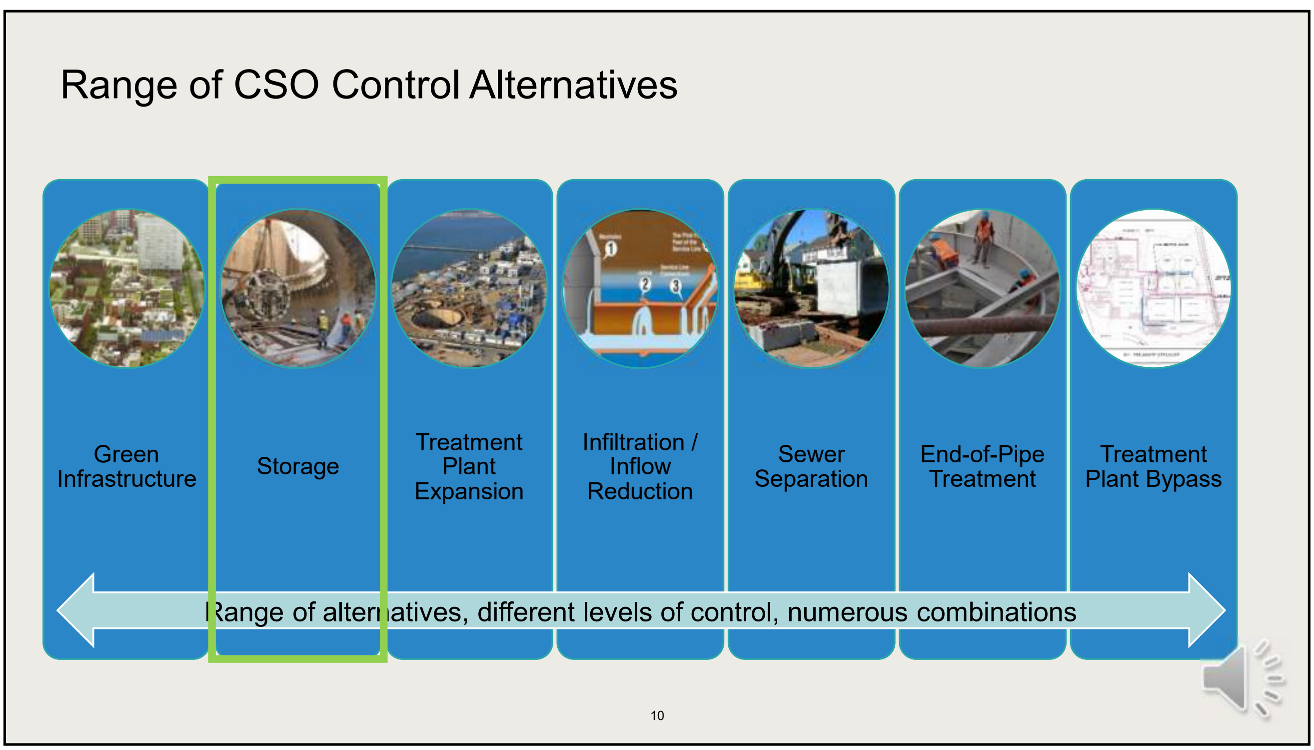
Presumption Approach (performance based)	**Demonstration Approach (water quality based)**
• No less than 85 percent capture of annual overflow volume; • No less than the equivalent mass of the pollutants causing water quality impairment; or • No more than 4 overflows in the typical year	• Use receiving 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.

8

8

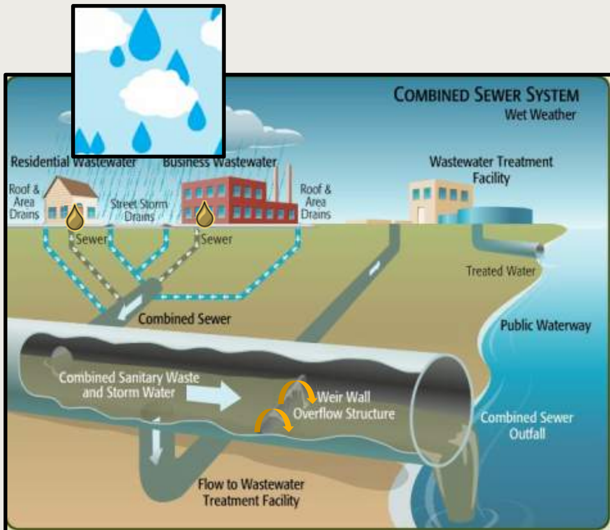

Range of CSO Control Alternatives
Green Infrastructure
Storage
Treatment Plant Expansion
Infiltration / Inflow Reduction
Sewer Separation
End-of-Pipe Treatment
Treatment Plant Bypass
Range of alternatives, different levels of control, numerous combinations
9

9


Range of CSO Control Alternatives
Green Infrastructure
Storage
Treatment Plant Expansion
Infiltration / Inflow Reduction
Sewer Separation
End-of-Pipe Treatment
Treatment Plant Bypass
Range of alternatives, different levels of control, numerous combinations
10

10

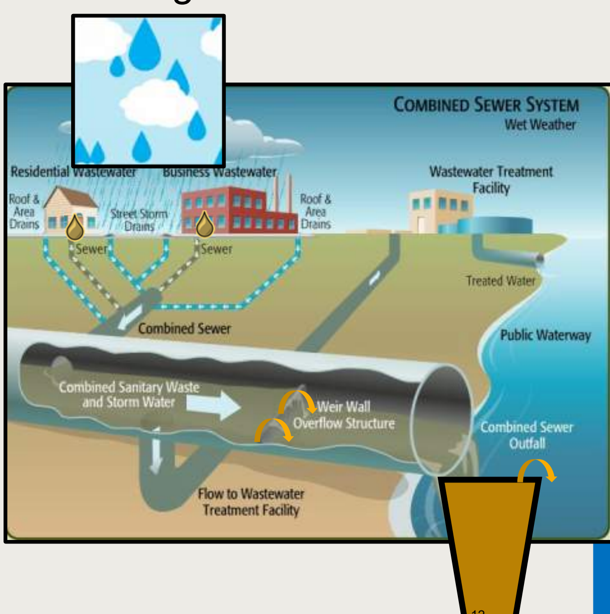
How does storage work?



11

11

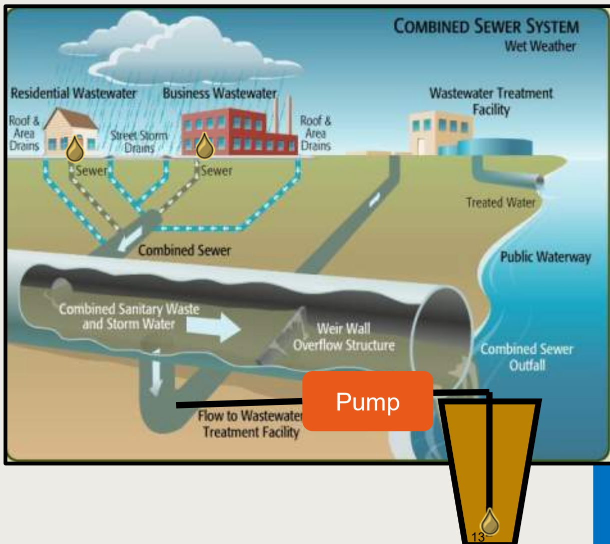
How does storage work?



12

12

How does storage work?



13

Where Will the Tank Be Located?

Several possible locations

14

Where Will the Tank Be Located?

Possible Layout

15

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

16

What will this cost the Village?

Total Project Cost

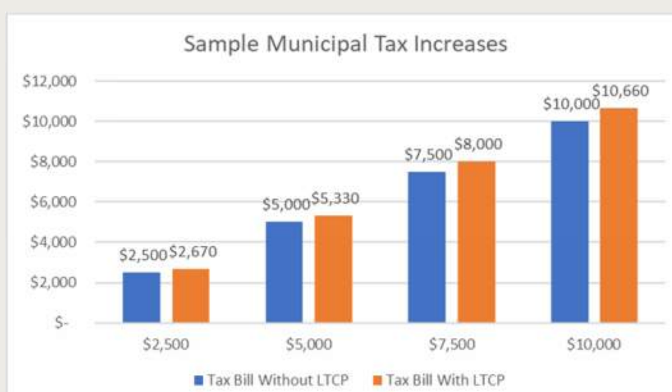
- **Capital Costs** $14M
- **Permit Costs** $40k/yr
- **O&M Costs** $105k/yr

17

17

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%



18

18

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

19

19

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

20

Questions?

John Dening P.E.
Mott MacDonald
Email john.dening@mottmac.com
Phone 973-912-2464

21

21

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
	John Rolak	Mott MacDonald	john.rolak@mottmac.com	973-912-2521
	John Dening	Mott MacDonald	John.dening@mottmac.com	973-912-2464
	Donna Gregory	Mott MacDonald	donna.gregory@mottmac.com	
	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
	Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com	201-440-5652
	Linda Quinn	Ridgefield Park Environmental Commission	linda.quinn125@gmail.com	201-440-5652
	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
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 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.3.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 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 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.

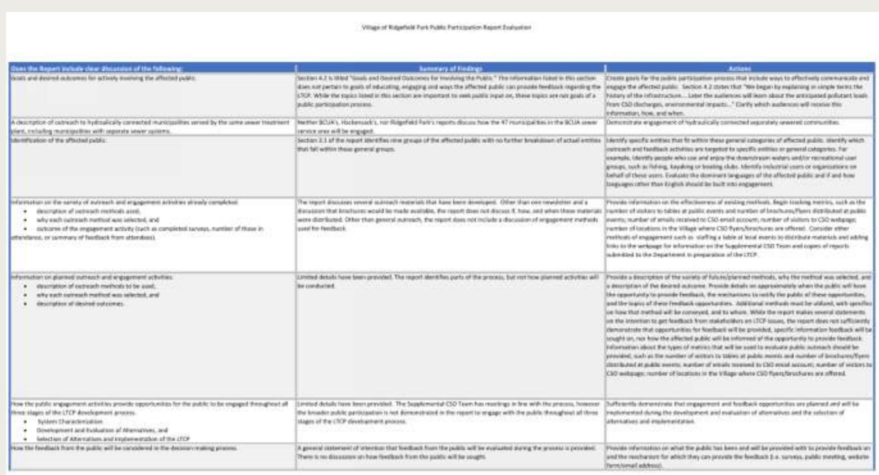
Thank you for your cooperation.

Sincerely,

Nancy Z. 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



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.

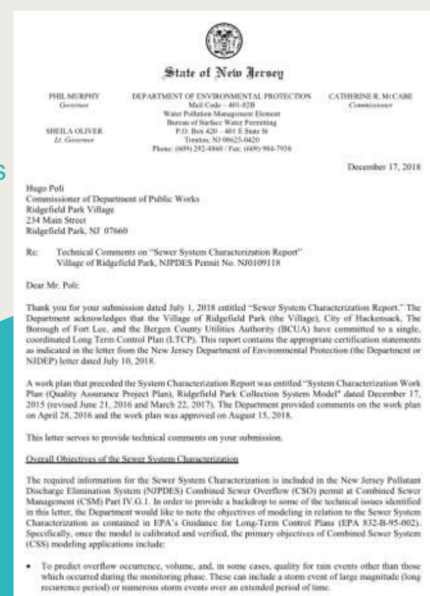
Mott MacDonald | Presentation 9 04 April 2019

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.

Mott MacDonald | Presentation 10

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:

- 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

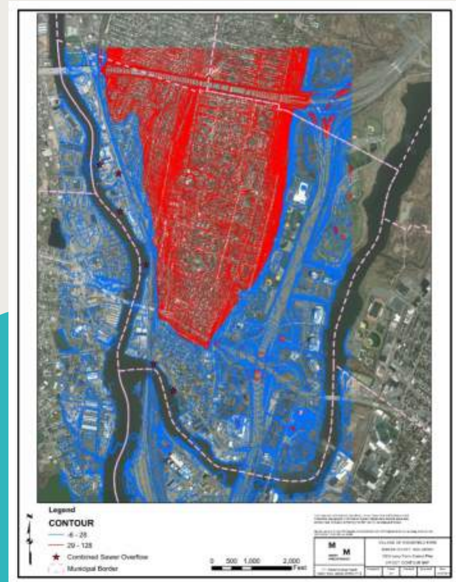
- Aerial Imagery and Land Use Classification
  - Structures vs. Paved vs. Vegetated
  - Open Space, Industrial, and Commercial vs. Residential and Transportation Corridors
  - Green Acres – NJDEP Approval – Propose GSI
- Parcel Data
  - Public vs. Private Ownership
- Soil Type
- Topography
  - Difference 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
  - 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



Mott MacDonald | Presentation 19 04 April 2019

Ridgefield Park Supplemental CSO Team

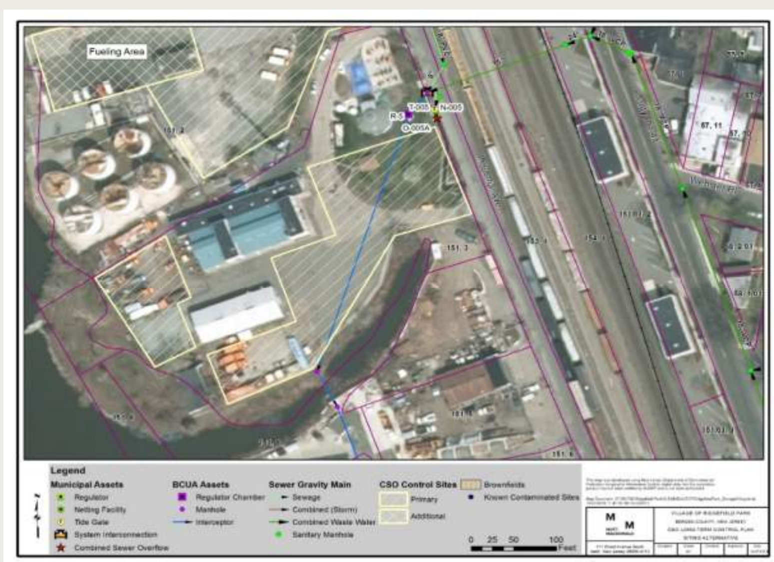
Development and Evaluation of Alternatives Report – Example Site

Area available:0.8 Acres

Ownership: Village of Ridgefield Park

Land use considerations:

DPW Operations



Mott MacDonald | Presentation 19

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

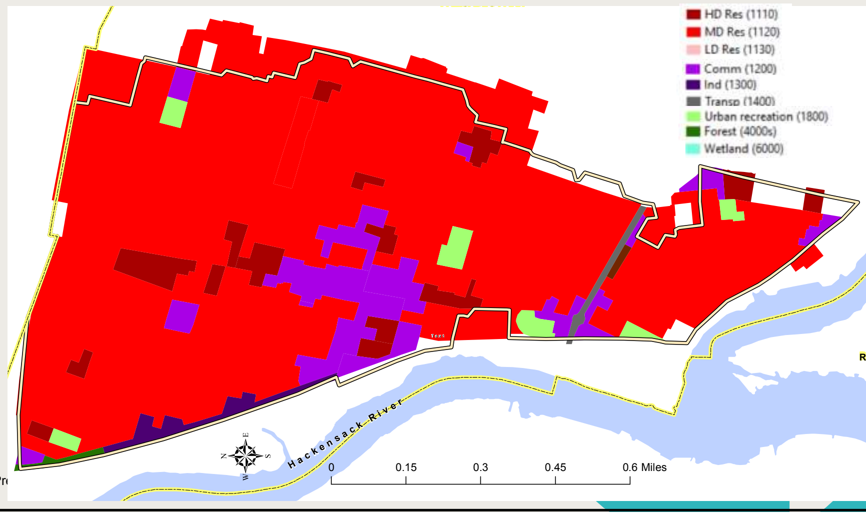
Analysis using GIS (mapping) data, including:

- 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

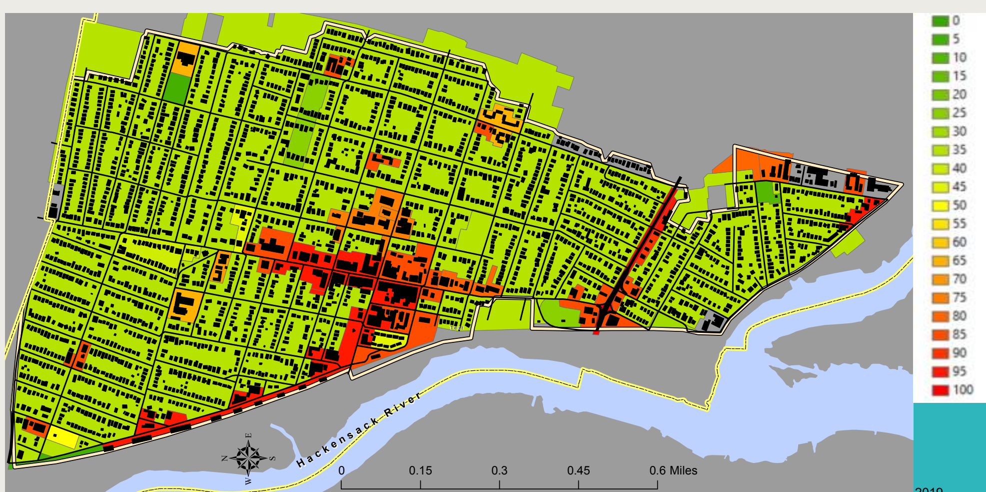
- Land Use / Land Cover



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

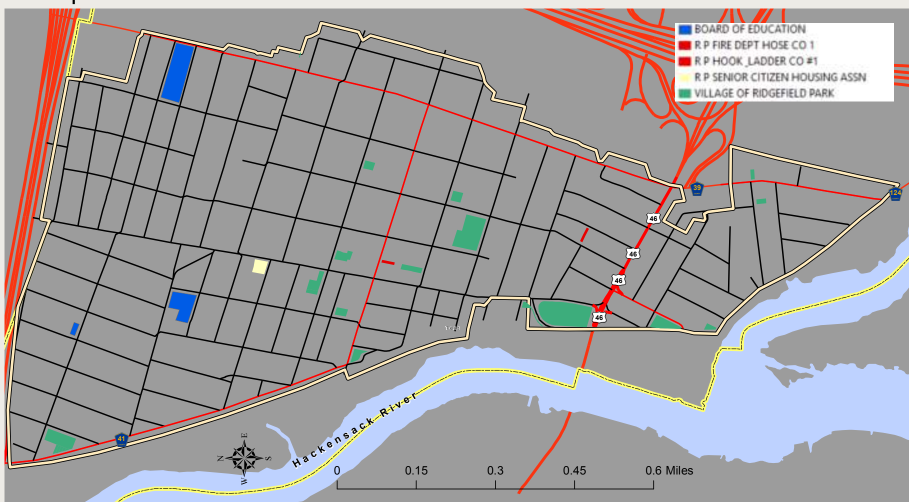
- Building footprints
- Impervious area



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

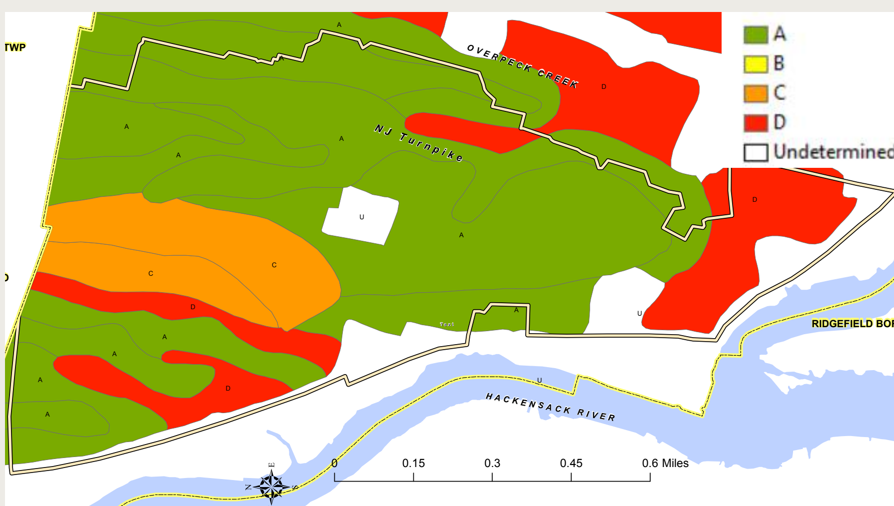
- Property Ownership



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

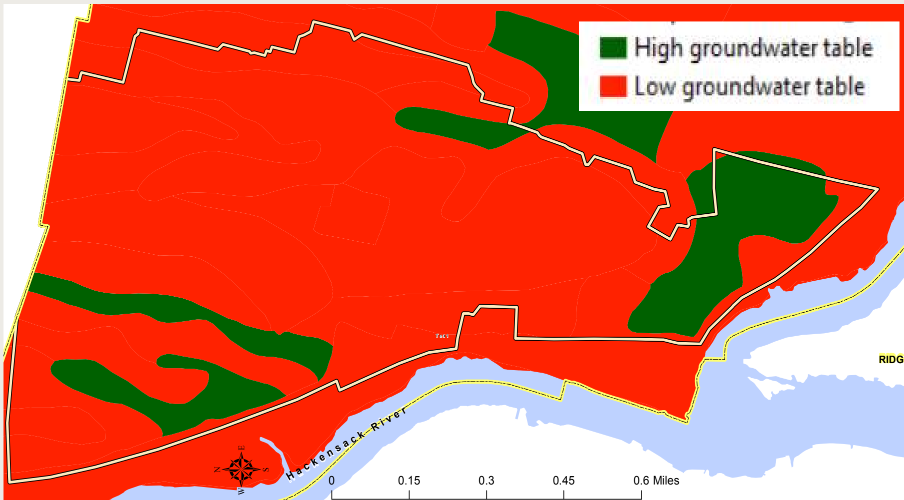
- Soil Type



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Siting Green Infrastructure

- Depth to Water



Mott MacDonald | Presentation 27 04 April 2019

Ridgefield Park Supplemental CSO Team

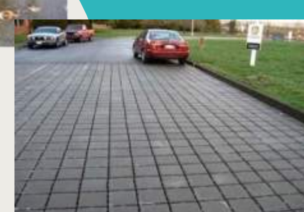
Development and Evaluation of Alternatives Report – Siting Green Infrastructure

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

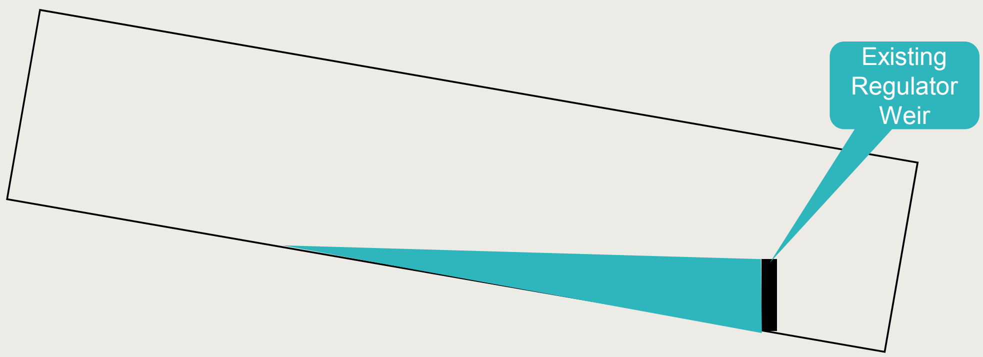


Mott MacDonald | Presentation 28

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity

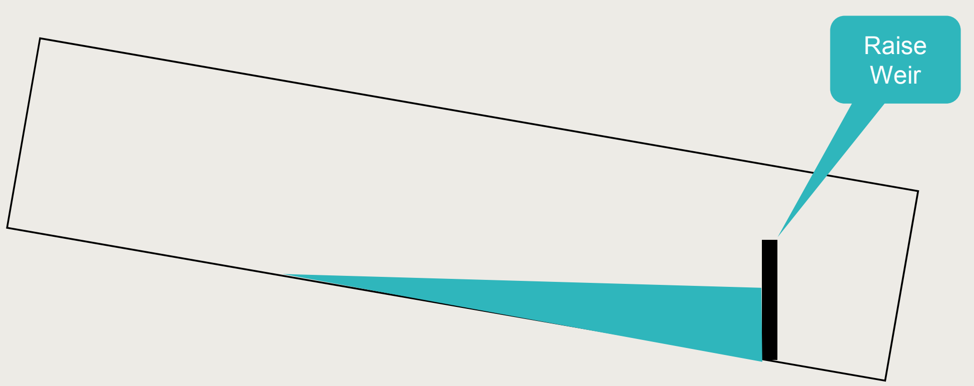


Mott MacDonald | Presentation 29 04 April 2019

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

Maximize inline storage capacity

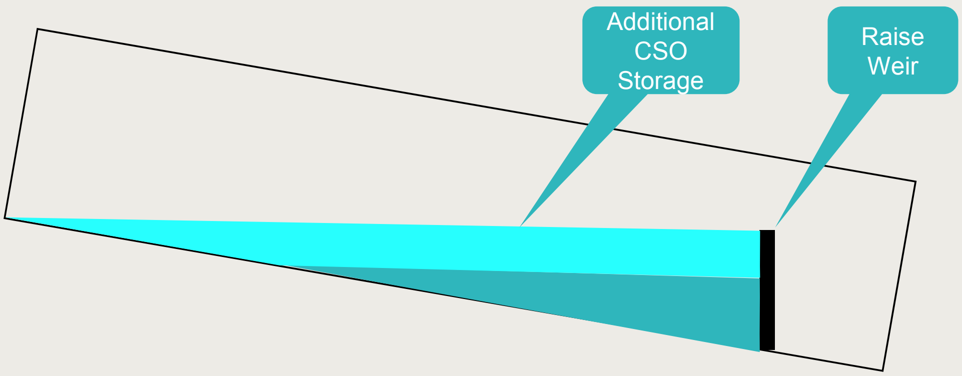


Mott MacDonald | Presentation 30 04 April 2019

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Inline Capacity

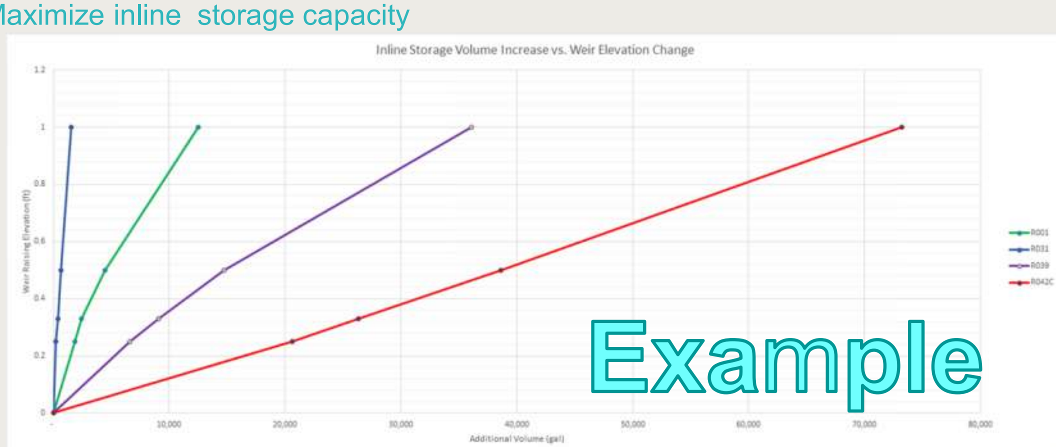
Maximize inline storage capacity



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

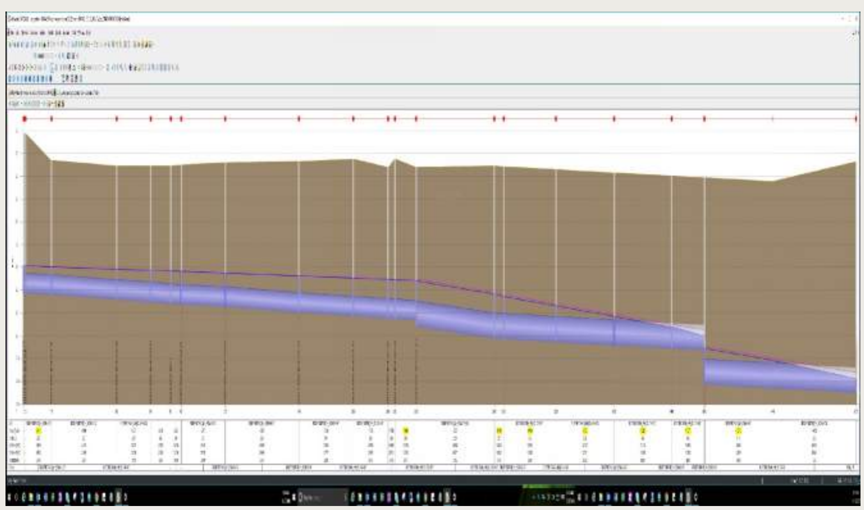
Maximize inline storage capacity

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

Mott MacDonald | Presentation 33 04 April 2019

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Maximize Conveyance to WWTP

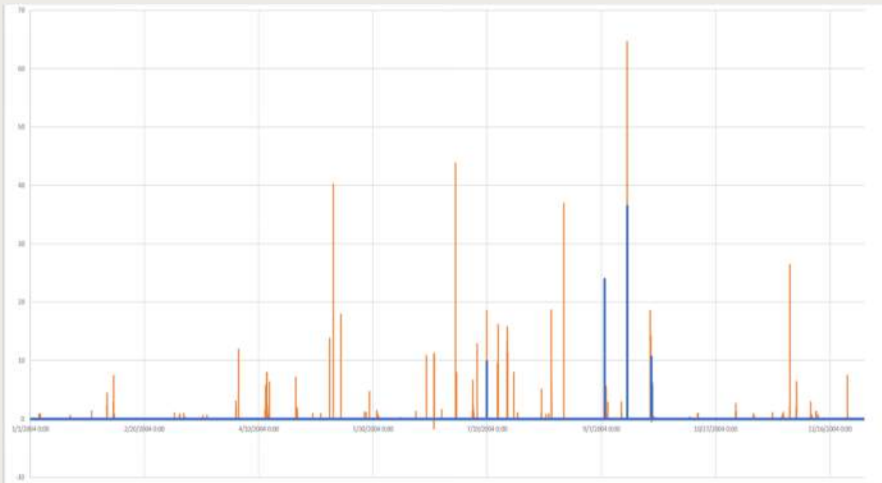


Mott MacDonald | Presentation 34 04 April 2019

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

Mid to Late January 2019: Complete initial screening to identify viable alternatives

Mid-March 2019: Detailed evaluation of viable alternatives (cost, sizing, benefits)

Mid-April 2019: Refine alternatives

Mid-May 2019: Finalize alternatives, draft report submission

June 2019: Submit final report to NJDEP

Supplemental CSO Team Meeting

Supplemental CSO Team Meeting

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?

M M
MOTT
MACDONALD

Title here and build upwards (Max 2 lines)

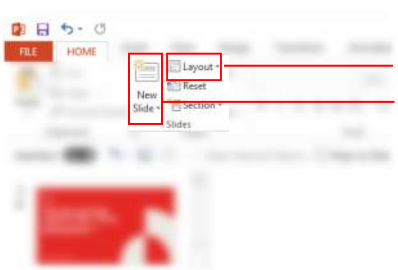
Subtitle will go here and build downward
Please don't go smaller than 16pt

Title here and build upwards (Max 2 lines)

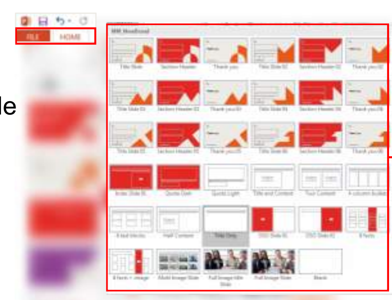
Subtitle will go here and build downward
Please don't go smaller than 16pt

Client name may be inserted in this section

Where to find the most commonly used slides



Home → layout
Home → new slide



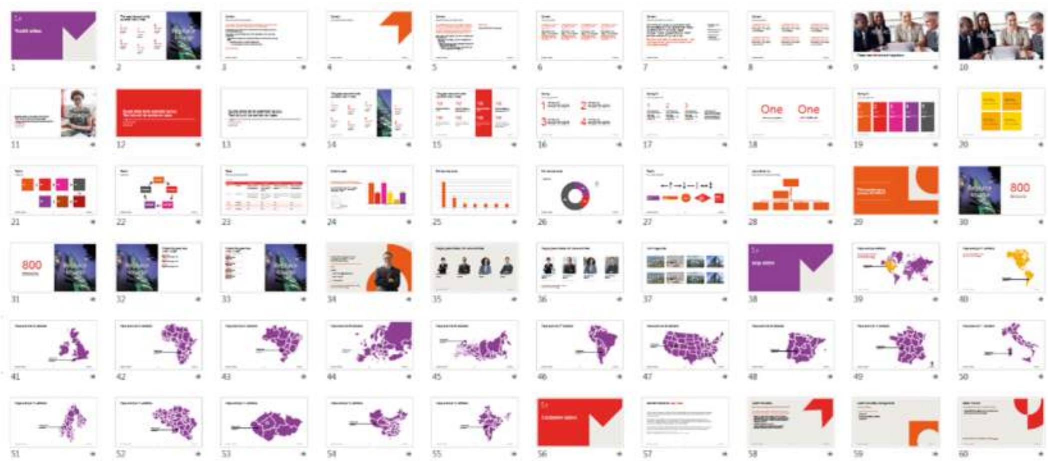
Master slides options to choose from

Don't forget to update the footer: **Insert → Header and Footer**

Mott MacDonald | Presentation 44 04 April 2019

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

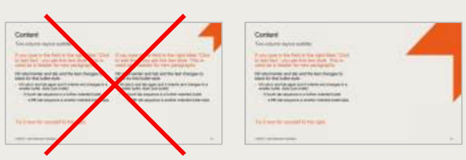


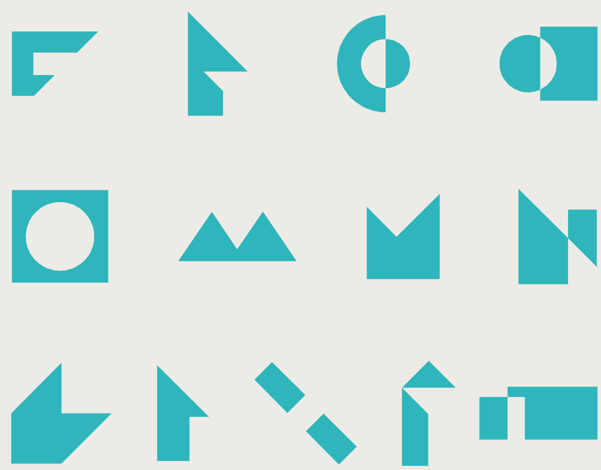
Shapes and rules

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

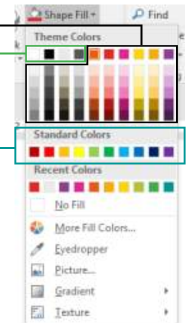
Cool palette

BLUE	TURQUOISE	GREEN	PURPLE
DK BLUE	DK TURQUOISE	LIME GREEN	

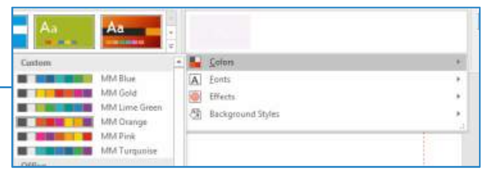
Use top line theme colours only, tints are mainly for tables and charts

DO NOT USE standard colours

Use the dark shades for text and light shades for background

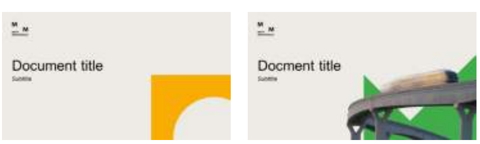


Colours can be changed using the variants menu (Design (tab) → Variants → Colors → then select colour group of your choice)



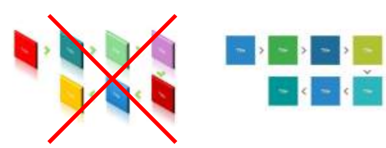
Quick checklist

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
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
	JOHN ANLIAN	Bd of Commissioner	johnanlian@yahoo.com	201.943-1110
	GERARD GAROFALO			201-440-4694
	Leslie Olson	R.P. Green Team R.P Environ. Cmsn	leslie-olson@verizon.net	201-440-5989
SS	Steve Seeberger	NJDEP	stephen.seeberger@dep.nj.gov	609 292-4860
RP	Rachel Pepe	NJDEP	Rachel.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

Mott MacDonald | Presentation 5 28 May 2019

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

1

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

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.

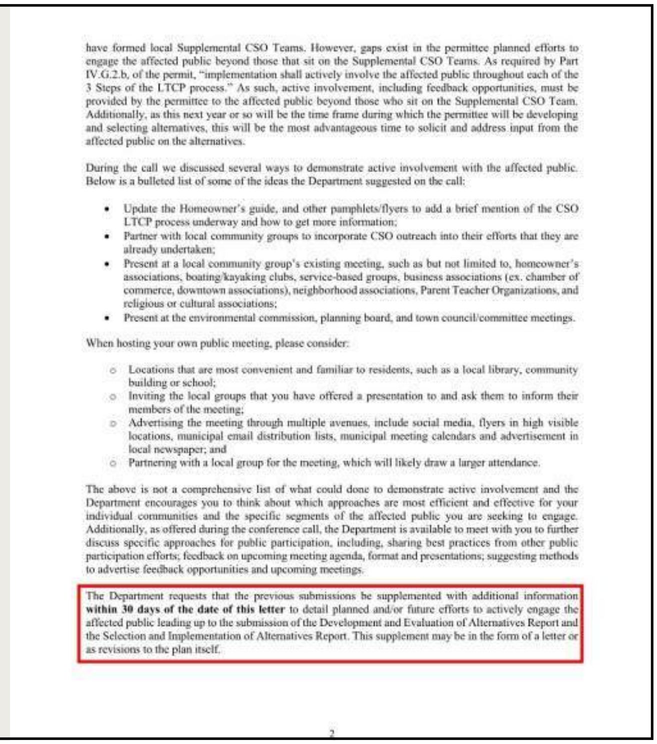
The Department requests that the previous submissions be supplemented with additional information **within 30 days of the date of this letter** to detail planned and/or future efforts to actively engage the affected public leading up to the submission of the Development and Evaluation of Alternatives 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

Proposed:

- Continue SCSO Team Meetings
- Seek additional SCSO Team Members
- Present to Council
- Newsletter Article
- Public and Community Group Meetings
- Earth Day 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.

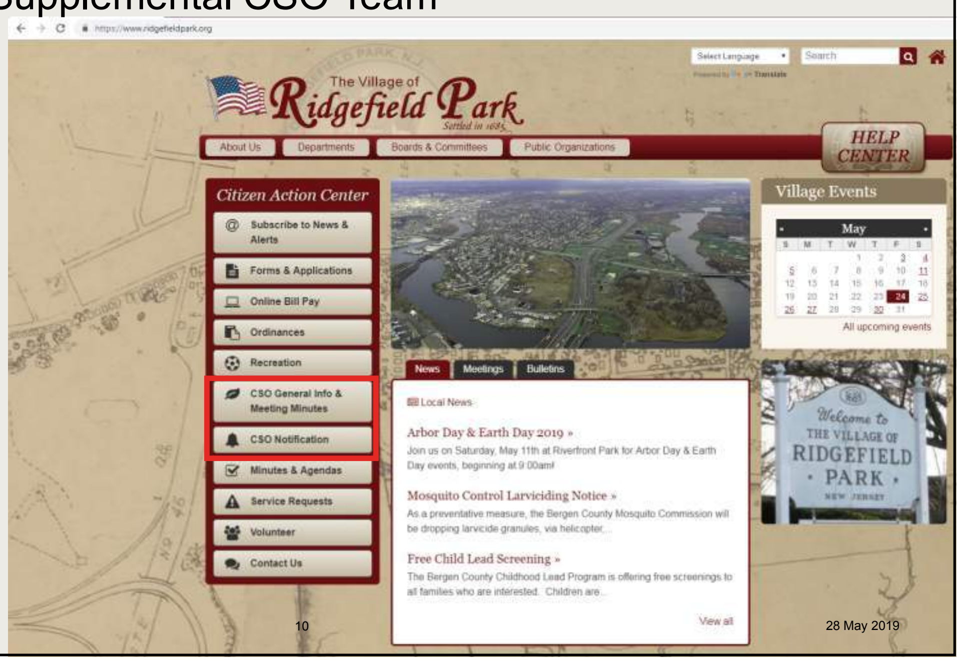
The above is not a comprehensive list of what could done to demonstrate active involvement and the Department encourages you to think about which approaches are most efficient and effective for your individual communities and the specific segments of the affected public you are seeking to engage. Additionally, 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

Ridgefield Park Supplemental CSO Team

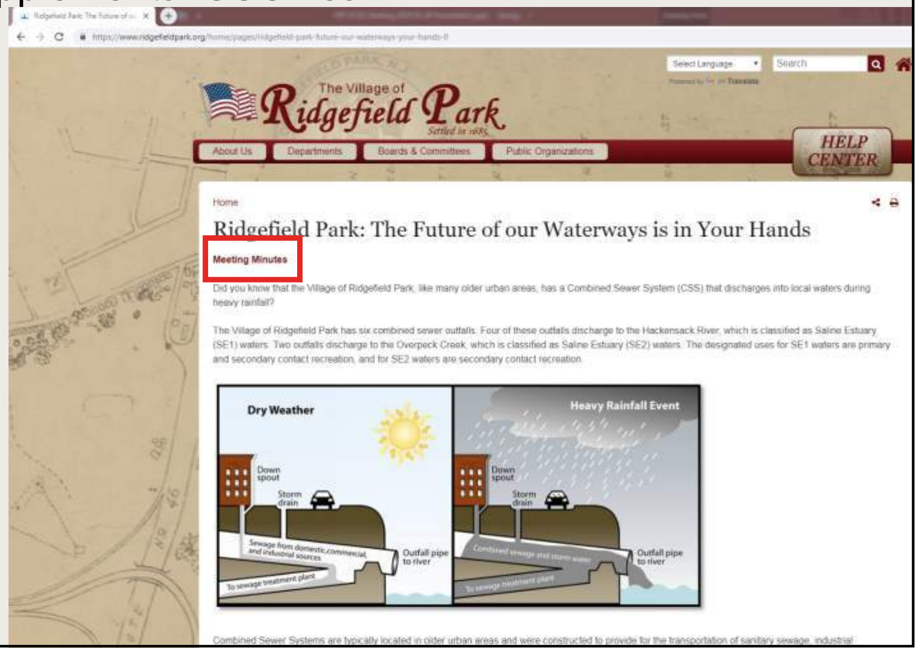
Meeting Minutes



Mott MacDonald | Presentation 10 28 May 2019

Ridgefield Park Supplemental CSO Team

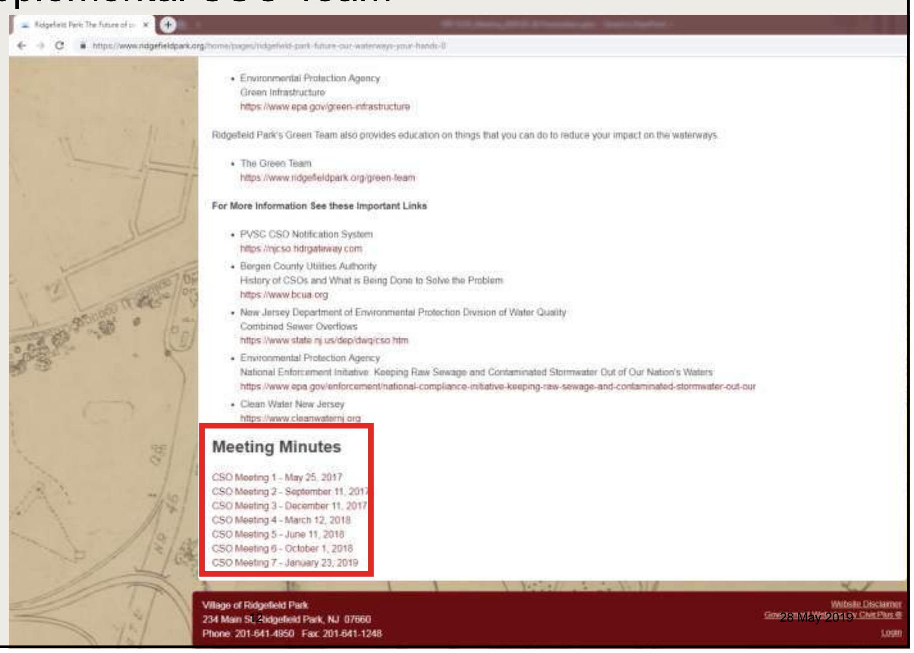
Meeting Minutes



Mott MacDonald | Presentation

Ridgefield Park Supplemental CSO Team

Meeting Minutes



Mott MacDonald | Presentation

12

28 May 2019

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

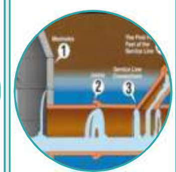
Ridgefield Park Supplemental CSO Team

Range of Alternatives

Green Infrastructure

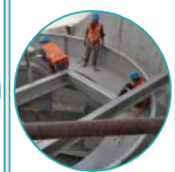
Storage

Treatment Plant Expansion



Infiltration / Inflow Reduction

Sewer Separation



End-of-Pipe Treatment

WWTP Bypass

Range of alternatives, different levels of control, numerous combinations

15 28 May 2019

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

The Big Picture

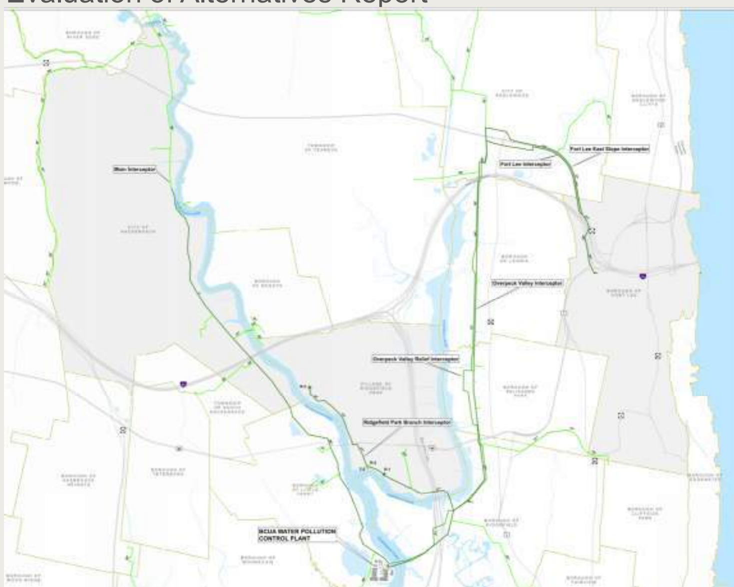
BCUA Facilities

- Transport
- Treatment

Mott MacDonald | Presentation 16 28 May 2019

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

Mott MacDonald | Presentation 21 28 May 2019

Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report

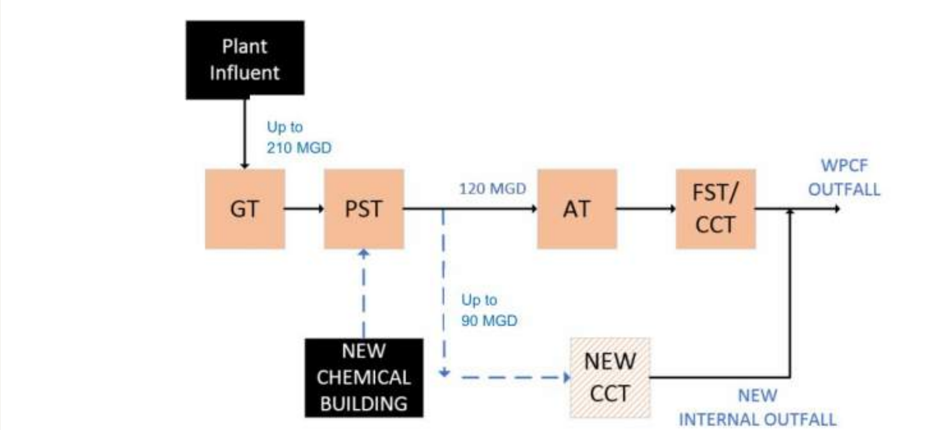


Figure 6. CEPT Alternative Block Flow Diagram

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

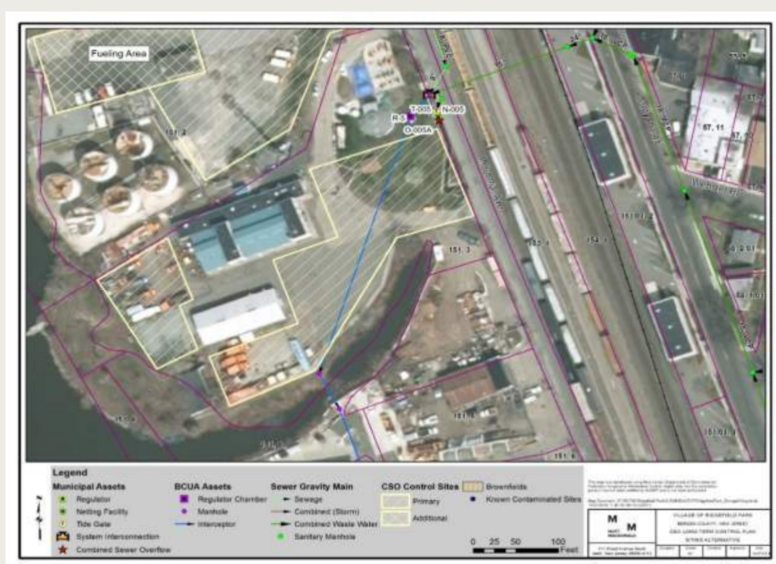
Area available: 0.8 Acres

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

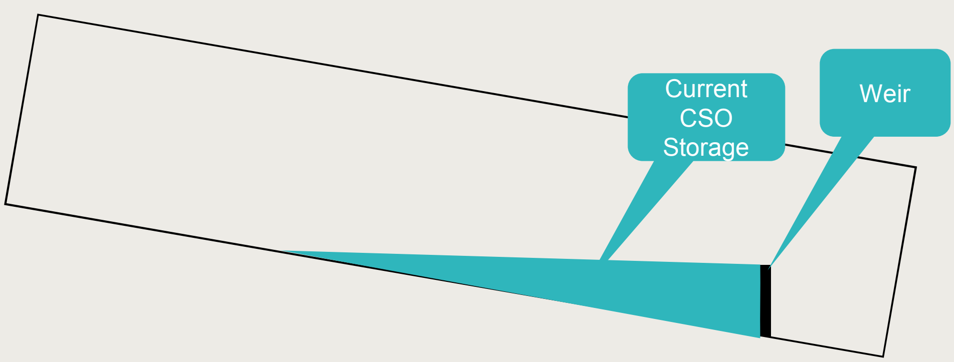
Potential locations considered:

- 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

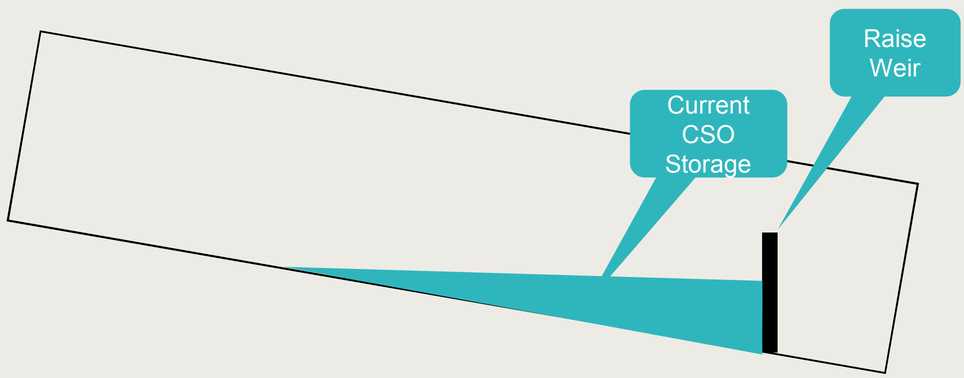
Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

Development and Evaluation of Alternatives Report – Screening

Maximize inline storage capacity



Ridgefield Park Supplemental CSO Team

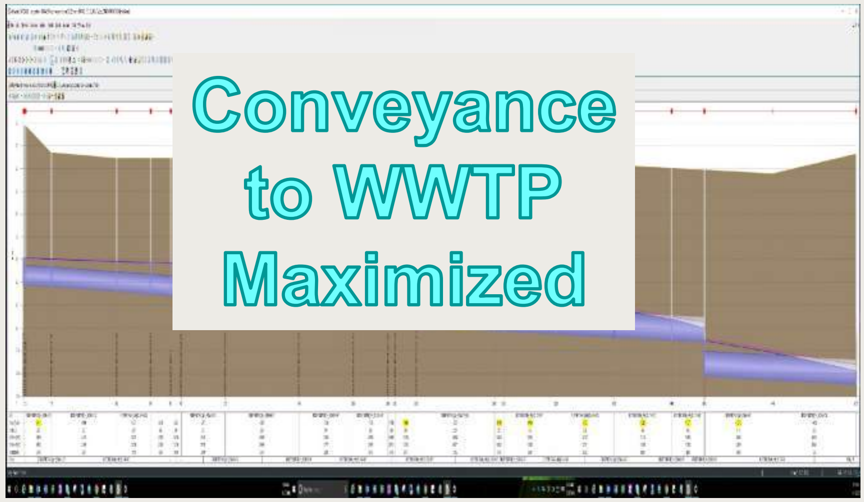
Development and Evaluation of Alternatives Report – Screening

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

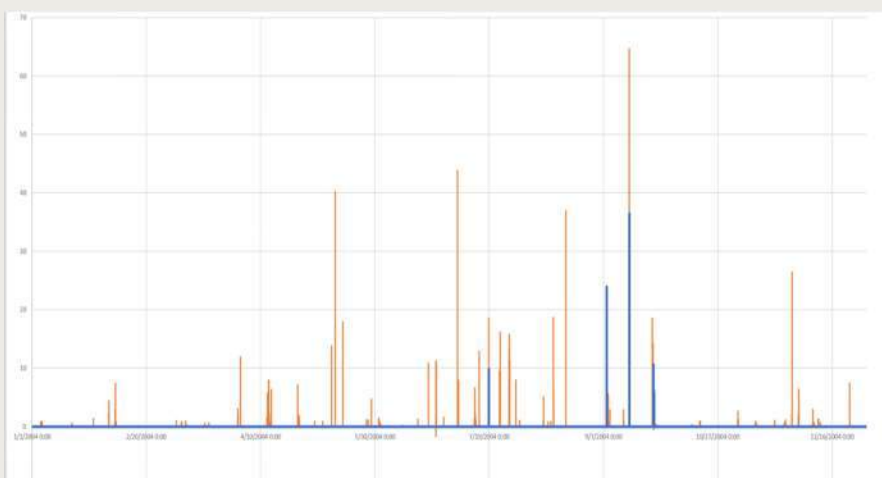


Mott MacDonald | Presentation 31 28 May 2019

Ridgefield Park Supplemental CSO Team

NJ CSO Group Coordination

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



Mott MacDonald | Presentation 32 28 May 2019

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

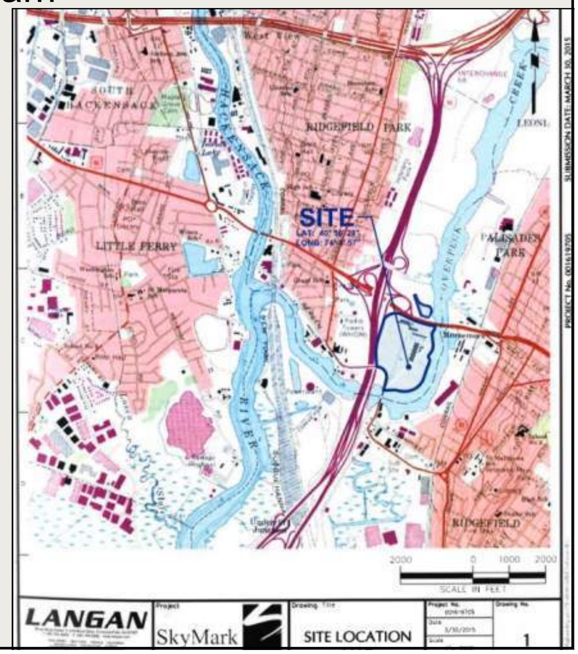
Future Baseline Conditions

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

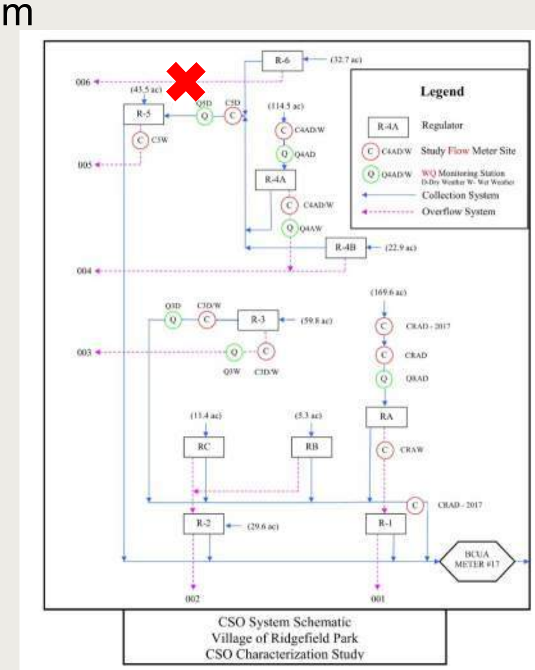
- Future growth associated with Skymark and outside of combined area.



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006



Ridgefield Park Supplemental CSO Team

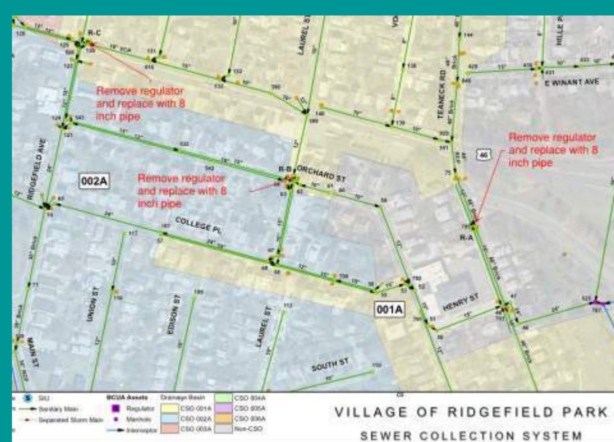
Control Programs

- Eliminate Regulator 006

Ridgefield Park Supplemental CSO Team

Control Programs

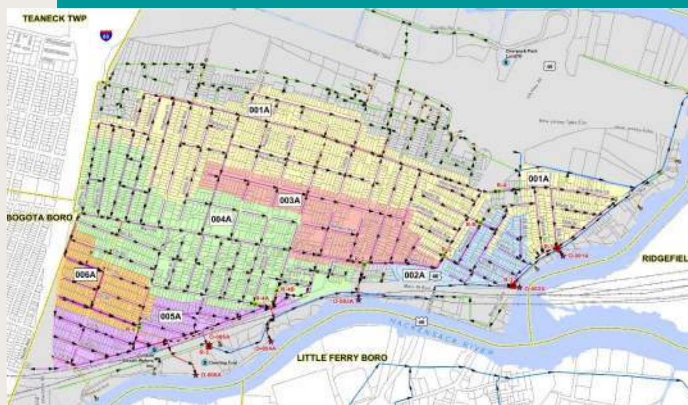
- Eliminate Regulator 006
- Eliminate Internal Regulators



Ridgefield Park Supplemental CSO Team

Control Programs

- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation



Ridgefield Park Supplemental CSO

Control Programs

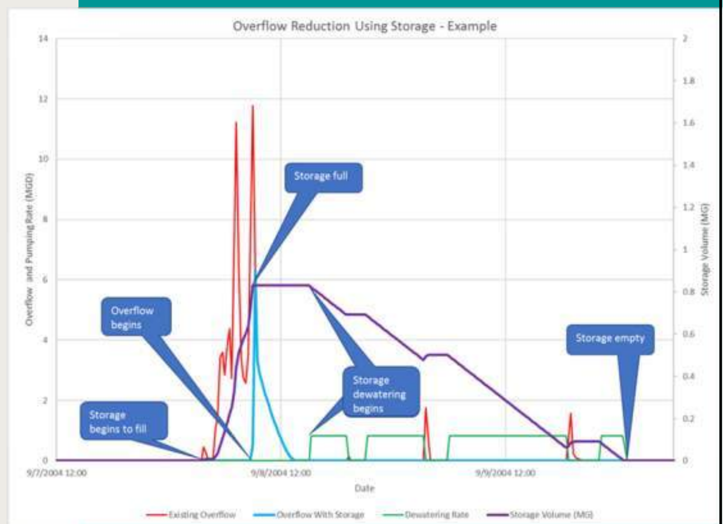
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation

- 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

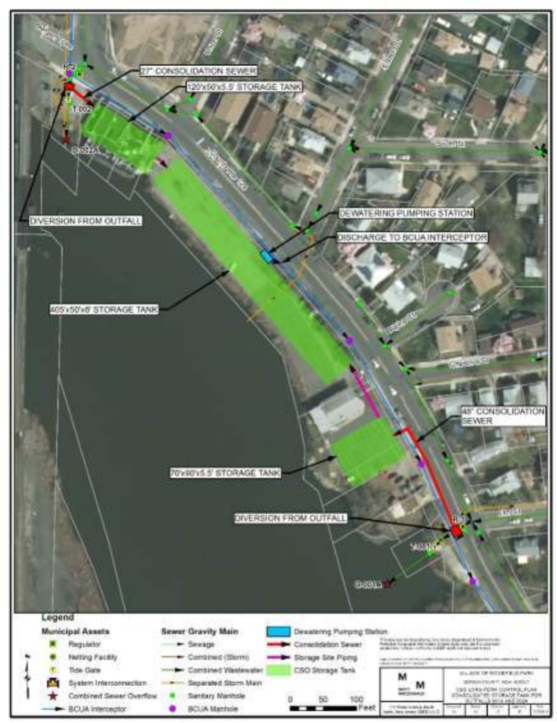
Control Programs

- 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

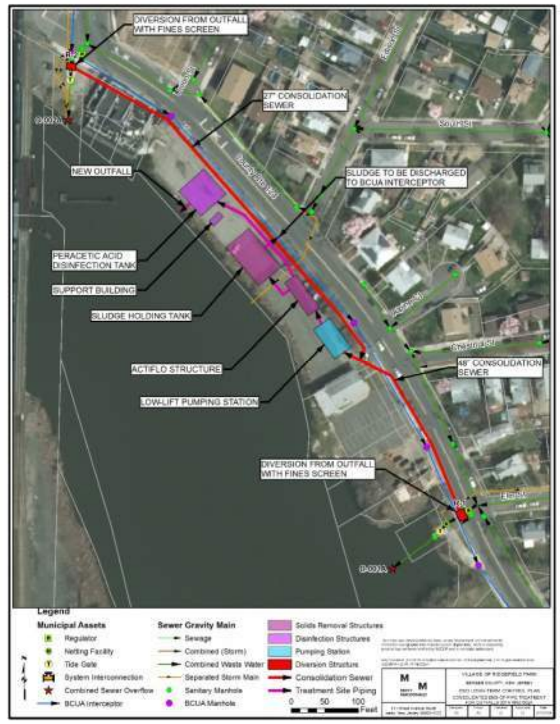
Control Programs

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

Ridgefield Park Supplemental CSO Team

Control Programs

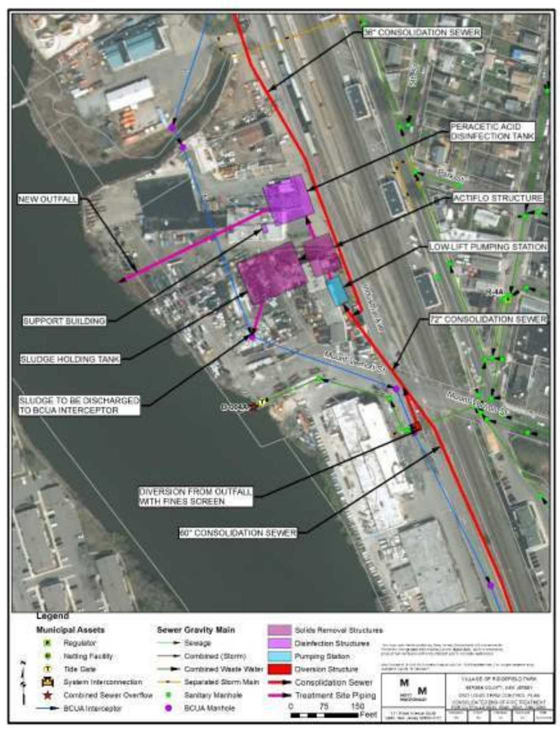
- Eliminate Regulator 006
- Eliminate Internal Regulators
- Sewer Separation
- Consolidated Storage
- Tunnel
- Green Infrastructure
- End of Pipe Treatment



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

Mott MacDonald | Presentation 55 28 May 2019

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

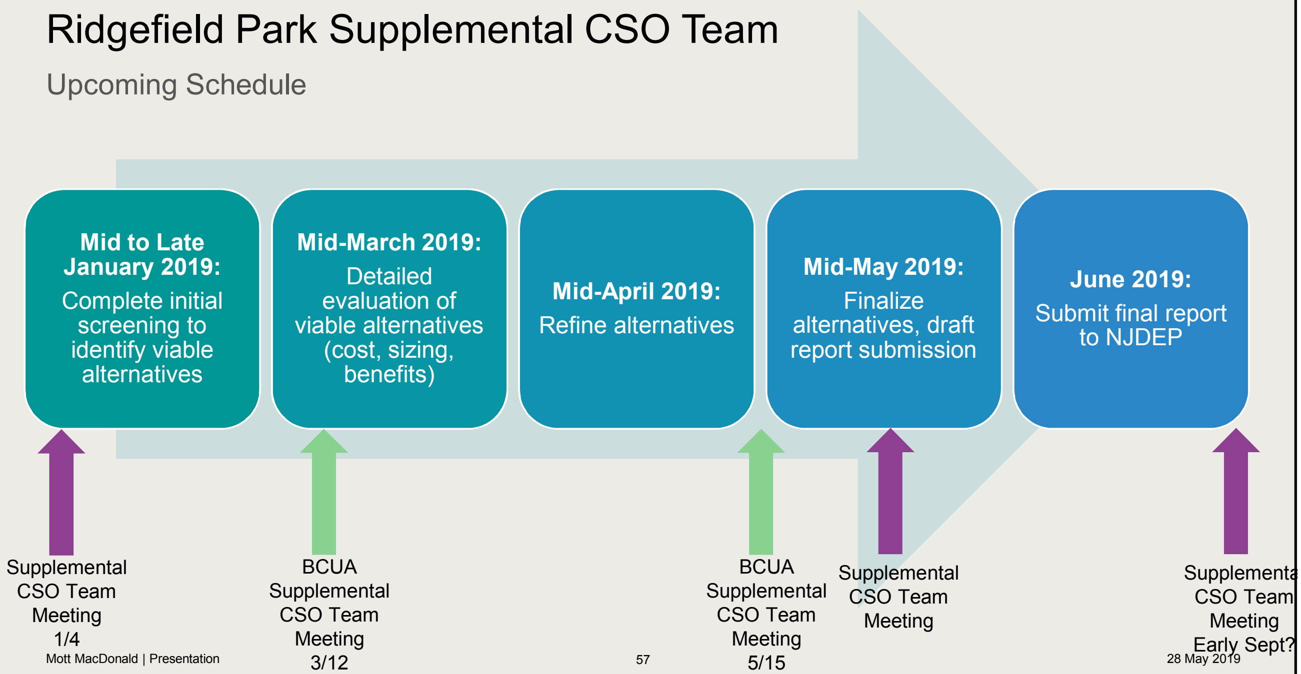
Step 3.

- Selection and Implementation of Alternatives Report
- Final LTCP – Due on 6/1/2020

56 May 28, 2019

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?

59 01 June 2019

Thank You?

60 01 June 2019

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
[illegible]	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
[illegible]	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
[illegible]	John Ponticorvo	Wanda Canoe Club	jponticorvo@aol.com	201-803-3643
AOG	Alan O'Grady	Village of Ridgefield Park DPW	aog560@aol.com	201-440-4860
	Mike Monroe	Village of Ridgefield Park DPW	ed81563@gmail.com	
	GERARD Garofalo			201-661-0767 201-440-4694
[illegible]	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

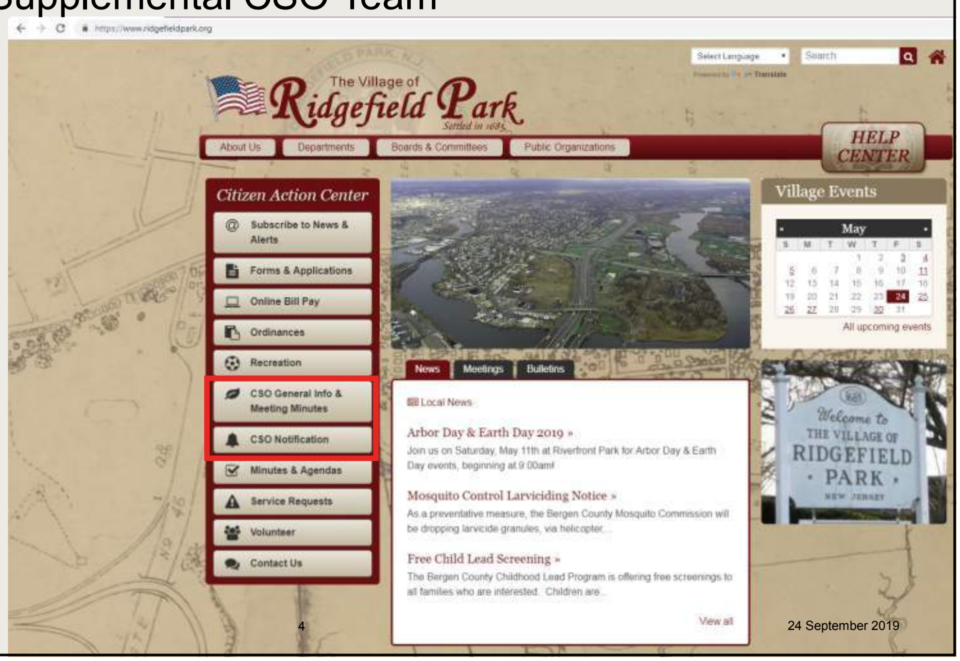
Meeting No. 9 Agenda

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

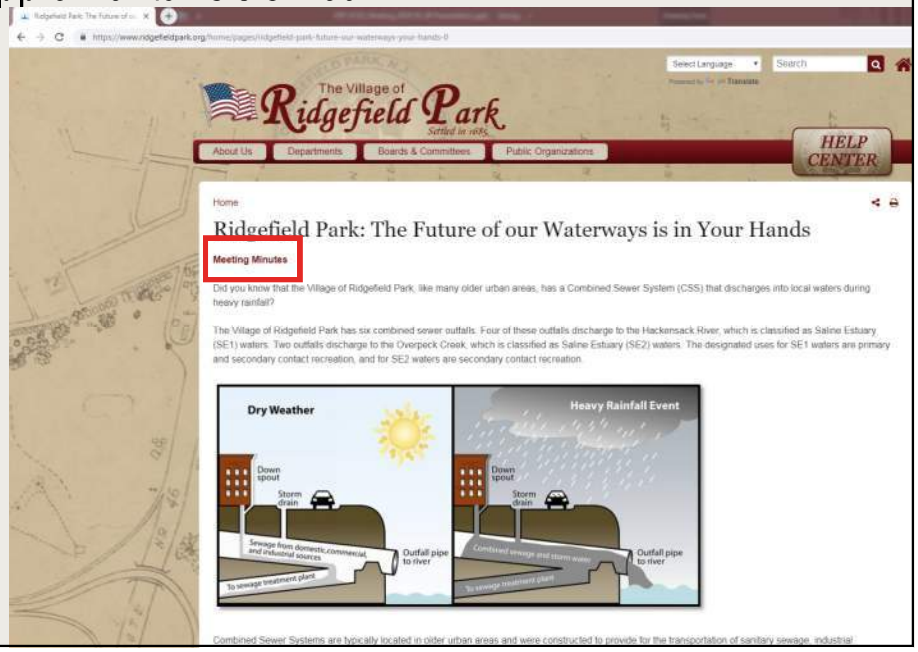
Ridgefield Park Supplemental CSO Team

Meeting Minutes



Ridgefield Park Supplemental CSO Team

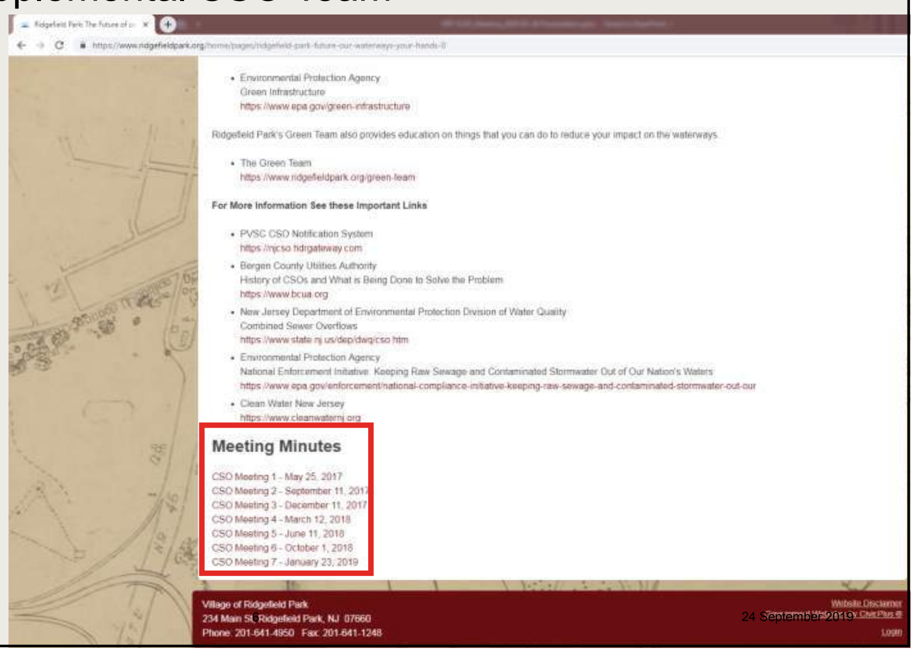
Meeting Minutes



Mott MacDonald | Presentation

Ridgefield Park Supplemental CSO Team

Meeting Minutes



Mott MacDonald | Presentation

24 September 2019

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 <u>reasonable range</u> of CSO control alternatives that <u>will meet the water quality-based requirements of the CWA</u>

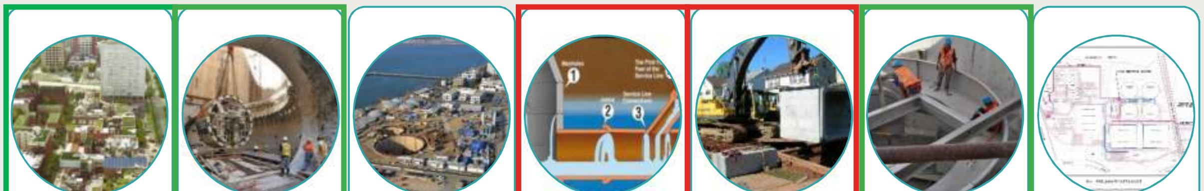
The Development and Evaluation of Alternatives Report shall include <u>a list of control alternative(s)</u> evaluated for each CSO enabling the permittee, …to select the alternatives to ensure the CSO controls will meet the water quality-based requirements of the CWA

The permittee shall evaluate the <u>practical</u> and <u>technical feasibility</u> 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 <u>Demonstration or Presumption</u> Approach

Ridgefield Park Supplemental CSO Team

Range of Alternatives



Green Infrastructure | Storage | Treatment Plant Expansion | Infiltration / Inflow Reduction | Sewer Separation | End-of-Pipe Treatment | WWTP Bypass

Range of alternatives, different levels of control, numerous combinations

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:
    - $(P|A, i\%, n) = ((1+i)^n-1)/((i(1+i)^n)$

11

Alternatives Evaluation

Control Program 1 - Elimination of Outfall 006A

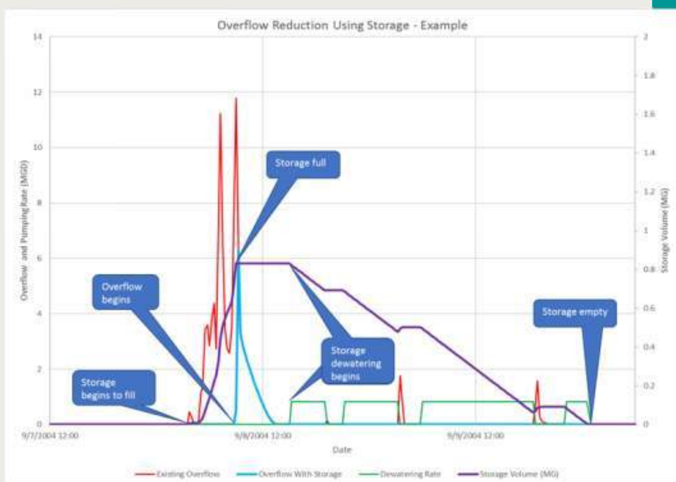
Small overflow volume at 006A

- 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

14

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

15

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.

16

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

17

Alternatives Evaluation

Control Program 3 –
Consolidated Tunnel Storage Contd.

Consolidated Tunnel Map

18

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.

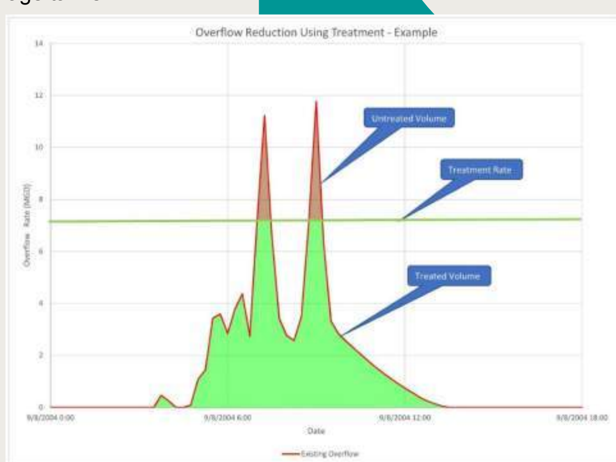
19

Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment

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

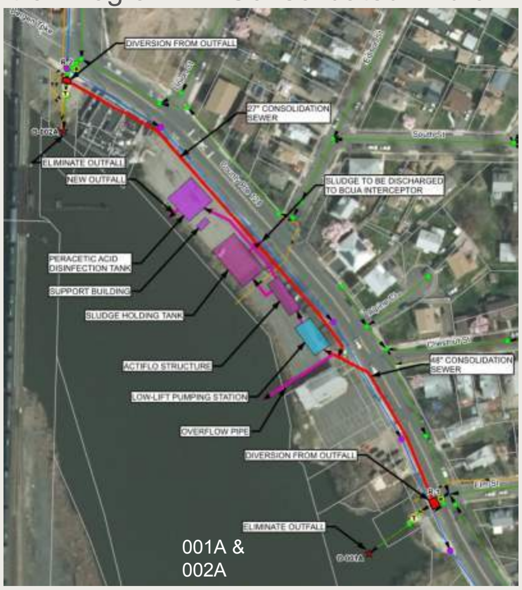
- Treatment capacity governed by flow, not volume like the storage tanks
- Treatment process:
  - Fine Screening for floatable and course particles
  - Pump Station
  - High-rate primary treatment (i.e. ActiFlo)
  - Disinfection by peracetic acid
  - Storage of underflow
- Similar pros and cons to consolidation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



20

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.

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%

23

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

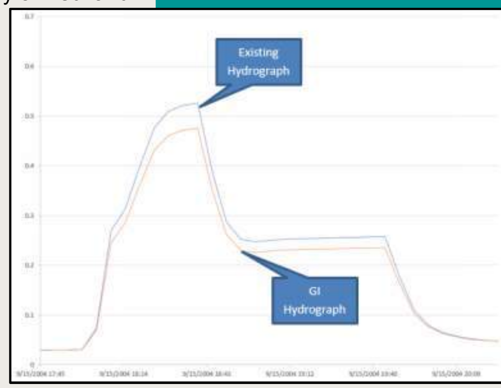
24

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



25

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.

26

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%	

27

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	

28

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

29

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%

30

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

BCUA CSO Group 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 Meeting

Public Meeting

Mott MacDonald | Presentation 33 10 September 2019

Final Questions?

34 27 September 2019

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
[illegible]	Stephen Quinn	Ridgefield Park Environmental Commission	stephencquinn@aol.com
LQ	Linda Quinn	Ridgefield Park Environmental Commission	linda.quinn125@gmail.com
[illegible]	John Ponticorvo	Wanda Canoe Club	jponticorvo@aol.com
AOG	Alan O'Grady	Village of Ridgefield Park DPW	aog560@aol.com
MM	Mike Monroe	Village of Ridgefield Park DPW	ed81563@gmail.com
[illegible]	Dayvonn Jones	NJDEP	dayvonn.jones@dep.nj.gov
[illegible]	Johnathan Lakhicharran	NJDEP	johnathan.lakhicharran@dep.nj.gov
PZ	Pavel Zhinkin	Mott MacDonald	pavel.zhinkin@mottmac.com

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

Mott MacDonald | Presentation 2 10 February 2020

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.

- 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

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

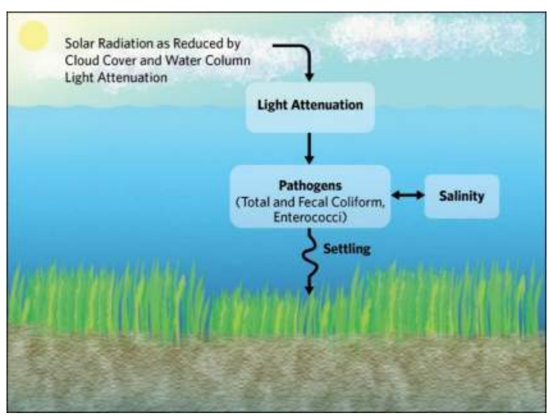
- Hydrodynamic Model (ECOMSED)
  - Water Elevation
  - Currents
  - Temperature
  - Salinity
- WQ Model (RCA)
  - Salinity
  - Tracer
  - E. coli
  - Fecal coliform
  - Enterococci
- Both models are run on the same grid (segmentation)
  - 10 vertical layers

7

Pathogen Model

Factors that affect bacteria

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



8

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)

Mott MacDonald | Presentation 10 10 February 2020

10

WQM Component Analysis

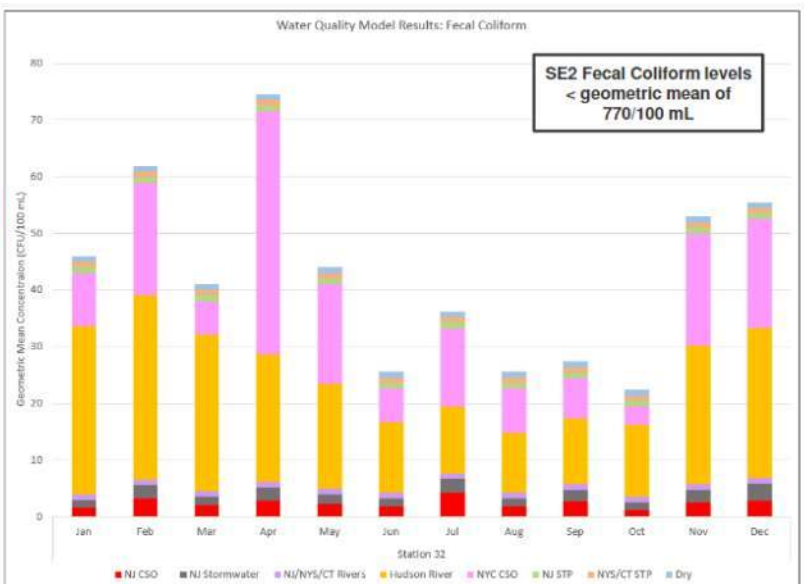
- WQ Component Analysis:
  - E. coli
  - Fecal
  - Enterococci
- Components:
  - NJ CSO
  - NJ SW/Runoff
  - NJ STP
  - NJ/NY/CT Rivers
  - Hudson River
  - Dry-weather
  - NYC CSO+SW
  - NY/CT STP

CLEAN WATERWAYS Healthy Neighborhoods

7

11

WQM Component Analysis – Fecal Coliform-Hudson River



CLEAN WATERWAYS Healthy Neighborhoods

15

12

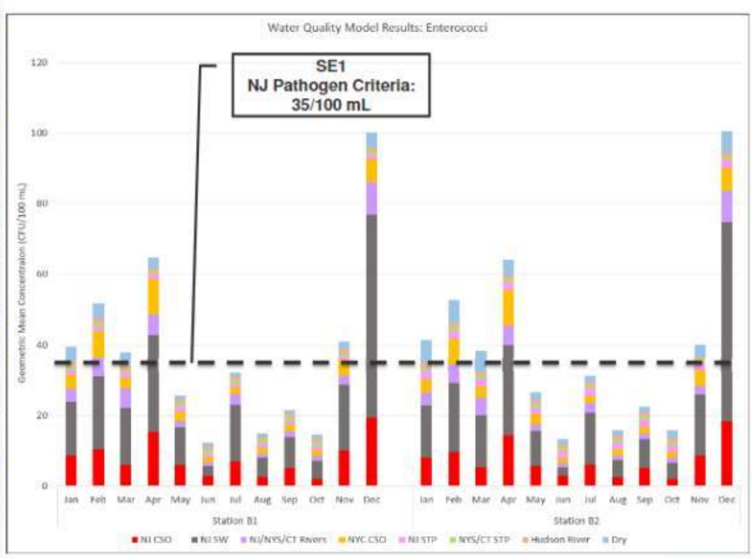
WQM Attainment

CONFIDENTIAL: THIS DOCUMENT CONTAINS ADVISORY, CONSULTATIVE AND/OR DELIBERATIVE MATERIAL. NOT SUBJECT TO DISCLOSURE UNDER THE NEW JERSEY OPEN PUBLIC RECORDS ACT OR THE COMMON LAW.

CLEAN WATERWAYS
Healthy Neighborhoods

13

WQM Component Analysis – Upper Hackensack River -Enterococci

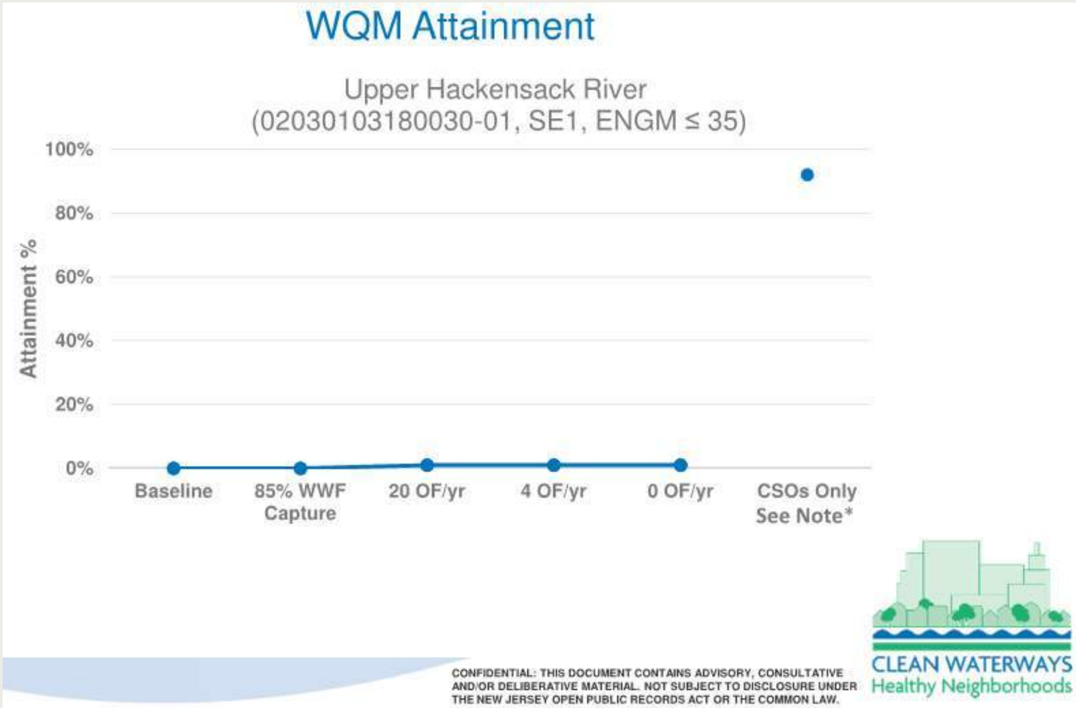


18

CONFIDENTIAL: THIS DOCUMENT CONTAINS ADVISORY, CONSULTATIVE AND/OR DELIBERATIVE MATERIAL. NOT SUBJECT TO DISCLOSURE UNDER THE NEW JERSEY OPEN PUBLIC RECORDS ACT OR THE COMMON LAW.

CLEAN WATERWAYS
Healthy Neighborhoods

14



15

Ridgefield Park Supplemental CSO Team

Alternatives Recommendations

Mott MacDonald | Presentation 16 10 February 2020

16

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

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

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

19

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

20

Alternatives Evaluation

Control Program 2 - Consolidated Tank Storage Contd.

21

Alt

Co

22

Alternatives Evaluation

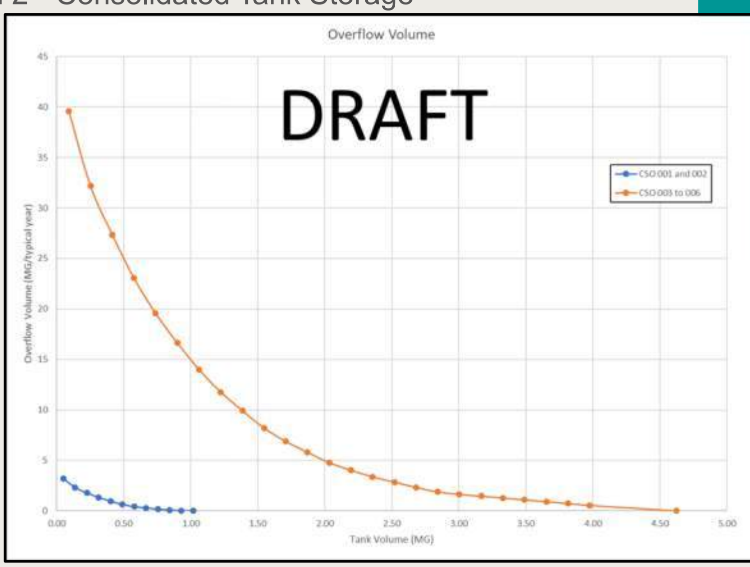
Control Program 2 - Consolidated Tank Storage Contd.

003A-
006A

23

DRAFT - Preliminary Alternatives Selection

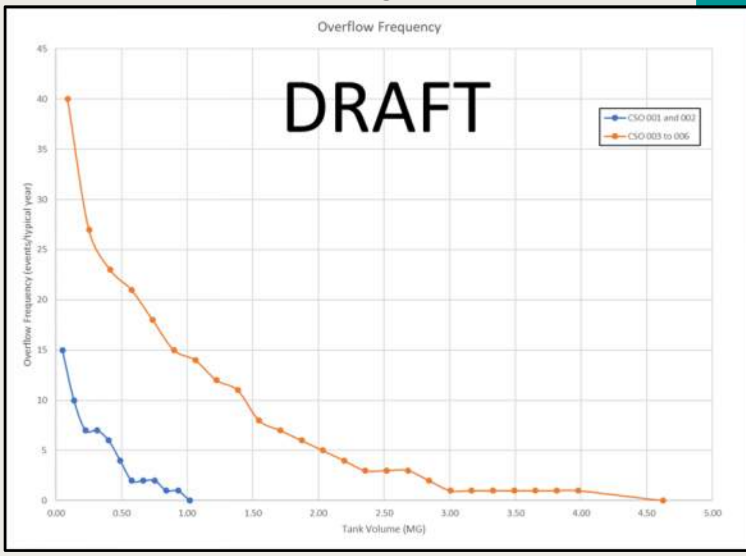
Control Program 2 - Consolidated Tank Storage



24

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

Mott MacDonald | Presentation 27 10 February 2020

27

Alternatives Evaluation

Control Program 3 –
Consolidated Tunnel Storage Contd.

Mott MacDonald | Presentation 28 10 February 2020

28

Alternatives Evaluation

Control Program 3 –
Consolidated Tunnel Storage Contd.

29

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%)

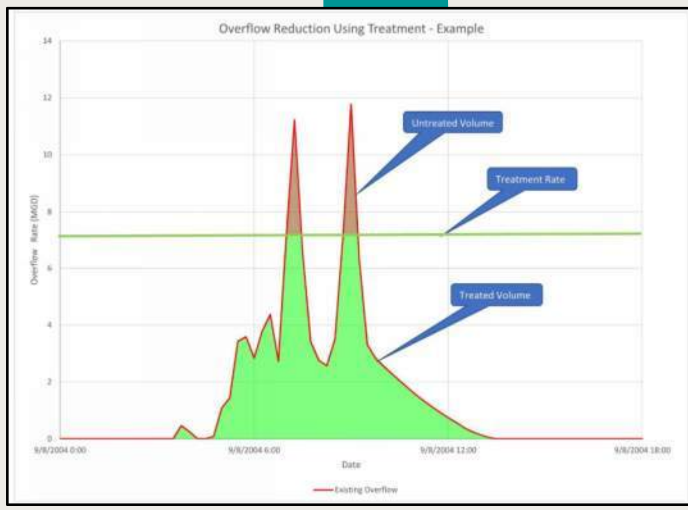
$2.20-$2.40/gal of CSO removed during typical year.
RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

30

Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.

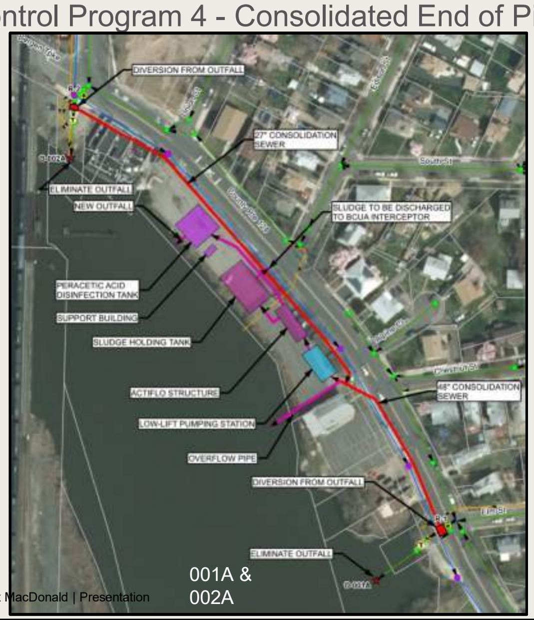
- Pros:
  - Elimination of outfalls, 6 reduced to 2
  - Provides full or partial treatment at all times
- Cons:
  - Most complex system
  - Surface facilities
  - Higher cost
  - Potential future effluent limits



31

Alternatives Evaluation

Control Program 4 - Consolidated End of Pipe Treatment Contd.



32

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.

RECOMMEND - ELIMINATE DUE TO COST AND COMPLEXITY

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

Alternatives Evaluation

Control Program 5 - Sewer Separation

Effectively removes the Village from being a CSO community

$193M (Class 5 Cost Estimate: -50%+100%)

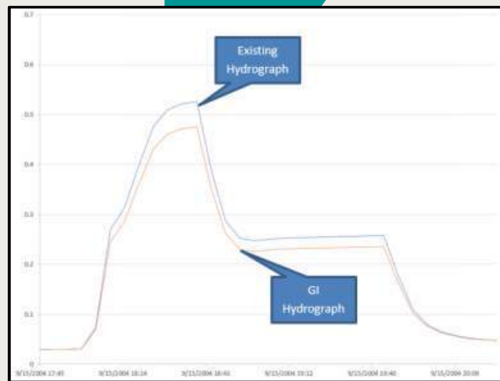
$3.8/gal of CSO removed during typical year

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

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

37

Alternatives Evaluation

Control Program 6 - Green Infrastructure

Distributed storage or detention throughout the village

38

39

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

40

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 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

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%

43

Ridgefield Park Supplemental CSO Team

Input on Alternatives

44

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?

45

Ridgefield Park Supplemental CSO Team

Financial Capability Assessment

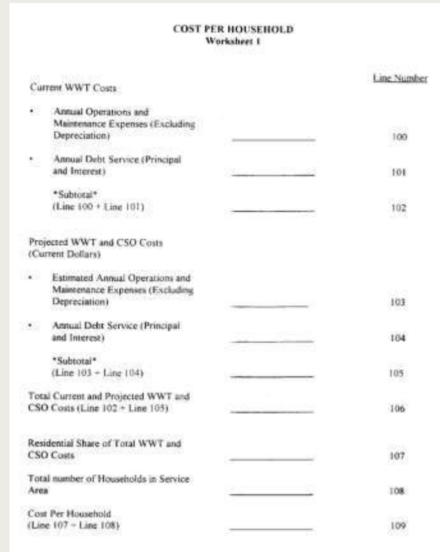
46

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

Mott MacDonald | Presentation 49 10 February 2020

49

Ridgefield Park Supplemental CSO Team

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)

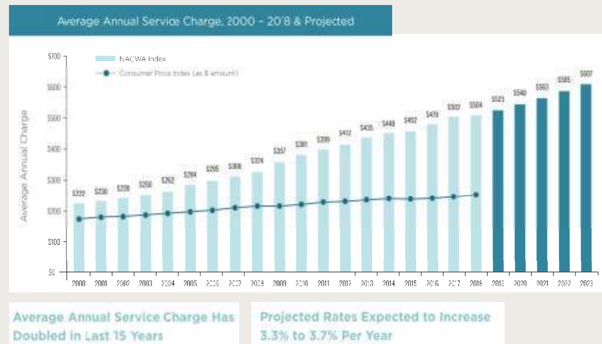
Mott MacDonald | Presentation 50 10 February 2020

50

Ridgefield Park Supplemental CSO Team

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

51

Ridgefield Park Supplemental CSO Team

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?

52

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment

So what is this all about?

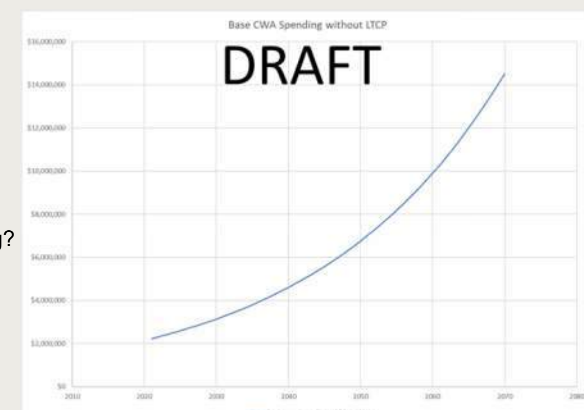
- So now we turn it into a LTCP
  - What are my Wastewater and Stormwater expenses?
  - What is my Median Household Income (MHI) and is it growing?
  - What projects will I build and when?
  - What do the projects cost?
  - How much will it cost to maintain?
  - What will my payments be?
  - What is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

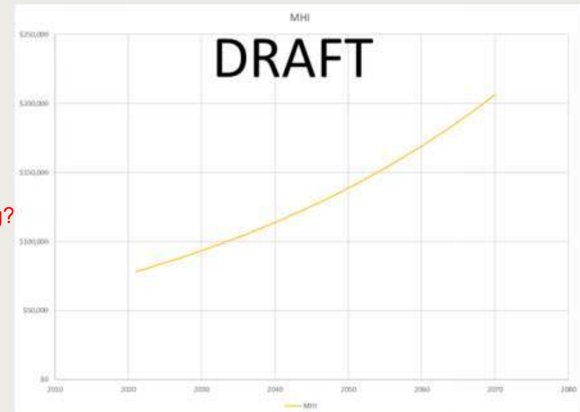
- BCUA $1.4 M
- Estimated other expenses $0.7 M

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?



Mott MacDonald | Presentation 55 10 February 2020

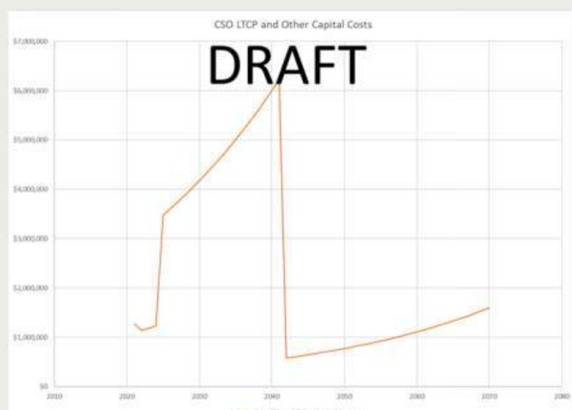
55

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?



Mott MacDonald | Presentation 56 10 February 2020

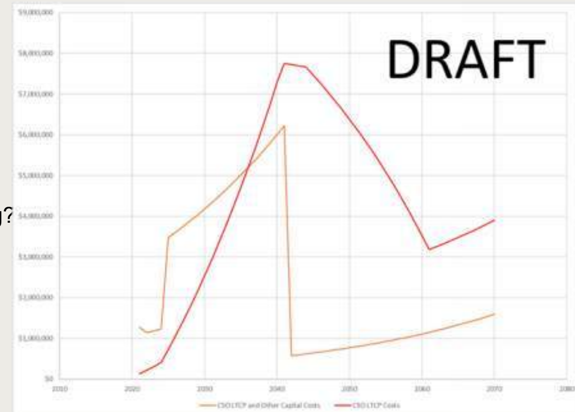
56

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?

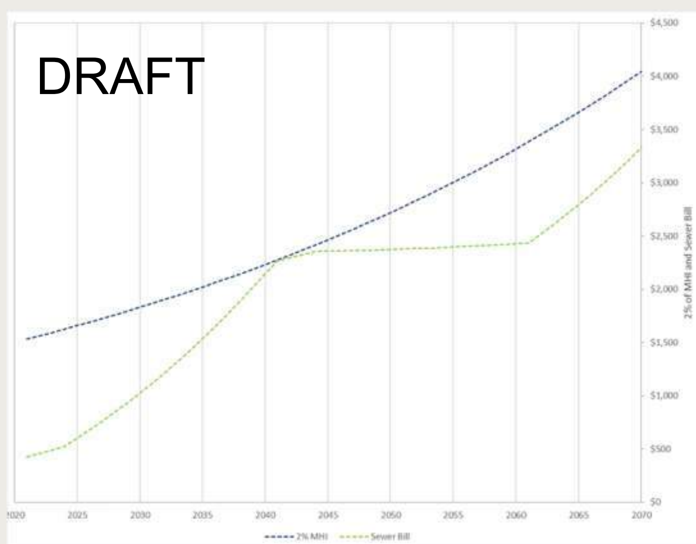


57

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment

What is the impact to me?

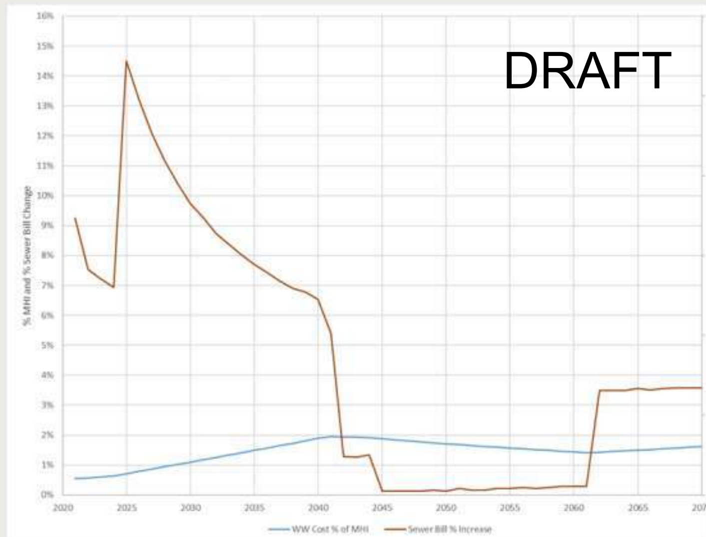


58

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment

What is the impact to me?



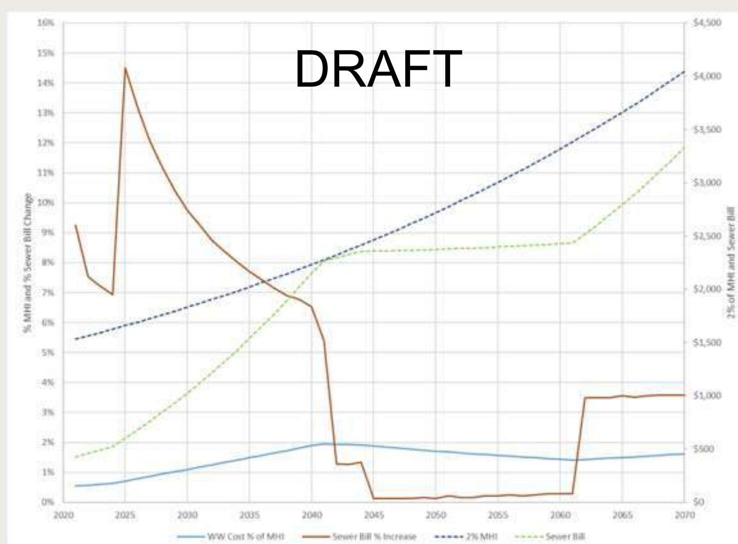
Mott MacDonald | Presentation 59 10 February 2020

59

Ridgefield Park Supplemental CSO Team

Financial Capabilities Assessment

What is the impact to me?



Mott MacDonald | Presentation 60 10 February 2020

60

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)

Final Questions?

Thank You?

63

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

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**

Supplemental CSO Team Meeting #11 3 July 30, 2020

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)

Supplemental CSO Team Meeting #11 4 July 30, 2020

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

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

11.5% of BCUA total

216
MG Wet Weather Inflow

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

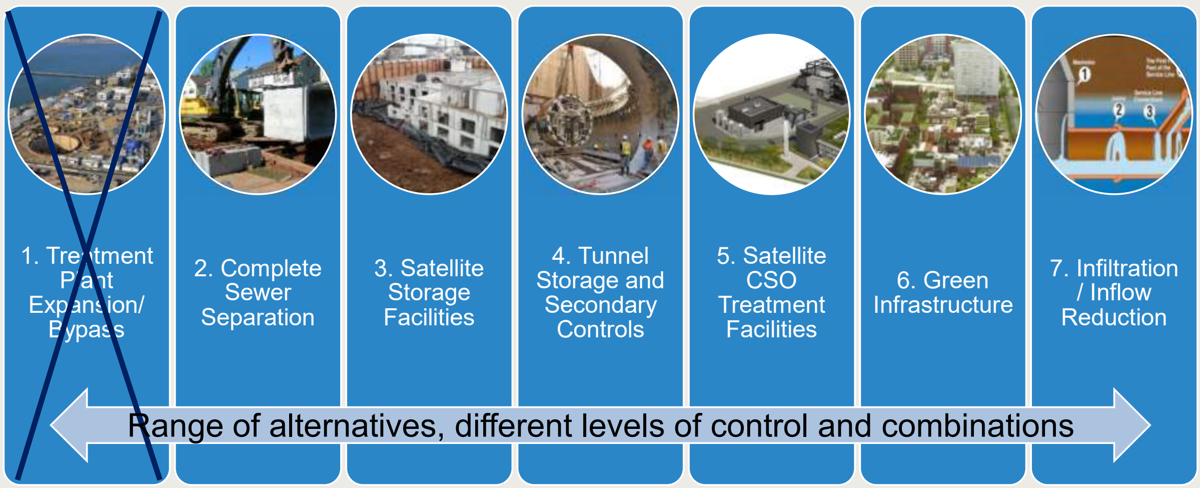
459
Million gallons per year Total combined sewer overflow volume BCUA System-wide

55
Typical Year Overflow Frequency

75.5%
Wet Weather Capture

Alternatives Evaluation

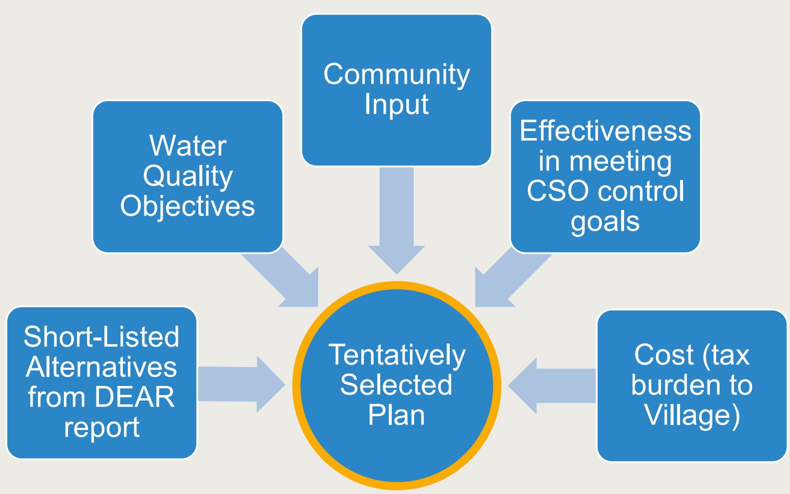
Control Programs Evaluated



7

Tentatively Selected Plan

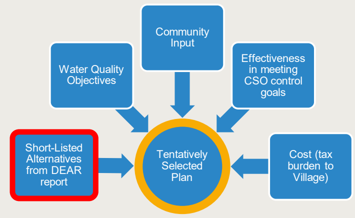
Selection Process



8

Rating of Ridgefield Park Alternatives

From Development and Evaluation of Alternatives Report



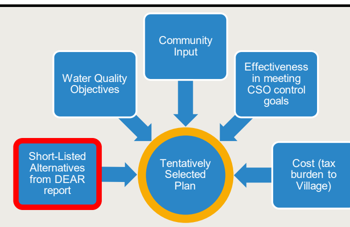
Requested SCSO Team input on rankings

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

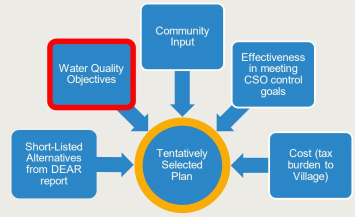
Presumption Approach Targeting 85 Percent Capture



- 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 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)

11

Water Quality Modeling

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

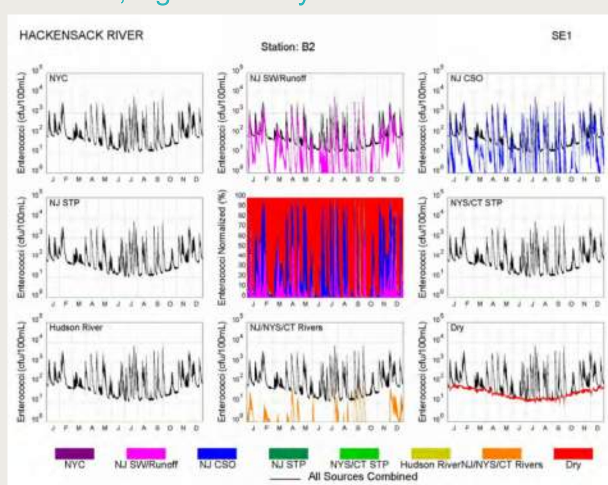


Figure 6-3. Component Analysis for Enterococci at Station B2

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

12

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.

13

Control Approach Selection

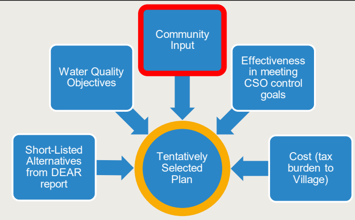
Presumption Approach Targeting 85 Percent Capture

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

14

Summary of Community Input

From previous Supplemental CSO Team meetings

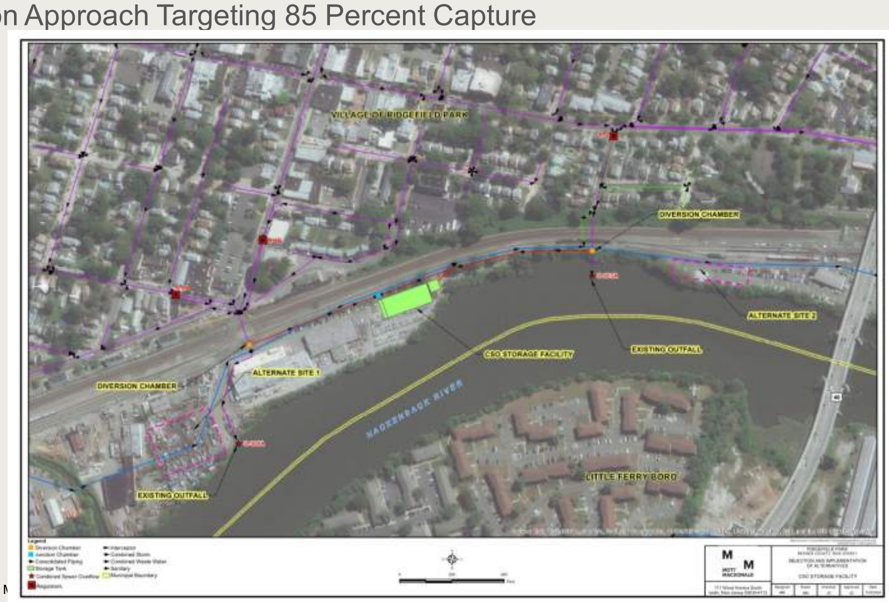


1. Cost is a priority for residents (both maintenance and capital)
2. Odor mitigation should be employed
3. Green infrastructure can be used as educational tool to supplement other CSO control alternatives due to cost and limited impact on CSO volumes.
4. Concern about the potential impact of future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

15

Tentatively Selected Plan – Subject to Change

Presumption Approach Targeting 85 Percent Capture



16

Tentatively Selected Plan – Subject to Change

Presumption Approach Targeting 85 Percent Capture

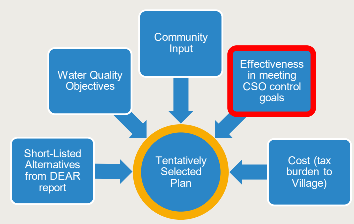
Supplemental CSO Team M

July 30, 2020

17

Tentatively Selected Plan

Knee of the curve



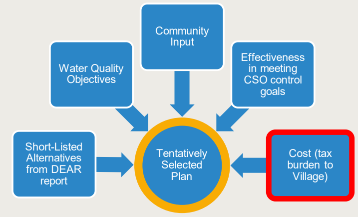
Supplemental CSO Team Meeting #11

18

July 30, 2020

18

Tentatively Selected LTCP Costs



Total Project Cost

- **Capital Costs** $14M
- **Permit Costs** $40k/yr
- **O&M Costs** $105K/yr

Supplemental CSO Team Meeting #11 19 July 30, 2020

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

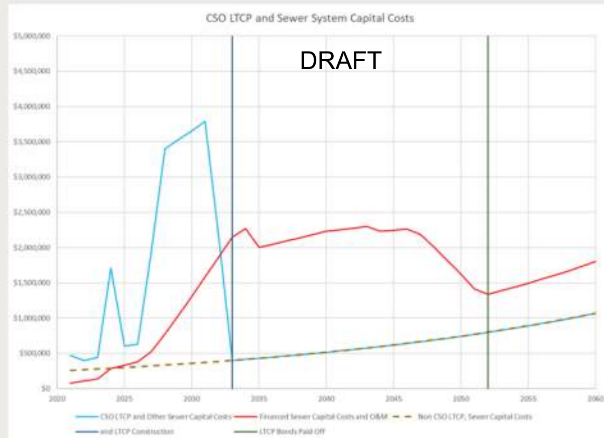
Years 15+
O&M

Supplemental CSO Team Meeting #11 20 July 30, 2020

20

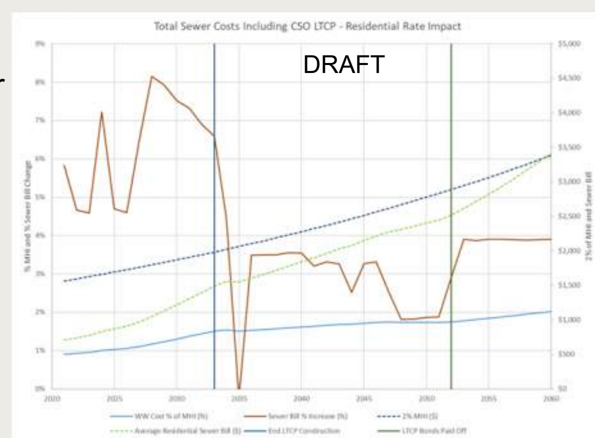
Cost Considerations

- 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

Reduced from 53

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

Reduced from 55

26
Typical Year Overflow Frequency

Increased from 75.5%

85.6%
Wet Weather Capture

23

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.

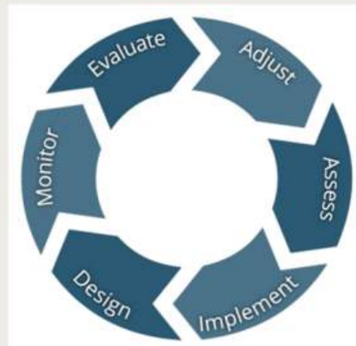
CSO facilities performance

- 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.

24

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



25

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

26

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

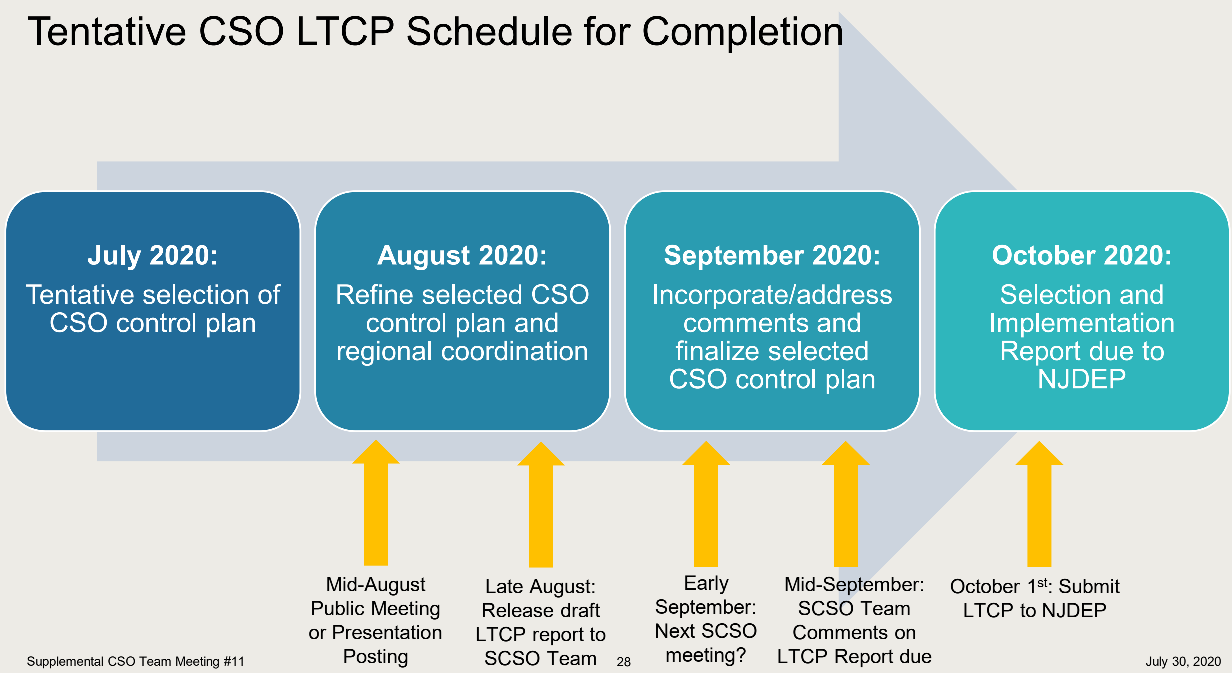
Advertising

- 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

Tentative CSO LTCP Schedule for Completion



Questions?

July 30, 2020 Supplemental CSO Team Meeting #11 29

29

Thank You!

July 30, 2020 Supplemental CSO Team Meeting #11 30

30

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

Contents

Tables

Figures

Appendices

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.

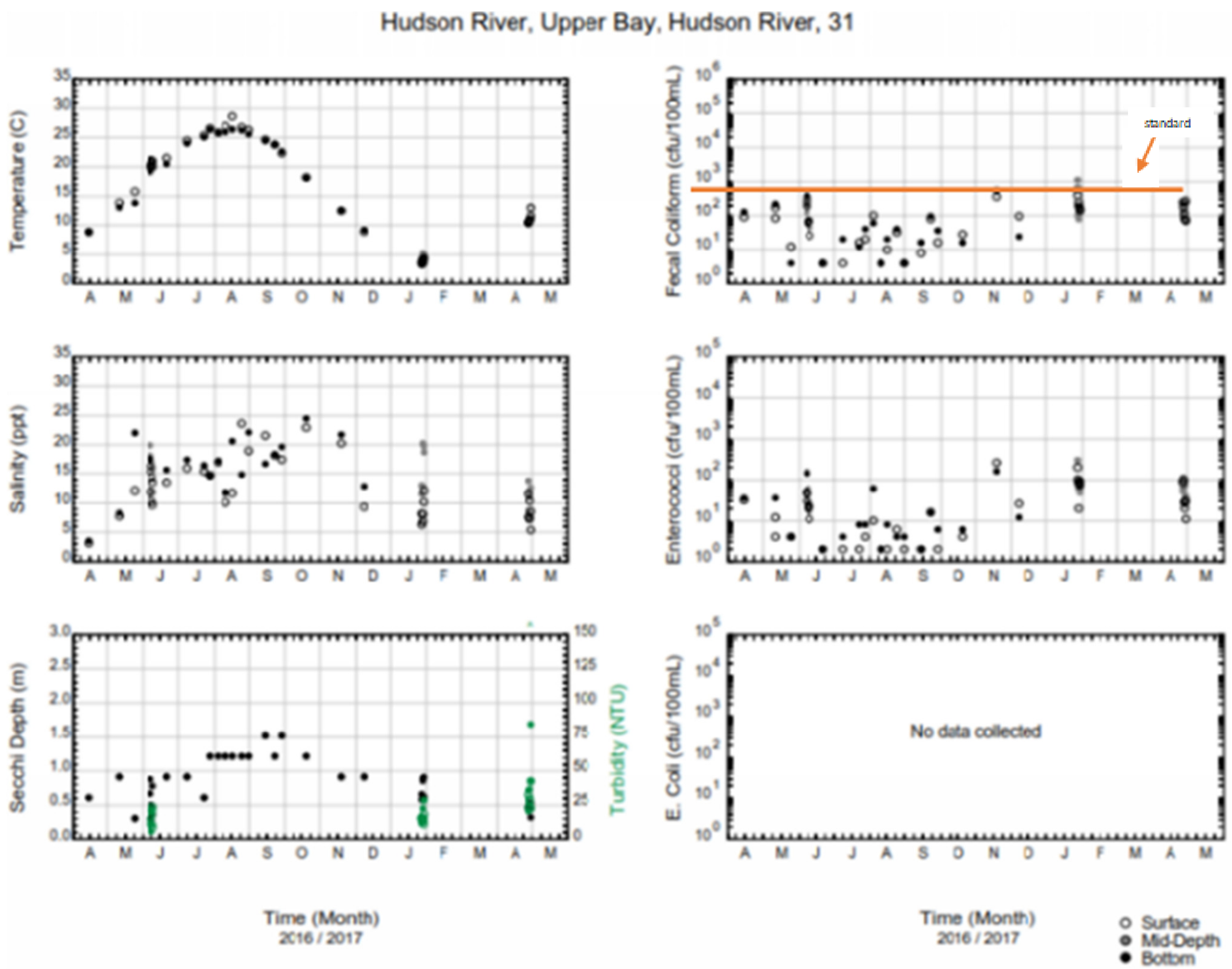


Figure 1. Water Quality Observed Data near Fort Lee Outfalls, Hudson River

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.

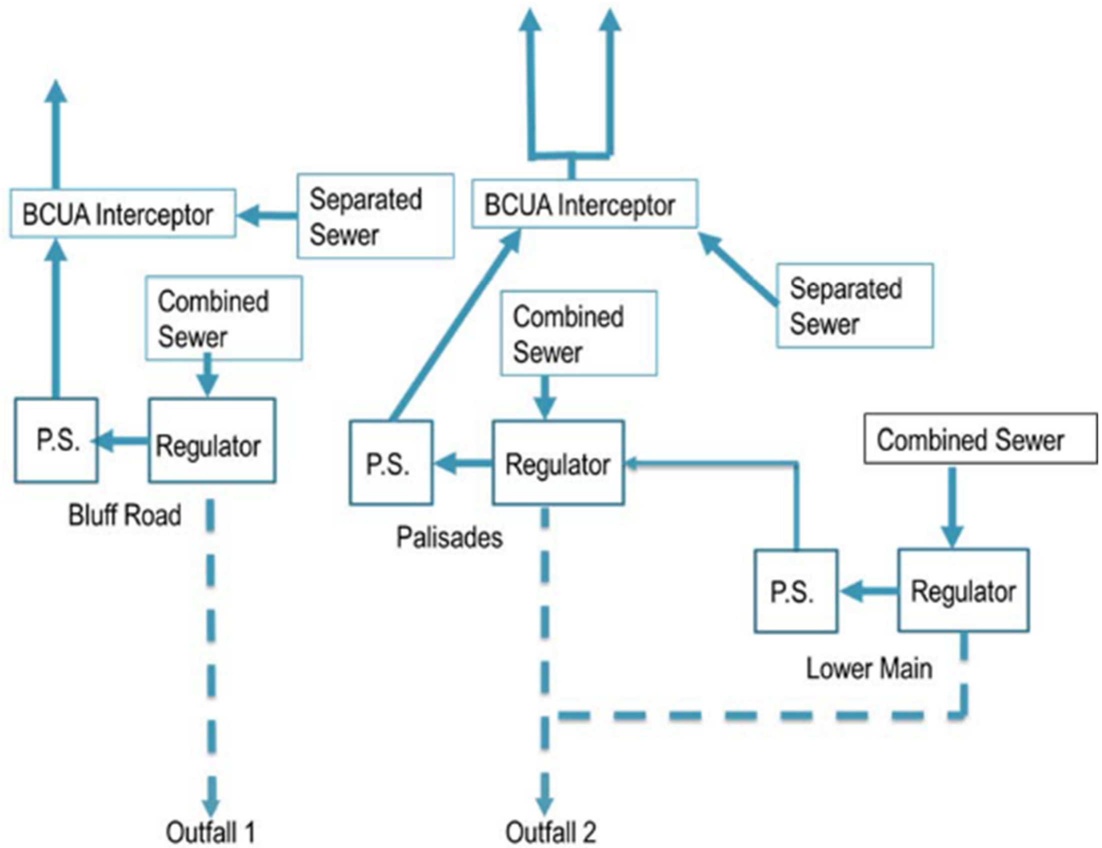


Figure 3. Historic Configuration of Fort Lee Collection System

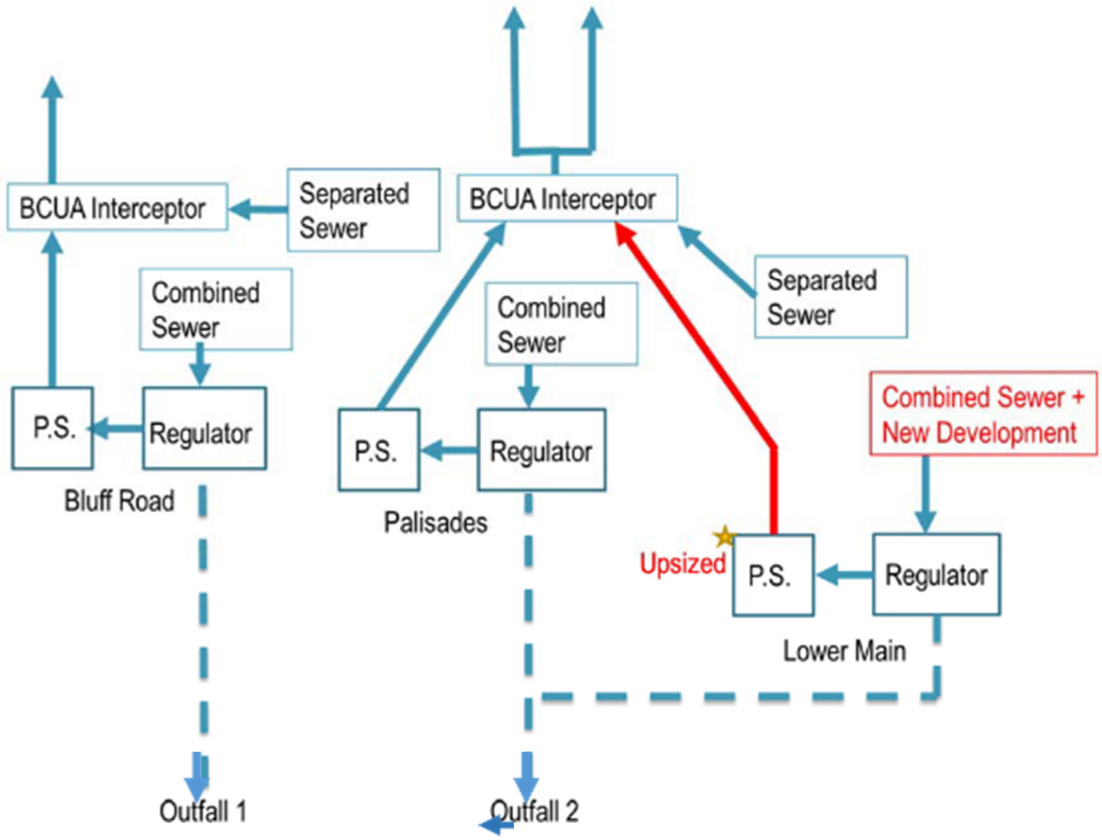


Figure 4. Present Configuration of Fort Lee Collection System

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.

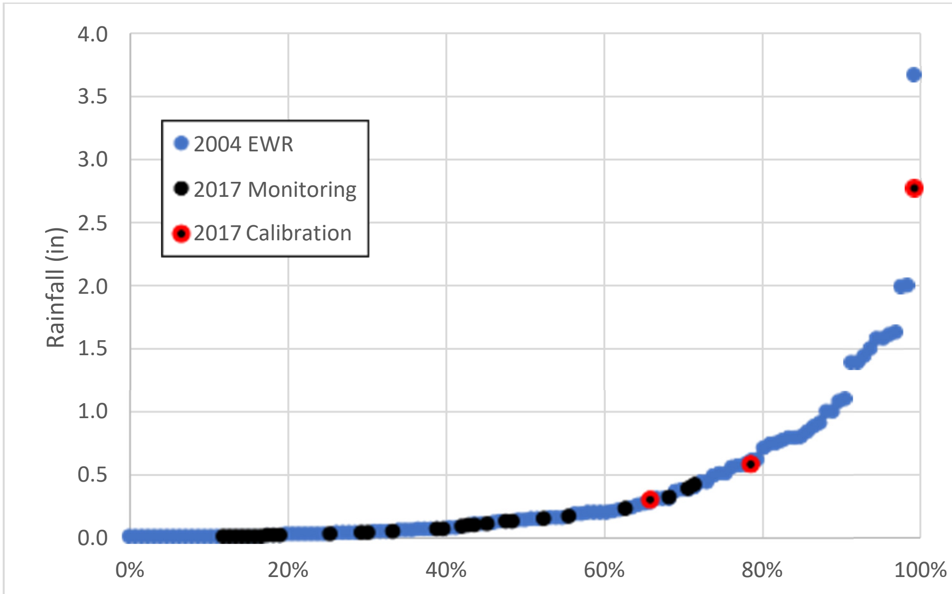


Figure 5. Rainfall Total Comparison during Typical Year

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.

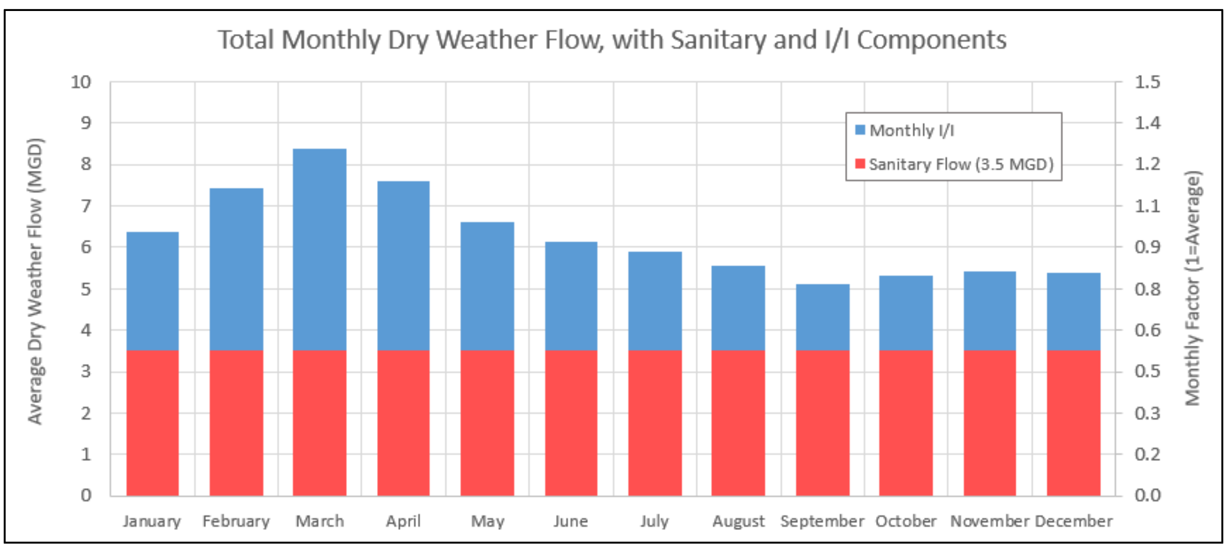
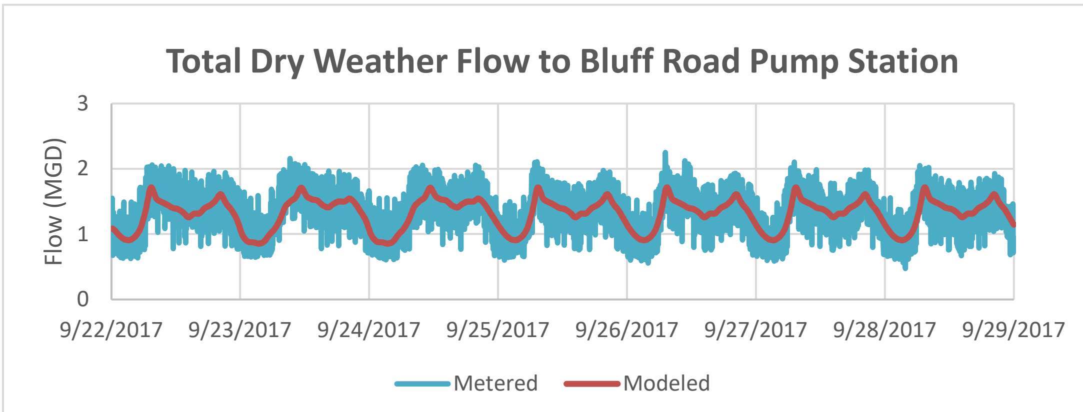
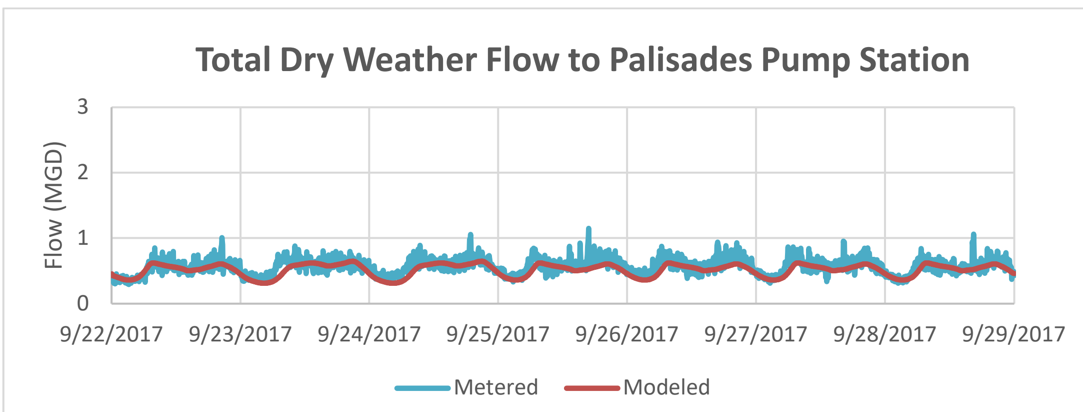


Figure 6. Monthly Variation in Total Dry Weather Flow, with Sanitary and GWI Components

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.





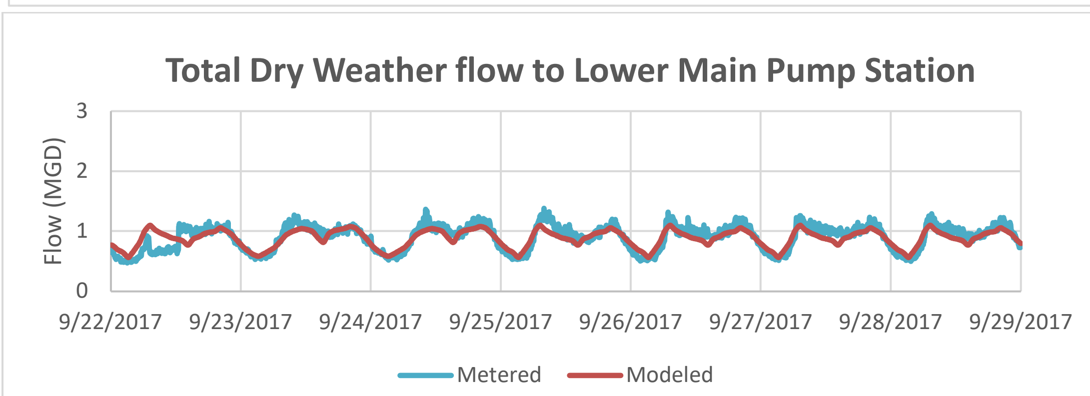


Figure 7. Dry-Weather Flow Calibration Results

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

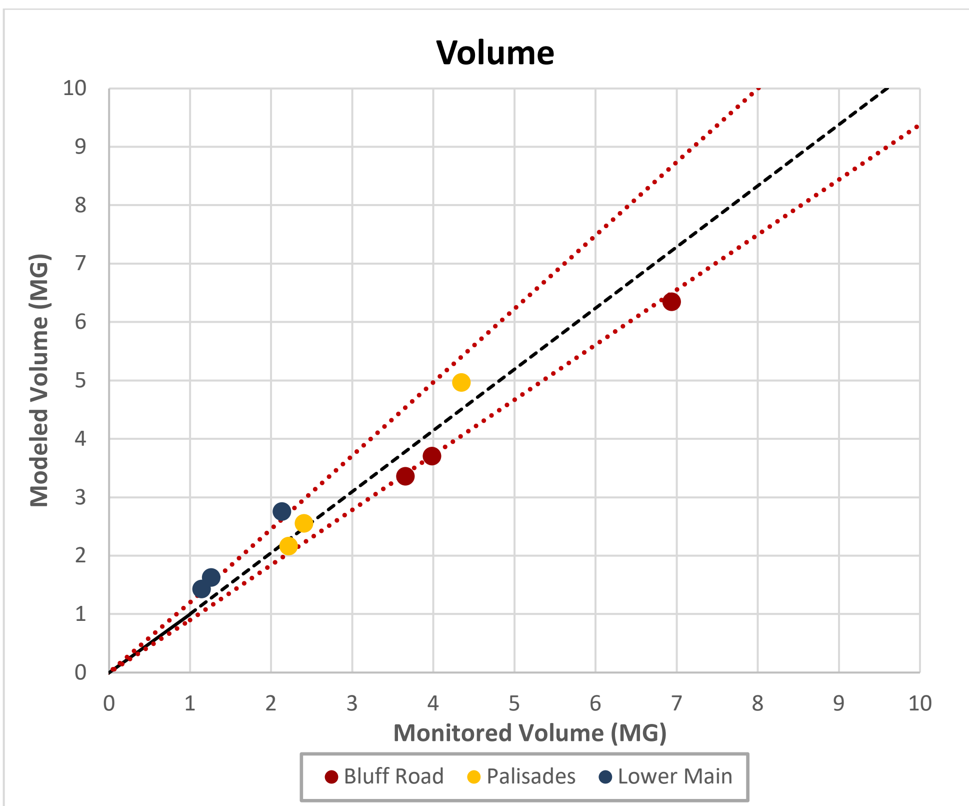
6.3.2 Wet-Weather Calibration Criteria

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

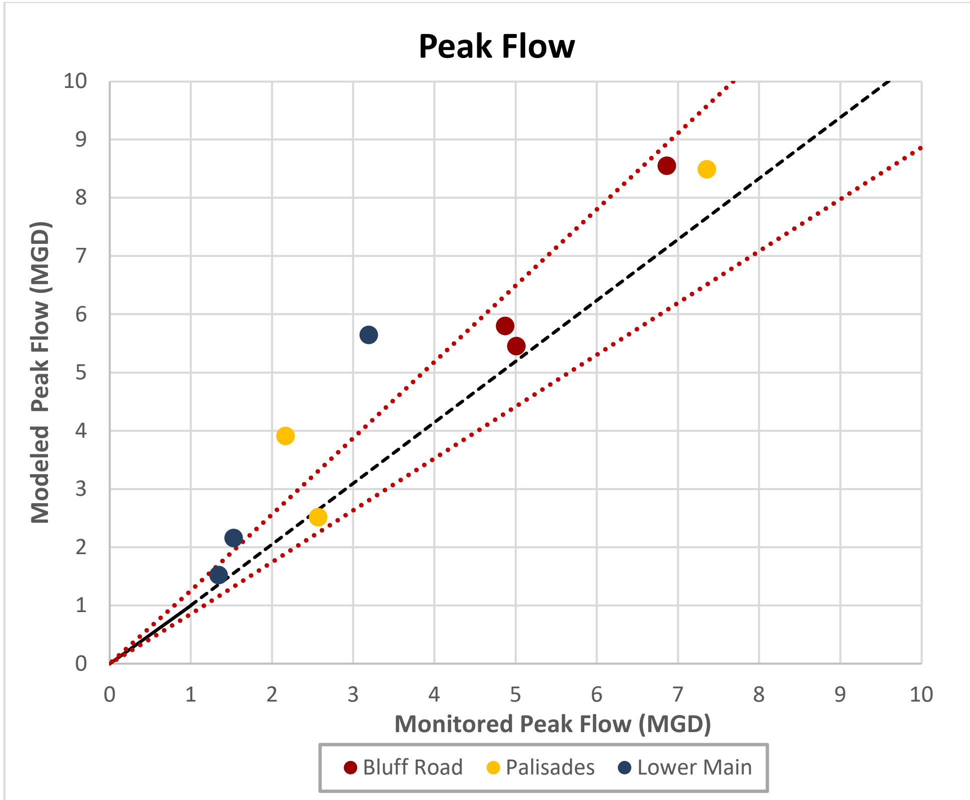


Figure 10. Observed vs. Modeled Peak Flow at Upstream of Each Pump Station

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.

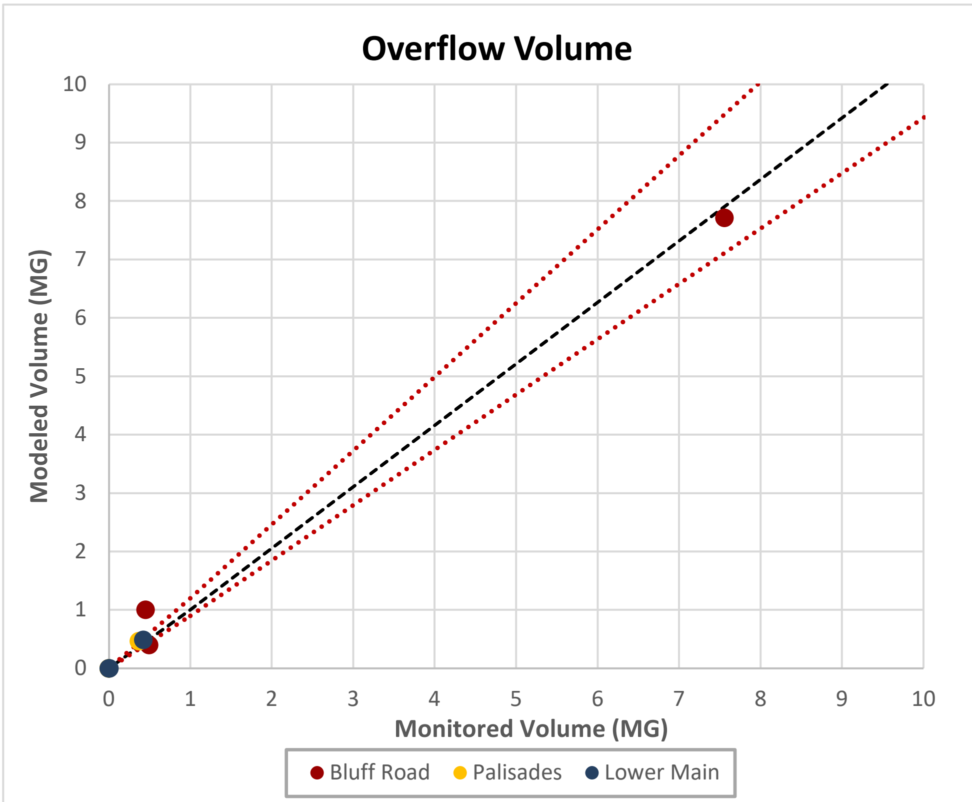


Figure 11. Observed vs. Modeled Overflow Volume

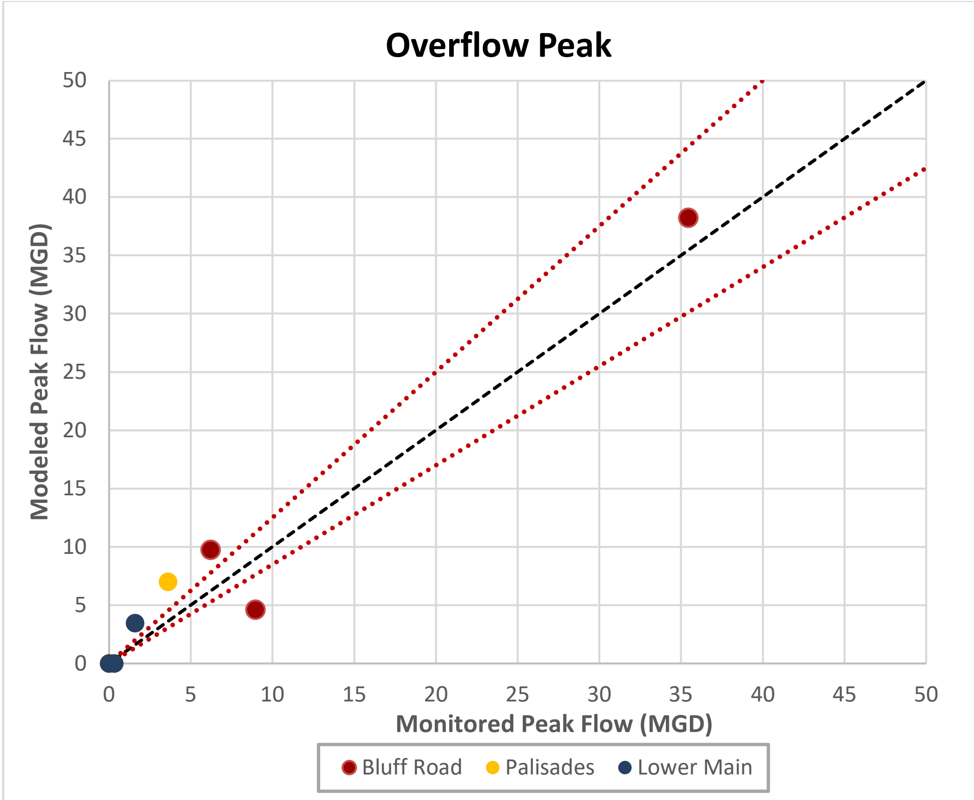


Figure 12. Observed vs. Modeled Overflow Peak Rate

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

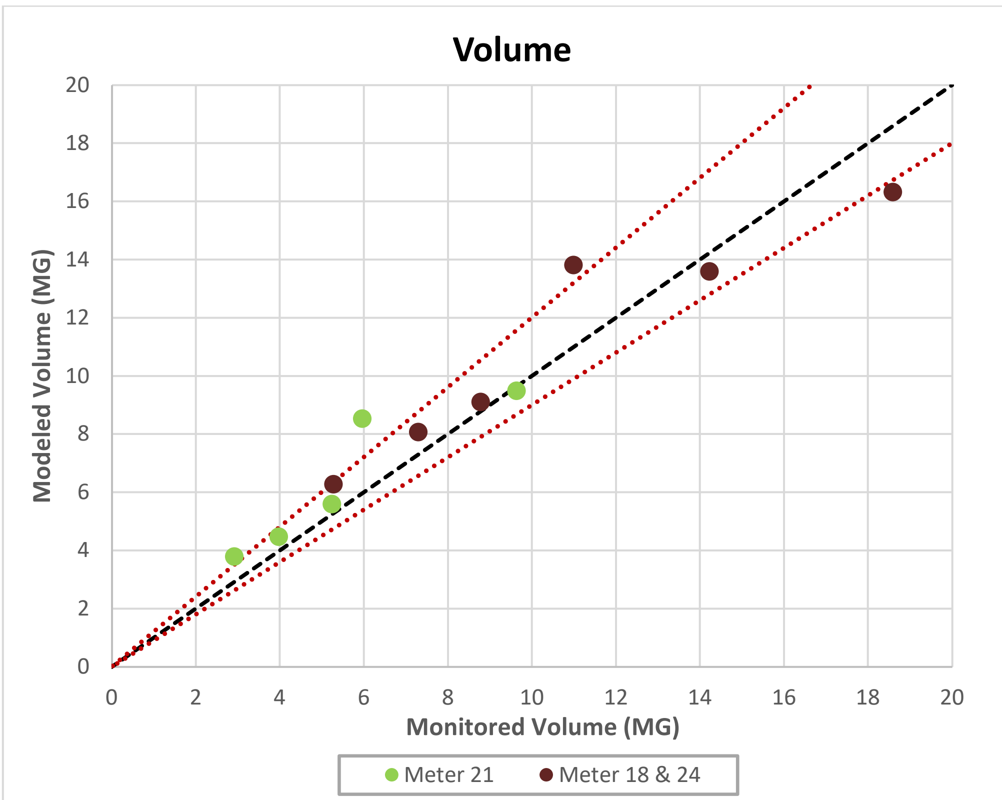


Figure 13. Observed vs. Modeled Volume for BCUA Meters

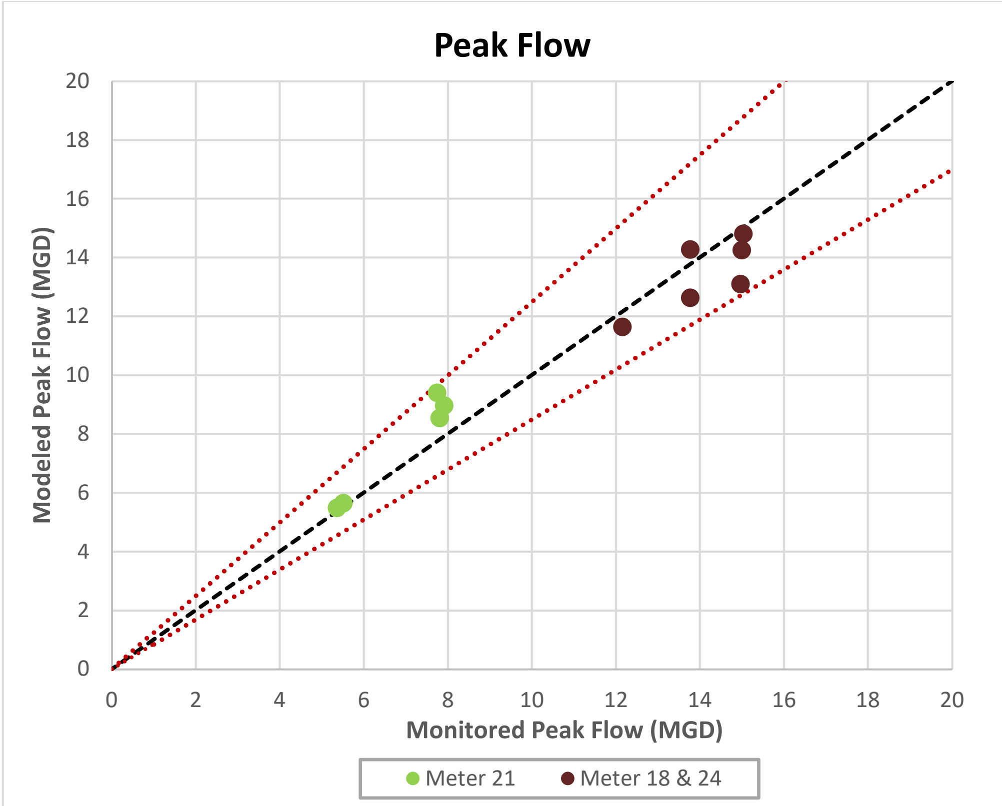


Figure 14. Observed vs. Modeled Peak Flow Rate for BCUA Meters

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

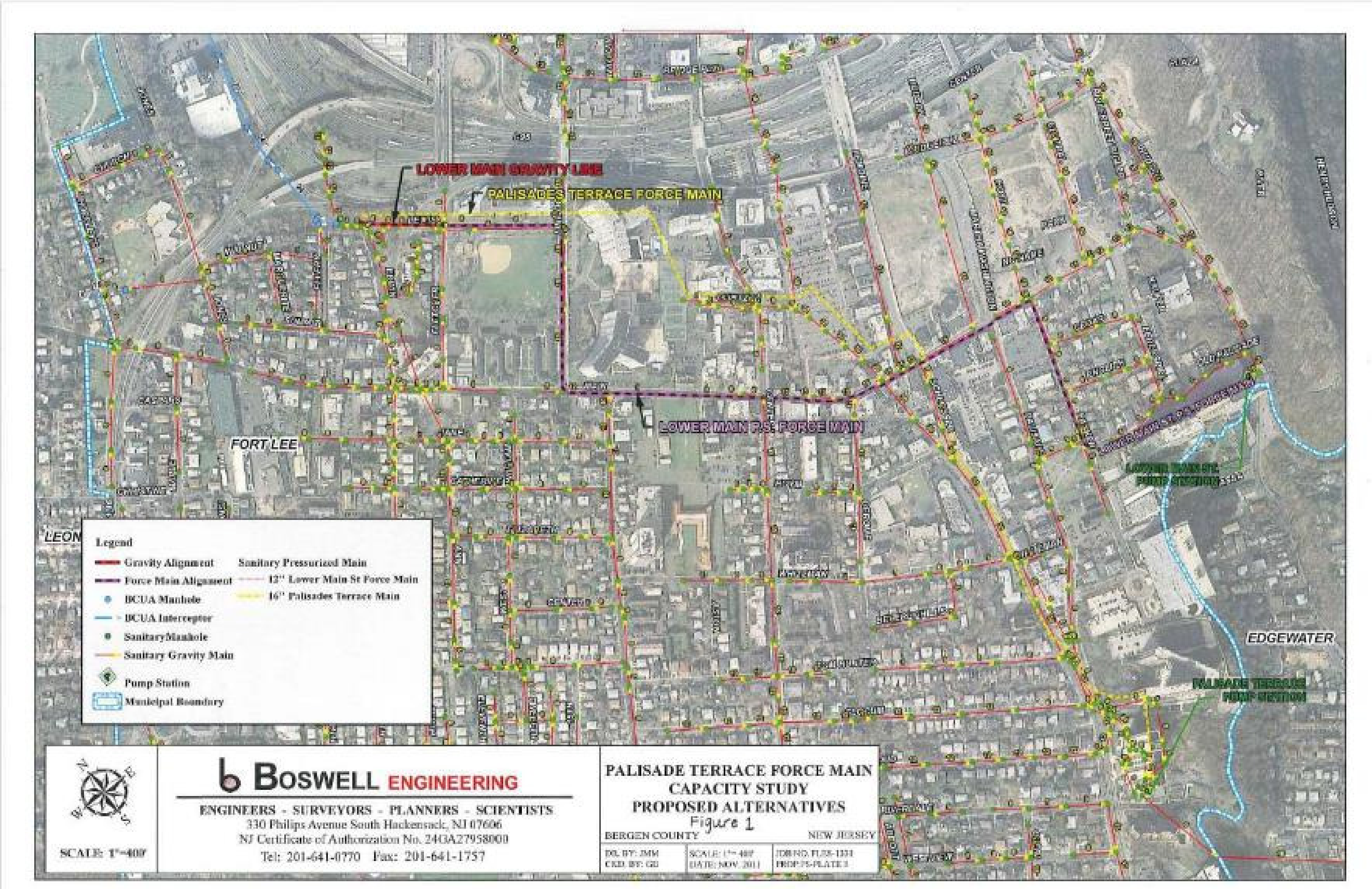


Figure 11. Revised Pipe Route for the Lower Main Pump Station

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.

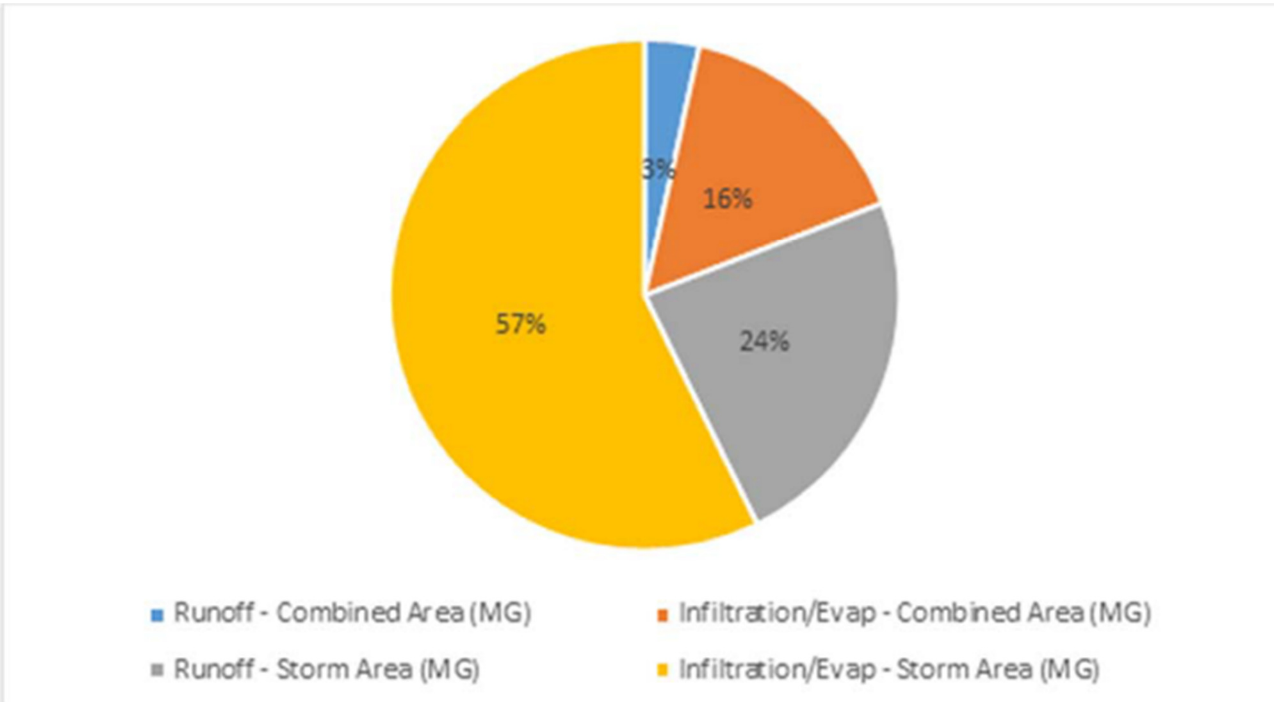


Figure 12. Water Budget from the 2004 CSO Simulation

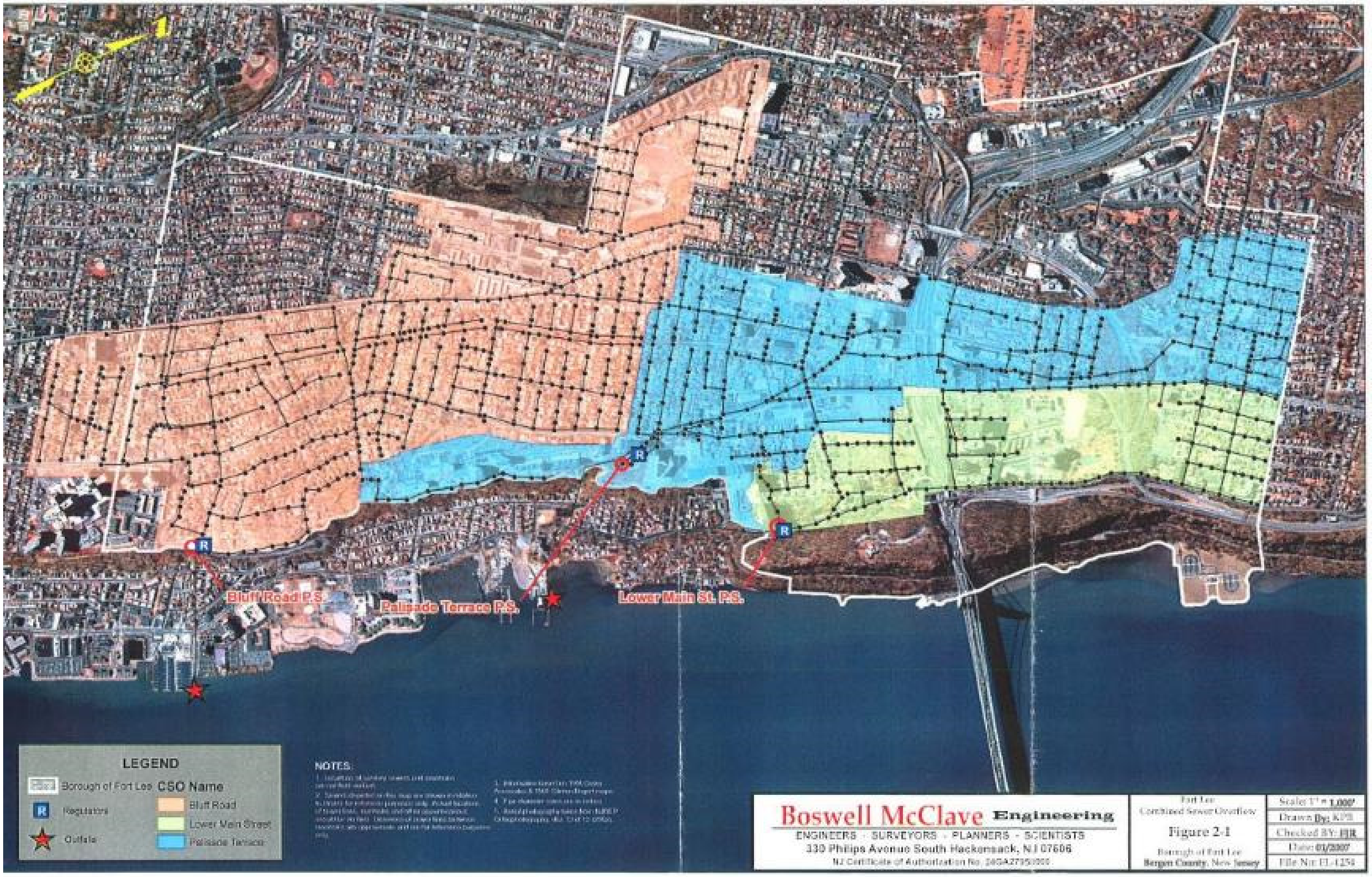
Appendix A

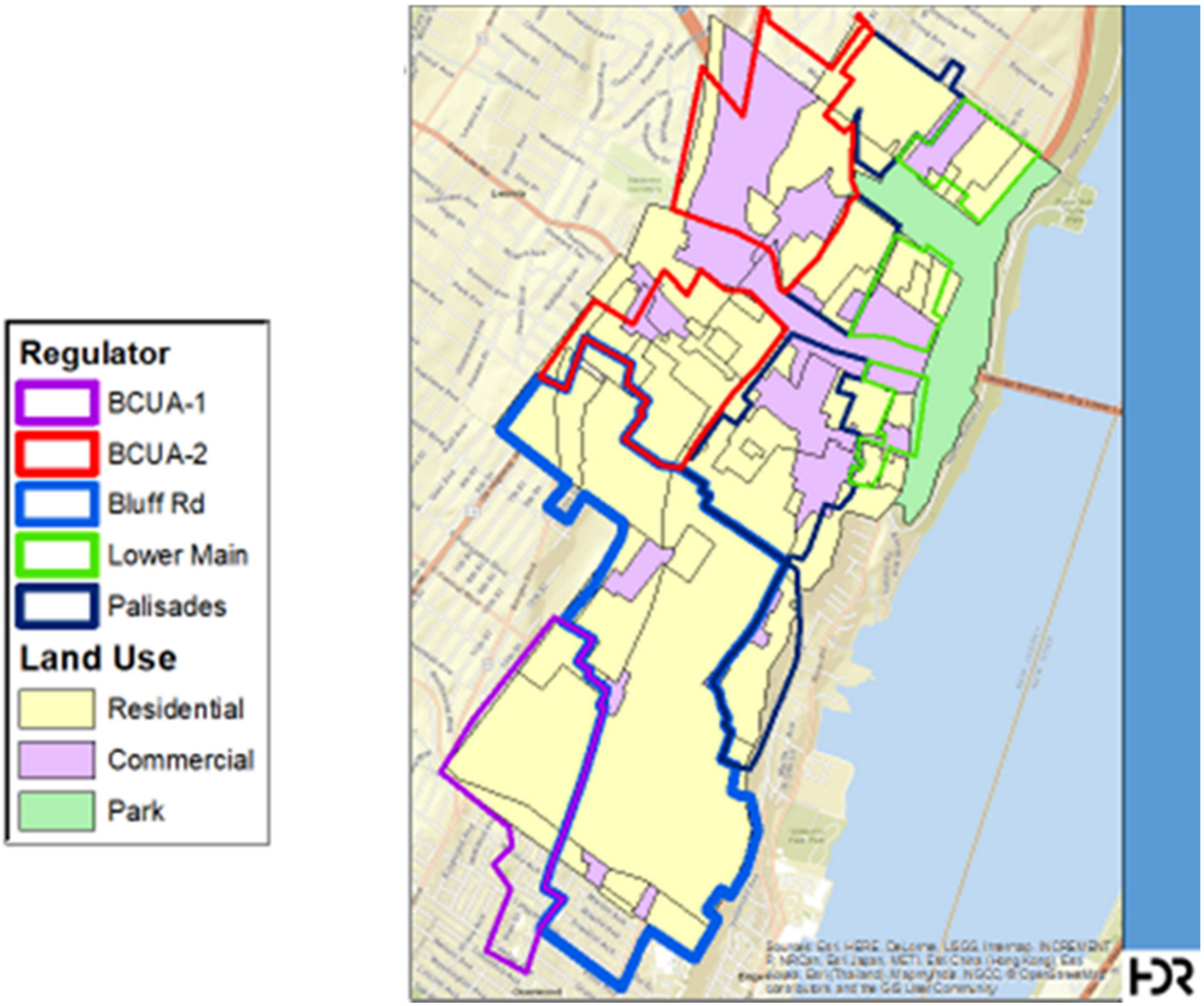
Summary of 2017 Flow Monitoring Data

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
Bluff Road
Lower Main Street
Outfalls
Palisade Terrace
NOTES:
Boswell McClave Engineering
ENGINEERS · SURVEYORS · PLANNERS · SCIENTISTS
330 Philips Avenue South Hackensack, N.J 07606
Fort Lee
Combined Sewer Overflow
Figure 2-1
Borough of Fort Lee
Bergen County, New Jersey
Scale: 1" = 1,000'
Drawn By: KPB
Checked BY: HR
Date: 01/2007


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: ______
Discribe 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

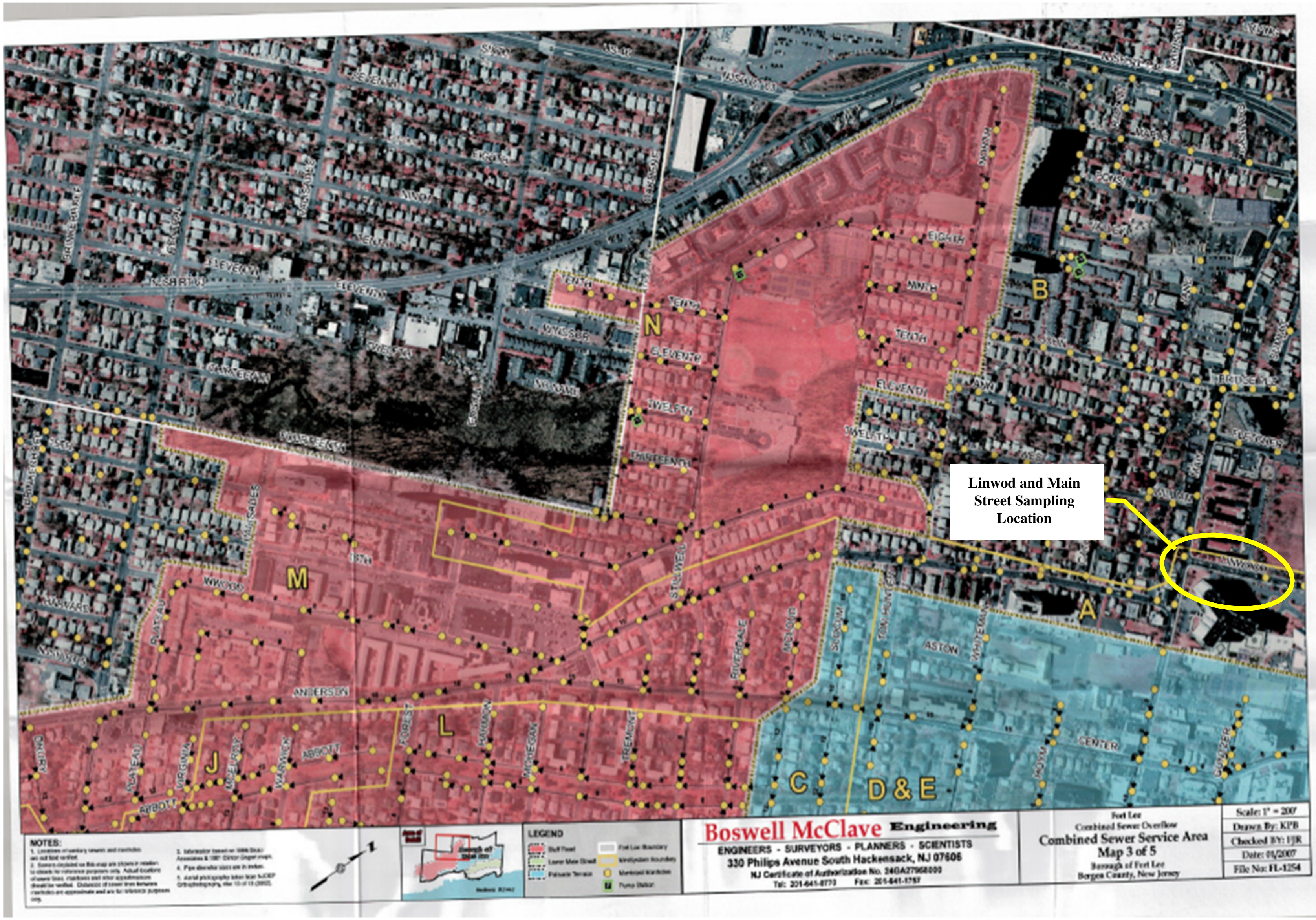
Summary of Reported Sewer Back-Ups / Odor Complaints

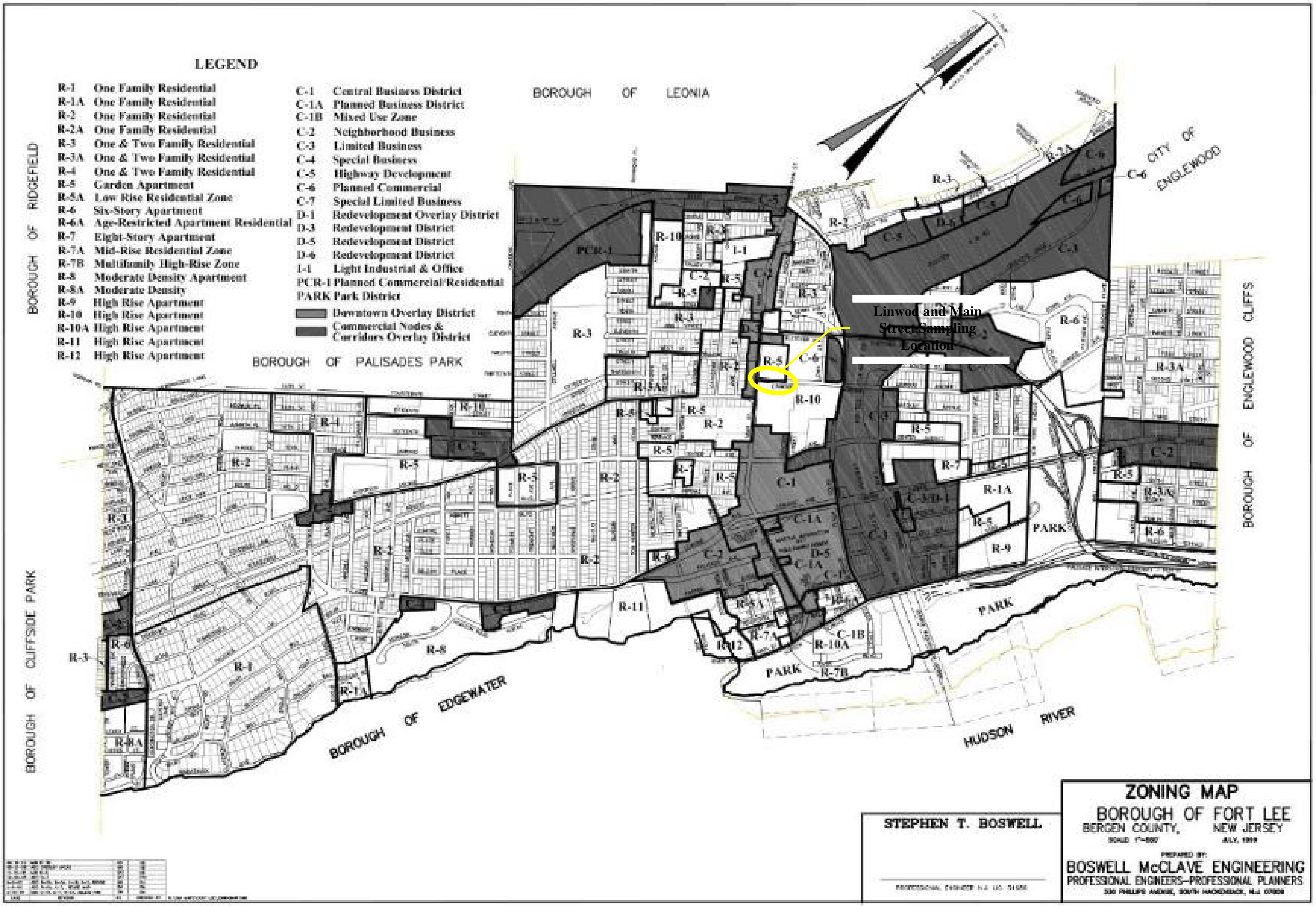
TABLE 1 - SUMMARY OF REPORTED SEWER BACK-UPS/ODOR COMPLAINTS
BOROUGH OF FORT LEE
January 1, 2019 - March 31,2019

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 Fletecher 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 Hoefly's Lane/Casper's Lane	Backup	Main line (Boro of Leonia)	Not determined	Line jetted by Borough of Leonia DPW	No		

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
L
J
C
D & E
ANDERSON
ABBOTT
CENTER
ASTON
ELEVENTH
TWELFTH
THIRTEENTH
TENTH
NINTH
EIGHTH
NOTES:
LEGEND
Boswell McClave Engineering
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
330 Philips Avenue South Hackensack, NJ 07606
NJ Certificate of Authorization No. 24GA27958000
Tel: 201-641-8770 Fax: 201-641-1757
Fort Lee
Combined Sewer Overflow
Combined Sewer Service Area
Map 3 of 5
Borough of Fort Lee
Bergen County, New Jersey
Scale: 1" = 200'
Drawn By: KPB
Checked BY: IJR
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
CITY OF ENGLEWOOD
BOROUGH OF ENGLEWOOD CLIFFS
BOROUGH OF RIDGEFIELD
BOROUGH OF PALISADES PARK
BOROUGH OF CLIFFSIDE PARK
BOROUGH OF EDGEWATER
HUDSON RIVER
Linwod and Main Street Sampling Location
ZONING MAP
BOROUGH OF FORT LEE
BERGEN COUNTY, NEW JERSEY
STEPHEN T. BOSWELL
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 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
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 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
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 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
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 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
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 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
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

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
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

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
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

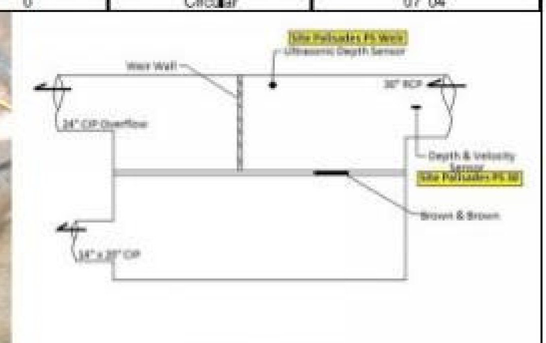
Meter Site Information Log Sheets

FLOW ASSESSMENT SERVICES

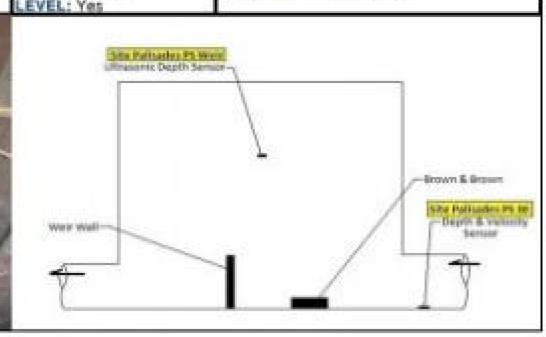
METER SITE INFORMATION FIELD LOG

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	



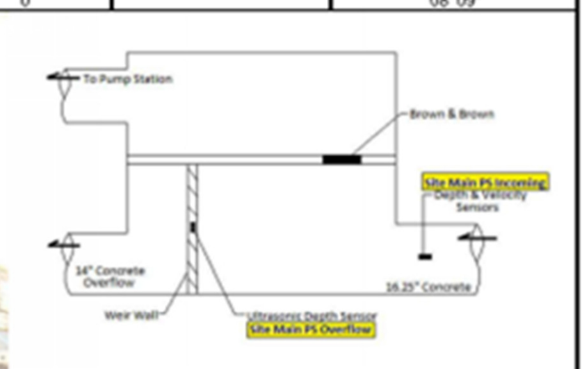
March 2019 | Appendix A
Page 1

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"



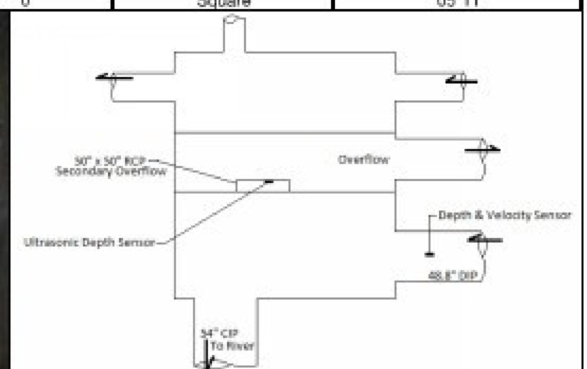
SURCHARGE INFORMATION	WEIR INFORMATION	
SURCHARGE NONE EVIDENT: X	**LENGTH:**	**HEIGHT ABOVE WEIR:**
SURCHARGED MARKS TO:	**BREADTH:**	**OVERFLOW OCCURS AT:**
SURCHARGE CURRENTLY TO:	**LEVEL:**	

March 2019 | Appendix A
Page 2

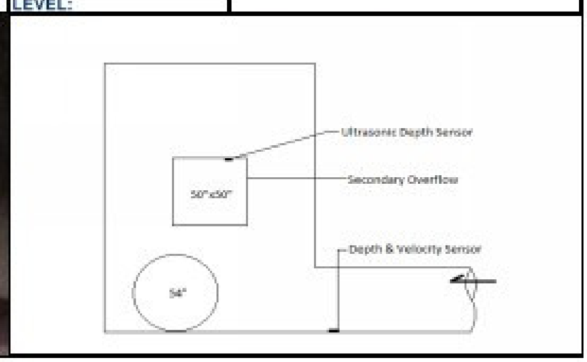
METER SITE INFORMATION FIELD LOG

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:**	



March 2019 | Appendix A
Page 3

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.

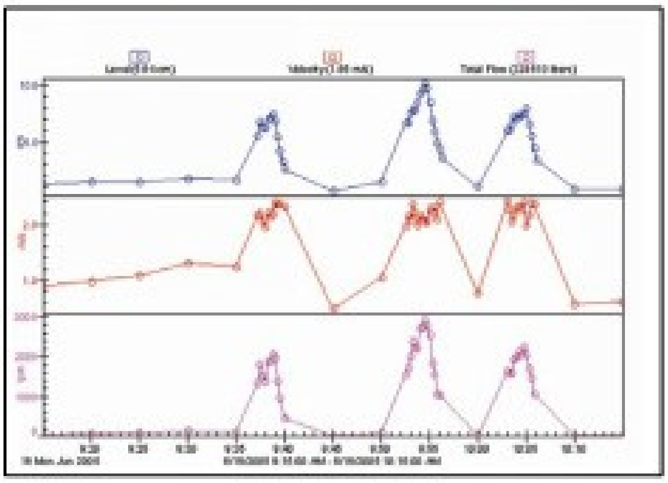
Standard Features

- 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

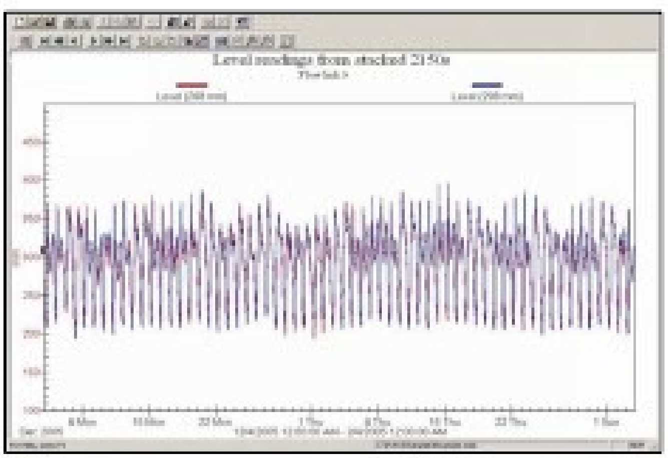
- Secure data storage. All data are continuously stored in flash memory to protect against loss in case of power failure
- Easy to upgrade. New operating software can be downloaded into non-volatile flash memory, without affecting stored program and data.
- Records and stores input voltage and temperature 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

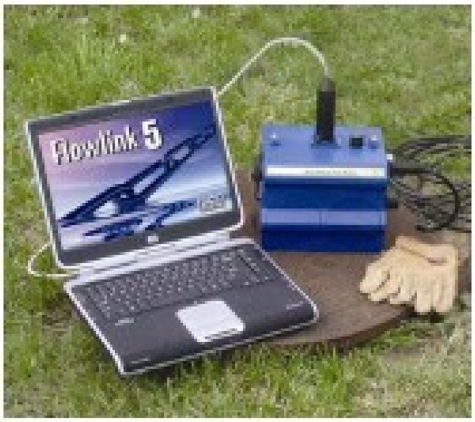
Frequent multipoint level recalibration is a requirement with other area velocity flow meters. Isco's exclusive "smart" sensor design in the area velocity probe yields exceptionally low drift in the level signal.

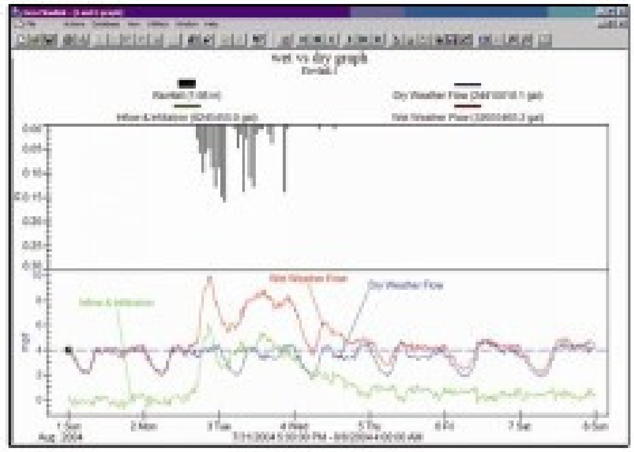
The 2150's factory-calibrated 3-meter span totally eliminates the need for cumbersome span recalibration in the field.

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

ISCO®
Water is life. Protect it.

Teledyne Isco, Inc.
4700 Superior Street
Lincoln NE 68504 USA
Tel: (402) 464-0231
USA and Canada: (800) 228-4373
Fax: (402) 465-3022
E-Mail: iscoinfo@teledyne.com
Internet: www.isco.com

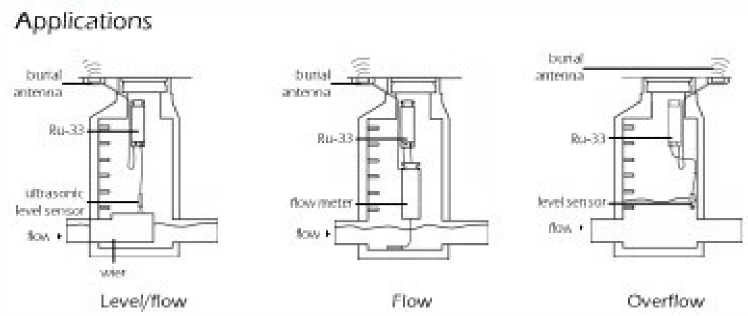
Certified
ISO 9001

Telog RU 33

Ru-33 Recording Telemetry Unit

Wireless RTU for underground monitoring

Ru-33 pictured with the Telog ultrasonic sensor



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 9x0 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

Telog Instruments, Inc.
830 Canning Parkway, Victor, NY 14564-8940, USA
Phone: 585.742.3000 • Fax: 585.742.3006
E-mail: TelogSales@telog.com • www.telog.com

8/05

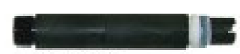
Supported Sensors

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 ¼") with three meters of cable
pH Sensor	
Model	B/pHS-M31tc
Type	Double junction reference cell (KCl/AgCl and KNO_3)
Range	0-14 pH
Output	±59.16 mV/pH unit @ 25° C Pre-amplified and temperature compensated. Includes internal lithium battery

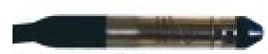
Ru-33 Telog Supplied Options

Burial Antenna

Ultrasonic sensor



pH-31 sensor



Pressure sensor

Temperature sensor

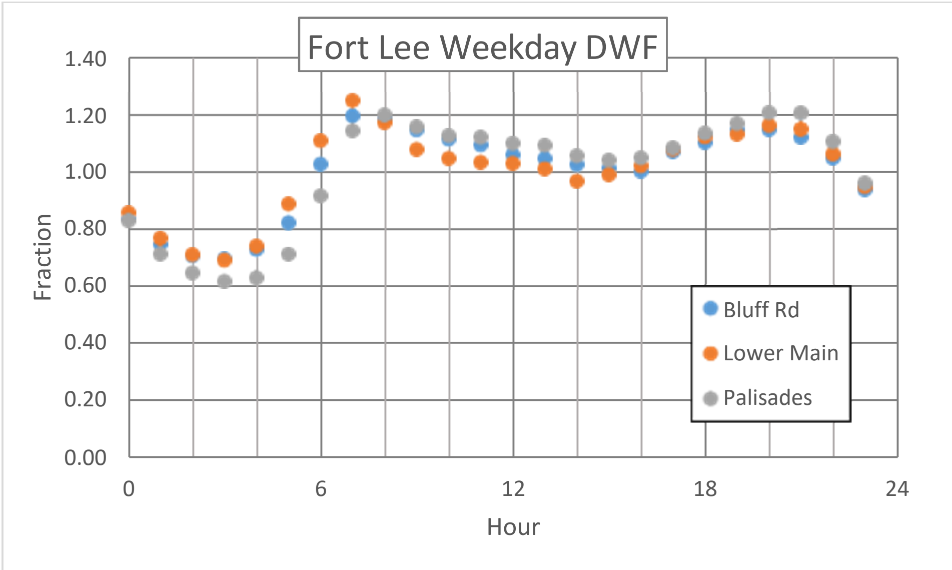
Ru-33 Supported Meters & Sensors

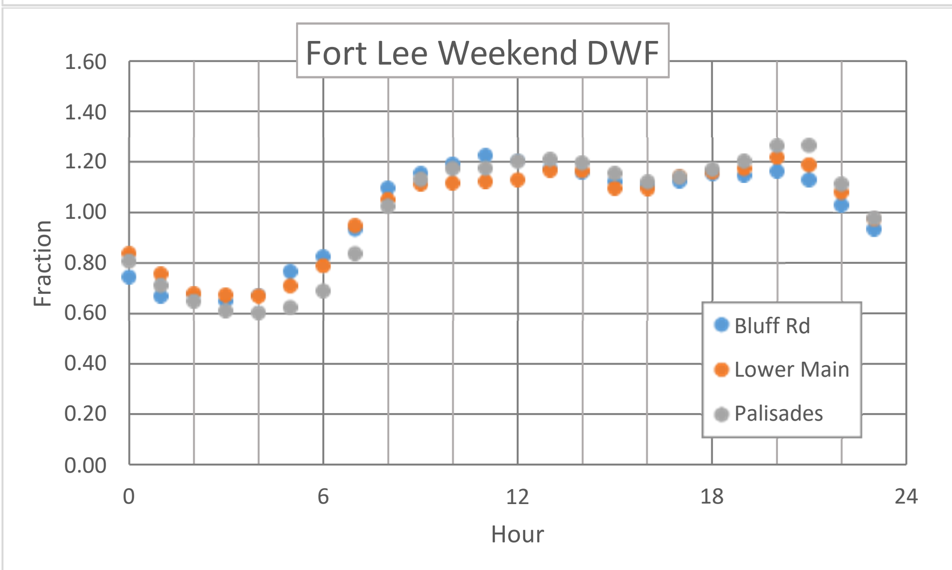
Flowmeters	
Via RS-232 or RS-485	Hach Sigma 900 Series
Interface to meter	ISCO 2150
Serial interface port	Marsh McBirney Flo-Dar & Flo-Tote3 Meters
	MGD ADFM & accOmin
	ADS Flow Shark
Sensors	
	Hydrolab Sondes
	Hach WMD Pipe Sonde
Water Quality	
	Hach Hydrolab Multiparameter Sondes
	DataSonde 4a, MiniSonde 4a
	DS5X, DS5, MS5
	Hach WDM Pipe Sonde

Appendix H

Model Calibration Results

Average Diurnal Patterns: Weekday vs Weeken

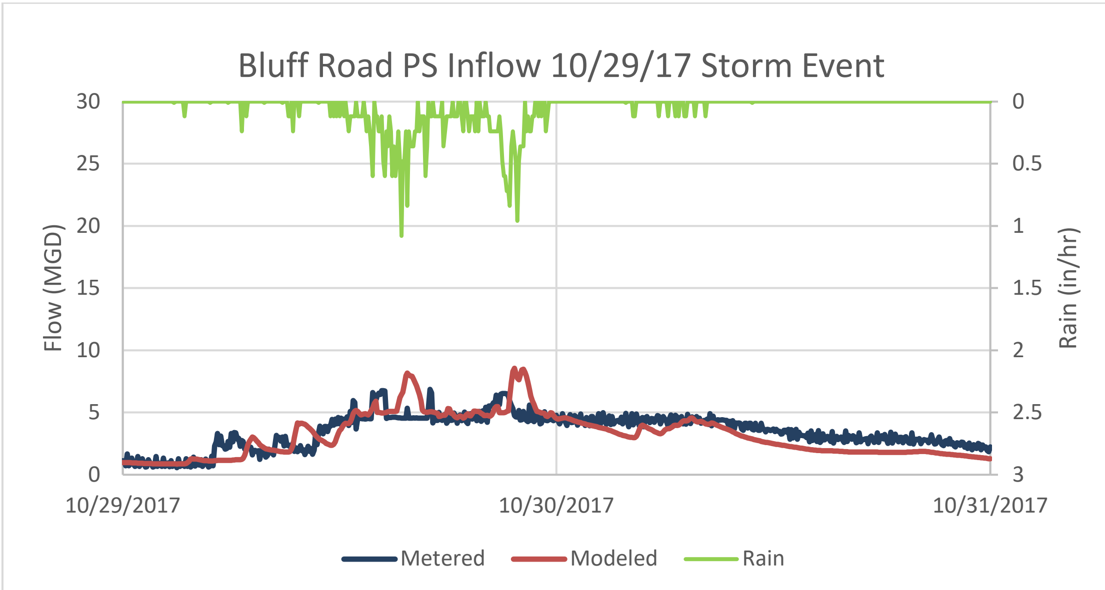


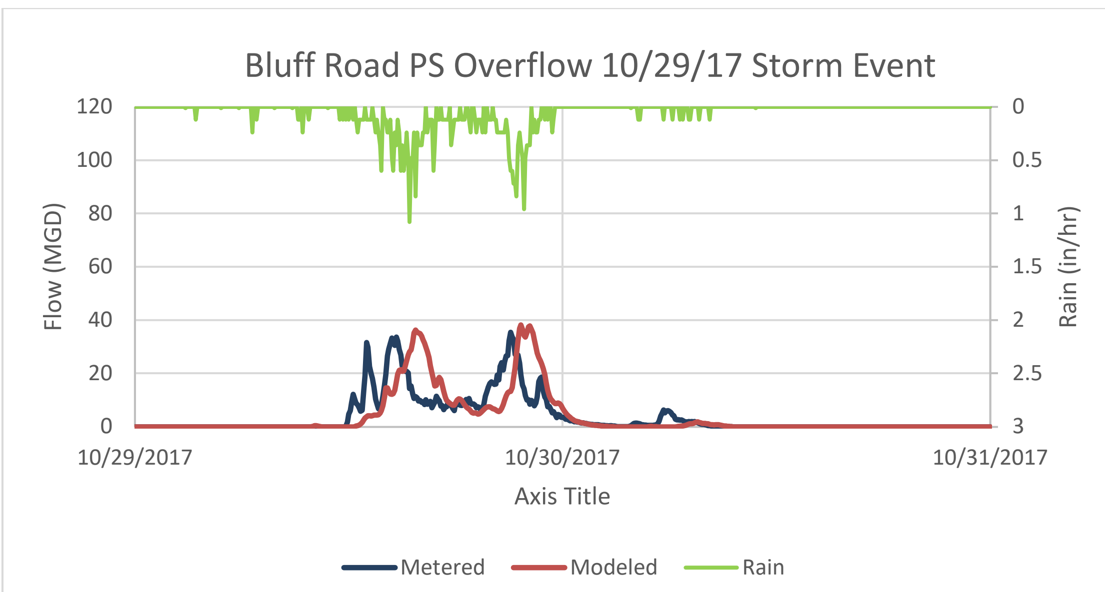


Part 1. Model Calibration Results

Event 11- 2.77 in on 10/29/2017

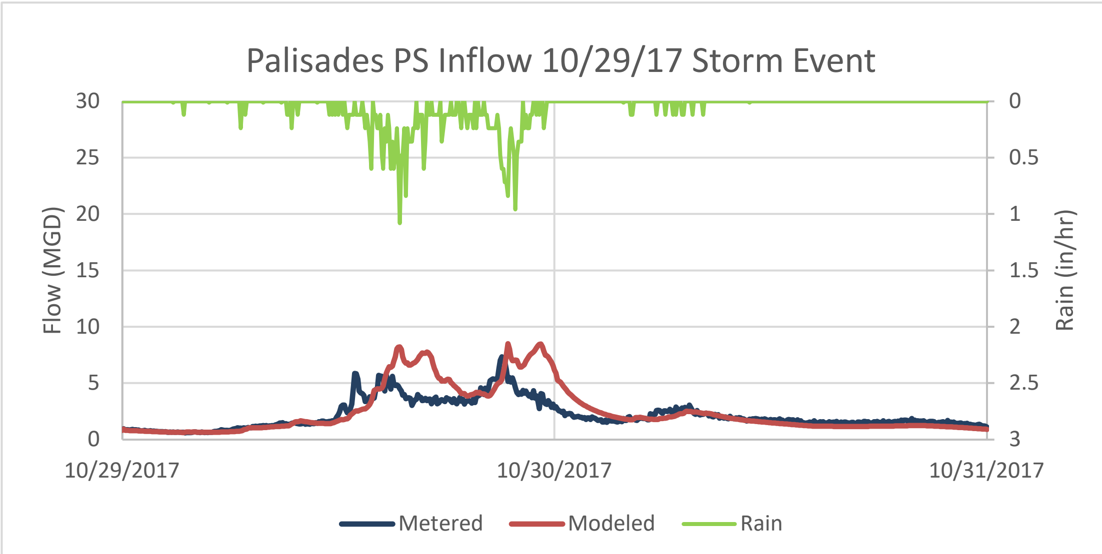
Bluff Road

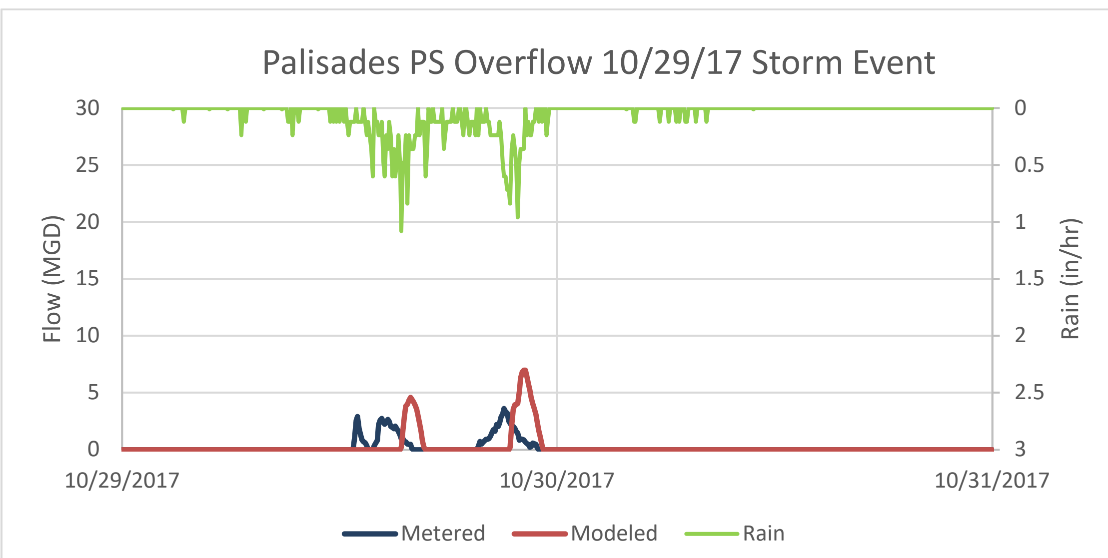




Event 11- 2.77 in on 10/29/2017

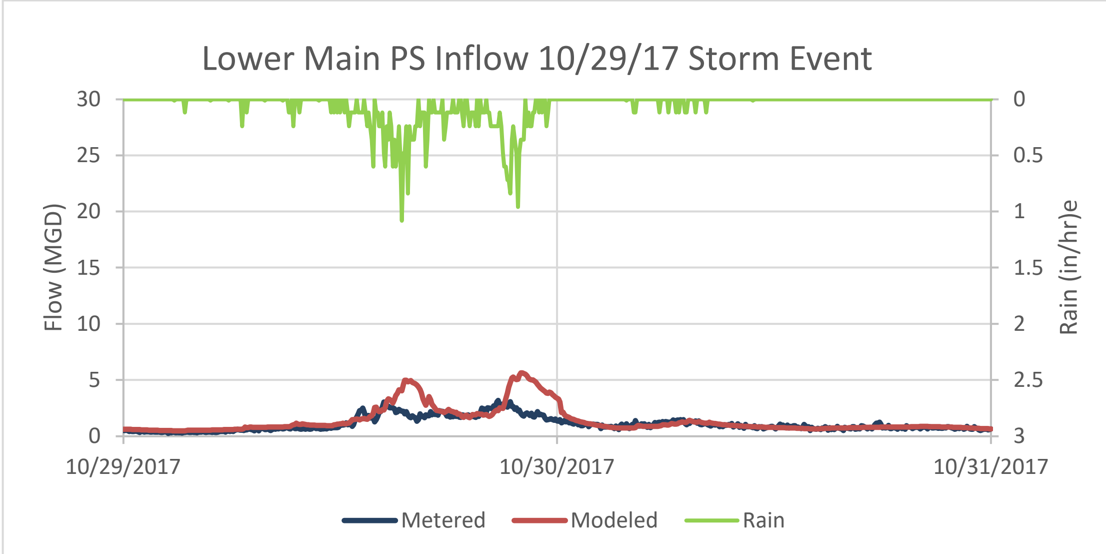
Palisades

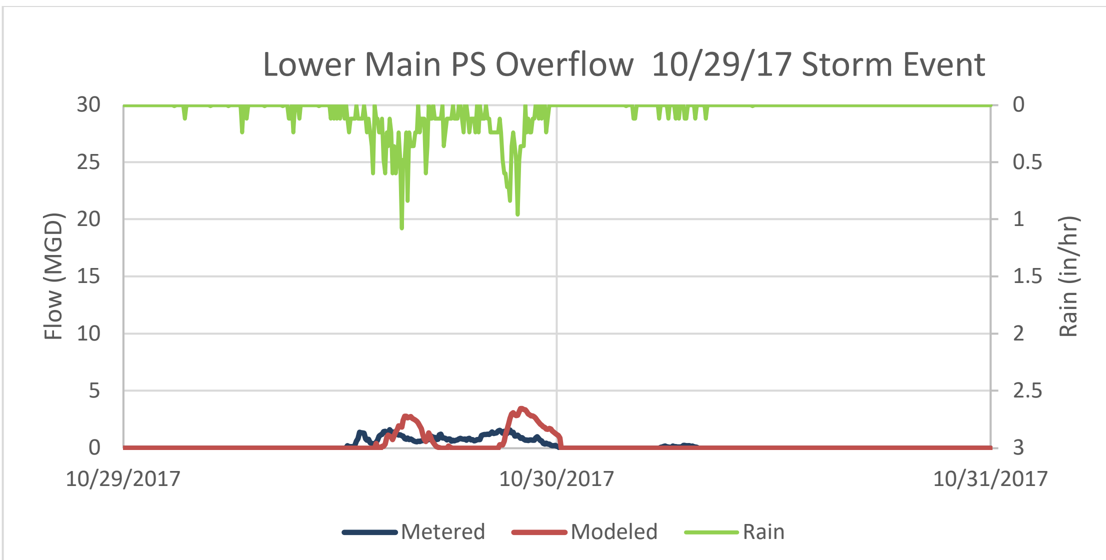




Event 11- 2.77 in on 10/29/2017

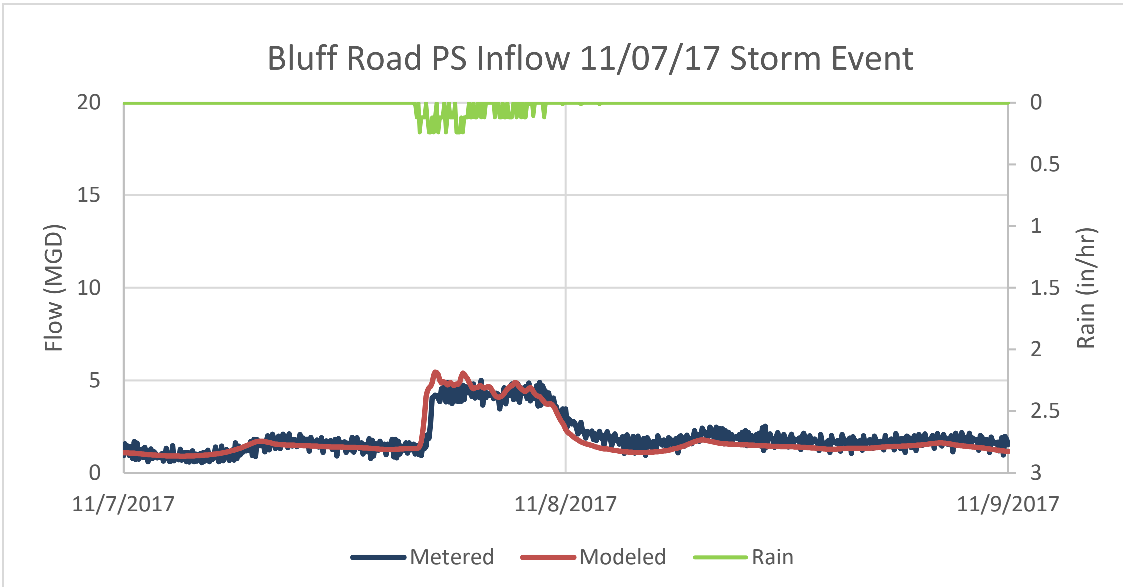
Lower Main

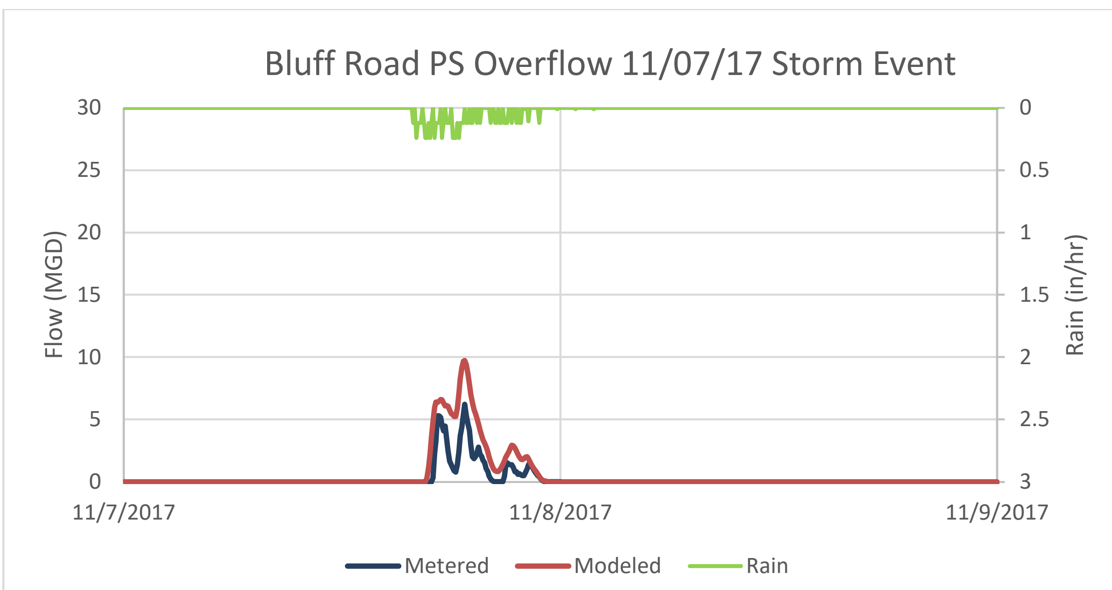

Lower Main PS Inflow 10/29/17 Storm Event
Flow (MGD)
Rain (in/hr)e
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
10/29/2017
10/30/2017
10/31/2017
Metered
Modeled
Rain


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

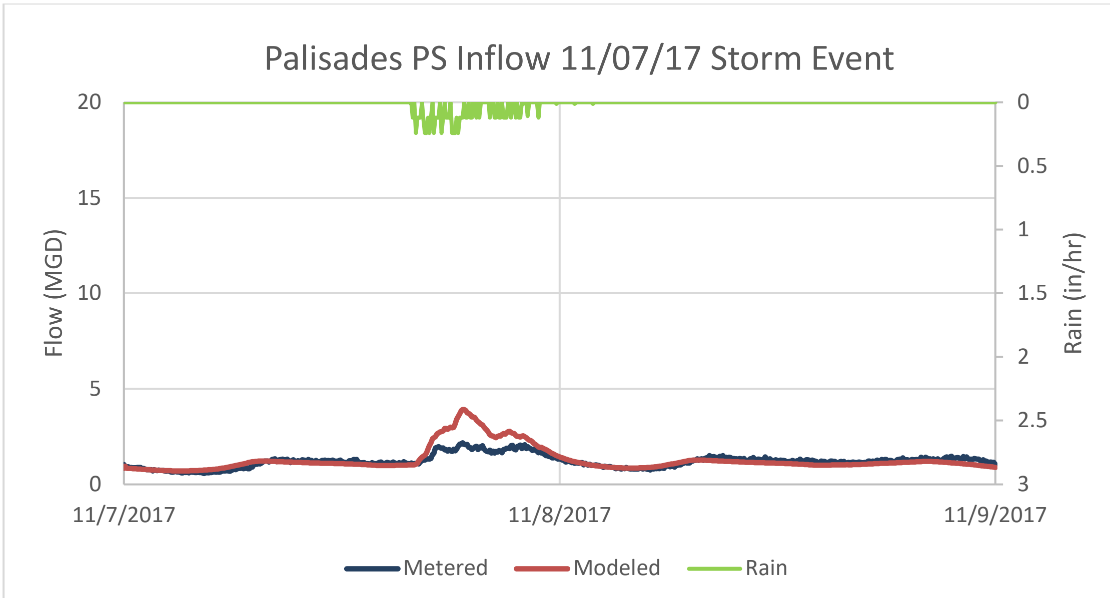
Bluff Road

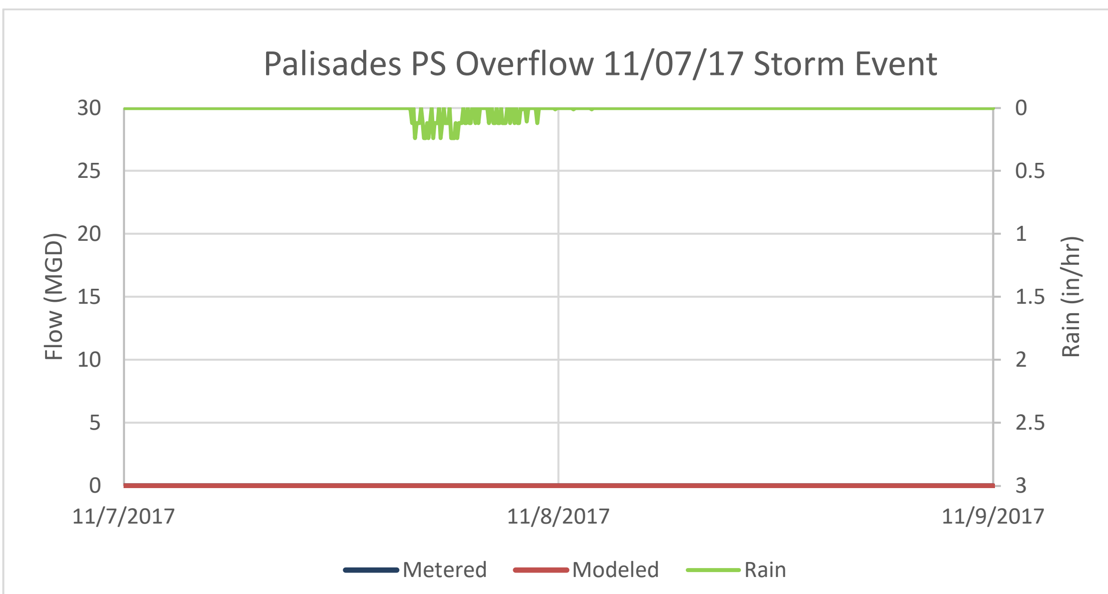




Event 11- 0.58 in on 11/07/2017

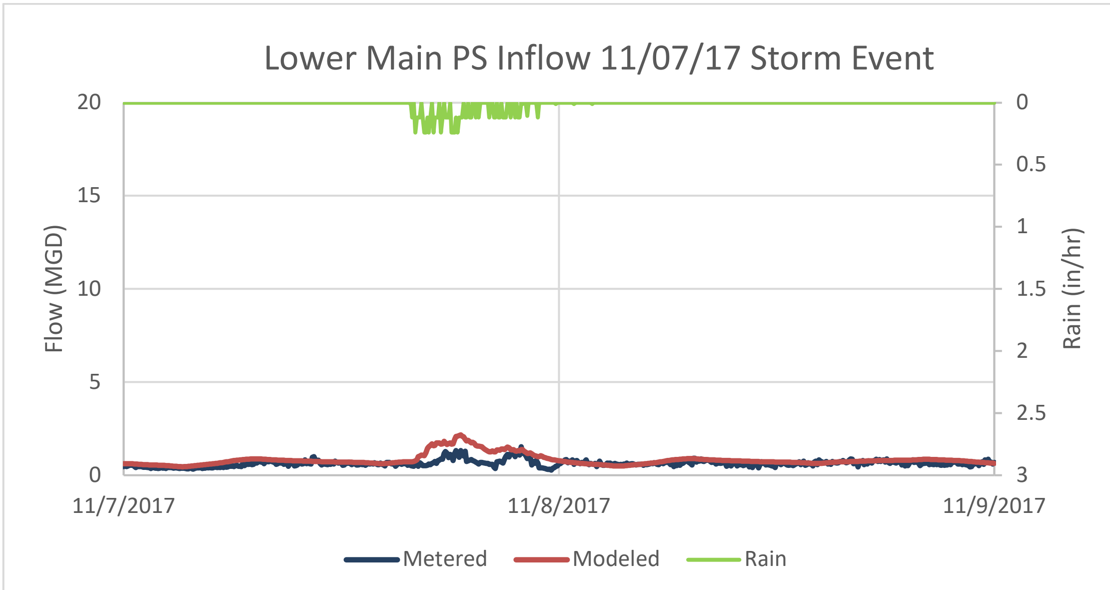
Palisades

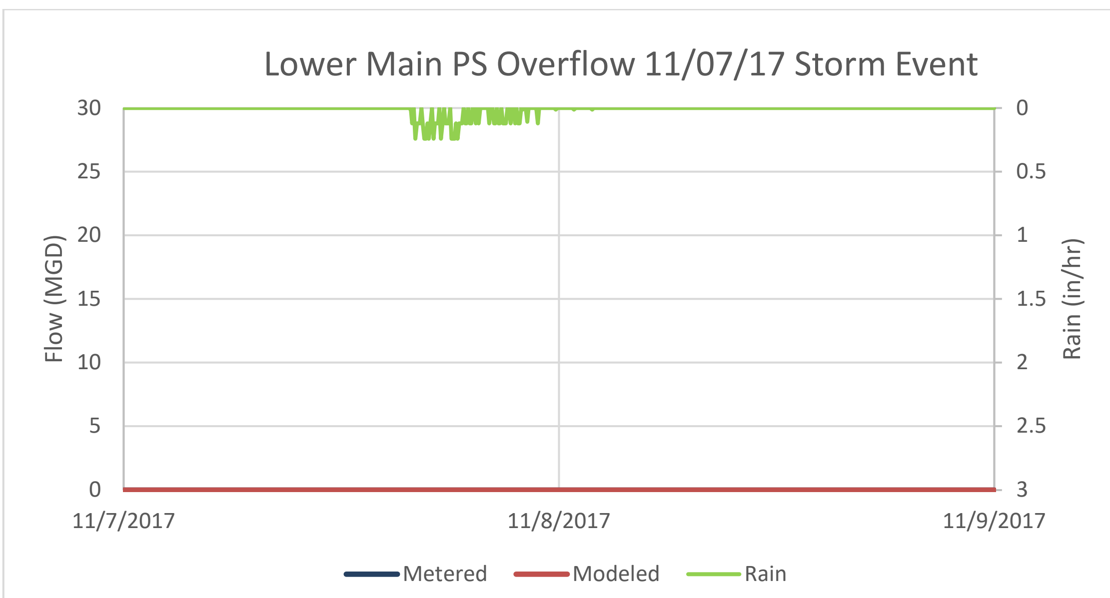




Event 11- 0.58 in on 11/07/2017

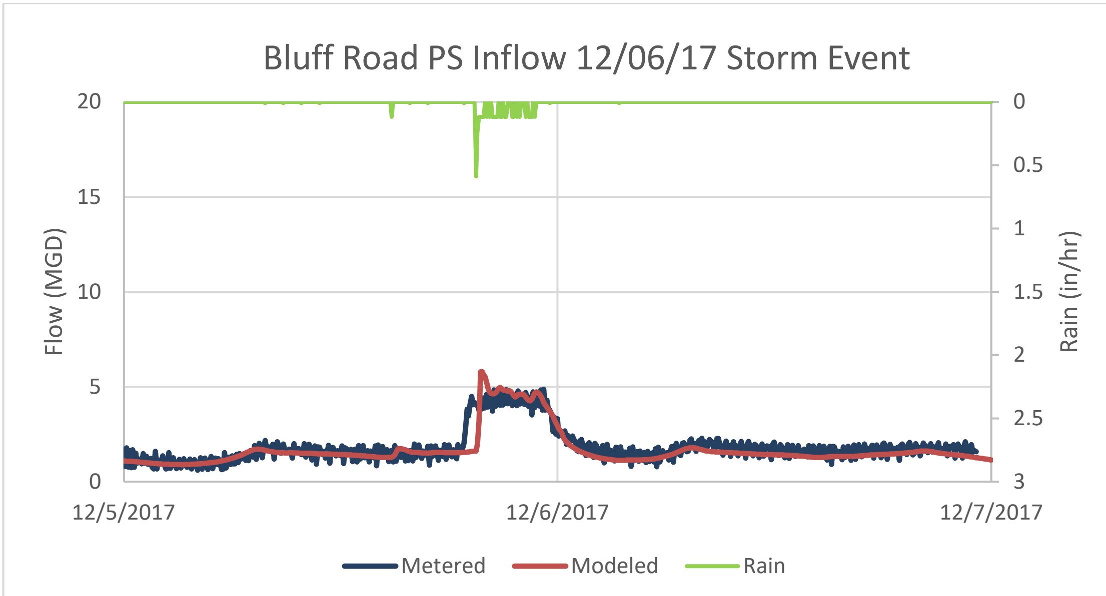
Lower Main

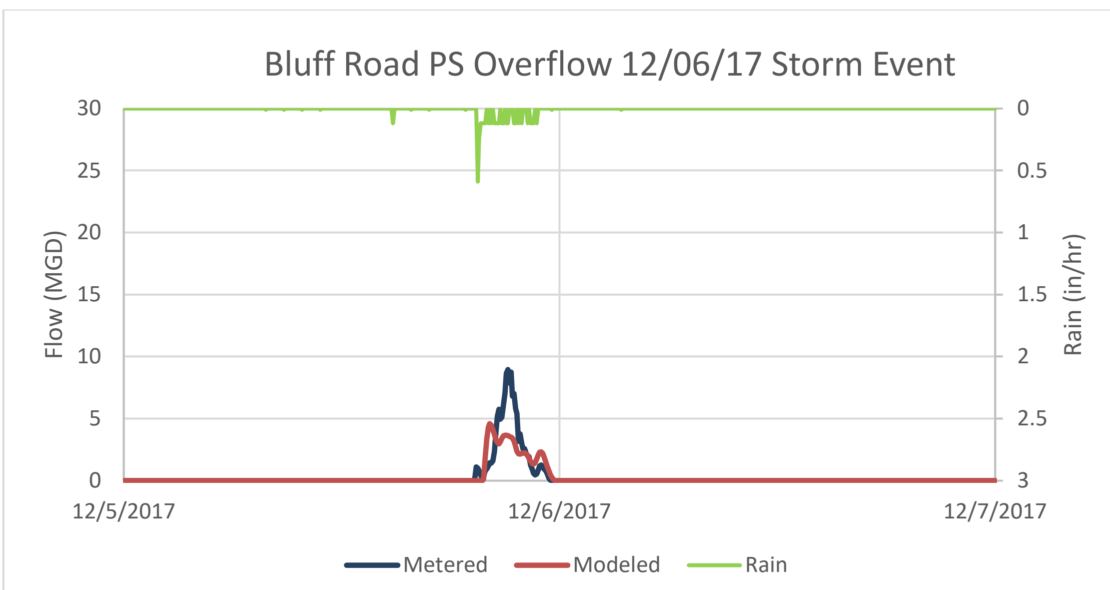




Event 25- 0.58 in on 12/06/2017

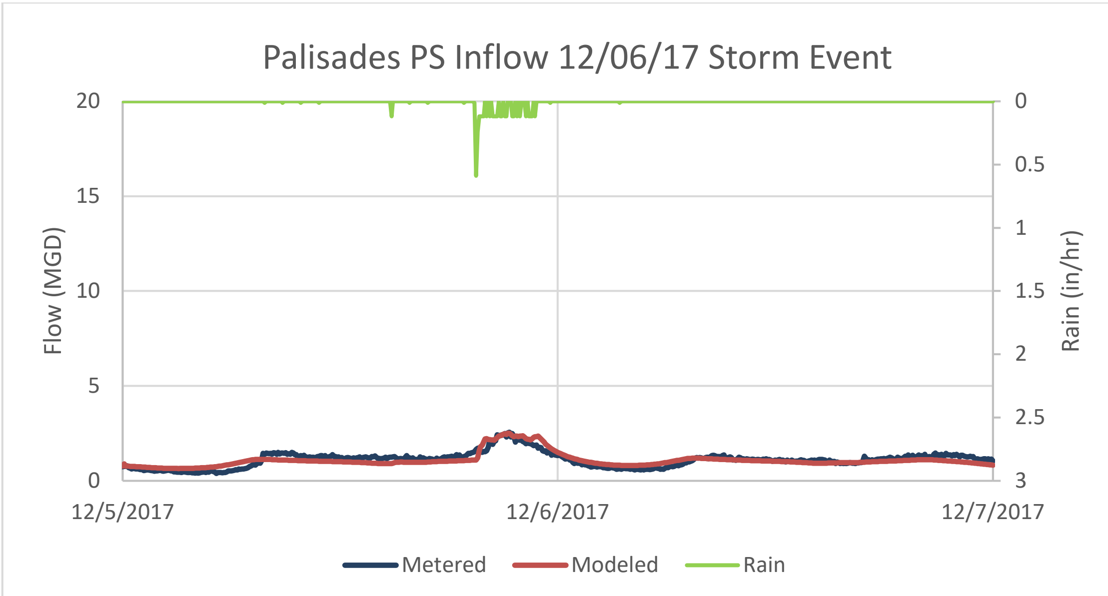
Bluff Road

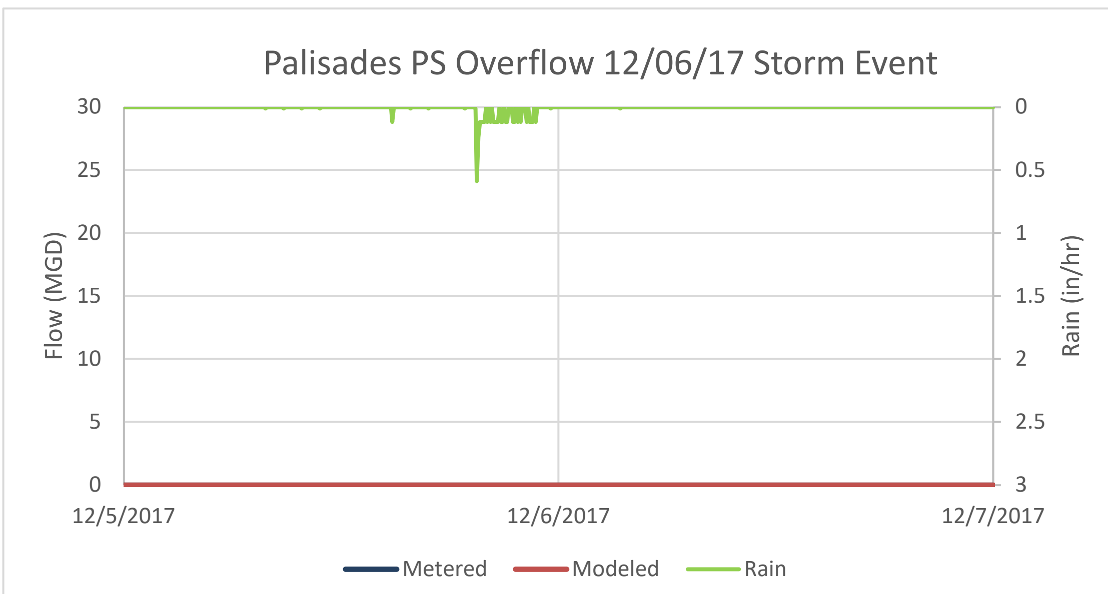




Event 25- 0.58 in on 12/06/2017

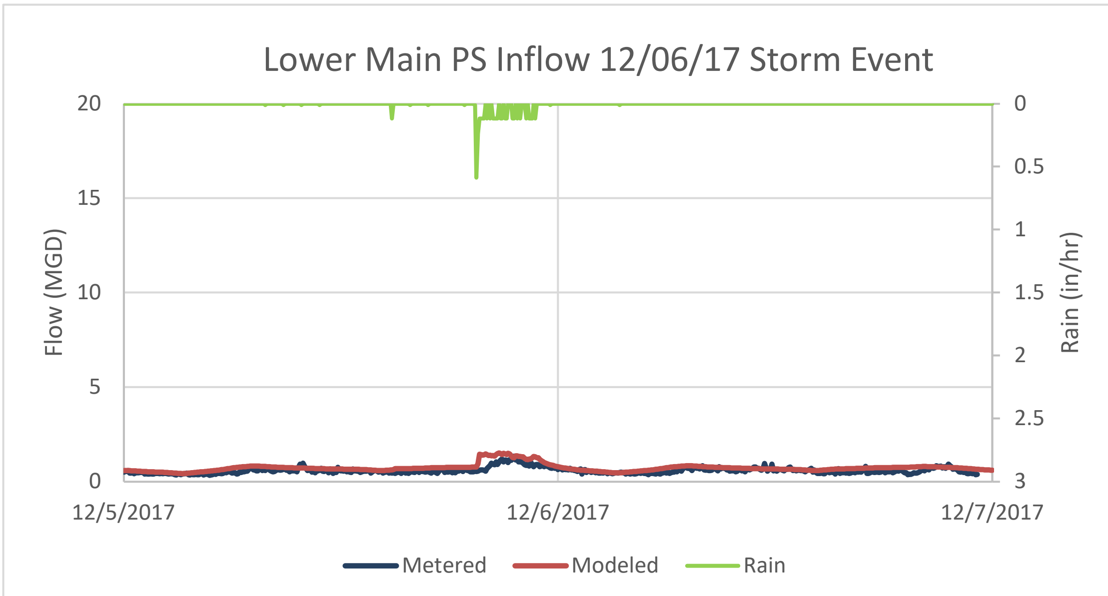
Palisades

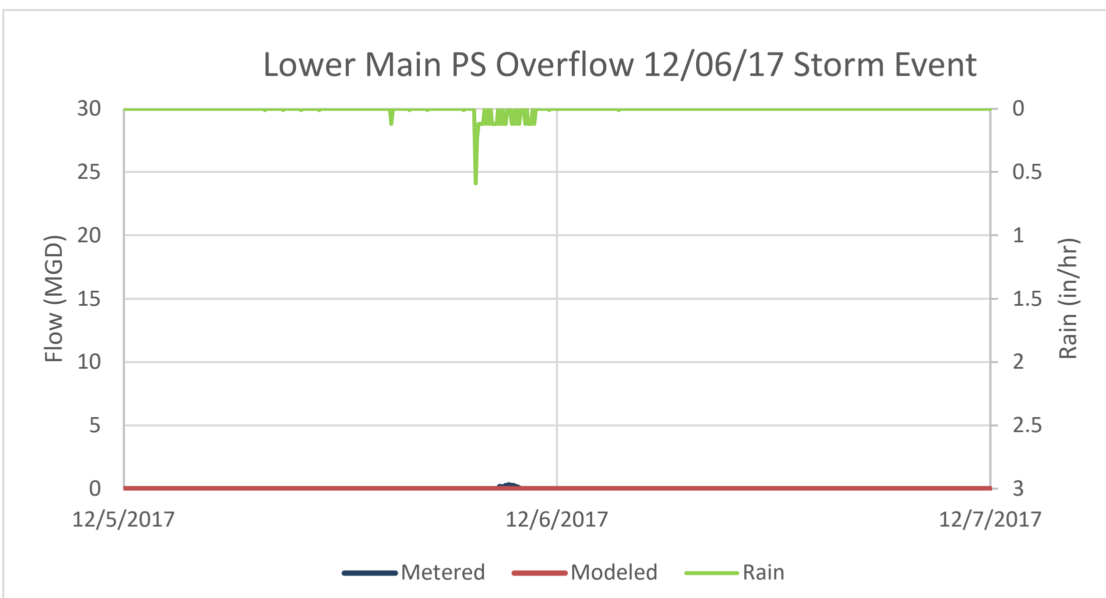




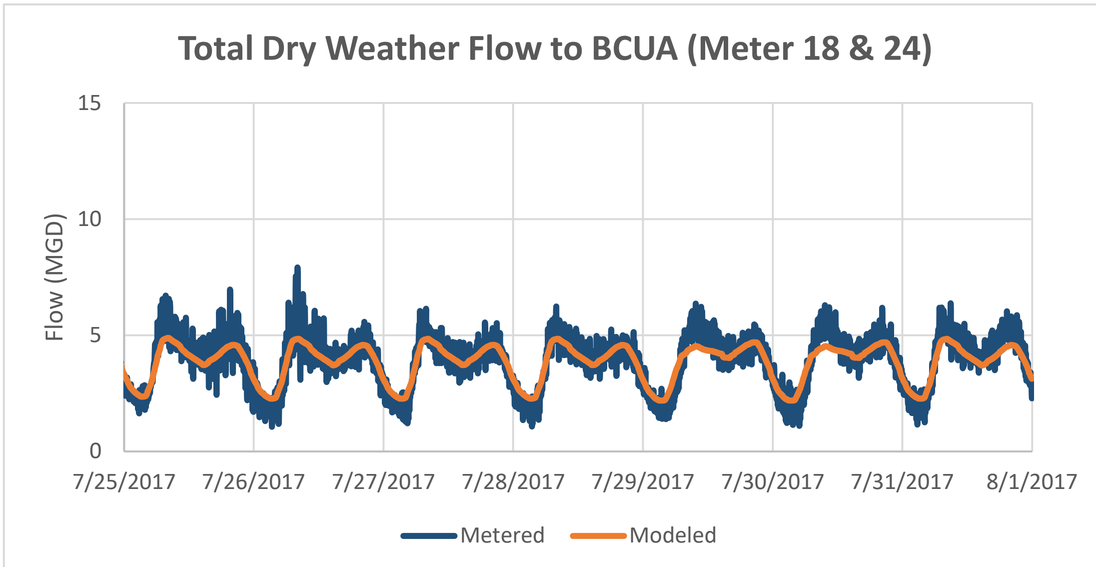
Event 25- 0.58 in on 12/06/2017

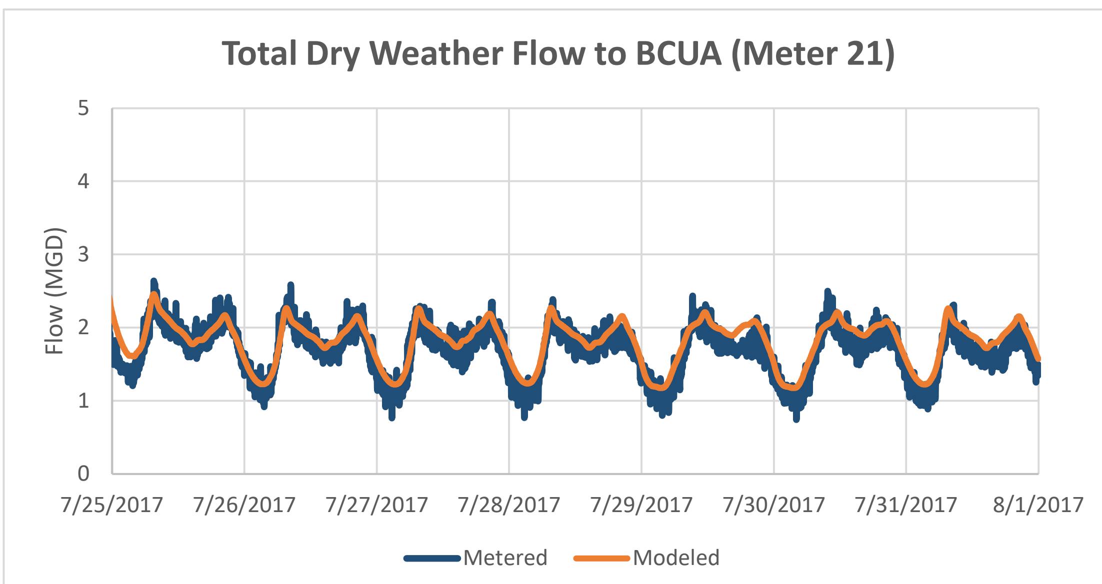
Lower Main

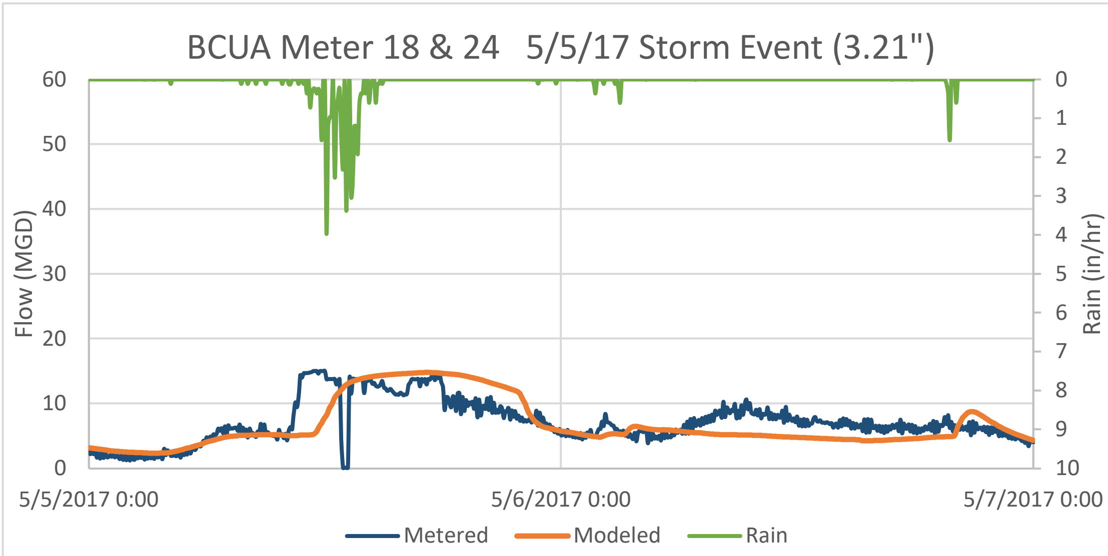


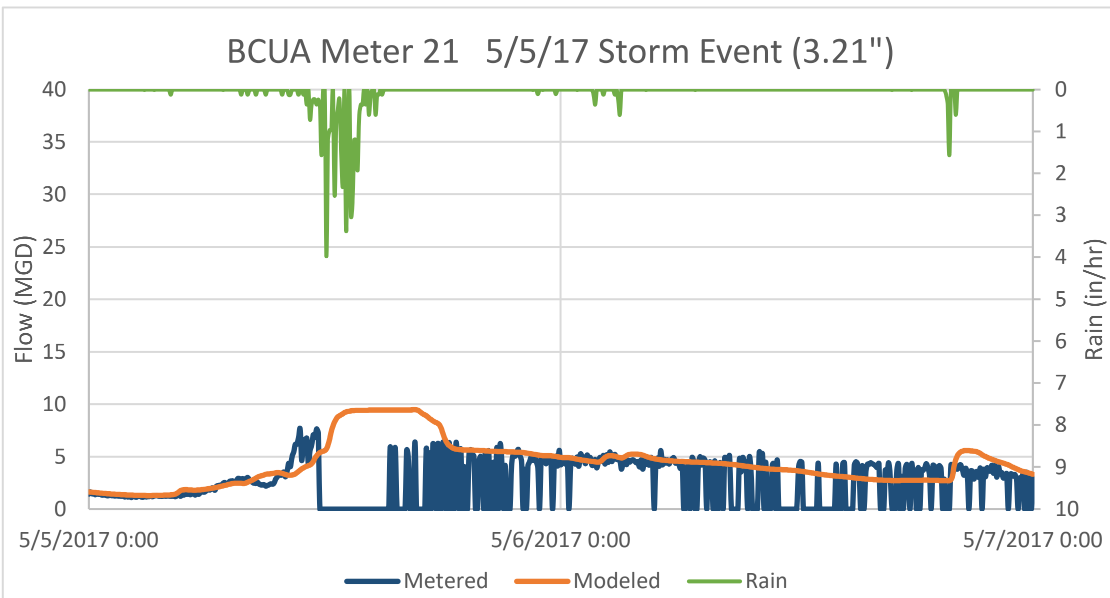


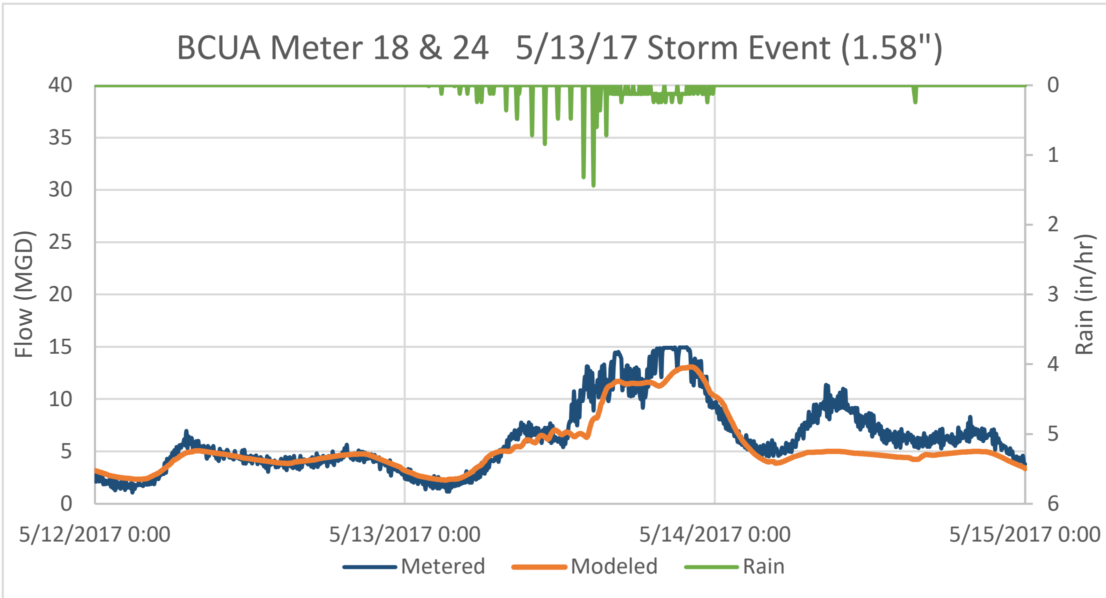
Part 2. Model Validation Plots

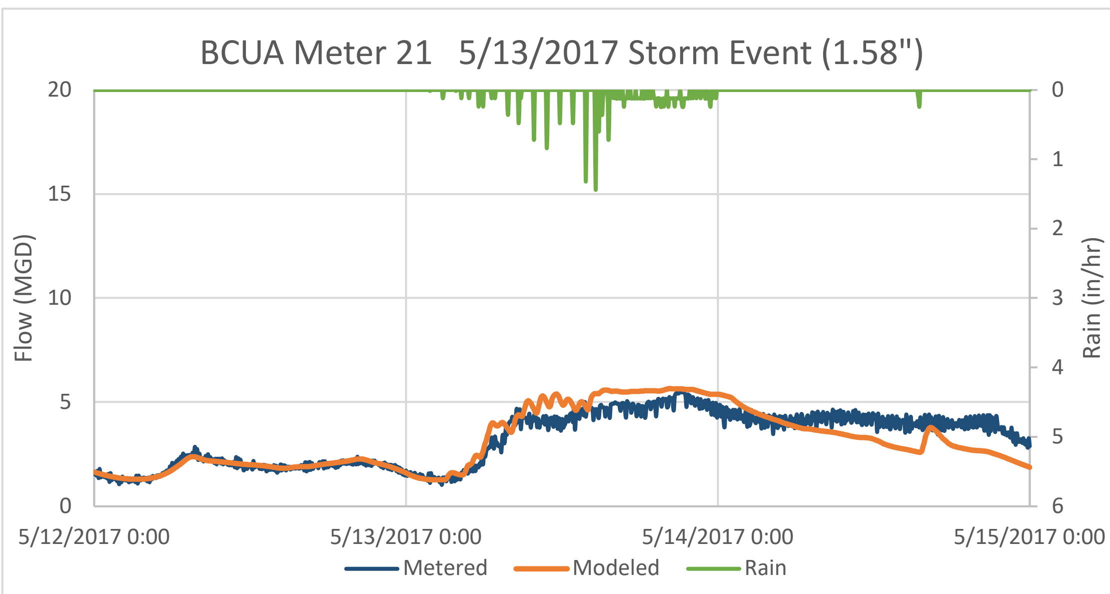


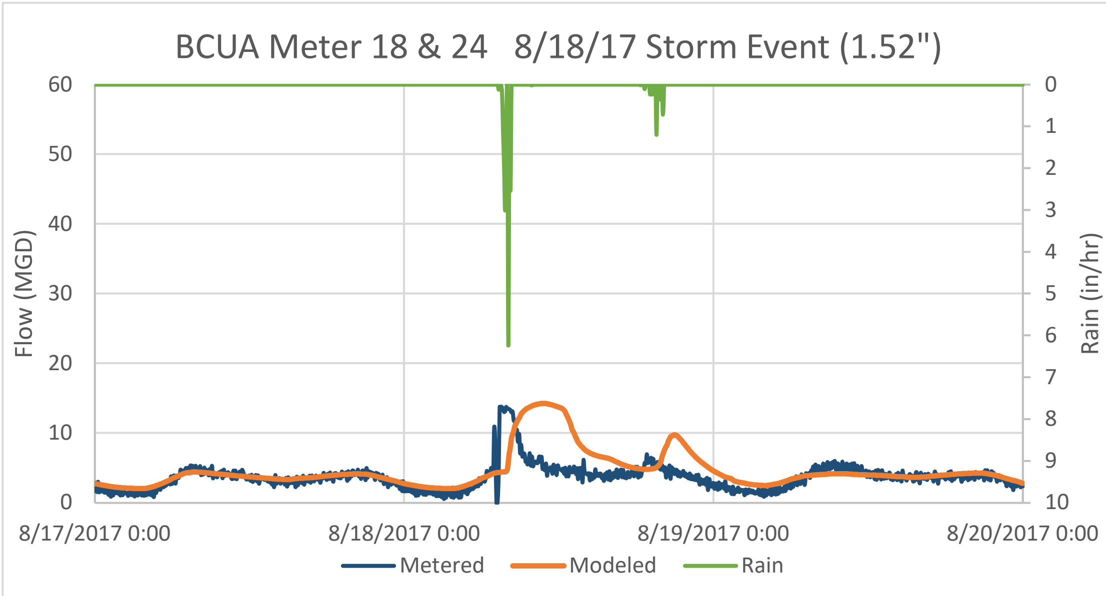


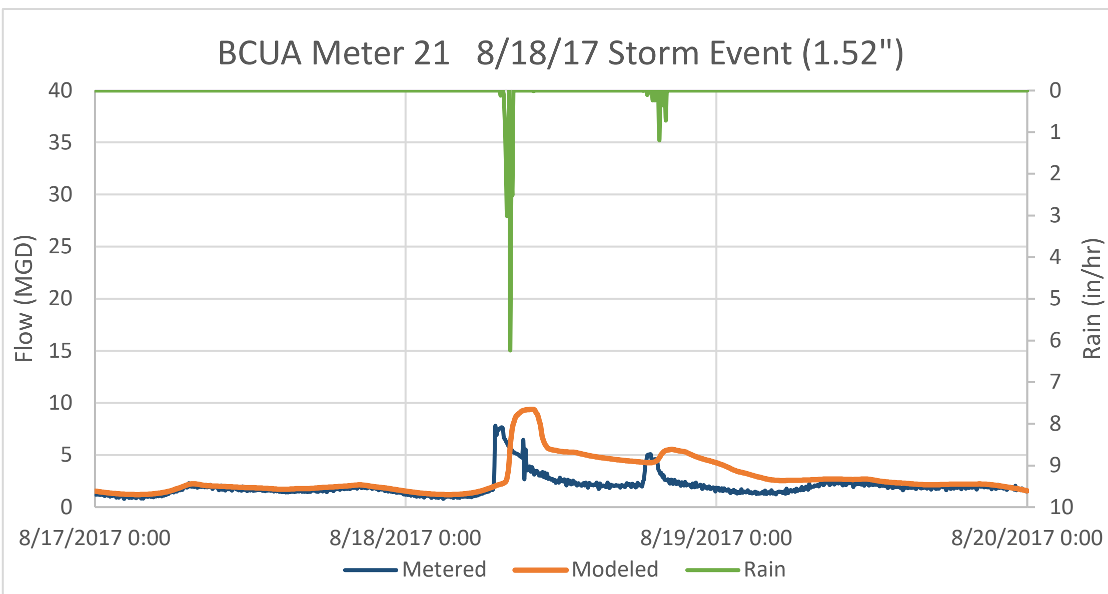

BCUA Meter 18 & 24 5/5/17 Storm Event (3.21")
Flow (MGD)
Rain (in/hr)
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
5/5/2017 0:00
5/6/2017 0:00
5/7/2017 0:00
Metered
Modeled
Rain

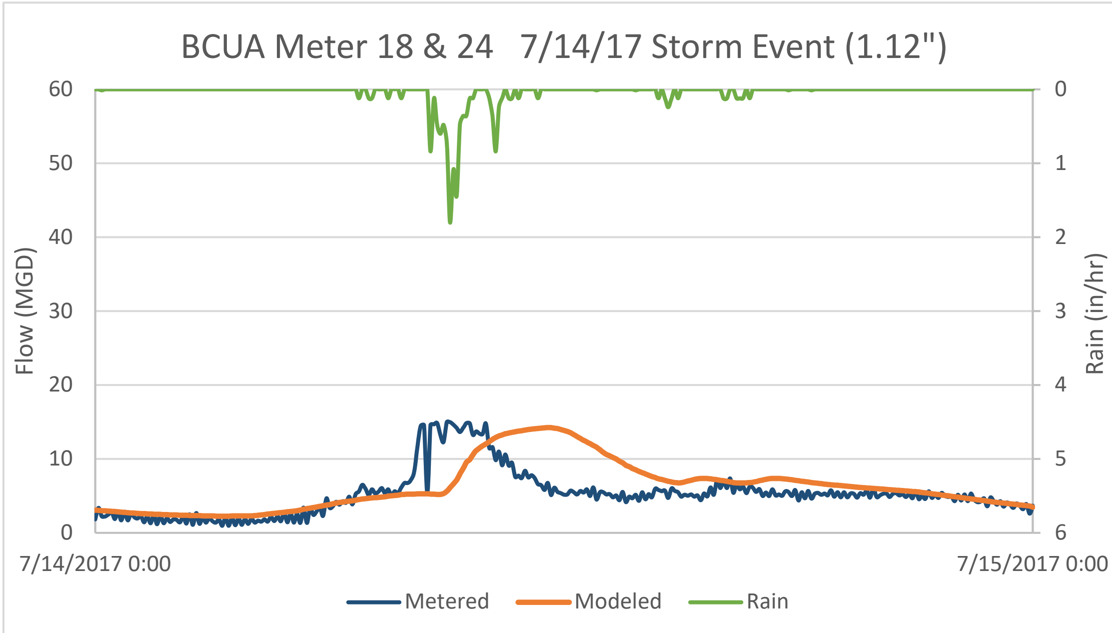

BCUA Meter 21 5/5/17 Storm Event (3.21")
Flow (MGD)
Rain (in/hr)
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
5/5/2017 0:00
5/6/2017 0:00
5/7/2017 0:00
Metered
Modeled
Rain

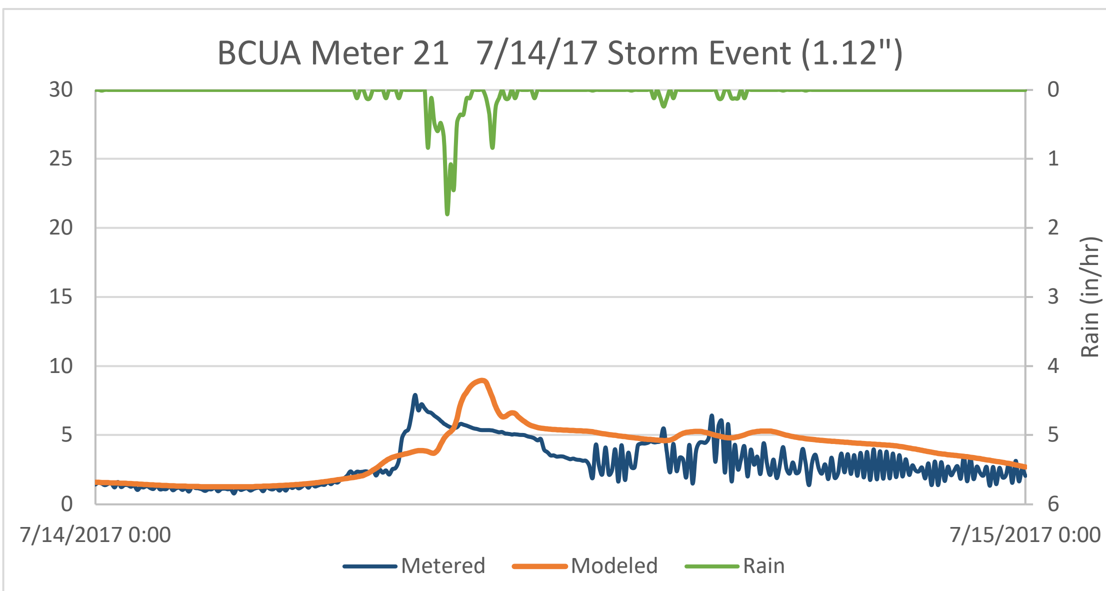

BCUA Meter 18 & 24 5/13/17 Storm Event (1.58")
Flow (MGD)
Rain (in/hr)
0
5
10
15
20
25
30
35
40
0
1
2
3
4
5
6
5/12/2017 0:00
5/13/2017 0:00
5/14/2017 0:00
5/15/2017 0:00
Metered
Modeled
Rain

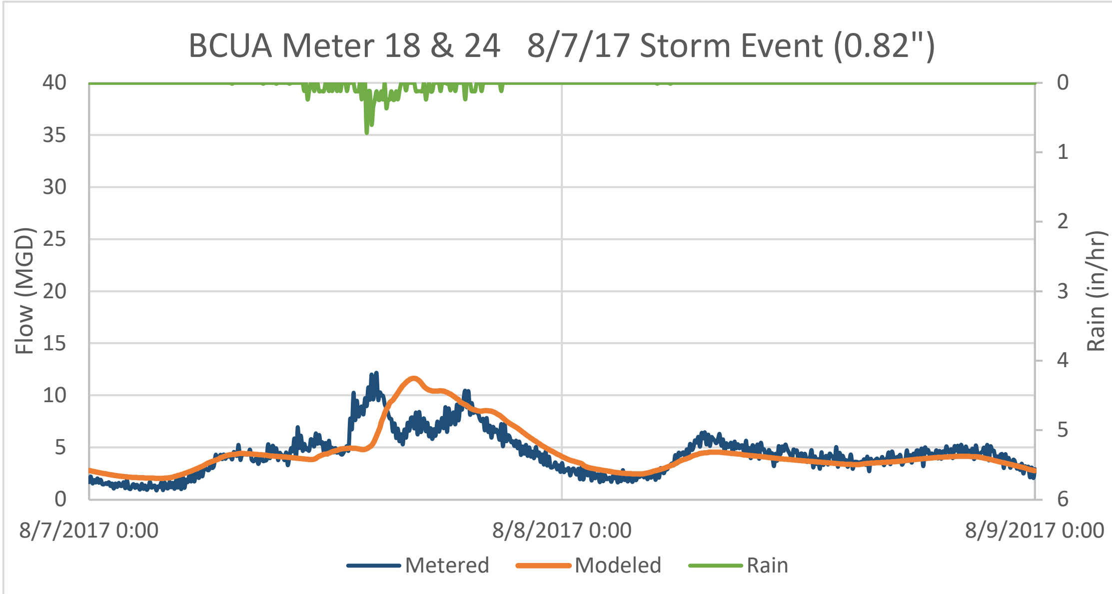

BCUA Meter 21 5/13/2017 Storm Event (1.58")
Flow (MGD)
Rain (in/hr)
0
5
10
15
20
0
1
2
3
4
5
6
5/12/2017 0:00
5/13/2017 0:00
5/14/2017 0:00
5/15/2017 0:00
Metered
Modeled
Rain

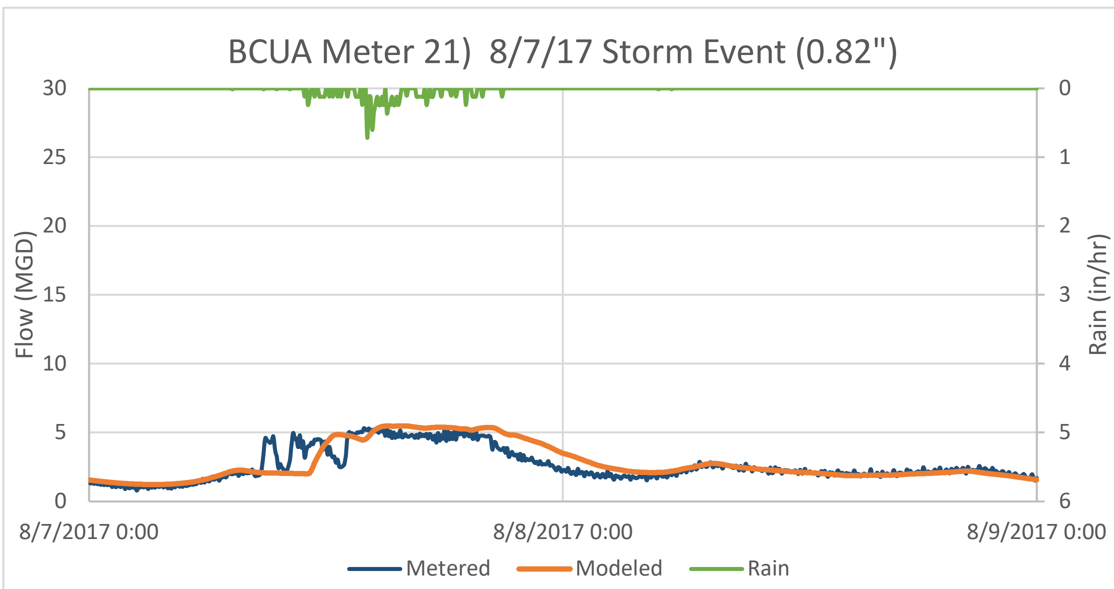

BCUA Meter 18 & 24 8/18/17 Storm Event (1.52")
Flow (MGD)
Rain (in/hr)
8/17/2017 0:00
8/18/2017 0:00
8/19/2017 0:00
8/20/2017 0:00
Metered
Modeled
Rain

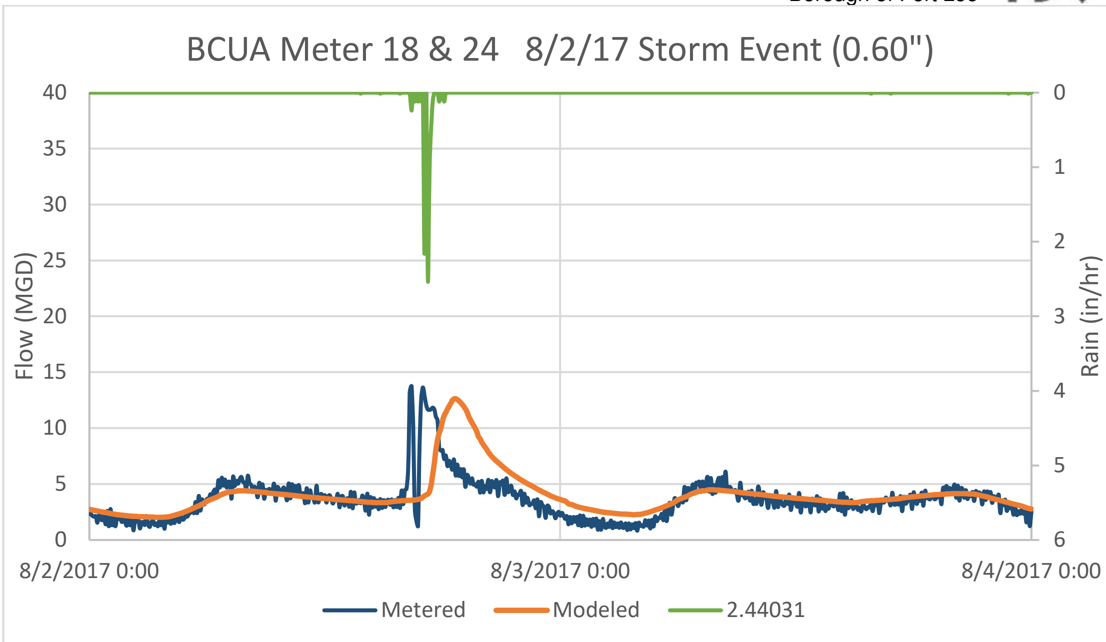

BCUA Meter 21 8/18/17 Storm Event (1.52")
Flow (MGD)
Rain (in/hr)
8/17/2017 0:00
8/18/2017 0:00
8/19/2017 0:00
8/20/2017 0:00
Metered
Modeled
Rain

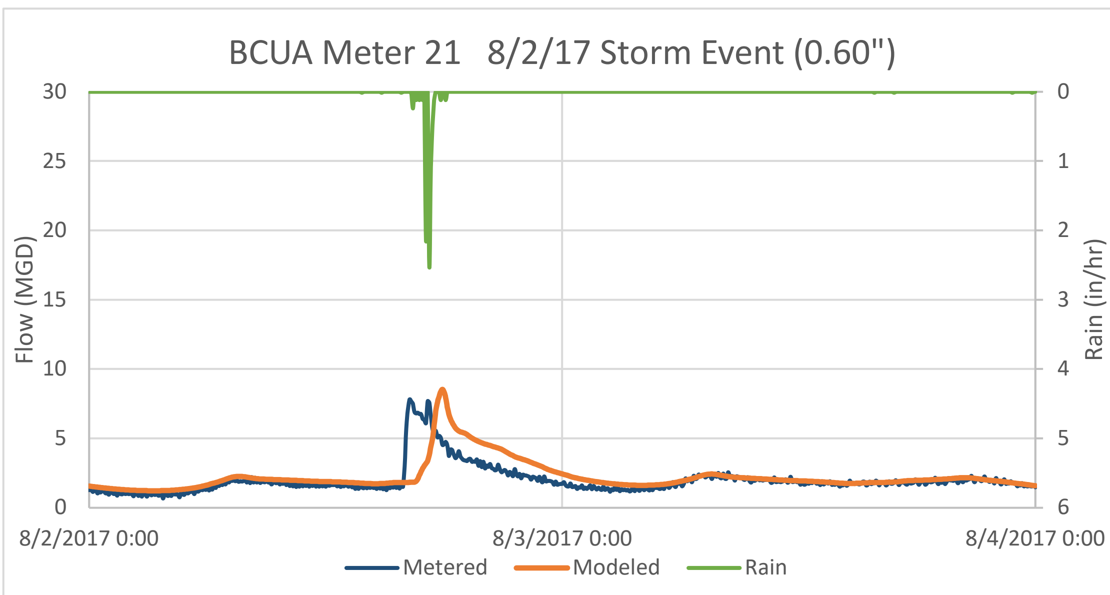

BCUA Meter 18 & 24 7/14/17 Storm Event (1.12")
Flow (MGD)
Rain (in/hr)
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7/14/2017 0:00
7/15/2017 0:00
Metered
Modeled
Rain


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.

---

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

City of Hackensack, New Jersey

FINANCIAL CAPABILITY ASSESSMENT

September 25, 2020

FINANCIAL CAPABILITY ASSESSMENT

FINANCIAL CAPABILITY ASSESSMENT

Prepared for:

Mr. Ted M. Ehrenburg
City Manager
65 Central Avenue
Hackensack, New Jersey 07601

Prepared by:

Arcadis U.S., Inc.
17-17 Route 208 North 2nd Floor
Fair Lawn
New Jersey 07410
Tel 201 398 4433

Our Ref:

30054480.0000

Date:

September 25, 2020

arcadis.com

CONTENTS

TABLES

FIGURES

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

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

FINANCIAL CAPABILITY 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 "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.

FINANCIAL CAPABILITY ASSESSMENT

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.

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.

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.

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.

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.

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 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.

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.

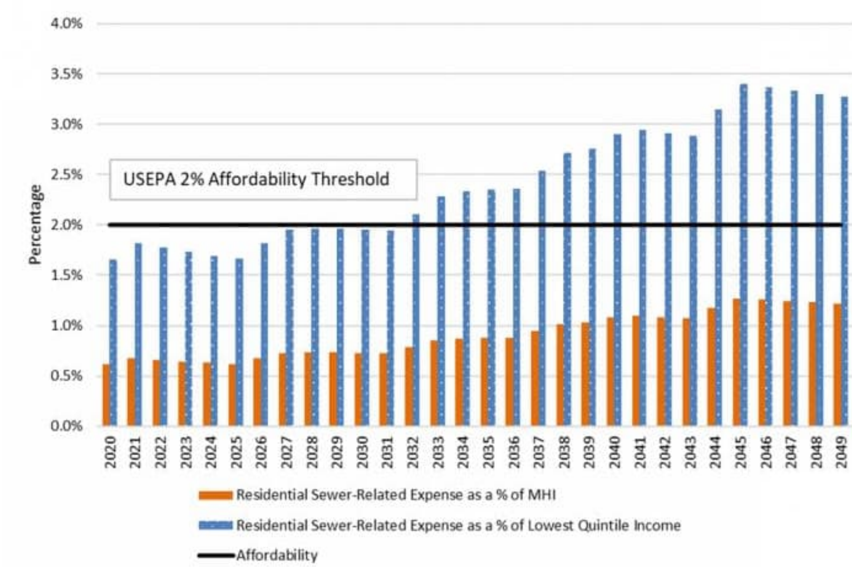
Debt service to finance capital projects was assumed to be funds from NJIB with the following finance terms: no issuance cost, 2.00 percent fee for services of New Jersey Department of Environmental Protection, 2.85 percent interest rate, and a twenty-year term. See Section 2.1.1 for discussion on uncertainty 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.

Arcadis U.S., Inc.

17-17 Route 208 North 2nd Floor

Fairlawn, New Jersey 07410

Tel 201 398 4433

www.arcadis.com

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.

The Village of Ridgefield Park
2020 CSO Fiscal Impact Analysis
June 30, 2020

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.

The Village of Ridgefield Park
2020 CSO Fiscal Impact Analysis
June 30, 2020

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.}

The Village of Ridgefield Park
2020 CSO Fiscal Impact Analysis
June 30, 2020

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

The Village of Ridgefield Park
2020 CSO Fiscal Impact Analysis
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

The Village of Ridgefield Park
2020 CSO Fiscal Impact Analysis
June 30, 2020

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
8410 Sanctuary Boulevard
Riverdale, N.J.
07457
239-877-4807

24. Appendix J – NJDEP May 25, 2021 Comments and Responses

May 25, 2021 NJDEP Comment Letter

BCUA CSO Group Comment Responses

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 & Pretreatment Permitting
P.O. Box 420 – 401 E State St
Trenton, NJ 08625-0420
Phone: (609) 292-4860 / Fax: (609) 984-7938

SHAWN M. LATOURETTE
Acting Commissioner

May 26, 2021

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

Alfred R. Restaino, Borough Administrator
Borough of Fort Lee
309 Main Street
Fort Lee, NJ 07024

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

Mark Olson, Commissioner of Department of Public Works
Ridgefield Park Village
234 Main Street
Ridgefield Park, NJ 07660

Re: Review of Selection and Implementation of Alternatives Report
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 October 1, 2020 entitled "Selection and Implementation of Alternatives Report" for the BCUA, Borough of Fort Lee (Fort Lee), City of Hackensack (Hackensack) and Village of Ridgefield Park (Ridgefield Park) as submitted to the New Jersey Department of Environmental Protection (the Department or NJDEP). This report was submitted in a timely manner and was prepared in accordance with Part IV.D.3.b.vi of the above referenced New Jersey Pollutant Discharge Elimination System (NJPDES) permit. This submission was issued in response to the Long-Term Control Plan (LTCP) submittal requirements as due on October 1, 2020.

The overall objective of the LTCP is to identify and select 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). The Federal CSO Policy establishes a framework for the coordination, planning, selection, and implementation of CSO controls required for permittee compliance with the Clean Water Act. 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 June 2018 "Sewer System Characterization Report" (approved by the Department on March 5, 2019 for BCUA, June 29, 2019 for Fort Lee, March 19, 2019 for Hackensack, and March 11, 2019 for Ridgefield Park); the July 1, 2018 "Supplemental CSO Team Public Participation Process Report" for Fort Lee (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 2018 "Identification of Sensitive Areas Report" (approved by the Department on April 8, 2019); the June 30, 2018 "NJCSO Group Compliance Monitoring

Program Report" (approved by the Department on March 1, 2019); and the July 1, 2019 Development and Evaluation of Alternatives (DEAR) (approved by the Department on February 12, 2020).

The below represents the Department's initial comments. The Department reserves the right to further comment on these issues. Comments are as follows.

1 Certification

Comment 1: Part IV.D.1.b of your existing CSO permit states the following:

"b. All reports submitted to the Department pursuant to the requirements of this permit shall comply with the signatory requirements of N.J.A.C. 7:14A-4.9, and contain the following certification:

i. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. 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".

The Department acknowledges that a modified version of the above referenced certification statement is included in the report and has been signed by representatives for each permittee. These statements are consistent with the version utilized in other previous reports and are acceptable to the Department.

2 Executive Summary

Comment 2: The Executive Summary serves to provide a summary of the overall report. Comments have been incorporated on the specific report sections below; however, any changes as part of a revised LTCP should include revisions to the Executive Summary as appropriate.

Comments below are organized by report section where the majority of the specific subject matter is discussed. Similar to the Executive Summary, in order to address the comments below, this may require revisions to other sections of the report.

Comment 3: Section 2.1 BCUA LTCP Summary states the following:

"A key factor in making use of opportunities to treat more flow at the LF [Little Ferry] WPCF [Water Pollution Control Facility] is the current permit, which was modified in June of 2019, and limits the plant flow and effluent loads. Accepting additional flow at the existing WPCF is possible under low flow conditions, but under high flow condition (flow rates in excess of 120 MGD [million gallons per day]) the plant cannot accept additional flow. BCUA is currently preparing a Capacity Analysis Report that outlines a plan on how the facility could be modified to achieve the revised permit requirements at future higher influent flows. The anticipated load conditions will include dewatering flows from CSO facilities which BCUA has agreed to accept under specified conditions at the WPCF. BCUA worked with the municipalities and their consultants to develop criteria for allowable dewatering rates to the BCUA intercepting sewers to limit dewatering pumping to periods when the plant could accept the flow without exceeding their design capacity. The BCUA notes that this will require the acceptance of additional stormwater along with the sanitary sewage from storage tanks. This runs contrary to BCUA extensive efforts to reduce inflows and the BCUA expects the NJDEP to acknowledge the greater benefit of CSO reduction and to make the necessary allowances to the BCUA's permit to accept this flow without penalty."

The Department is in receipt of the "Little Ferry WPCF Capacity Assurance Report" dated December 3, 2020 as prepared by the BCUA Special Engineer. This report was submitted to fulfill the requirements of N.J.A.C. 7:14A-22.16 and is currently pending review within the Department's Treatment Works Approval program. The Department did modify the NJPDES CSO permit for BCUA as referenced in this comment where the Department concurred that the diversion of additional CSO flows could justify alternate loading limits. Therefore, the Department has already acknowledged the benefit of CSO reduction and agreed to proposed a NJPDES permit modification if additional CSO flows were diverted to the plant. As stated within RESPONSE 7 of the June 28, 2019 final permit action:

"Nonetheless, the Department would need adequate justification under 40 CFR 122.44 (l) in order to consider any alternate limits based on a flow of 94 MGD or a higher flow if specified in the approved WMP [Wastewater Management Plans]. However, provided the permittee can justify that higher loadings are appropriate, in accordance with the criteria at Section 402(o)(2) of the Clean Water Act, the Department may consider adjusting these limitations. For example, if the permittee were to accept CSO flows from hydraulically connected communities, this may justify the inclusion of higher loading limitations as it would result in an overall decrease in pollutants discharged to the waterbody."

However, as noted within Section 2.1 of the LTCP, it appears that BCUA will not see a net increase in CSO flows which is described as follows:

"…In the typical year, it is anticipated that, due exclusively to the CSO LTCP projects, the BCUA will experience an annual reduction in flow of 0.6 MG [million gallons], or a decrease in average daily flow of 0.002 MGD. This change is made up of reductions of 15.3 MG from Fort Lee and 7.4 MG from Hackensack, which are offset by an increase of 22.1 MG from Ridgefield Park. The BCUA intends to apply the stormwater inflow reductions from sewer separation projects against its targeted inflow and infiltration reduction program, creating a win-win scenario."

While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Comment 4: Regarding Fort Lee, Section 2.2.2, Selected Plan includes Table 2-1 which shows the impact of sewer separation on CSO Volume and Number of Events as follows:

Table 2-1: Fort Lee CSO LTCP Impact on CSOs

Condition	Acres Separated	% CSO Capture	CSO Volume (MG)	Number of Events
Baseline (2045)	-	76.3	161.6	58
New Development [1]	16	79.1	142.5	58
Sewer Separation Phase 1	5	79.7	138.5	58
Sewer Separation Phase 2	10	81.0	129.6	58
Sewer Separation Phase 3	13	82.4	120.0	58
Sewer Separation Phase 4	15	84.0	109.1	58
Sewer Separation Phase 5	17	85.4	99.6	58

[1] Includes pump station modifications discussed in the DEAR report.

Please provide additional information to supplement Table 2-1:

a) Explain why the number of events remains the same throughout the five phases of sewer separation.
b) Provide additional justification as to how separation of 60 acres equates to the change in percent capture values.
c) Acknowledge that the separated stormwater will be managed in accordance with the Stormwater Management Rules at N.J.A.C. 7:8 as required under Fort Lee's NJPDES MS4 permit.

Comment 5: Section 2.2.2, Selected Plan includes Figure 2-1, Time Required to Reach 85% Capture With Separated Sewers, which is related to Table 2-1. Clarify what is intended by EDP + 5 years within this figure.

Comment 6: Section 2.2.4 , Operational Plan, Schedule, and Post Construction Compliance Monitoring includes Figure 2-2 namely a map of Fort Lee as follows:

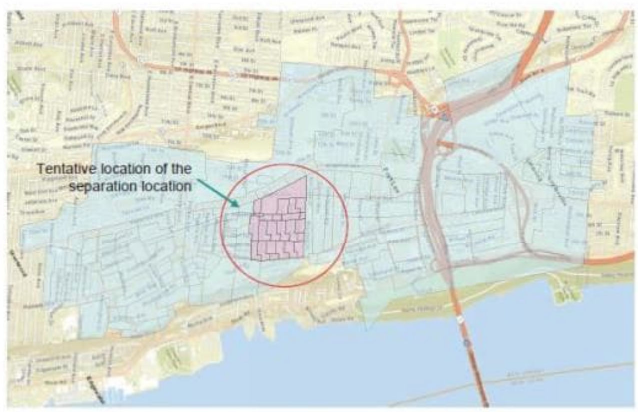


Figure 2-2: Example of the Delineation of the 60 Acre Sewer Separation Area

Provide additional information to supplement Figure 2-2:

a) In order to show the relative effect of sewer separation, revise Figure 2-2 to designate which portions of Fort Lee are currently served by a combined sewer system versus a separate sewer system. In addition, label the location of the existing CSO outfalls.
b) Expand and revise Figure 2-2 to indicate the locations of the five phases of sewer separation.
c) Figure 2-2 states "Tentative location of the separation location" and is labeled "Example of the Delineation of the 60 Acre sewer Separation Area." Given that this is an LTCP, it must include the selected alternatives and not indicate tentative locations. The Department is concerned that there is not a firm plan or commitment to sewer separation given these labeling designations. Please explain.

Comment 7: Regarding Ridgefield Park, as noted within Section 2.4.2, Selected Plan:

"…a 0.7 MG storage tank was selected as the preferred LTCP. The tank will be situated on the west side of the Village and collect overflow from the two largest outfalls by annual volume of discharge and the most active by frequency of overflow..."

Section 2.4.4, Operational Plan and Schedule then describes the schedule including a feasibility study for 2 years; property acquisition for 3 years; design permitting and funding for 3 years; construction for 5 years; and monitoring and model update for 2 years. This extensive period of time for a feasibility study for a final CSO control alternative has not been adequately justified.

In addition, while some detail is provided within Section 2.4.4, the Department questions why a feasibility study is being included. Given that this is an LTCP, it must begin with implementation of the final selection where a feasibility study was more appropriate for the Development and Evaluation of Alternatives phase which already occurred. Please explain.

Comment 8: Section 2.4.2, Selected Plan includes a summary of the Ridgefield Park LTCP including Table 2-3:

Table 2-3: Ridgefield Park LTCP Summary of Overflows

	2015 Baseline		LTCP 85% Capture	
Outfall	Overflow Volume (MG)	Overflow Frequency	Overflow Volume (MG)	Overflow Frequency
001A	6.0	19	6.0	19
002A	0.4	11	0.4	12
003A	15.2	45	2.4	11
004A	27.7	55	18.2	21
005A	3.4	25	3.5	26
0006A	0.5	12	0.5	15
Total	53.2	55	31.1	26

While the overflow volumes and frequency show a decrease for outfalls 003A and 004A through the implementation of the selected alternatives, there is a slight increase in the volume and/or frequency for outfalls 002A, 005A and 006A. Please explain.

3 Introduction

Comment 9: Section 3.1, General Introduction to System, Plant and Municipalities states the following:

"The BCUA and its WPCF now provide wastewater transportation and treatment services for 47 municipalities, serving a population of about 565,000 people…Forty-four municipalities in the service area have separate sewer systems, while three municipalities have combined sewer systems: Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park.

While the BCUA owns and operates the trunk/intercepting sewers (trunk sewers) that transport flows to the WPCF, it does not own or operate any of local collector sewers, which are owned and operated by each individual municipality, also, the BCUA does not own any CSO outfalls."

The Department agrees that BCUA does not own any CSO outfalls; however, BCUA does own/operate 3 internal regulators (also referred to as flow control structures) in Ridgefield Park. As described in Section 4.2 of the June 27, 2018 Sewer System Characterization Report, these control structures (R-1, R-2 and R5) serve to prevent surcharge of the interceptor or trunk sewer by restricting or closing the regulator gate to the interceptor and diverting flow to an outfall during periods of rainfall. Please revise the above description.

4 System Characterization and Modeling

Comment 10: Section 4.1, Hydraulically Connected System Definition and Segmentation states the following:

"Given that Fort Lee CSOs discharge into the Hudson River while Hackensack and the Village of Ridgefield Park discharge to the Hackensack River or Overpeck Creek just upstream from the Hackensack River, it was logical to consider segmentation of the hydraulically connected system. This concept was discussed with the NJDEP and a request to formalize the segmentation of the hydraulically connected system was provided to the NJDEP via letter on April 24, 2020 (see Appendix A). The letter requested segmenting the BCUA hydraulically connected system into the following two segments:

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

A hydraulically connected system is defined within the NJPDES permit at Part IV.B.1.c 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."

The STP and other CSO entities within each hydraulically connected system were required by the 2015 NJPDES permit to work together to develop a single, jointly-prepared LTCP in order to qualify for the extended 59 month LTCP schedule. A key objective of the single, jointly-prepared LTCP was to ensure that permittees within the hydraulically connected system worked together to guarantee robust coordination and communication. Given that operation and ownership responsibilities within the hydraulically connected system vary, this coordination was key to ensuring the development of a holistic LTCP for the various components of the system and in the ultimate selection of CSO control alternatives. Since the LTCP has now been submitted and the underlying elements of the LTCP (e.g., System Characterization Report, Development and Evaluation of Alternatives) have already been approved, this key objective of the 2015 NJPDES permit has been satisfied.

The Department acknowledges that Fort Lee has requested segmentation of their system separate from Hackensack and Ridgefield Park. At this point in the LTCP process, it appears that the primary implication of demarcating this system as an individual hydraulically connected system is related to the evaluation of percent capture on a municipality level. Another factor identified within the LTCP concerns the evaluation of costs of upgrading BCUA to accept more CSO flows which was not the selected option. In order to address this issue, please confirm that Fort Lee will attain 85% capture within its municipal boundary. Similarly, confirm that Hackensack and Ridgefield Park will attain 85% capture within each of their municipal boundaries.

Comment 11: Section 4.2.3, Representative Hydrologic Year selection (Typical Year) states the following:

"It is acknowledged that sea levels have been rising and are expected to continue to rise over the life of the project and beyond, however, the rate of change is uncertain. To overflow, the water level in the combined sewer must exceed the tide elevation. The rate of discharge is also related to the relative elevation difference between the water level in the combined sewer and the receiving water. Thus, increased sea levels would tend to reduce the volume of combined sewage overflow. There is potential for rising sea levels to impact the hydraulic performance of the combined sewer systems in Hackensack and Ridgefield Park. The potential for sea level rise to impact Fort Lee is very low. Fort Lee is located on the Palisades, a series of steep cliffs along the west side of the Hudson River. The systems have been assessed for flooding under current conditions and any future flooding, resulting from sea level rise, would need to be addressed independently. Existing tide levels were used to provide a conservative estimation of the alternatives' performance for CSO reduction."

The State of New Jersey and the Department are working to address and mitigate the impacts of climate change where additional information is available here: https://www.nj.gov/dep/climatechange/. Climate change can have an impact on the design for CSO control alternatives and resiliency requirements must be considered in the design of any infrastructure. Specifically, in accordance with the provisions of Executive Order 11988, the USEPA and the New Jersey Water Bank require that funded infrastructure be located outside of floodplains or elevated above the 500-year flood elevation. Where such avoidance is not possible, the following hierarchy of protective measures has been established:

1. Elevation of critical infrastructure above the 500-year floodplain;
2. Flood-proofing of structures and critical infrastructure;
3. Flood-proofing of system components.

Address how the selected CSO control alternatives address climate change and sea level rise for all three municipalities.

Comment 12: Regarding CSO related flooding specific to Fort Lee, the Department is aware of periodic overflows at the Bluff Road pump station when, during some storm events, flow cannot be processed through the netting chamber resulting in the influent chamber causing surcharging and, in some cases, overtopping the chamber. This uncontrolled flow is mostly intercepted by local stormwater catch basins along NJ State Highway Route 5 before being ultimately discharged to the Hudson River. Provide a status update on any work being done to rectify this issue as required by the September 18, 2018 Administrative Order CWA-02-2018-3048. The LTCP must address the elimination of CSO related flooding where this should be the utmost priority.

Comment 13: The 2015 NJPDES CSO permit requires selection of either the Presumption Approach or the Demonstration Approach. The Federal CSO Control Policy and the NJPDES permit at Part IV.G.4.f.ii specify that wet weather capture is a means of compliance under the Presumption Approach as follows:

"ii. The elimination of 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;"

All permittees have selected the Presumption Approach namely 85% capture of combined sewage entering the collection system during wet weather. This is stated in Section 2.2 (Fort Lee LTCP Summary), Section 2.3 (Hackensack Summary), and Section 2.4 (Ridgefield Park LTCP Summary). Section 4.2.9, Baseline Conditions System Performance then includes the following table:

Table 4-1: 2015 Baseline Summary of Typical Year Performance

Outfall	Overflow Events	Overflow Volume (MG)	Wet Weather Inflow (MG)	% Capture
FL-001	58	124.5	NA	NA
FL-002	25	25	NA	NA
Fort Lee/Hudson River Total	**58**	**149.5**	**631**	**76.3%**
HK-001	56	105.3	NA	NA
HK-002	56	151.4	NA	NA
Hackensack Total	**56**	**256.7**	**814.8**	**68.5%**
RP-001	19	6.0	NA	NA
RP-002	11	0.4	NA	NA
RP-003	45	15.2	NA	NA
RP-004	55	27.7	NA	NA
RP-005	25	3.4	NA	NA
RP-006	12	0.5	NA	NA
Ridgefield Park Total	**53**	**53.2**	**216.0**	**75.4%**
Hackensack River Basin Total	**56**	**309.9**	**1031**	**69.9%**
BCUA Systemwide	**58**	**459.4**	**1662**	**72.4%**

The Department acknowledges that model updates were performed, as described in Sections 4.2.5, 4.2.6, and 4.2.8, and that the above values represent slightly more conservative baseline results for Ridgefield Park. Confirm that a consistent methodology was applied to calculate baseline percent capture for all three municipalities. In addition, confirm that Fort Lee, Hackensack and Ridgefield Park will attain 85% capture within the municipal boundaries. Finally, confirm that the BCUA Systemwide as well as the waterbody based percent capture values (i.e., Hackensack River Basin Total and Hudson River Total) are for informational use only.

Comment 14: Section 4.3.1, Baseline sampling program states the following:

> "The NJPDES CSO Permits, direct permittees to implement a Compliance Monitoring Program (CMP) adequate to verify existing ambient water quality conditions for pathogens and evaluate the effectiveness of future CSO controls related to compliance with water quality standards (WQS) and the protection of designated uses...Per the NJPDES CSO Permits, pathogens are the pollutant parameters of concern for ambient water quality monitoring and WQS compliance…"

While the Department agrees that pathogens are intended to serve as an indicator parameter for CSOs, note that the CSO Control Policy requires controls adequate to meet the water quality based requirements of the Clean Water Act. This should be clarified in the report.

Comment 15: Section 4.3, Receiving Waters and Water Quality Conditions includes Section 4.3.3, Hudson River which states the following:

> "The Fort Lee combined sewer system overflows flow during rainfall events to the Hudson River. NJDEP has designated the Hudson River as a Primary Contact, Saline Estuary with a SE2 Class…"

N.J.A.C. 7:9B-1.12(e) defines the designated uses for SE2 waters as follows:

> "(e) In all SE2 waters the designated uses are:
> 1. Maintenance, migration and propagation of the natural and established biota;
> 2. Migration of diadromous fish;
> 3. Maintenance of wildlife;
> 4. Secondary contact recreation; and
> 5. Any other reasonable uses."

Given that primary contact is not a designated use of SE2 waters, correct the above statement.

Comment 16: Section 4.3.3 states the following:

> "As described in the BCUA Sewer Characterization Report, monitoring of the receiving waters was done jointly with numerous permittees through the NJ CSO Group…Location 31…is located adjacent to Fort Lee's discharge and results are shown…Currently, the water is not impaired compared to the standards."

Section 4.3.4, Hackensack River then explains that the Baseline Compliance Monitoring Program (BCMP) also includes three monitoring locations immediately adjacent to Hackensack and the Village of Ridgefield Park namely sites B1 and B2 on the Hackensack River and site B11 on the saline estuary portion of Overpeck Creek.

The data collected for the June 30, 2018 BCMP was conducted to comply with the NJPDES permit requirement at Part IV.G.9. While the BCMP was deemed acceptable by the Department, it did not have sufficient data to conduct an analysis against water quality standards; therefore, a finding of "impaired" or "not impaired" can not be made utilizing this data. In fact, this is stated on page 35 of the June 30, 2018 "NJCSO Group Compliance Monitoring Program Report":

> "The BCMP was not designed to provide an adequate data volume for assessing attainment of water quality standards, which would have required five samples per month at each sampling location to compute monthly geometric means."

Given the limited data set for most months, the data set does not support an accurate assessment against water quality standards. As a result, please revise the statement above regarding data for Location 31 for Fort Lee.

5 Control Plan Approach and Compliance Strategy

Comment 17: Section 5.1, Background on Water Quality Objectives states the following:

> "To improve receiving water quality, the primary objectives of the CSO long term control program are to reduce pathogens and CSO volume. The goal is to select and implement a CSO control program to cost-effectively improve water quality of the receiving waters sufficient to meet the water-quality based requirements of the Clean Water Act."

The NJPDES CSO permit requires permittees to meet the water quality based and technology based requirements of the Clean Water Act (CWA) consistent with the National Combined Sewer Overflow Control Strategy issued on August 10, 1989 (54 Federal Register 37370). As stated in the March 12, 2015 NJPDES CSO permit:

> "**RESPONSE 63:** CSOs are subject to both the technology-based and water quality-based requirements of the CWA's discharge permitting system, National Strategy, 54 Fed. Reg. at 37371; National Policy, Part I.A, 59 Fed. Reg. at 18689, and permittees must satisfy the more stringent of the technology-based or water quality-based requirements of the CWA. N.J.A.C. 7:14A-13.2…"

Please revise this statement.

Comment 18: Section 5.1, Background on Water Quality Objectives states the following:

> "Pathogen Water Quality Model (PWQM) simulations were undertaken by the NJ CSO Group to understand the pollutant sources and their relative contributions for the affected study area. The results of this modeling are summarized in the "Calibration and Validation of the Pathogen Water Quality Model (PWQM) for the Passaic Valley Sewerage Commission", September 2020. The NJ CSO Group water quality model was used to provide insight into the applicability of either the Demonstration or Presumption Approach and which level of control for the CSO outfalls would be needed to demonstrate attainment of WQS and designated uses of the corresponding receiving waters…"

The Department is in in receipt of the "Calibration and Validation of the Pathogen Water Quality Model," September 2020 as submitted by the NJ CSO Group and it is currently pending review. Note also that the permittee is required to comply with the Federal CSO Control Policy and has elected to do so through the Presumption Approach. While the NJ CSO Group permittees have submitted a Pathogen Water Quality Model, a modeling approach is germane to the Demonstration Approach. The Department does not agree that the Pathogen Water Quality Model will define the level of control or the maximum pollutant reduction benefits reasonably attainable for the receiving waters rather compliance with the Presumption Approach will define the level of control. In addition, it is premature to draw conclusions regarding attainment of water quality standards as "Baseline % Attainment" and "100% Control % Attainment", as shown in Table 5-1, AU Attainment in SE2 Waterbodies under Baseline and 100% Control Conditions, since the PATH model is still pending review by the Department. Revise accordingly.

In addition, the selection of either the Presumption or Demonstration approach is required in the NJPDES CSO permit where the Presumption Approach has been selected. Note that it is not acceptable to switch between the Presumption Approach (85% wet weather capture) and the Demonstration Approach (modeling based approach) since a commitment was required as part of the 2015 NJPDES CSO permit requirement.

Comment 19: Section 5.5.1, Hudson River segment approach and level of control states the following:

> "The water quality modeling and sampling data shows that the Hudson River is consistently meeting the SE2 water quality standard of 770 cfu/100 ml, and the component analysis shows that the CSOs are a small portion of the pollutant loading. Therefore, the goals of the presumptive approach are already met; however, the CSO capture is at 76.3%, below the CSO policy goal of 85%..."

This excerpt states that "the goals of the presumptive approach are already met" where this statement is not appropriate at this time. In addition, the Presumption Approach is defined within the Federal CSO Control Policy as a program that would be presumed to meet the water quality-based requirements of the Clean Water Act where these criteria are provided in Part IV.G.4.f. Please revise this statement given that the wet weather capture goals have not yet been met.

Comment 20: Section 5.5.3, Percent Capture Definition states the following:

- "Wet weather flow contributions within CSO municipalities – The entire wet weather flow contribution from within each CSO municipality was used in the calculation of percent capture. This includes the separately sewered areas within Ridgefield Park and Fort Lee as they discharge to the BCUA at the same location as the combined sewage. Hackensack considered only the combined sewer area and sanitary sewers flowing into combined sewers. There is a distinct divide with the remaining sanitary sewers discharging to the BCUA branch interceptor north and west due to a ridgeline."

Section 5.5.3 also includes the following equation:

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

Table 5-4 is then displayed as follows:

Table 5-4: Summary of 2015 Baseline Typical Year Municipal Percent Capture

Municipality	Wet Weather Inflow (MG)	Overflow (MG)	% Capture	Overflow @ 85% Capture (MG)
Fort Lee (Hudson River)	631	149.5	76.3%	94.7
Hackensack	814.8	256.7	68.5%	122.2
Ridgefield Park	216.0	53.2	75.4%	32.4
Hackensack River Total	1031	309.9	69.9%	154.7
BCUA Hydraulically Connected System	1662	459.4	72.4%	257

Provide additional information on the following:

a) Clarify what is meant by the inclusion of "separately sewered areas within Ridgefield Park and Fort Lee as they discharge to the BCUA at the same location as the combined sewage" and if these values are included in the total wet weather capture volume in terms of the percent capture results. Describe the locations of these areas and include a sensitivity analysis to document the relevance of separately sewered areas in this calculation.

b) Clarify if the above referenced values include only combined sewer areas within Fort Lee, Hackensack and Ridgefield Park.

c) Clarify if the fraction of the flow lost includes flooding such as flooding in the vicinity of the Bluff Road outfall.

d) Confirm that a similar methodology was utilized for all three municipalities.

e) Confirm that Fort Lee, Hackensack and Ridgefield Park will attain 85% capture within the municipal boundaries and that the BCUA Hydraulically Connected System information as well as the waterbody based percent capture values are for informational use only.

f) Provide a breakdown of results by outfall to supplement Table 4-1, 2015 Baseline Summary of Typical Year Performance.

Approval of this report hinges in part on the inputs and results of this equation being clearly demonstrated and reproducible.

6 Development of Alternatives

Comment 21: Section 6.1.2, Rankings states the following:

> "The BCUA does not own any CSO outfalls, but has agreed to work cooperatively with the municipal permittees, who will be responsible for bearing the costs for any expansion of transport and treatment facilities to accommodate additional combined flow conveyed to and treated by the BCUA. Accordingly, the municipal permittees will need to weigh the costs of CSO controls within the municipality against the costs to convey and treat the flow at the BCUA WPCF. Therefore, the selection of alternatives acceptable to the BCUA lies with the municipal permittees… The cost of blending is significantly less than full expansion of the treatment plant, however this does not appear feasible in light of the current plant permit, refer to Section 6.1.4 for applicability of blending under June 2019 permit revisions. …It is noted BCUA will need to agree to any municipal funded project that will result in changes to flow, transport, or treatment capacity, but has agreed to accept dewatering flows from municipal CSO storage facilities, within the control parameters specified by the BCUA and provided to the municipalities."

The Department acknowledges that the BCUA, Fort Lee, Hackensack and Ridgefield Park have worked cooperatively in developing CSO control alternatives. The municipalities own their collection system and BCUA owns the Main Trunk Sewer, Overpeck Valley Trunk Sewer and Overpeck Valley Relief Sewer, as indicated in Table 6-1, Summary of BCUA Trunk Sewer Capacities. BCUA also owns internal regulators in Ridgefield Park. The conclusion of the LTCP is then that an overall net increase in flow will not be diverted to BCUA. While there are several factors contributing to this conclusion, it is worth noting that the Federal CSO Control Policy does not mandate that costs be borne by the municipality. In addition, any or all of the permittees could evaluate the feasibility of forming a stormwater utility to help distribute costs. See https://www.nj.gov/dep/dwq/SWU_establishing_utility.html. The Department also maintains that the 2019 NJPDES permit modification does acknowledge that loading limits could be revisited if additional CSO flows were diverted to the plant. As a result, the Department maintains that blending or expansion could trigger modification to the NJPDES permit limits and it is inappropriate to state that these options are infeasible under the existing NJPDES permit. The above referenced description should also be revised to include the components of the system that BCUA owns. Please incorporate these changes.

Comment 22: Section 6.1.4, Expansion of Treatment Capacity and CSO Bypass at Regional WPCF includes a summary of the DEAR as well as the Department's comments on the DEAR. In its February 12, 2020 approval letter, the Department questioned BCUA's statement within the DEAR that "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 expansion or bypass." In response to this statement, Section 6.1.4 states that BCUA has "carefully coordinated with the municipalities regarding plant and interceptor capacity" and included a supplemental analysis regarding directing more flow to the BCUA interceptors; conveying additional flow to the treatment plant; and plant capacity upgrades. This supplemental analysis serves to address the required elements at Part IV.G.4.e.iii namely STP expansion and/or storage at the plant as well as CSO related bypass of the secondary treatment portion of the STP. Specifically, Section 6.1.4.6, CSO Bypass at the Existing WPCF states the following:

> "There is no current means to bypass the primary or secondary treatment units to blend raw wastewater with treated effluent prior to discharge. The influent pumping station currently discharges directly into the grit removal facilities, after which, flow is split and flows by gravity to the primary clarifiers and subsequent treatment units in each of the four batteries.

Similarly, Section 6.1.4.7, Expansion of the Existing Regional WPCF states the following:

"With the new effluent permit limits requiring nitrification and lower cBOD5 discharge concentrations, the existing facility would need to be de-rated to 60 MGD average annual flow and 120 MGD peak hydraulic flow. The BCUA is in the process of preparing a Capacity Analysis Report, that report evaluated a potential 60 MGD expansion of the treatment plant, providing levels of treatment as required by the current permit, and which would also be required to treat additional combined sewage flows at the LF WPCF, if any additional CSO are directed to the plant, however none are planned other than tank dewatering flows…"

The Department acknowledges that CSO related bypass is not the chosen method of CSO control for Fort Lee, Hackensack or Ridgefield Park. However, it is important to note that overall improvements are currently ongoing at the WPCF to improve total suspended solids (TSS) removal rates through the rehabilitation of the sixteen Final Sedimentation Tanks and the installation of polymer feed channels. These improvements are in addition to other planned treatment improvements, due in part to the effluent limitations in the June 28, 2019 permit modification, namely more stringent $CBOD_5$, ammonia and Dissolved Oxygen limitations. The NJPDES program routinely requires more stringent limitations in NJPDES permits based on ongoing regulatory changes such as the inclusion of criteria for ammonia for SE2 waters in NJSWQS rule amendments in January 22, 2002. CSO municipalities could have chosen to incorporate a CSO related bypass as part of these WPCF upgrades but instead decided on other alternatives. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Comment 23: Section 6.3.2, Rankings states the following regarding Table 6-16, Alternatives Evaluation Matrix:

"…These alternatives have since been further evaluated and added as potential projects for the City's LTCP. Section 0 further discusses the additional alternatives in detail.

Correct this reference to Section 0.

7 Selection of LTCP

Comment 24: Section 7.2.2, Selection Methodology states the following:

…Green infrastructure was also selected in a secondary role. The technology is limited in its CSO flow reducing characteristics, however, it is a preferred technology to some members of the public because it is a visible technology. This visibility also requires that it be maintained."

In Table 7-1, Cost Schedule Percent Capture and CSO flows for Fort Lee's LTCP there is a \$200,000 allocation for Green Infrastructure. However, the excerpt in Section 7.2.2 is the only detail regarding Green Infrastructure for Fort Lee. Provide additional information regarding any project(s) that was utilized to derive the \$200,000 value including the project type and potential location. In addition, although green infrastructure has been included in the cost estimate and financial capability assessment, green infrastructure was not included in the Implementation Schedule in Section 10.2. Please rectify this omission.

Comment 25: Section 7.2.6, Opinion of Cost for LTCP states the following regarding Fort Lee:

> "The cost schedule with the impact on CSO percent capture and CSO flows is presented in Table 7-1. The sewer separation costs are based on $300,000 per separated acre developed by PVSC. A total cost of $23,000,000 will be spent in Fort Lee for CSO control to achieve 85.4% CSO reduction. $4,800,000 has been [spent] through 2017 on The Towers and Hudson Lights projects and $18,200,000 will be spent on sewer separation over 25 years. The Borough[']s portion is shown in Table 7-1…"

Table 7-1, Cost Schedule, Percent Capture and CSO flows for Fort Lee's LTCP shows a cumulative cost of $18,200,000. The Department acknowledges that Fort Lee has selected the Presumption Approach namely the elimination of 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. As a result, the baseline of 79.1% already includes the benefits attained from the 2017 sewer separation projects described above. It is the Department's understanding that these projects were funded by a private developer. Justify why the costs of these projects are included in the total price tag of costs for Fort Lee as part of the financial capability assessment since the costs have already incurred and since these costs were not borne by Fort Lee.

Comment 26: Section 7.2.7, Selected Plan states the following:

> "…Green infrastructure projects will be constructed on public property or rights of way. Selected Alternatives Performance."

It appears that the last statement is incomplete. Please revise.

Comment 27: Section 7.2.7.2, Adaptive Management states the following:

> "…The Borough recommends the LTCP be flexible and adaptable to changes during the implementation of the program…Additionally, the future requirements of the Borough's MS4 permit may also impact the Borough's LTCP."

Please describe what is intended regarding "future requirements of the MS4 permit" and how this may affect the LTCP given its pending finalization.

Comment 28: Section 7.3.6.1, Selected Alternatives Description includes detail regarding the stormwater infrastructure project within Hackensack's Selected Alternative:

> "The Court Street Stormwater Project was a study that the City undertook in 2019 just after the submission of the DEAR Report to examine problematic flooding issues in certain areas. This study evaluated different alternatives, conceptual designs, and cost estimates for the management of stormwater west of Railroad Avenue in the Court Street Subdrainage Area. This area is notorious for flooding during rainfall events and has been a longstanding issue for City residents...
>
> …The conclusion of the study recommended a dedicated stormwater interceptor sewer system with in-line storage underneath Railroad Avenue and a pump station located near a new stormwater outfall…The stormwater project would be able to drain approximately 200 acres of area west of Railroad Avenue. The stormwater system would be designed for a 25-year storm event at high tide with a sea level rise increase projected for the year 2050 to account for estimated climate change. The in-line storage would be capable of storing approximately 1.5 MG of stormwater, and the pump station near the outfall would be capable of pumping approximately 142 MGD…

> …By undertaking the Court Street Stormwater Study, the City intends to create a project that assist in mitigating a City specific flooding issue as well as assists with the CSO reduction requirements in the City's NJPDES permit…"

The Department concurs with Hackensack's assessment that the LTCP should give the utmost priority to the elimination of ongoing flooding, which is a public health issue, and agrees that the stormwater infrastructure project in the Court Street Stormwater Project should be prioritized. The Department also acknowledges that this project has received public support through the public participation process as described in Section 7.3.3, Public Input. Provide additional detail as to whether or not this flooding is related to sewer backups, stormwater flooding or tidal inundation. In addition, please explain if flooding within Hackensack is limited to this area or if other areas are prone to flooding (including adjacent separately sewered areas) and the cause of such.

Comment 29: Section 7.3.6.1, Selected Alternatives Description includes detail regarding Green Infrastructure:

> "…Therefore, the city intends to include a green infrastructure program within its selected plan. The green infrastructure program will set aside a specific amount of funds, including grant funding, per year of the LTCP implementation that will be allocated towards a green infrastructure program…The green infrastructure program would allow for the City to create and implement an ordinance to require developers to install, operate, and maintain green infrastructure as part of their developer agreement. The other function of the green infrastructure program is to serve as an educational program for the public…"

The Department acknowledges that Hackensack has included green infrastructure as part of its LTCP. However, note that if green infrastructure is installed due to the project qualifying as a major development program the Stormwater Management rule at N.J.A.C.7:8 now requires that a maintenance plan be submitted as part of the major development application that is reviewed and approved by the City. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Comment 30: Section 7.3.6.1, Selected Alternatives Description includes detail regarding the Storage Tank at Anderson Street:

> "The CSOs from the Anderson Street subdrainage area discharge to Outfall 001A. As the LTCP selected plan currently stands, a storage tank upstream of Outfall 001A may be required to achieve a minimum 85% system-wide capture in the City. The storage tank would have a storage capacity of approximately 0.85 MG. The tank can either be a deep vertical treatment shaft, 60 feet diameter by 40 feet deep, or a more conventional type of underground storage tank, 70 feet wide by 70 feet long by 23 feet deep. The current site for the storage tank would be underneath the parking lot near Johnson Park, across Anderson Street from Outfall 001A and the screening facility…
>
> …
>
> The size and necessity of a storage tank will be re[e]vaulated after the first phases of the City's LTCP are implement…""

The Department acknowledges that the Federal CSO Control Policy requires a minimum of 85% wet weather capture as one of the alternatives under the Presumption Approach. However, as currently written, the LTCP components focus on the Court Street sewershed and the only CSO control alternative targeted for the Anderson Street sewershed is this storage tank. As detailed in Table 7-3:

Table 7-3: Phased LTCP Selected Plan Alternatives Performance

Condition / Phase of LTCP	Outfall	City Overflow Volume (MG)	City Volume Captured to BCUA (MG)	City Storm water Volume Separated (MG)	City Overflow Frequency	City Percentage of CSO Volume Captured (%)
Baseline Condition prior to LTCP Implementation	Outfall 001A	105.3	162.3	N/A	56	60.7%
	Outfall 002A	151.4	395.8	N/A	56	72.3%
	Total System	256.7	558.1	N/A	56	68.5%
Localized Main Street Sewer Separation Projects	Outfall 001A	105.3	162.3	N/A	55	60.7%
	Outfall 002A	132.7	390.1	24.4	52	75.7%
	Total System	238.0	552.4	24.4	56	70.8%
Localized Main Street Sewer Separation Projects + Court Street Stormwater Project	Outfall 001A	105.3	162.3	N/A	55	60.7%
	Outfall 002A	37.5	353.6	156.1	23	93.1%
	Total System	142.8	515.9	156.1	56	82.4%
Full Recommended Plan: Localized Main Street Sewer Separation Projects + Court Street Stormwater Project + Anderson Street Storage Tank	Outfall 001A	70.5	197.1	N/A	30	73.6%
	Outfall 002A	37.5	353.6	156.1	23	93.1%
	Total System	108.0	550.7	156.1	30	86.8%

Given that inclusion of the Anderson Street Storage Tank in the CSO control strategy will attain 86.8%, it is likely that this storage tank will be needed to be implemented to meet the minimum value of 85%. The Department maintains that the purpose of the LTCP is to commit to selected projects and that this project is currently part of the CSO control strategy and costs have been included in the financial capability analysis. Please include this project in the selected alternatives in order to ensure a pathway to compliance with the minimum value of 85%. In the event that it is determined that the tank is not needed, any changes to the selected strategy must be approved by the Department.

Comment 31: Section 7.3.1, Summary of High Ranked Alternatives states the following for Hackensack:

> "…However, small scale partial sewer separation projects can help assist the City with achieving its percent capture goal, assist in localize[d] flooding, and reduce the quantity of combined sewers in the City. The City has two ongoing partial sewer separation projects in the vicinity of Main Street that will have an impact on the City's percent capture and LTCP. In addition to the two ongoing projects, the City will explore additional localized partial sewer separation projects to undergo as part of its LTCP."

Sewer separation is also described in Section 10.3 Implementation Schedule for Hackensack where it is stated:

> "Year 2019: Continue and complete the on-going Main Street partial sewer separation projects and outfall extension projects."

This project is also included in the chart entitled "City of Hackensack LTCP Implementation" where is shown that upon completion of this project the City will achieve a 70.7% CSO Capture Goal by the end of 2023.

Provide additional detail on the ongoing Main Street partial sewer separation project including what is meant by the term "partial", a map of the location, and the number of acres affected. In addition, provide a map of any potential future sewer separation projects although it is acknowledged that these projects have not yet been incorporated into the schedule or cost estimates.

Comment 32: Section 7.4.5, Cost and Performance Evaluation (Level of control vs. costs) states the following:

> "To achieve the selected level of control of 85% capture, a 0.7 MG tank is required to address overflow from Outfall RP-003A and RP-004A. The cost effectiveness of the recommended alternative was tested to see if additional benefits could be achieved at a low cost by expansion of the facilities. Figure 7-7 shows a plot of additional cost per gallon of CSO reduction versus different size tanks."

Figure 7-7, Incremental Cost per Gallon of Additional CSO Reduction (Construction Costs) depicts the various tank sizes and associated costs per gallon of additional overflow reduction ($/gallon). Clarify why the cost per gallon of a 1.0 MG is $1.33 which is greater than the cost of a larger 1.1 MG tank at $1.13. Please clarify. In addition, confirm that BCUA can accept this additional stored flow given the concerns raised in the report regarding WPCF upgrades and capacity assurance.

Comment 33: Section 7.4.1, Summary of High Ranked Alternatives includes the following:

> "…It is noted that outfalls are clustered into two sets of outfalls, those discharging to the Overpeck Creek (RP-001A and RP-002A) and those discharging to the Hackensack River (RP-003A, RP-004A, RP-005A, and RP-006A). There were no isolated bottlenecks identified in the system and the clustered discharge points are similar, therefore while many technologies and control programs were considered and approaches that consist of combinations of technologies applied to different locations is not likely to provide a superior outcome…"

Provide additional detail as to any issues related to CSO related flooding in the Village of Ridgefield Park and clarify if the inclusion of this storage tank will address any ongoing flooding concerns since flooding of combined sewage in streets is a public health concern and is not acceptable. Given that this project is central to the LTCP as the selected alternative, please revisit the timeline to expedite construction. Note that the LTCP must address the elimination of street flooding where this should be the utmost priority.

8 Financial Capability Assessment (FCA) and 9 Financing Plan

Comment 34: Section 8.2.3, Implications for the Long Term CSO Control Program states the following:

> "Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, the Permittees 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 the permittees' control. …these provisions could including scheduling the implementation of specific CSO control measures to occur during the five year NJPDES permit cycles. Although a complete implementation schedule is being proposed as part of this SIAR, a revised affordability assessment should be performed during review of the next NJPDES permit to re-evaluate and validate

financial capability and to identify any revisions to the proposed controls that may or may not be are financially feasible during the next permit period."

The Department agrees that financial capability and economic conditions are critical components of the LTCP review. As a separate process, the Department is currently conducting rulemaking for New Jersey's Environmental Justice Law (N.J.S.A. 13:1D-157) as signed by Governor Murphy on September 18, 2020, as indicated on the Department's website: https://www.nj.gov/dep/ej/.

Adaptive Management is referenced within this section as well as in Section 7.2.2 and 7.2.4 for Fort Lee; Section 7.3.6.4 for Hackensack; and Section 7.4.6.6 for Ridgefield Park. Adaptive Management is also discussed at length in Section 12.6, Adaptive Management Plan. The Department agrees that an Adaptive Management approach could serve as a compliance "check in" as the projects proceed and an Adaptive Management requirement could be a component of a future NJPDES permit action. The Department agrees that Adaptive Management could also allow flexibility from the perspective of treatment technology advancements and compliance provided the resultant percent capture requirement is attained. However, while flexibility can be a component of each five year permit cycle, the permittee is obligated to set forth a path for compliance with the Federal CSO Control Policy through measures set forth in the LTCP. Note that any changes to projects set forth in the NJPDES permit as part of the LTCP will require a NJPDES permit modification or renewal. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Comment 35: Section 8.3, FCA for Fort Lee; Section 8.4, FCA for Hackensack; and Section 8.5, FCA for Ridgefield Park references the Financial Capabilities Assessment for each of the municipalities in Appendices G, H and I, respectively. To supplement this section the Department requests to see in table format in an Excel spreadsheet showing calculations, a year-by-year listing of (1) existing O&M costs and debt service; (2) CSO control program additional O&M costs, capital outlay and loan amounts, additional debt service and other additional costs; (3) current and projected wastewater treatment and CSO costs including residential share, number of households, cost per household; and (4) median household income and resulting residential indicator. A review of the financial capability analysis can not be conducted until this information has been provided.

10 Implementation Schedule

Comment 36: Section 10.2, Implementation Schedule for Fort Lee states the following:

"The Fort Lee LTCP will be conducted through five phases over 25 years. 16 acres have been separated in two new developments, The Towers and Hudson Lights. 60 acres will be separated in the LTCPs five phases. The progression of these phases is presented in Table 10-1:

Table 10-1: Fort Lee Schedule

Condition	Schedule	Acres Separated per Year	Cumulative Acres Separated
Baseline	2015	-	
New Development(2045 Baseline)	2017	16	16
Sewer Separation Phase 1	EDP + 5 Years	5	21
Sewer Separation Phase 2	EDP + 10 Years	10	31
Sewer Separation Phase 3	EDP + 15 Years	13	44
Sewer Separation Phase 4	EDP + 20 Years	15	59
Sewer Separation Phase 5	EDP + 25 Years	17	76

"

Comments regarding the specifics and timeline for projects for Fort Lee are as follows:

a) Explain and justify why Phase 5 will address 17 acres whereas Phase 1 will only address 5 acres.
b) Identify which NJDEP permits will be required and add them to any timeline. This includes NJDEP Waterfront Development permits, compliance with the Stormwater Management Rules at N.J.A.C. 7:8 and issuance of any local permits.
c) Green infrastructure must be added to the schedule since it is a selected alternative.

This schedule must be revisited to ensure that additional work is done during the beginning years to ensure improvements to water quality.

Comment 37: Section 10.4, Implementation Schedule for Ridgefield Park includes a breakdown of Years 1-5; Years 6-10; Years 11-15; Years 16-20. Years 1-5 focus on a feasibility study for completing sewer separation upstream of Regulator 006 whereas property acquisition for an offline storage facility does not begin until Year 3. Comments are as follows:

a) The Department acknowledges that because the feasibility and hence benefits of the sewer separation of Regulator 006 are unknown, this alternative is not included in the percent capture analysis. While the Department agrees that this project should be pursued, it should be in parallel with the selected CSO alternative namely the construction of the offline storage facility.
b) The schedule for the selected CSO alternative, namely installation of an offline storage facility, must be revisited and expedited. It appears that the property acquisition process has not commenced. Given that this component is key to the overall CSO control strategy, this process should commence immediately and it is unclear why three years are allocated towards that process.
c) Fieldwork and design for construction of the offline storage facility are targeted for years 6, 7, 8 and 9. Construction of the offline storage facility is targeted for years Year 10, 11, 12, 13 and 14. This length of time is not justified and must be revisited.
d) The implementation schedule for Years 12 through 15 does not match the cost table. Please reevaluate.

11 Operational Plan

Comment 38: Section 11.1, Introduction states the following:

"Part IV G 6 requires that the municipalities update their combined sewer system operation and maintenance manuals to "to address the final LTCP CSO control facilities and operating strategies, including but not limited to, maintaining Green Infrastructure, staffing and budgeting, I/I, and Emergency plans". Since the LTCP facilities will be constructed over a period of decades the manuals cannot be updated until the facilities are completed. Accordingly, each municipality has identified the need for their LTCP facilities to be maintained and to update their manuals and that they understand the additional responsibilities."

As noted within the LTCP, Part IV.G.6 of the NJPDES CSO permit states the following regarding Operational Plan:

"a. Upon Departmental approval of the final LTCP and throughout implementation of the approved LTCP as appropriate, the permittee shall modify the O&M Program and Manual in accordance with D.3.a and G.10, to address the final LTCP CSO control facilities and operating strategies, including but not limited to, maintaining Green Infrastructure, staffing and budgeting, I/I, and emergency plans."

In accordance with N.J.A.C. 7:14A-6.12 of the NJPDES Rules, the permittee must maintain and operate the treatment works and facilities installed by the permittee to achieve compliance with the terms and conditions of the discharge permit. The rules provide that proper operation and maintenance includes, but is not limited to, effective performance; adequate funding; effective management; adequate staffing and training; regularly scheduled inspections and maintenance; and adequate laboratory/process controls. While you have provided information regarding the O&M Program and Manual and updates that will be performed in the future for CSO controls, expand upon this section as to how the Operational Plan for the LTCP, including the Emergency Plan and Asset Management Plan, will address effective performance; adequate funding; effective management; adequate staffing and training; regularly scheduled inspections and maintenance; and adequate laboratory/process controls. In addition, acknowledge that an operations and maintenance plan will be prepared for the operation and maintenance of green infrastructure.

12 Compliance Monitoring Plan

Comment 39: Section 12.5, Performance Assessment states the following:

"To demonstrate compliance under the Presumption Approach, members of the BCUA CSO Group will continue to update and calibrate the H&H model after the implementation of CSO control measures and post-construction monitoring phase data has been collected. The model will be used to simulate CSS performance in the BCUA system and to demonstrate compliance with the performance criteria identified, a minimum of 85% capture by volume of the systemwide, and by segment of the hydraulically connected system, wet weather volume during the Typical Year (2004). Where applicable a H&H model will also be used to assess the performance of control measures...An Adaptive Management Plan shall be developed in the event that CSO control measures exceed or do not meet the Performance Criteria…"

The Department concurs that a rerun of the model would be appropriate particularly after significant construction projects are completed. This will allow verification of the percent capture calculations as part of Adaptive Management to provide an assessment of compliance against 85% wet weather capture. However, note that any effort to recalibrate the H&H model should be performed after consultation with the Department. Clarify accordingly.

13 Public Participation

Comment 40: Section 13 includes subsections for the BCUA CSO Group, Fort Lee, Hackensack and Ridgefield Park namely a Summary of Public Participation prior to submittal of DEAR report; Public Participation since DEAR; and Planned Public Participation. Sections 6 and 7 also include summaries of public input on the DEAR as well as on the LTCP. Overall, the LTCP provides a robust summary of public participation activities and feedback to date.

Public participation will continue in the next NJPDES permit and could include three primary goals: inform, educate and engage. The Department is evaluating this issue and is in the process of preparing updated NJPDES permit language to advance this issue for the next permit renewal as part of a stakeholder process. Future permit language will likely include specific requirements for advance advertisement of public meetings. Provide any suggestions as to how to better inform the public of meetings. Provide input on the viability of public input on this topic.

Please incorporate these changes to the report and submit a revised version of the report to the Department no later than 60 days from the date of this letter. Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water & Pretreatment Permitting

C: Marco Alebus, Bureau of Surface Water Permitting
Nancy Kempel, CSO Team Leader, Bureau of Stormwater Permitting
Dwayne Kobesky, Bureau of Surface Water & Pretreatment Permitting
Johnathan Lakhicharran, Bureau of Surface Water & Pretreatment Permitting
Joseph Mannick, Bureau of Surface Water & Pretreatment Permitting
Brian Salvo, Bureau of Surface Water & Pretreatment Permitting
Adam Sarafan, Bureau of Surface Water & Pretreatment Permitting
Stephen Seeberger, Bureau of Surface Water & Pretreatment Permitting

Responses to NJDEP comments on the BCUA CSO Group SIAR dated May 26, 2021.
Comments are in regular text; responses are in **bold**.

1 Certification

Comment 1: Part IV.D.1.b of your existing CSO permit states the following:

"b. All reports submitted to the Department pursuant to the requirements of this permit shall comply with the signatory requirements of N.J.A.C. 7:14A-4.9, and contain the following certification:

i. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. 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".

The Department acknowledges that a modified version of the above referenced certification statement is included in the report and has been signed by representatives for each permittee. These statements are consistent with the version utilized in other previous reports and are acceptable to the Department.

Response 1: Acknowledged no response required.

2 Executive Summary

Comment 2: The Executive Summary serves to provide a summary of the overall report. Comments have been incorporated on the specific report sections below; however, any changes as part of a revised LTCP should include revisions to the Executive Summary as appropriate.

Comments below are organized by report section where the majority of the specific subject matter is discussed. Similar to the Executive Summary, in order to address the comments below, this may require revisions to other sections of the report.

<u>Response 2</u>: Acknowledged, the Executive Summary has been updated to reflect associated report changes, in general changes were minor.

<u>Comment 3</u>: Section 2.1 BCUA LTCP Summary states the following:

> "A key factor in making use of opportunities to treat more flow at the LF [Little Ferry] WPCF [Water Pollution Control Facility] is the current permit, which was modified in June of 2019, and limits the plant flow and effluent loads. Accepting additional flow at the existing WPCF is possible under low flow conditions, but under high flow condition (flow rates in excess of 120 MGD) the plant cannot accept additional flow. BCUA is currently preparing a Capacity Analysis Report that outlines a plan on how the facility could be modified to achieve the revised permit requirements at future higher influent flows. The anticipated load conditions will include dewatering flows from CSO facilities which BCUA has agreed to accept under specified conditions at the WPCF. BCUA worked with the municipalities and their consultants to develop criteria for allowable dewatering rates to the BCUA intercepting sewers to limit dewatering pumping to periods when the plant could accept the flow without exceeding their design capacity. The BCUA notes that this will require the acceptance of additional stormwater along with the sanitary sewage from storage tanks. This runs contrary to BCUA extensive efforts to reduce inflows and the BCUA expects the NJDEP to acknowledge the greater benefit of CSO reduction and to make the necessary allowances to the BCUA's permit to accept this flow without penalty."

The Department is in receipt of the "Little Ferry WPCF Capacity Assurance Report" dated December 3, 2020 as prepared by the BCUA Special Engineer. This report was submitted to fulfill the requirements of N.J.A.C. 7:14A-22.16 and is currently pending review within the Department's Treatment Works Approval program. The Department did modify the NJPDES CSO permit for BCUA as referenced in this comment where the Department concurred that the diversion of additional CSO flows could justify alternate loading limits. Therefore, the Department has already acknowledged the benefit of CSO reduction and agreed to proposed a NJPDES permit modification if additional CSO flows were diverted to the plant. As stated within <u>RESPONSE 7</u> of the June 28, 2019 final permit action:

> "Nonetheless, the Department would need adequate justification under 40 CFR 122.44 (l) in order to consider any alternate limits based on a flow of 94 MGD or a higher flow if specified in the approved WMP [Wastewater Management Plans]. However, provided the permittee can justify that higher loadings are appropriate, in accordance with the criteria at Section 402(o)(2) of the Clean Water Act, the Department may consider adjusting these limitations. For example, if the permittee were to accept CSO flows from hydraulically connected communities, this may justify the inclusion of higher loading limitations as it would result in an overall decrease in pollutants discharged to the waterbody."

However, as noted within Section 2.1 of the LTCP, it appears that BCUA will not see a net increase in CSO flows which is described as follows:

> "…In the typical year, it is anticipated that, due exclusively to the CSO LTCP projects, the BCUA will experience an annual reduction in flow of 0.6 MG, or a decrease in average daily flow of 0.002 MGD. This change is made up of reductions of 15.3 MG from Fort Lee and 7.4 MG from Hackensack, which are offset by an increase of 22.1 MG from Ridgefield Park. The BCUA intends to apply the stormwater inflow reductions from sewer separation projects against its targeted inflow and infiltration reduction program, creating a win-win scenario."

While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Response 3: Acknowledged no response required.

Comment 4: Regarding Fort Lee, Section 2.2.2, Selected Plan includes Table 2-1 which shows the impact of sewer separation on CSO Volume and Number of Events as follows:

Table 2-1: Fort Lee CSO LTCP Impact on CSOs

Condition	Acres Separated	% CSO Capture	CSO Volume (MG)	Number of Events
Baseline (2045)	-	76.3	161.6	58
New Development [1]	16	79.1	142.5	58
Sewer Separation Phase 1	5	79.7	138.5	58
Sewer Separation Phase 2	10	81.0	129.6	58
Sewer Separation Phase 3	13	82.4	120.0	58
Sewer Separation Phase 4	15	84.0	109.1	58
Sewer Separation Phase 5	17	85.4	99.6	58

[1] Includes pump station modifications discussed in the DEAR report.

Please provide additional information to supplement Table 2-1:

a) Explain why the number of events remains the same throughout the five phases of sewer separation.
b) Provide additional justification as to how separation of 60 acres equates to the change in percent capture values.
c) Acknowledge that the separated stormwater will be managed in accordance with the Stormwater Management Rules at N.J.A.C. 7:8 as required under Fort Lee's NJPDES MS4 permit.

Response 4:

a) **The CSO outfall will remain and some of the area will still drain to the outfalls so the number of events is expected to remain same the number of events reflects both outfalls .**
b) **Percent capture and CSO volumes were calculated from model results. The separated areas are considered stormwater and are not part of the cso volume or percent capture calculation**
c) **Separated stormwater will be managed in accordance with the Stormwater Management Rules at N.J.A.C. 7:8 as required under Fort Lee's NJPDES MS4 permit. Report modified to reflect this.**

Comment 5: Section 2.2.2, Selected Plan includes Figure 2-1, Time Required to Reach 85% Capture With Separated Sewers, which is related to Table 2-1. Clarify what is intended by EDP + 5 years within this figure.

Response 5:

EDP is "effective date of permit" so if the permit is issued in 2022 the five phases will follow in 2027, 2032, 2037, 2042 and 2047.

Comment 6: Section 2.2.4 , Operational Plan, Schedule, and Post Construction Compliance Monitoring includes Figure 2-2 namely a map of Fort Lee as follows:

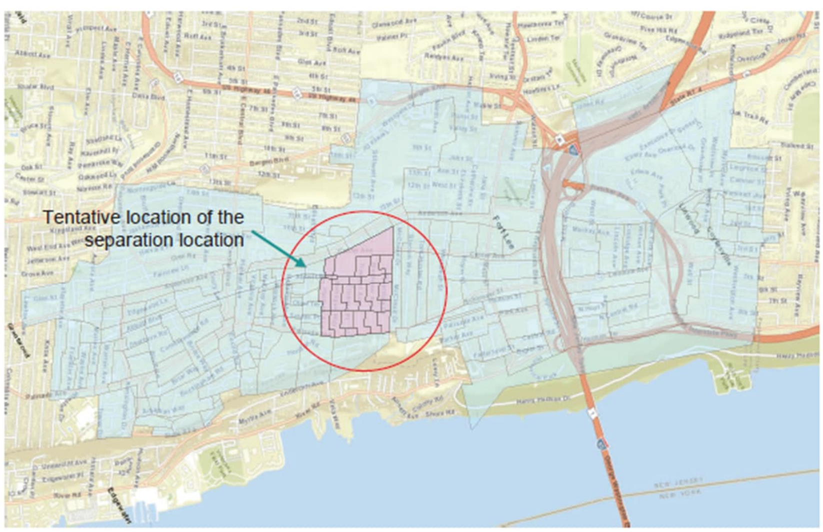


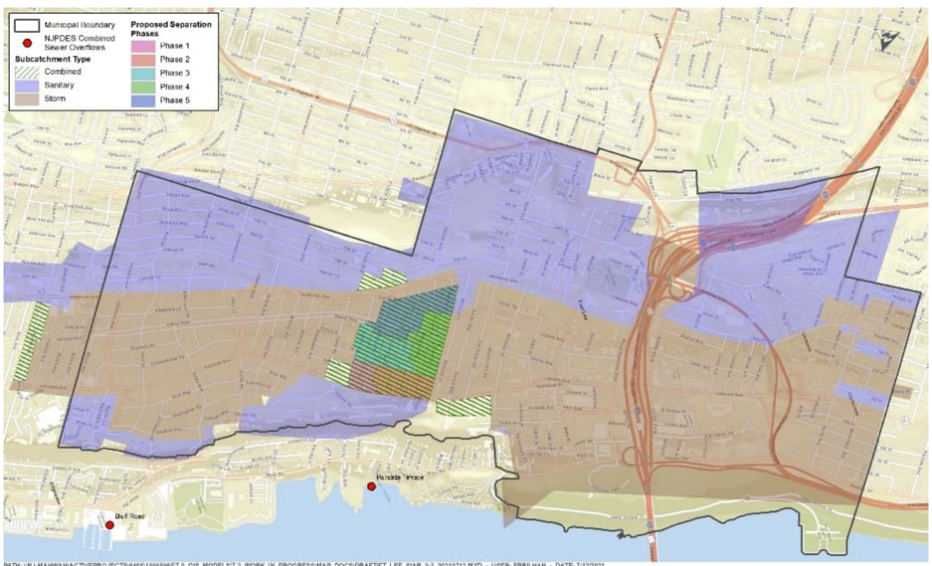
Figure 2-2: Example of the Delineation of the 60 Acre Sewer Separation Area

Provide additional information to supplement Figure 2-2:

a) In order to show the relative effect of sewer separation, revise Figure 2-2 to designate which portions of Fort Lee are currently served by a combined sewer system versus a separate sewer system. In addition, label the location of the existing CSO outfalls.
b) Expand and revise Figure 2-2 to indicate the locations of the five phases of sewer separation.
c) Figure 2-2 states "Tentative location of the separation location" and is labeled "Example of the Delineation of the 60 Acre sewer Separation Area." Given that this is an LTCP, it must include the selected alternatives and not indicate tentative locations. The Department is concerned that there is not a firm plan or commitment to sewer separation given these labeling designations. Please explain.

<u>Response 6</u>:

Figure revised:



a) Done.
b) Done
c) Figure updated to refer to separation areas as Proposed

<u>Comment 7</u>: Regarding Ridgefield Park, as noted within Section 2.4.2, Selected Plan:

> "…a 0.7 MG storage tank was selected as the preferred LTCP. The tank will be situated on the west side of the Village and collect overflow from the two largest outfalls by annual volume of discharge and the most active by frequency of overflow..."

Section 2.4.4, Operational Plan and Schedule then describes the schedule including a feasibility study for 2 years; property acquisition for 3 years; design permitting and funding for 3 years;

construction for 5 years; and monitoring and model update for 2 years. This extensive period of time for a feasibility study for a final CSO control alternative has not been adequately justified.

In addition, while some detail is provided within Section 2.4.4, the Department questions why a feasibility study is being included. Given that this is an LTCP, it must begin with implementation of the final selection where a feasibility study was more appropriate for the Development and Evaluation of Alternatives phase which already occurred. Please explain.

Response 7: The feasibility study contains elements not covered in the LTCP and is the next step in advancing the design. For example, it will include environmental and geotechnical sampling, contacting various utility companies for record plans and discussions with regulatory agencies. It is a necessary step for determining if the initial site is usable, or if other sites are more suitable and is require prior to acquiring property. The Village has expressed a strong preference for utilizing the DPW yard including incorporating the existing drainage channel. The Village understands this is a substantial permitting challenge, and that if this location is pursued, the permitting process is expected to be quite lengthy. The Village prefers to use property it already owns and not to acquire property either through eminent domain or negotiated purchase. In addition, the Village has identified an additional property, which they were already in the process of acquiring, that may be usable for the LTCP along Bergen Turnpike. This location is removed from outfalls 003A and 004A and the potentially reduced costs of acquisition will need to be balanced against that additional conveyance costs, or potential for two tanks.

Comment 8: Section 2.4.2, Selected Plan includes a summary of the Ridgefield Park LTCP including Table 2-3:

Table 2-3: Ridgefield Park LTCP Summary of Overflows

	2015 Baseline		LTCP 85% Capture	
Outfall	Overflow Volume (MG)	Overflow Frequency	Overflow Volume (MG)	Overflow Frequency
001A	6.0	19	6.0	19
002A	0.4	11	0.4	12
003A	15.2	45	2.4	11
004A	27.7	55	18.2	21
005A	3.4	25	3.5	26
0006A	0.5	12	0.5	15
Total	**53.2**	**55**	**31.1**	**26**

While the overflow volumes and frequency show a decrease for outfalls 003A and 004A through the implementation of the selected alternatives, there is a slight increase in the volume and/or frequency for outfalls 002A, 005A and 006A. Please explain.

Response 8: The slight changes for outfalls 002A and 005A are due to the hydraulic impacts of the flow diversions since the entire system is interconnected. The change in overflows at outfall 006A was an error and have been corrected, the value was correctly represented in Table 7-7.

3 Introduction

Comment 9: Section 3.1, General Introduction to System, Plant and Municipalities states the following:

> “The BCUA and its WPCF now provide wastewater transportation and treatment services for 47 municipalities, serving a population of about 565,000 people…Forty-four municipalities in the service area have separate sewer systems, while three municipalities have combined sewer systems: Borough of Fort Lee, City of Hackensack, and Village of Ridgefield Park.
>
> While the BCUA owns and operates the trunk/intercepting sewers (trunk sewers) that transport flows to the WPCF, it does not own or operate any of local collector sewers, which are owned and operated by each individual municipality, also, the BCUA does not own any CSO outfalls.”

The Department agrees that BCUA does not own any CSO outfalls; however, BCUA does own/operate 3 internal regulators (also referred to as flow control structures) in Ridgefield Park. As described in Section 4.2 of the June 27, 2018 Sewer System Characterization Report, these control structures (R-1, R-2 and R5) serve to prevent surcharge of the interceptor or trunk sewer by restricting or closing the regulator gate to the interceptor and diverting flow to an outfall during periods of rainfall. Please revise the above description.

Response 9: The report text has been modified to acknowledge BCUA’s ownership of the three (3) regulators in Ridgefield Park.

4 System Characterization and Modeling

Comment 10: Section 4.1, Hydraulically Connected System Definition and Segmentation states the following:

> "Given that Fort Lee CSOs discharge into the Hudson River while Hackensack and the Village of Ridgefield Park discharge to the Hackensack River or Overpeck Creek just upstream from the Hackensack River, it was logical to consider segmentation of the hydraulically connected system. This concept was discussed with the NJDEP and a request to formalize the segmentation of the hydraulically connected system was provided to the NJDEP via letter on April 24, 2020 (see Appendix A). The letter requested segmenting the BCUA hydraulically connected system into the following two segments:
>
> - Hackensack and Ridgefield Park sewer systems which discharge CSO to the Hackensack River and Overpeck Creek
> - The Fort Lee sewer system which discharges CSO to the Hudson River."

A hydraulically connected system is defined within the NJPDES permit at Part IV.B.1.c 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."

The STP and other CSO entities within each hydraulically connected system were required by the 2015 NJPDES permit to work together to develop a single, jointly-prepared LTCP in order to qualify for the extended 59 month LTCP schedule. A key objective of the single, jointly-prepared LTCP was to ensure that permittees within the hydraulically connected system worked together to guarantee robust coordination and communication. Given that operation and ownership responsibilities within the hydraulically connected system vary, this coordination was key to ensuring the development of a holistic LTCP for the various components of the system and in the ultimate selection of CSO control alternatives. Since the LTCP has now been submitted and the underlying elements of the LTCP (e.g., System Characterization Report, Development and Evaluation of Alternatives) have already been approved, this key objective of the 2015 NJPDES permit has been satisfied.

The Department acknowledges that Fort Lee has requested segmentation of their system separate from Hackensack and Ridgefield Park. At this point in the LTCP process, it appears that the primary implication of demarcating this system as an individual hydraulically connected system is related to the evaluation of percent capture on a municipality level. Another factor identified within the LTCP concerns the evaluation of costs of upgrading BCUA to accept more

CSO flows which was not the selected option. In order to address this issue, please confirm that Fort Lee will attain 85% capture within its municipal boundary. Similarly, confirm that Hackensack and Ridgefield Park will attain 85% capture within their municipal boundaries.

Response 10: As shown in Table 7-7 each municipality is achieving 85% capture individually, 85% capture is also being achieved on a watershed basis and regionally across the hydraulically connected communities.

Comment 11: Section 4.2.3, Representative Hydrologic Year selection (Typical Year) states the following:

> "It is acknowledged that sea levels have been rising and are expected to continue to rise over the life of the project and beyond, however, the rate of change is uncertain. To overflow, the water level in the combined sewer must exceed the tide elevation. The rate of discharge is also related to the relative elevation difference between the water level in the combined sewer and the receiving water. Thus, increased sea levels would tend to reduce the volume of combined sewage overflow. There is potential for rising sea levels to impact the hydraulic performance of the combined sewer systems in Hackensack and Ridgefield Park. The potential for sea level rise to impact Fort Lee is very low. Fort Lee is located on the Palisades, a series of steep cliffs along the west side of the Hudson River. The systems have been assessed for flooding under current conditions and any future flooding, resulting from sea level rise, would need to be addressed independently. Existing tide levels were used to provide a conservative estimation of the alternatives' performance for CSO reduction."

The State of New Jersey and the Department are working to address and mitigate the impacts of climate change where additional information is available here: https://www.nj.gov/dep/climatechange/. Climate change can have an impact on the design for CSO control alternatives and resiliency requirements must be considered in the design of any infrastructure. Specifically, in accordance with the provisions of Executive Order 11988, the USEPA and the New Jersey Water Bank require that funded infrastructure be located outside of floodplains or elevated above the 500-year flood elevation. Where such avoidance is not possible, the following hierarchy of protective measures has been established:

1. Elevation of critical infrastructure above the 500-year floodplain;
2. Flood-proofing of structures and critical infrastructure;
3. Flood-proofing of system components.

Address how the selected CSO control alternatives address climate change and sea level rise for all three municipalities.

Response 11: **Alternatives selected in the SIAR and scheduled for design and construction are intended to reduce CSOs and meet the presumptive approach requirements and criteria of the LTCP. These alternatives were selected and will be designed for CSO compliance based on the Typical Year. However, climate change and resiliency will also be considered further, during the detailed design, permitting, and implementation phases, as required by permitting and/or funding agencies requirements. Detailed design of these projects will need to satisfy permitting and/or funding agency's resiliency requirements.**

Comment 12: Regarding CSO related flooding specific to Fort Lee, the Department is aware of periodic overflows at the Bluff Road pump station when, during some storm events, flow cannot be processed through the netting chamber resulting in the influent chamber causing surcharging and, in some cases, overtopping the chamber. This uncontrolled flow is mostly intercepted by local stormwater catch basins along NJ State Highway Route 5 before being ultimately discharged to the Hudson River. Provide a status update on any work being done to rectify this issue as required by the September 18, 2018 Administrative Order CWA-02-2018-3048. The LTCP must address the elimination of street flooding where this should be the utmost priority.

Response 12:

Fort Lee continues to monitor flooding at Bluff Road, new alarm system was installed in December, 2020 The new system was put in by Rapid Pump. The borough will incorporate flooding mitigation strategies in its final LTCP.

Comment 13: The 2015 NJPDES CSO permit requires selection of either the Presumption Approach or the Demonstration Approach. The Federal CSO Control Policy and the NJPDES permit at Part IV.G.4.f.ii specify that wet weather capture is a means of compliance under the Presumption Approach as follows:

> "ii. The elimination of 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;"

All permittees have selected the Presumption Approach namely 85% capture of combined sewage entering the collection system during wet weather. This is stated in Section 2.2 (Fort Lee LTCP Summary), Section 2.3 (Hackensack Summary), and Section 2.4 (Ridgefield Park LTCP

Summary). Section 4.2.9, Baseline Conditions System Performance then includes the following table:

Table 4-1: 2015 Baseline Summary of Typical Year Performance

Outfall	Overflow Events	Overflow Volume (MG)	Wet Weather Inflow (MG)	% Capture
FL-001	58	124.5	NA	NA
FL-002	25	25	NA	NA
Fort Lee/Hudson River Total	**58**	**149.5**	**631**	**76.3%**
HK-001	56	105.3	NA	NA
HK-002	56	151.4	NA	NA
Hackensack Total	**56**	**256.7**	**814.8**	**68.5%**
RP-001	19	6.0	NA	NA
RP-002	11	0.4	NA	NA
RP-003	45	15.2	NA	NA
RP-004	55	27.7	NA	NA
RP-005	25	3.4	NA	NA
RP-006	12	0.5	NA	NA
Ridgefield Park Total	**53**	**53.2**	**216.0**	**75.4%**
Hackensack River Basin Total	**56**	**309.9**	**1031**	**69.9%**
BCUA Systemwide	**58**	**459.4**	**1662**	**72.4%**

The Department acknowledges that model updates were performed, as described in Sections 4.2.5, 4.2.6, and 4.2.8, and that the above values represent slightly more conservative baseline results for Ridgefield Park. Confirm that a consistent methodology was applied to calculate baseline percent capture for all three municipalities. In addition, confirm that Fort Lee, Hackensack and Ridgefield Park will attain 85% capture within the municipal boundaries. Finally, confirm that the BCUA Systemwide as well as the waterbody based percent capture values (i.e., Hackensack River Basin Total and Hudson River Total) are for informational use only.

Response 13: Fort Lee and Ridgefield Park applied a consistent methodology as described in Section 5.5.3. Hackensack applied the methodology to only the combined sewered areas in Hackensack. The percent capture calculation excluded all portions of Hackensack outside the CSS. The Hackensack model included only the CSS areas, the separate areas were incorporated into the regional model. We confirm that watershed and regional percent captures in Table 4-1 are provided for informational use.

Comment 14: Section 4.3.1, Baseline sampling program states the following:

> "The NJPDES CSO Permits, direct permittees to implement a Compliance Monitoring Program (CMP) adequate to verify existing ambient water quality conditions for pathogens and evaluate the effectiveness of future CSO controls related to compliance with water quality standards (WQS) and the protection of designated uses...Per the NJPDES CSO Permits, pathogens are the pollutant parameters of concern for ambient water quality monitoring and WQS compliance…"

While the Department agrees that pathogens are intended to serve as an indicator parameter for CSOs, note that the CSO Control Policy requires controls adequate to meet the water quality based requirements of the Clean Water Act. This should be clarified in the report.

Response 14: Section 4.3.1 has been modified to reflect the requirements of the Clean Water Act.

Comment 15: Section 4.3, Receiving Waters and Water Quality Conditions includes Section 4.3.3, Hudson River which states the following:

> "The Fort Lee combined sewer system overflows flow during rainfall events to the Hudson River. NJDEP has designated the Hudson River as a Primary Contact, Saline Estuary with a SE2 Class…"

N.J.A.C. 7:9B-1.12(e) defines the designated uses for SE2 waters as follows:

> "(e) In all SE2 waters the designated uses are:
>
> 1. Maintenance, migration and propagation of the natural and established biota;
> 2. Migration of diadromous fish;
> 3. Maintenance of wildlife;
> 4. Secondary contact recreation; and
> 5. Any other reasonable uses."

Given that primary contact is not a designated use of SE2 waters, correct the above statement.

Response 15: Comment acknowledged and report will be modified

Comment 16: Section 4.3.3 states the following:

> "As described in the BCUA Sewer Characterization Report, monitoring of the receiving waters was done jointly with numerous permittees through the NJ CSO Group…Location 31…is located adjacent to Fort Lee's discharge and results are shown…Currently, the water is not impaired compared to the standards."

Section 4.3.4, Hackensack River then explains that the Baseline Compliance Monitoring Program (BCMP) also includes three monitoring locations immediately adjacent to Hackensack and the Village of Ridgefield Park namely sites B1 and B2 on the Hackensack River and site B11 on the saline estuary portion of Overpeck Creek.

The data collected for the June 30, 2018 BCMP was conducted to comply with the NJPDES permit requirement at Part IV.G.9. While the BCMP was deemed acceptable by the Department, it did not have sufficient data to conduct an analysis against water quality standards; therefore, a finding of "impaired" or "not impaired" cannot be made utilizing this data. In fact, this is stated on page 35 of the June 30, 2018 "NJCSO Group Compliance Monitoring Program Report":

> "The BCMP was not designed to provide an adequate data volume for assessing attainment of water quality standards, which would have required five samples per month at each sampling location to compute monthly geometric means."

Given the limited data set for most months, the data set does not support an accurate assessment against water quality standards. As a result, please revise the statement above regarding data for Location 31 for Fort Lee.

Response 16: Comment acknowledged and report will be modified as:

Though these data do not show a contravention of water quality standards, given the limited data set collected, an accurate assessment of compliance with water quality standards cannot be inferred.

5 Control Plan Approach and Compliance Strategy

Comment 17: Section 5.1, Background on Water Quality Objectives states the following:

> "To improve receiving water quality, the primary objectives of the CSO long term control program are to reduce pathogens and CSO volume. The goal is to select and implement a CSO control program to cost-effectively improve water quality of the receiving waters sufficient to mee the water-quality based requirements of the Clean Water Act."

The NJPDES CSO permit requires permittees to meet the water quality based and technology based requirements of the Clean Water Act (CWA) consistent with the National Combined Sewer Overflow Control Strategy issued on August 10, 1989 (54 Federal Register 37370),. As stated in the March 12, 2015 NJPDES CSO permit:

> **"<u>RESPONSE 63:</u>** CSOs are subject to both the technology-based and water quality-based requirements of the CWA's discharge permitting system, National Strategy, 54 Fed. Reg. at 37371; National Policy, Part I.A, 59 Fed. Reg. at 18689, and permittees must satisfy the more stringent of the technology-based or water quality-based requirements of the CWA. N.J.A.C. 7:14A-13.2…"

Please revise this statement.

<u>Response 17</u>: The text has been revised to indicate the goal is to meet the requirements of the permit and CWA

<u>Comment 18</u>: Section 5.1, Background on Water Quality Objectives states the following:

> "Pathogen Water Quality Model (PWQM) simulations were undertaken by the NJ CSO Group to understand the pollutant sources and their relative contributions for the affected study area. The results of this modeling are summarized in the "Calibration and Validation of the Pathogen Water Quality Model (PWQM) for the Passaic Valley Sewerage Commission", September 2020. The NJ CSO Group water quality model was used to provide insight into the applicability of either the Demonstration or Presumption Approach and which level of control for the CSO outfalls would be needed to demonstrate attainment of WQS and designated uses of the corresponding receiving waters…"

The Department is in in receipt of the "Calibration and Validation of the Pathogen Water Quality Model," September 2020 as submitted by the NJ CSO Group and it is currently pending review. Note also that the permittee is required to comply with the Federal CSO Control Policy and has elected to do so through the Presumption Approach. While the NJ CSO Group permittees have submitted a Pathogen Water Quality Model, a modeling approach is germane to the Demonstration Approach. The Department does not agree that the Pathogen Water Quality Model will define the level of control or the maximum pollutant reduction benefits reasonably attainable for the receiving waters rather compliance with the Presumption Approach will define the level of control. In addition, it is premature to draw conclusions regarding attainment of water quality standards as "Baseline % Attainment" and "100% Control % Attainment", as shown in Table 5-1, AU Attainment in SE2 Waterbodies under Baseline and 100% Control Conditions, since the PATH model is still pending review by the Department. Revise accordingly.

In addition, the selection of either the Presumption or Demonstration approach is required in the NJPDES CSO permit where the Presumption Approach has been selected. Note that it is not acceptable to switch between the Presumption Approach (85% wet weather capture) and the Demonstration Approach (modeling based approach) since a commitment was required as part of the 2015 NJPDES CSO permit requirement.

Response 18: The text has been revised. We concur compliance with the selected Presumption Approach of 85% capture, will define the level of control and confirm our commitment to the Presumption Approach.

Comment 19: Section 5.5.1, Hudson River segment approach and level of control states the following:

> "The water quality modeling and sampling data shows that the Hudson River is consistently meeting the SE2 water quality standard of 770 cfu/100 ml, and the component analysis shows that the CSOs are a small portion of the pollutant loading. Therefore, the goals of the presumptive approach are already met; however, the CSO capture is at 76.3%, below the CSO policy goal of 85%..."

This excerpt states that "the goals of the presumptive approach are already met." As described in the previous comment, this statement is premature since an assessment of attainment can not be conducted given available data. In addition, the Presumption Approach is defined within the Federal CSO Control Policy as a program that would be presumed to meet the water quality-based requirements of the Clean Water Act where these criteria are provided in Part IV.G.4.f. Please revise this statement given that the wet weather capture goals have not yet been met.

Response 19: Comment acknowledged and report will be modified removing "the goals of the presumptive approach are already met."

Comment 20: Section 5.5.3, Percent Capture Definition states the following:

- "Wet weather flow contributions within CSO municipalities – The entire wet weather flow contribution from within each CSO municipality was used in the calculation of percent capture. This includes the separately sewered areas within Ridgefield Park and Fort Lee as they discharge to the BCUA at the same location as the combined sewage. Hackensack considered only the combined sewer area and sanitary sewers flowing into combined sewers. There is a distinct divide with the remaining sanitary sewers discharging to the BCUA branch interceptor north and west due to a ridgeline."

Section 5.5.3 also includes the following equation:

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

Table 5-4 is then displayed as follows:

Table 5-4: Summary of 2015 Baseline Typical Year Municipal Percent Capture

Municipality	Wet Weather Inflow (MG)	Overflow (MG)	% Capture	Overflow @ 85% Capture (MG)
Fort Lee (Hudson River)	631	149.5	76.3%	94.7
Hackensack	814.8	256.7	68.5%	122.2
Ridgefield Park	216.0	53.2	75.4%	32.4
Hackensack River Total	1031	309.9	69.9%	154.7
BCUA Hydraulically Connected System	1662	459.4	72.4%	257

Provide additional information on the following:

a) Clarify what is meant by the inclusion of "separately sewered areas within Ridgefield Park and Fort Lee as they discharge to the BCUA at the same location as the combined sewage" and if these values are included in the total wet weather capture volume in terms of the percent capture results. Describe the locations of these areas and include a sensitivity analysis to document the relevance of separately sewered areas in this calculation.

<u>Response 20a:</u>

Fort Lee - Inflow from separate sewered areas were included areas shown in Figure 2-2. as they discharge to the BCUA at the same location as the combined sewage. Note that the

calculation performed is conservative when compared to EPA documents which include contributions from entire separately sewered communities. Fort Lee prefers not to provide a calculation that may misrepresent the Village's compliance with the requirement of the Presumption Approach.

Ridgefield Park –The calculation performed is conservative when compared to EPA documents which include contributions from entire separately sewered communities. The Village prefers not to provide a calculation that may misrepresent the Village's compliance with the requirement of the Presumption Approach.

Hackensack – Only combined sewer areas were modeled and included for the calculation of percent capture.

b) Clarify if the above referenced values include only combined sewer areas within Fort Lee, Hackensack and Ridgefield Park.

Response 20b: See Response 20a.

c) Clarify if the fraction of the flow lost includes flooding such as flooding in the vicinity of the Bluff Road outfall.

Response 20c:

The permittees confirm the models are configured so that any surface flooding is stored and then drained back into the collection system. In the model, all flows are sent to the plant or are discharged from one of the permitted outfalls. There is no volume "lost" flooding.

d) Confirm that a similar methodology was utilized for all three municipalities.

Response 20d: The three municipal permittees coordinated their calculations to be consistent with the description prepared in the report text.

e) Confirm that Fort Lee, Hackensack and Ridgefield Park will attain 85% capture within the municipal boundaries and that the BCUA Hydraulically Connected System information as well as the waterbody based percent capture values are for informational use only.

Response 20e: As shown in Table 7-7 each municipality is achieving 85% capture individually, 85% capture is also being achieved on a watershed basis and regionally across the hydraulically connected communities.

f) Provide a breakdown of results by outfall to supplement Table 4-1, 2015 Baseline Summary of Typical Year Performance.

<u>Response 20e:</u> Providing such a breakdown is not consistent with the requirements of the National CSO Policy which references systemwide compliance. An outfall by outfall breakdown may give the impression that compliance is not being achieve. Given the interconnected nature of the regulators, particularly in the Village of Ridgefield Park, this information could be easily misinterpreted to the detriment of the permittees.

Approval of this report hinges in part on the inputs and results of this equation being clearly demonstrated and reproducible.

6 Development of Alternatives

<u>Comment 21</u>: Section 6.1.2, Rankings states the following:

> "The BCUA does not own any CSO outfalls, but has agreed to work cooperatively with the municipal permittees, who will be responsible for bearing the costs for any expansion of transport and treatment facilities to accommodate additional combined flow conveyed to and treated by the BCUA. Accordingly, the municipal permittees will need to weigh the costs of CSO controls within the municipality against the costs to convey and treat the flow at the BCUA WPCF. Therefore, the selection of alternatives acceptable to the BCUA lies with the municipal permittees… The cost of blending is significantly less than full expansion of the treatment plant, however this does not appear feasible in light of the current plant permit, refer to Section 6.1.4 for applicability of blending under June 2019 permit revisions. …It is noted BCUA will need to agree to any municipal funded project that will result in changes to flow, transport, or treatment capacity, but has agreed to accept dewatering flows from municipal CSO storage facilities, within the control parameters specified by the BCUA and provided to the municipalities."

The Department acknowledges that the BCUA, Fort Lee, Hackensack and Ridgefield Park have worked cooperatively in developing CSO control alternatives. The municipalities own their collection system and BCUA owns the Main Trunk Sewer, Overpeck Valley Trunk Sewer and Overpeck Valley Relief Sewer, as indicated in Table 6-1, Summary of BCUA Trunk Sewer Capacities. BCUA also owns internal regulators in Ridgefield Park. The conclusion of the LTCP is then that an overall net increase in flow will not be diverted to BCUA. While there are several factors contributing to this conclusion, it is worth noting that the Federal CSO Control Policy does not mandate that costs be borne by the municipality. In addition, any or all of the permittees could evaluate the feasibility of forming a stormwater utility to help distribute costs. See https://www.nj.gov/dep/dwq/SWU_establishing_utility.html. The Department also maintains that the 2019 NJPDES permit modification does acknowledge that loading limits could be revisited if additional CSO flows were diverted to the plant. As a result, the Department maintains that blending or expansion could trigger modification to the NJPDES permit limits and it is inappropriate to state that these options are infeasible under the existing NJPDES permit. The above referenced description should also be revised to include the components of the system that BCUA owns. Please incorporate these changes.

Response 21: The permittees acknowledge that stormwater utilities area a potential funding mechanism.

BCUA notes that the Federal CSO Policy does not address scenarios when the outfalls are owned by one entity and the interceptor/treatment facilities are owned by another. BCUA will meet the obligations of its permit. The text in Section 6.1.2 and Section 6.1.4.6 has been revised to indicate the loading limits could be revisited, however it is difficult to develop a plan based on the potential for a permit revision the details of which are unknown. The costs of upgrading the plant for a CSO bypass still exceed the municipal alternatives. The text has been revised to reference the internal regulators owned by BCUA.

Comment 22: Section 6.1.4, Expansion of Treatment Capacity and CSO Bypass at Regional WPCF includes a summary of the DEAR as well as the Department's comments on the DEAR. In its February 12, 2020 approval letter, the Department questioned BCUA's statement within the DEAR that "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 expansion or bypass." In response to this statement, Section 6.1.4 states that BCUA has "carefully coordinated with the municipalities regarding plant and interceptor capacity" and included a supplemental analysis regarding directing more flow to the BCUA interceptors; conveying additional flow to the treatment plant; and plant capacity upgrades. This supplemental analysis serves to address the required elements at Part IV.G.4.e.iii namely STP expansion and/or storage at the plant as well as CSO related bypass of the secondary treatment portion of the STP. Specifically, Section 6.1.4.6, CSO Bypass at the Existing WPCF states the following:

> "There is no current means to bypass the primary or secondary treatment units to blend raw wastewater with treated effluent prior to discharge. The influent pumping station currently discharges directly into the grit removal facilities, after which, flow is split and flows by gravity to the primary clarifiers and subsequent treatment units in each of the four batteries.

Similarly, Section 6.1.4.7, Expansion of the Existing Regional WPCF states the following:

> "With the new effluent permit limits requiring nitrification and lower cBOD5 discharge concentrations, the existing facility would need to be de-rated to 60 MGD average annual flow and 120 MGD peak hydraulic flow. The BCUA is in the process of preparing a Capacity Analysis Report, that report evaluated a potential 60 MGD expansion of the treatment plant, providing levels of treatment as required by the current permit, and which would also be required to treat additional combined sewage flows at the LF WPCF, if any additional CSO are directed to the plant, however none are planned other than tank dewatering flows…"

The Department acknowledges that CSO related bypass is not the chosen method of CSO control for Fort Lee, Hackensack or Ridgefield Park. However, it is important to note that overall improvements are currently ongoing at the WPCF to improve TSS removal rates through the rehabilitation of the sixteen Final Sedimentation Tanks and the installation of polymer feed channels. These improvements are in addition to other planned treatment improvements, due in part to the effluent limitations in the June 28, 2019 permit modification, namely more stringent $CBOD_5$, ammonia and Dissolved Oxygen limitations. The NJPDES program routinely requires more stringent limitations in NJPDES permits based on ongoing regulatory changes such as the inclusion of criteria for ammonia for SE2 waters in NJSWQS rule amendments in January 22, 2002. CSO municipalities could have chosen to incorporate a CSO related bypass as part of these WPCF upgrades but instead decided on other alternatives. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Response 22: Acknowledged.

Comment 23: Section 6.3.2, Rankings states the following regarding Table 6-16, Alternatives Evaluation Matrix:

> "…These alternatives have since been further evaluated and added as potential projects for the City's LTCP. Section 0 further discusses the additional alternatives in detail.

Correct this reference to Section 0.

Response 23: Text has been corrected.

7 Selection of LTCP

Comment 24: Section 7.2.2, Selection Methodology states the following:

> …Green infrastructure was also selected in a secondary role. The technology is limited in its CSO flow reducing characteristics, however, it is a preferred technology to some members of the public because it is a visible technology. This visibility also requires that it be maintained."

In Table 7-1, Cost Schedule Percent Capture and CSO flows for Fort Lee's LTCP there is a $200,000 allocation for Green Infrastructure. However, the excerpt in Section 7.2.2 is the only detail regarding Green Infrastructure for Fort Lee. Provide additional information regarding any project(s) that was utilized to derive the $200,000 value including the project type and potential location. In addition, although green infrastructure has been included in the cost estimate and financial capability assessment, green infrastructure was not included in the Implementation Schedule in Section 10.2. Please rectify this omission.

Response 24:

Section text to modified as:

The selection of alternatives is presented in the DEAR. It was based on the factors that are presented in the rankings assessment on Section 6. Performance factors included providing 85% reduction in CSO flows. Cost was also a primary factor for selecting the alternative. Green infrastructure was also selected in a secondary role. The technology is limited in its CSO flow reducing characteristics; however, it is a preferred technology to some members of the public because it is a visible technology. This visibility also requires that it be maintained. Location of proposed GI projects have yet to be determined. Fort Lee will review planed road improvement projects, park renovations and proposed developments to look for opportunities to couple these types of projects with GI. Fort Lee expects the allocated funds to be used to develop two visible green infrastructure projects or as an alternative several smaller deployments of GI practices such as tree pits or bioswales. Maintenance plans for GI implemented will be incorporated into the O&M manual.

Comment 25: Section 7.2.6, Opinion of Cost for LTCP states the following regarding Fort Lee:

> "The cost schedule with the impact on CSO percent capture and CSO flows is presented in Table 7-1. The sewer separation costs are based on $300,000 per separated acre developed by PVSC. A total cost of $23,000,000 will be spent in Fort Lee for CSO control to achieve 85.4% CSO reduction. $4,800,000 has been [spent] through 2017 on The Towers and Hudson Lights projects and $18,200,000 will be spent on sewer separation over 25 years. The Borough[']s portion is shown in Table 7-1…"

Table 7-1, Cost Schedule, Percent Capture and CSO flows for Fort Lee's LTCP shows a cumulative cost of $18,200,000. The Department acknowledges that Fort Lee has selected the Presumption Approach namely the elimination of 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. As a result, the baseline of 79.1% already includes the benefits attained from the 2017 sewer separation projects described above. It is the Department's understanding that these projects were funded by a private developer. Justify why the costs of these projects are included in the total price tag of costs for Fort Lee as part of the financial capability assessment since the costs have already incurred and since these costs were not borne by Fort Lee.

<u>Response 25:</u> The Borough and its consultant will review the FCA and issue and addendum if any changes are needed.

<u>Comment 26:</u> Section 7.2.7, Selected Plan states the following:

> "…Green infrastructure projects will be constructed on public property or rights of way. Selected Alternatives Performance."

It appears that the last statement is incomplete. Please revise.

<u>Response 26:</u> Revised: text to be deleted "Selected Alternatives Performance" seems to be a fragment of a draft section heading.

<u>Comment 27</u>: Section 7.2.7.2, Adaptive Management states the following:

> "…The Borough recommends the LTCP be flexible and adaptable to changes during the implementation of the program…Additionally, the future requirements of the Borough's MS4 permit may also impact the Borough's LTCP."

Please describe what is intended regarding "future requirements of the MS4 permit" and how this may affect the LTCP given its pending finalization.

<u>Response 27:</u> Changes in the MS4 permit such as a requirement of the use of GI may necessitate a reallocation of funds or a balancing of GI implementation efforts.

Comment 28: Section 7.3.6.1, Selected Alternatives Description includes detail regarding the stormwater infrastructure project within Hackensack's Selected Alternative:

> "The Court Street Stormwater Project was a study that the City undertook in 2019 just after the submission of the DEAR Report to examine problematic flooding issues in certain areas. This study evaluated different alternatives, conceptual designs, and cost estimates for the management of stormwater west of Railroad Avenue in the Court Street Subdrainage Area. This area is notorious for flooding during rainfall events and has been a longstanding issue for City residents...
>
> …The conclusion of the study recommended a dedicated stormwater interceptor sewer system with in-line storage underneath Railroad Avenue and a pump station located near a new stormwater outfall…The stormwater project would be able to drain approximately 200 acres of area west of Railroad Avenue. The stormwater system would be designed for a 25-year storm event at high tide with a sea level rise increase projected for the year 2050 to account for estimated climate change. The in-ine storage would be capable of storing approximately 1.5 MG of stormwater, and the pump station near the outfall would be capable of pumping approximately 142 MGD…
>
> …By undertaking the Court Street Stormwater Study, the City intends to create a project that assist in mitigating a City specific flooding issue as well as assists with the CSO reduction requirements in the City's NJPDES permit…"

The Department concurs with Hackensack's assessment that the LTCP should give the utmost priority to the elimination of ongoing flooding, which is a public health issue, and agrees that the stormwater infrastructure project in the Court Street Stormwater Project should be prioritized. The Department also acknowledges that this project has received public support through the public participation process as described in Section 7.3.3, Public Input. Provide additional detail as to whether or not this flooding is related to sewer backups, stormwater flooding or tidal inundation. In addition, please explain if flooding within Hackensack is limited to this area or if other areas are prone to flooding (including adjacent separately sewered areas) and the cause of such.

Response 28: The flooding in the Court Street subdrainage study area is stormwater flooding. This is due to the steep topography in the area which directs the stormwater flow towards the railroad mound. The railroad mound prevents the stormwater flow from draining towards the Hackensack River and creates a barrier which contributes to the flooding. Additionally, there is limited capacity in the combined sewers that receive the stormwater flow from this area during storm events. Other areas (separately sewered or combined sewered) may be prone to flooding in the City depending on the size and intensity of the storm event. The main cause of flooding is related to topography and

limited sewer capacities. Figure 3-1B provided in the City's Sewer System Characterization Report submitted to NJDEP in March 2019 presents additional locations prone to flooding in the City.

<u>Comment 29:</u> Section 7.3.6.1, Selected Alternatives Description includes detail regarding Green Infrastructure:

> "…Therefore, the city intends to include a green infrastructure program within its selected plan. The green infrastructure program will set aside a specific amount of funds, including grant funding, per year of the LTCP implementation that will be allocated towards a green infrastructure program…The green infrastructure program would allow for the City to create and implement an ordinance to require developers to install, operate, and maintain green infrastructure as part of their developer agreement. The other function of the green infrastructure program is to serve as an educational program for the public…"

The Department acknowledges that Hackensack has included green infrastructure as part of its LTCP. However, note that if green infrastructure is installed due to the project qualifying as a major development program the Stormwater Management rule at N.J.A.C.7:8 now requires that a maintenance plan be submitted as part of the major development application that is reviewed and approved by the City. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

<u>Response 29:</u> Acknowledged.

<u>Comment 30</u>: Section 7.3.6.1, Selected Alternatives Description includes detail regarding the Storage Tank at Anderson Street:

> "The CSOs from the Anderson Street subdrainage area discharge to Outfall 001A. As the LTCP selected plan currently stands, a storage tank upstream of Outfall 001A may be required to achieve a minimum 85% system-wide capture in the City. The storage tank would have a storage capacity of approximately 0.85 MG. The tank can either be a deep vertical treatment shaft, 60 feet diameter by 40 feet deep, or a more conventional type of underground storage tank, 70 feet wide by 70 feet long by 23 feet deep. The current site for the storage tank would be underneath the parking lot near Johnson Park, across Anderson Street from Outfall 001A and the screening facility…
>
> …
>
> The size and necessity of a storage tank will be re[e]vaulated after the first phases of the City's LTCP are implement…""

The Department acknowledges that the Federal CSO Control Policy requires a minimum of 85% wet weather capture as one of the alternatives under the Presumption Approach. However, as currently written, the LTCP components focus on the Court Street sewershed and the only CSO control alternative targeted for the Anderson Street sewershed is this storage tank. As detailed in Table 7-3:

Table 7-3: Phased LTCP Selected Plan Alternatives Performance

Condition / Phase of LTCP	Outfall	City Overflow Volume (MG)	City Volume Captured to BCUA (MG)	City Storm water Volume Separated (MG)	City Overflow Frequency	City Percentage of CSO Volume Captured (%)
Baseline Condition prior to LTCP Implementation	Outfall 001A	105.3	162.3	N/A	56	60.7%
	Outfall 002A	151.4	395.8	N/A	56	72.3%
	Total System	256.7	558.1	N/A	56	68.5%
Localized Main Street Sewer Separation Projects	Outfall 001A	105.3	162.3	N/A	55	60.7%
	Outfall 002A	132.7	390.1	24.4	52	75.7%
	Total System	238.0	552.4	24.4	56	70.8%
Localized Main Street Sewer Separation Projects + Court Street Stormwater Project	Outfall 001A	105.3	162.3	N/A	55	60.7%
	Outfall 002A	37.5	353.6	156.1	23	93.1%
	Total System	142.8	515.9	156.1	56	82.4%
Full Recommended Plan: Localized Main Street Sewer Separation Projects + Court Street Stormwater Project + Anderson Street Storage Tank	Outfall 001A	70.5	197.1	N/A	30	73.6%
	Outfall 002A	37.5	353.6	156.1	23	93.1%
	Total System	108.0	550.7	156.1	30	86.8%

Given that inclusion of the Anderson Street Storage Tank in the CSO control strategy will attain 86.8%, it is likely that this storage tank will be needed to be implemented to meet the minimum value of 85%. The Department maintains that the purpose of the LTCP is to commit to selected projects and that this project is currently part of the CSO control strategy and costs have been included in the financial capability analysis. Please include this project in the selected alternatives in order to ensure a pathway to compliance with the minimum value of 85%. In the event that it is determined that the tank is not needed, any changes to the selected strategy must be approved by the Department.

<u>Response 30:</u> At the time of this Report and comment response document, the selected plan includes the Anderson Street Storage Tank. It is acknowledged that moving forward, any changes to the selected strategy must be approved by the Department.

<u>Comment 31</u>: Section 7.3.1, Summary of High Ranked Alternatives states the following for Hackensack:

> "…However, small scale partial sewer separation projects can help assist the City with achieving its percent capture goal, assist in localize[d] flooding, and reduce the quantity of combined sewers in the City. The City has two ongoing partial sewer separation projects in the vicinity of Main Street that will have an impact on the City's percent capture and LTCP. In addition to the two ongoing projects, the City will explore additional localized partial sewer separation projects to undergo as part of its LTCP."

Sewer separation is also described in Section 10.3 Implementation Schedule for Hackensack where it is stated:

> "Year 2019: Continue and complete the on-going Main Street partial sewer separation projects and outfall extension projects."

This project is also included in the chart entitled "City of Hackensack LTCP Implementation" where is shown that upon completion of this project the City will achieve a 70.7% CSO Capture Goal by the end of 2023.

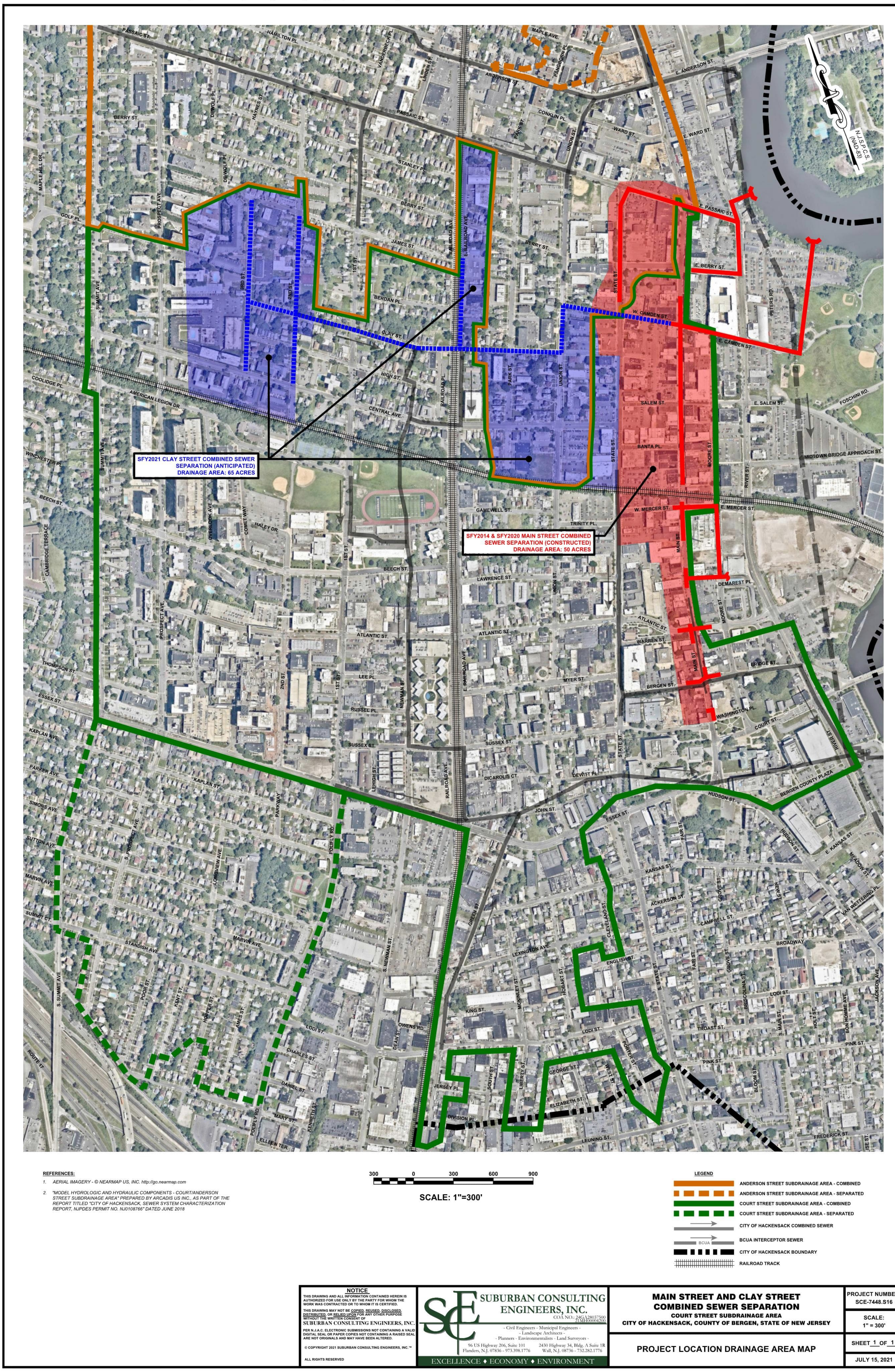
Provide additional detail on the ongoing Main Street partial sewer separation project including what is meant by the term "partial", a map of the location, and the number of acres affected. In addition, provide a map of any potential future sewer separation projects although it is acknowledged that these projects have not yet been incorporated into the schedule or cost estimates.

<u>Response 31:</u> The term "partial" sewer separation refers to potential stormwater connections such as unknown roof leaders or sump pumps that remain connected to the combined sewer system after constructing the new separated storm sewers as part of the separation projects. All known stormwater connections will be transferred from the combined sewers to the new stormwater sewers unless there are interferences with existing utilities. Also, there may be some instances that unknown stormwater connections, especially from internal plumbing and drains in older buildings, may still be

connected to the combined sewer system after the construction of the sewer separation projects.

The ongoing Main Street partial sewer separation projects separate approximately 50 acres of drainage. Future sewer separation projects are expected to occur along Clay Street between 3rd Street and State Street. Please see the attached maps of the constructed and ongoing partial sewer separation projects, as well as anticipated future projects.

E:\SCE\Hackensack\7448 Hackensack\7448.S16 Combined Sewer Management\7448.S16 Project Planning Exhibit.dwg Thu, Jul 15, 2021 - 10:18am slogue SUBURBAN CONSULTING ENGINEERS, INC.



Comment 32: Section 7.4.5, Cost and Performance Evaluation (Level of control vs. costs) states the following:

> "To achieve the selected level of control of 85% capture, a 0.7 MG tank is required to address overflow from Outfall RP-003A and RP-004A. The cost effectiveness of the recommended alternative was tested to see if additional benefits could be achieved at a low cost by expansion of the facilities. Figure 7-7 shows a plot of additional cost per gallon of CSO reduction versus different size tanks."

Figure 7-7, Incremental Cost per Gallon of Additional CSO Reduction (Construction Costs) depicts the various tank sizes and associated costs per gallon of additional overflow reduction ($/gallon). Clarify why the cost per gallon of a 1.0 MG is 1.33 is greater than the cost of a larger 1.1 MG tank at $1.13. Please clarify. In addition, confirm that BCUA can accept this additional stored flow given the concerns raised in the report regarding WPCF upgrades and capacity assurance.

Response 32: The graph is correct as each bar represents the additional cost per gallon of CSO reduction of the next incremental increase in tank size. For example, if a 0.5 MG tank cost $10M and reduced the overflow 10 MG, the cost per gallon of cost reduction would be $1/gal. If the tank were increased to 0.75 MG for a cost of $13M and a CSO reduction of 12 MG, the total cost of CSO reduction would be $1.08/gal, but the cost per gallon to go from 10 MG reduction to 12 MGD reduction would be $1.50/gal, showing that the incremental cost for each additional gallon of CSO control rises rapidly as the tank is expanded. The particular point in question represents a case where an incremental increase in tank size produces little CSO benefit relative to the cost, this is likely due to the distribution of storms.

Comment 33: Section 7.4.1, Summary of High Ranked Alternatives includes the following:

> "…It is noted that outfalls are clustered into two sets of outfalls, those discharging to the Overpeck Creek (RP-001A and RP-002A) and those discharging to the Hackensack River (RP-003A, RP-004A, RP-005A, and RP-006A). There were no isolated bottlenecks identified in the system and the clustered discharge points are similar, therefore while many technologies and control programs were considered and approaches that consist of combinations of technologies applied to different locations is not likely to provide a superior outcome…"

In addition, provide additional detail as to any issues related to CSO related flooding in the Village of Ridgefield Park and clarify if the inclusion of this storage tank will address any ongoing flooding concerns since flooding of combined sewage in streets is a public health concern and is not acceptable. Given that this project is central to the LTCP as the selected alternative, please revisit the timeline to expedite construction. Note that the LTCP must address the elimination of street flooding where this should be the utmost priority.

Response 33: In general flooding is not an issue in the Village. However, it is reported that when tides are high and there is intense rainfall flooding occurs along Bergen Turnpike in the vicinity of Chestnut Street, Elm Street, Oak Street and Maple Street. Since all sewer systems have design limitation, it is not clear if these areas qualify as being subject to ongoing flooding. The flooding is not near the currently proposed tank and will not be significantly impacted by the CSO LTCP. However, the Village is also considering a site along Bergen Turnpike which may offer some opportunity to address flooding as well, if appropriate this will be investigated during the feasibility study See Response 36 for discussion of project timeline.

8 Financial Capability Assessment (FCA) and 9 Financing Plan

Comment 34: Section 8.2.3, Implications for the Long Term CSO Control Program states the following:

> "Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, the Permittees 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 the permittees' control. …these provisions could including scheduling the implementation of specific CSO control measures to occur during the five year NJPDES permit cycles. Although a complete implementation schedule is being proposed as part of this SIAR, a revised affordability assessment should be performed during review of the next NJPDES permit to re-evaluate and validate financial capability and to identify any revisions to the proposed controls that may or may not be are financially feasible during the next permit period."

The Department agrees that financial capability and economic conditions are critical components of the LTCP review. As a separate process, the Department is currently conducting rulemaking for New Jersey's Environmental Justice Law (N.J.S.A. 13:1D-157) as signed by Governor Murphy on September 18, 2020, as indicated on the Department's website: https://www.nj.gov/dep/ej/.

Adaptive Management is referenced within this section as well as in Section 7.2.2 and 7.2.4 for Fort Lee; Section 7.3.6.4 for Hackensack; and Section 7.4.6.6 for Ridgefield Park. Adaptive Management is also discussed at length in Section 12.6, Adaptive Management Plan. The Department agrees that an Adaptive Management approach could serve as a compliance "check in" as the projects proceed and an Adaptive Management requirement could be a component of a future NJPDES permit action. The Department agrees that Adaptive Management could also allow flexibility from the perspective of treatment technology advancements and compliance provided the resultant percent capture requirement is attained. However, while flexibility can be a component of each five year permit cycle, the permittee is obligated to set forth a path for compliance with the Federal CSO Control Policy through measures set forth in the LTCP. Note that any changes to projects set forth in the NJPDES permit as part of the LTCP will require a NJPDES permit modification or renewal. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Response 34: Acknowledged.

Comment 35: Section 8.3, FCA for Fort Lee; Section 8.4, FCA for Hackensack; and Section 8.5, FCA for Ridgefield Park references the Financial Capabilities Assessment for each of the municipalities in Appendices G, H and I, respectively. To supplement this section the Department requests to see in table format in an Excel spreadsheet showing calculations, a year-by-year listing of (1) existing O&M costs and debt service; (2) CSO control program additional O&M costs, capital outlay and loan amounts, additional debt service and other additional costs; (3) current and projected wastewater treatment and CSO costs including residential share, number of households, cost per household; and (4) median household income and resulting residential indicator. A review of the financial capability analysis can not be conducted until this information has been provided.

Response 35: The requested tables have been provided below or are in the document text.

Fort Lee:

The CSO municipalities each conducted a financial capability assessment (FCA) based on guidance from the EPA's "Combined Sewer Overflows –Guidance for Financial Capability Assessment and Schedule Development. Section 9.2 discusses the financing plan for Fort Lee. Table 9-1 "Fort Lee Financing Plan for the Long Term Control Plan: excerpted below provides a breakdown by year of the long-term financial plan for implementing CSO controls. Clarifying description of the columns addressing the items in Comment 35 are shown in the excerpt.

BCUA CSO Group
Selection and Implementation of Alternatives Report

Table 9-1: Fort Lee Financing Plan for the Long Term Control Plan

	Current WWT Annual Costs	CSO Total Annual Cost	Median Household Income	# of Households	WWT - Residential Cost	CSO - Residential Cost	WWT - Cost per Household	CSO - Cost per Household	Total - Cost per Household	WWT as % of MHI	CSO as % of MHI	Total as % of MHI
2020	Existing O&M costs and debt service	CSO control program additional O&M costs, etc.	Median household income	Number of households			Current and projected wastewater treatment and CSO costs/ residential share and cost per household					Resulting residential indicator
2021					$4,123,157	$5,528				0.29%	0.00%	
2022					4,101,857	19,712				0.28%	0.00%	
2023	[illegible]	[illegible]	87,027	17,347	4,081,727	34,208	235.30	1.97	237.28	0.27%	0.00%	0.27%
2024	10,834,108	130,771	88,612	17,433	4,062,790	49,039	233.05	2.81	235.86	0.26%	0.00%	0.27%
2025	10,786,858	179,291	90,227	17,521	4,045,072	67,234	230.88	3.84	234.71	0.26%	0.00%	0.26%
2026	10,742,920	228,941	91,870	17,608	4,028,595	85,853	228.79	4.88	233.67	0.25%	0.01%	0.25%

Hackensack – The requested table is provided below.

	Main Street Partial Sewer Separation Projects	Green Infrastructure Program	Court Street Stormwater Project	Anderson Street Storage Tank (if needed)	Other WW / SW Capital Improvements	Number of Households	Estimated Residential Share Based on Wastewater Flow Characteristics	Median Household Income	Total Annual Costs for all LTCP Phases	Residential Share of Total Annual Costs for all LTCP Phases	Potential Added Wastewater Costs per Household (18817 households) in City of Hackensack	Current Estimated Annual Wastewater Costs per Household without planned future CIP Projects (not LTCP Projects) (from FCA)	Estimated Annual Wastewater Costs per Household with LTCP Loan Payback	Residential Indicator with LTCP and Other Capital Costs	Residential Indicator without LTCP and Other Capital Costs
Planned Year for Startup	Year 1 2019	Year 3 2021	Year 4 2022	Year 20 2038	Year 2 2020										
Capital Costs + Land Costs	$ 12,300,000	$ 3,000,000	$ 66,000,000	$ 20,400,000	$ 6,700,000										
Annual O&M Costs	$ -	$ 70,000	$ 1,000,000	$ 640,000	$ -										
Estimated Equivalent Annual Financing Costs (EUAC) 20-years at 2.85% Interest	$ 800,000	$ 300,000	$ 5,400,000	$ 2,000,000	$ 440,000										
Years in Payment Drawdown Schedule															
2019	$ 800,000					18,817	75.8%	$ 61,220	$ 800,000	$ 606,400	$ 32	$ 393	$ 426	0.7%	0.6%
2020	$ 800,000				$ 440,000	18,817	75.8%	$ 62,215	$ 1,240,000	$ 939,920	$ 50	$ 400	$ 450	0.7%	0.6%
2021	$ 800,000	$ 300,000			$ 440,000	18,817	75.8%	$ 63,226	$ 1,540,000	$ 1,167,320	$ 62	$ 406	$ 468	0.7%	0.6%
2022	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 64,254	$ 6,940,000	$ 5,260,520	$ 280	$ 413	$ 692	1.1%	0.6%
2023	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 65,299	$ 6,940,000	$ 5,260,520	$ 280	$ 420	$ 699	1.1%	0.6%
2024	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 66,360	$ 6,940,000	$ 5,260,520	$ 280	$ 426	$ 706	1.1%	0.6%
2025	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 67,439	$ 6,940,000	$ 5,260,520	$ 280	$ 433	$ 713	1.1%	0.6%
2026	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 68,535	$ 6,940,000	$ 5,260,520	$ 280	$ 440	$ 720	1.1%	0.6%
2027	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 69,649	$ 6,940,000	$ 5,260,520	$ 280	$ 447	$ 727	1.0%	0.6%
2028	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 70,781	$ 6,940,000	$ 5,260,520	$ 280	$ 455	$ 734	1.0%	0.6%
2029	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 71,932	$ 6,940,000	$ 5,260,520	$ 280	$ 462	$ 742	1.0%	0.6%
2030	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 73,101	$ 6,940,000	$ 5,260,520	$ 280	$ 470	$ 749	1.0%	0.6%
2031	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 74,289	$ 6,940,000	$ 5,260,520	$ 280	$ 477	$ 757	1.0%	0.6%
2032	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 75,497	$ 6,940,000	$ 5,260,520	$ 280	$ 485	$ 765	1.0%	0.6%
2033	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 76,724	$ 6,940,000	$ 5,260,520	$ 280	$ 493	$ 773	1.0%	0.6%
2034	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 77,971	$ 6,940,000	$ 5,260,520	$ 280	$ 501	$ 781	1.0%	0.6%
2035	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 79,238	$ 6,940,000	$ 5,260,520	$ 280	$ 509	$ 789	1.0%	0.6%
2036	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 80,526	$ 6,940,000	$ 5,260,520	$ 280	$ 517	$ 797	1.0%	0.6%
2037	$ 800,000	$ 300,000	$ 5,400,000		$ 440,000	18,817	75.8%	$ 81,835	$ 6,940,000	$ 5,260,520	$ 280	$ 526	$ 805	1.0%	0.6%
2038	$ 800,000	$ 300,000	$ 5,400,000	$ 2,000,000	$ 440,000	18,817	75.8%	$ 83,166	$ 8,940,000	$ 6,776,520	$ 360	$ 534	$ 894	1.1%	0.6%
2039		$ 300,000	$ 5,400,000	$ 2,000,000	$ 440,000	18,817	75.8%	$ 84,518	$ 8,140,000	$ 6,170,120	$ 328	$ 543	$ 871	1.0%	0.6%
2040		$ 300,000	$ 5,400,000	$ 2,000,000		18,817	75.8%	$ 85,891	$ 7,700,000	$ 5,836,600	$ 310	$ 552	$ 862	1.0%	0.6%
2041			$ 5,400,000	$ 2,000,000		18,817	75.8%	$ 87,288	$ 7,400,000	$ 5,609,200	$ 298	$ 561	$ 859	1.0%	0.6%
2042				$ 2,000,000		18,817	75.8%	$ 88,706	$ 2,000,000	$ 1,516,000	$ 81	$ 570	$ 650	0.7%	0.6%
2043				$ 2,000,000		18,817	75.8%	$ 90,148	$ 2,000,000	$ 1,516,000	$ 81	$ 579	$ 660	0.7%	0.6%
2044				$ 2,000,000		18,817	75.8%	$ 91,614	$ 2,000,000	$ 1,516,000	$ 81	$ 589	$ 669	0.7%	0.6%
2045				$ 2,000,000		18,817	75.8%	$ 93,103	$ 2,000,000	$ 1,516,000	$ 81	$ 598	$ 679	0.7%	0.6%
2046				$ 2,000,000		18,817	75.8%	$ 94,616	$ 2,000,000	$ 1,516,000	$ 81	$ 608	$ 688	0.7%	0.6%
2047				$ 2,000,000		18,817	75.8%	$ 96,154	$ 2,000,000	$ 1,516,000	$ 81	$ 618	$ 698	0.7%	0.6%
2048				$ 2,000,000		18,817	75.8%	$ 97,717	$ 2,000,000	$ 1,516,000	$ 81	$ 628	$ 708	0.7%	0.6%
2049				$ 2,000,000		18,817	75.8%	$ 99,306	$ 2,000,000	$ 1,516,000	$ 81	$ 638	$ 719	0.7%	0.6%
2050				$ 2,000,000		18,817	75.8%	$ 100,920	$ 2,000,000	$ 1,516,000	$ 81	$ 648	$ 729	0.7%	0.6%
2051				$ 2,000,000		18,817	75.8%	$ 102,560	$ 2,000,000	$ 1,516,000	$ 81	$ 659	$ 740	0.7%	0.6%
2052				$ 2,000,000		18,817	75.8%	$ 104,227	$ 2,000,000	$ 1,516,000	$ 81	$ 670	$ 750	0.7%	0.6%
2053				$ 2,000,000		18,817	75.8%	$ 105,922	$ 2,000,000	$ 1,516,000	$ 81	$ 681	$ 761	0.7%	0.6%
2054				$ 2,000,000		18,817	75.8%	$ 107,643	$ 2,000,000	$ 1,516,000	$ 81	$ 692	$ 772	0.7%	0.6%
2055				$ 2,000,000		18,817	75.8%	$ 109,393	$ 2,000,000	$ 1,516,000	$ 81	$ 703	$ 783	0.7%	0.6%
2056				$ 2,000,000		18,817	75.8%	$ 111,171	$ 2,000,000	$ 1,516,000	$ 81	$ 714	$ 795	0.7%	0.6%

Ridgefield Park – The requested table is provided below.

The Village wishes to reiterate that the number presented are projections with increasing uncertainty as the project extend further into the future. Discrete events such economic downturns and catastrophic events which cannot be predicted may also influence the affordability of the project. The Village is not committing to any specific rate increases or expenditures based on the projections below.

			Without LTCP				With LTCP						
Year	Number of households	Median Household Income	Exisitng O&M and Debt Service	Exisitng O&M and Debt Service (Residential Share)	Average Sewer Rate without LTCP	Residential Indicator without LTCP	LTCP Construction Costs	LTCP Permit/O&M Costs	Total Annual LTCP Costs	CSO LTCP O&M and Debt Service	Average Sewer Rate with LTCP	Average Sewer Rate Increase Due to LTCP	Residential Indicator with LTCP
2021	4703	$ 78,100	$ 3,843,000	$ 3,267,000	$ 698	0.89%	$ -	$ -	$ -	$ -	$ 698	$ 0	0.89%
2022	4703	$ 79,700	$ 3,993,000	$ 3,394,000	$ 729	0.91%	$ -	$ -	$ -	$ -	$ 729	$ 0	0.91%
2023	4703	$ 81,300	$ 4,149,000	$ 3,527,000	$ 760	0.93%	$ -	$ -	$ -	$ -	$ 760	$ (0)	0.93%
2024	4703	$ 82,900	$ 4,311,000	$ 3,664,000	$ 793	0.96%	$ -	$ -	$ -	$ -	$ 793	$ (0)	0.96%
2025	4703	$ 84,600	$ 4,479,000	$ 3,807,000	$ 828	0.98%	$ 300,000	$ 48,000	$ 348,000	$ 70,000	$ 841	$ 13	0.99%
2026	4703	$ 86,300	$ 4,653,000	$ 3,955,000	$ 863	1.00%	$ 1,492,000	$ 50,000	$1,542,000	$ 181,000	$ 896	$ 33	1.04%
2027	4703	$ 88,000	$ 4,835,000	$ 4,110,000	$ 901	1.02%	$ 3,095,000	$ 66,000	$3,161,000	$ 422,000	$ 977	$ 76	1.11%
2028	4703	$ 89,800	$ 5,023,000	$ 4,270,000	$ 939	1.05%	$ 2,340,000	$ 68,000	$2,408,000	$ 595,000	$ 1,046	$ 107	1.17%
2029	4703	$ 91,600	$ 5,219,000	$ 4,436,000	$ 979	1.07%	$ 139,000	$ 95,000	$ 234,000	$ 631,000	$ 1,093	$ 114	1.19%
2030	4703	$ 93,400	$ 5,423,000	$ 4,610,000	$ 1,020	1.09%	$ 1,726,000	$ 98,000	$1,824,000	$ 760,000	$ 1,158	$ 138	1.24%
2031	4703	$ 95,300	$ 5,634,000	$ 4,789,000	$ 1,064	1.12%	$ 1,939,000	$ 102,000	$2,041,000	$ 905,000	$ 1,227	$ 163	1.29%
2032	4703	$ 97,200	$ 5,854,000	$ 4,976,000	$ 1,108	1.14%	$ 2,938,000	$ 121,000	$3,059,000	$1,138,000	$ 1,314	$ 206	1.35%
2033	4703	$ 99,100	$ 6,082,000	$ 5,170,000	$ 1,155	1.17%	$ 321,000	$ 139,000	$ 460,000	$1,179,000	$ 1,368	$ 213	1.38%
2034	4703	$ 101,100	$ 6,320,000	$ 5,372,000	$ 1,203	1.19%	$ 3,160,000	$ 144,000	$3,304,000	$1,414,000	$ 1,459	$ 256	1.44%
2035	4703	$ 103,100	$ 6,566,000	$ 5,581,000	$ 1,254	1.22%	$ 259,000	$ 150,000	$ 409,000	$1,439,000	$ 1,514	$ 260	1.47%
2036	4703	$ 105,200	$ 6,822,000	$ 5,799,000	$ 1,306	1.24%	$ 3,577,000	$ 155,000	$3,732,000	$1,705,000	$ 1,614	$ 308	1.53%
2037	4703	$ 107,300	$ 7,088,000	$ 6,025,000	$ 1,360	1.27%	$ 3,709,000	$ 190,000	$3,899,000	$2,010,000	$ 1,723	$ 363	1.61%
2038	4703	$ 109,400	$ 7,365,000	$ 6,260,000	$ 1,416	1.29%	$ 3,558,000	$ 417,000	$3,975,000	$2,495,000	$ 1,867	$ 451	1.71%
Construction Complete													
2039	4703	$ 111,600	$ 7,652,000	$ 6,504,000	$ 1,475	1.32%	$ -	$ 205,000	$ 205,000	$2,284,000	$ 1,887	$ 412	1.69%
2040	4703	$ 113,800	$ 7,950,000	$ 6,758,000	$ 1,535	1.35%	$ -	$ 213,000	$ 213,000	$2,292,000	$ 1,950	$ 415	1.71%
2041	4703	$ 116,100	$ 8,260,000	$ 7,021,000	$ 1,595	1.37%	$ -	$ 222,000	$ 222,000	$2,300,000	$ 2,011	$ 416	1.73%
2042	4703	$ 118,400	$ 8,582,000	$ 7,295,000	$ 1,657	1.40%	$ -	$ 230,000	$ 230,000	$2,309,000	$ 2,074	$ 417	1.75%
2043	4703	$ 120,800	$ 8,917,000	$ 7,579,000	$ 1,721	1.42%	$ -	$ 239,000	$ 239,000	$2,318,000	$ 2,140	$ 419	1.77%
2044	4703	$ 123,200	$ 9,265,000	$ 7,875,000	$ 1,788	1.45%	$ -	$ 249,000	$ 249,000	$2,327,000	$ 2,209	$ 421	1.79%
2045	4703	$ 125,700	$ 9,626,000	$ 8,182,000	$ 1,858	1.48%	$ -	$ 258,000	$ 258,000	$2,315,000	$ 2,276	$ 418	1.81%
2046	4703	$ 128,200	$ 10,002,000	$ 8,502,000	$ 1,930	1.51%	$ -	$ 268,000	$ 268,000	$2,217,000	$ 2,331	$ 401	1.82%
2047	4703	$ 130,800	$ 10,392,000	$ 8,833,000	$ 2,005	1.53%	$ -	$ 279,000	$ 279,000	$2,002,000	$ 2,367	$ 362	1.81%
2048	4703	$ 133,400	$ 10,797,000	$ 9,177,000	$ 2,083	1.56%	$ -	$ 290,000	$ 290,000	$1,842,000	$ 2,416	$ 333	1.81%
2049	4703	$ 136,000	$ 11,218,000	$ 9,535,000	$ 2,164	1.59%	$ -	$ 301,000	$ 301,000	$1,844,000	$ 2,497	$ 333	1.84%
2050	4703	$ 138,800	$ 11,656,000	$ 9,908,000	$ 2,248	1.62%	$ -	$ 313,000	$ 313,000	$1,730,000	$ 2,561	$ 313	1.85%
2051	4703	$ 141,500	$ 12,110,000	$ 10,294,000	$ 2,336	1.65%	$ -	$ 325,000	$ 325,000	$1,601,000	$ 2,625	$ 289	1.85%
2052	4703	$ 144,400	$ 12,582,000	$ 10,695,000	$ 2,426	1.68%	$ -	$ 338,000	$ 338,000	$1,399,000	$ 2,679	$ 253	1.86%
2053	4703	$ 147,300	$ 13,073,000	$ 11,112,000	$ 2,521	1.71%	$ -	$ 351,000	$ 351,000	$1,389,000	$ 2,772	$ 251	1.88%
2054	4703	$ 150,200	$ 13,583,000	$ 11,546,000	$ 2,619	1.74%	$ -	$ 365,000	$ 365,000	$1,173,000	$ 2,831	$ 212	1.88%
2055	4703	$ 153,200	$ 14,113,000	$ 11,996,000	$ 2,721	1.78%	$ -	$ 379,000	$ 379,000	$1,168,000	$ 2,932	$ 211	1.91%
2056	4703	$ 156,300	$ 14,663,000	$ 12,464,000	$ 2,826	1.81%	$ -	$ 394,000	$ 394,000	$ 923,000	$ 2,993	$ 167	1.92%
2057	4703	$ 159,400	$ 15,235,000	$ 12,950,000	$ 2,936	1.84%	$ -	$ 409,000	$ 409,000	$ 668,000	$ 3,057	$ 121	1.92%
2058	4703	$ 162,600	$ 15,829,000	$ 13,455,000	$ 3,050	1.88%	$ -	$ 425,000	$ 425,000	$ 425,000	$ 3,127	$ 77	1.92%
Loan Payments Complete													
2059	4703	$ 165,800	$ 16,446,000	$ 13,979,000	$ 3,169	1.91%	$ -	$ 441,000	$ 441,000	$ 441,000	$ 3,249	$ 80	1.96%
2060	4703	$ 169,200	$ 17,088,000	$ 14,525,000	$ 3,292	1.95%	$ -	$ 459,000	$ 459,000	$ 459,000	$ 3,375	$ 83	2.00%

10 Implementation Schedule

Comment 36: Section 10.2, Implementation Schedule for Fort Lee states the following:

"The Fort Lee LTCP will be conducted through five phases over 25 years. 16 acres have been separated in two new developments, The Towers and Hudson Lights. 60 acres will be separated in the LTCPs five phases. The progression of these phases is presented in Table 10-1:

Table 10-1: Fort Lee Schedule

Condition	Schedule	Acres Separated per Year	Cumulative Acres Separated
Baseline	2015	-	
New Development(2045 Baseline)	2017	16	16
Sewer Separation Phase 1	EDP + 5 Years	5	21
Sewer Separation Phase 2	EDP + 10 Years	10	31
Sewer Separation Phase 3	EDP + 15 Years	13	44
Sewer Separation Phase 4	EDP + 20 Years	15	59
Sewer Separation Phase 5	EDP + 25 Years	17	76

"

Comments regarding the specifics and timeline for projects for Fort Lee are as follows:

a) Explain and justify why Phase 5 will address 17 acres whereas Phase 1 will only address 5 acres.

b) Identify which NJDEP permits will be required and add them to any timeline. This includes NJDEP Waterfront Development permits, compliance with the Stormwater Management Rules at N.J.A.C. 7:8 and issuance of any local permits.

c) Green infrastructure must be added to the schedule since it is a selected alternative.

This schedule must be revisited to ensure that additional work is done during the beginning years to ensure improvements to water quality.

Response 36:

a) Areas presented in the 5 phases are targets and increase as the program evolves. When the plan is implemented the phases maybe adjusted to optimize efficiency.

b) **Noted. Identification of the required permits will be conducted during the design of the sewer separation projects.**

c) **Table 10-1 and text will be updated.**

<u>Comment 37</u>: Section 10.4, Implementation Schedule for Ridgefield Park includes a breakdown of Years 1-5; Years 6-10; Years 11-15; Years 16-20. Years 1-5 focus on a feasibility study for completing sewer separation upstream of Regulator 006 whereas property acquisition for an offline storage facility does not begin until Year 3. Comments are as follows:

a) The Department acknowledges that because the feasibility and hence benefits of the sewer separation of Regulator 006 are unknown, this alternative is not included in the percent capture analysis. While the Department agrees that this project should be pursued, it should be in parallel with the selected CSO alternative namely the construction of the offline storage facility.

<u>Response 37a</u>: The schedule as proposed conducts the Regulator 006 investigations and potential separation in parallel with the CSO storage tank feasibility study, see Year 1 bullets in Section 10.4.1. Property acquisition is scheduled to start Year 3 so that the optimal site can be selected rather than acquiring the property and then determining it does not meet the project need. The actual schedule will depend on the property selected, if acquisition is required, and nature of the acquisition process. The proposed schedule allows for these uncertainties.

b) The schedule for the selected CSO alternative, namely installation of an offline storage facility, must be revisited and expedited. It appears that the property acquisition process has not commenced. Given that this component is key to the overall CSO control strategy, this process should commence immediately and it is unclear why three years are allocated towards that process.

<u>Response 37b:</u> As discussed in Response 36a the start of the investigations for the CSO storage tank will start in the first year of the LTCP. Regarding property acquisition, the Village will first investigate properties it owns and then progress to acquiring property. It is premature to acquire property which may require condemnation until a thorough investigation of Village owned property, including site conditions and geotechnical investigations, have been made. Acquiring property through negotiated purchase or, if necessary, through eminent domain, can be a lengthy process. The Village cannot acquire a property or use a property it already owns that may be unusable or that may create additional liabilities for the Village such as contaminated soils.

c) Fieldwork and design for construction of the offline storage facility are targeted for years 6, 7, 8 and 9. Construction of the offline storage facility is targeted for years Year 10, 11, 12, 13 and 14. This length of time is not justified and must be revisited.

Response 37c: As discussed in Response 36a the start of the investigations for the CSO storage tank will start in the first year of the LTCP. The time allotted is in line with experience for the design, funding and permitting process of similar projects.

d) The implementation schedule for Years 12 through 15 does not match the cost table. Please reevaluate.

Response 37d: Table 9-3 and implementation schedules were reviewed, and they appear to agree, the discrepancy noted may be related to the assumption the construction would be completed mid-year.

11 Operational Plan

Comment 38: Section 11.1, Introduction states the following:

> "Part IV G 6 requires that the municipalities update their combined sewer system operation and maintenance manuals to "to address the final LTCP CSO control facilities and operating strategies, including but not limited to, maintaining Green Infrastructure, staffing and budgeting, I/I, and Emergency plans". Since the LTCP facilities will be constructed over a period of decades the manuals cannot be updated until the facilities are completed. Accordingly, each municipality has identified the need for their LTCP facilities to be maintained and to update their manuals and that they understand the additional responsibilities."

As noted within the LTCP, Part IV.G.6 of the NJPDES CSO permit states the following regarding Operational Plan:

"a. Upon Departmental approval of the final LTCP and throughout implementation of the approved LTCP as appropriate, the permittee shall modify the O&M Program and Manual in accordance with D.3.a and G.10, to address the final LTCP CSO control facilities and operating strategies, including but not limited to, maintaining Green Infrastructure, staffing and budgeting, I/I, and emergency plans."

In accordance with N.J.A.C. 7:14A-6.12 of the NJPDES Rules, the permittee must maintain and operate the treatment works and facilities installed by the permittee to achieve compliance with the terms and conditions of the discharge permit. The rules provide that proper operation and maintenance includes, but is not limited to, effective performance; adequate funding; effective management; adequate staffing and training; regularly scheduled inspections and maintenance; and adequate laboratory/process controls. While you have provided information regarding the O&M Program and Manual and updates that will be performed in the future for CSO controls, expand upon this section as to how the Operational Plan for the LTCP, including the Emergency Plan and Asset Management Plan, will address effective performance; adequate funding; effective management; adequate staffing and training; regularly scheduled inspections and maintenance;

and adequate laboratory/process controls. In addition, acknowledge that an operations and maintenance plan will be prepared for the operation and maintenance of green infrastructure.

Response 38: The section has been expanded to note the requirements.

12 Compliance Monitoring Plan

Comment 39: Section 12.5, Performance Assessment states the following:

> "To demonstrate compliance under the Presumption Approach, members of the BCUA CSO Group will continue to update and calibrate the H&H model after the implementation of CSO control measures and post-construction monitoring phase data has been collected. The model will be used to simulate CSS performance in the BCUA system and to demonstrate compliance with the performance criteria identified, a minimum of 85% capture by volume of the systemwide, and by segment of the hydraulically connected system, wet weather volume during the Typical Year (2004). Where applicable a H&H model will also be used to assess the performance of control measures...An Adaptive Management Plan shall be developed in the event that CSO control measures exceed or do not meet the Performance Criteria…"

The Department concurs that a rerun of the model would be appropriate particularly after significant construction projects are completed. This will allow verification of the percent capture calculations as part of Adaptive Management to provide an assessment of compliance against 85% wet weather capture. However, note that any effort to recalibrate the H&H model should be performed after consultation with the Department. Clarify accordingly.

Response 39: The permittees acknowledge that updates to the model to assess compliance should be performed in consultation with the Department.

13 Public Participation

Comment 40: Section 13 includes subsections for the BCUA CSO Group, Fort Lee, Hackensack and Ridgefield Park namely a Summary of Public Participation prior to submittal of DEAR report; Public Participation since DEAR; and Planned Public Participation. Sections 6 and 7 also include summaries of public input on the DEAR as well as on the LTCP. Overall, the LTCP provides a robust summary of public participation activities and feedback to date.

Public participation will continue in the next NJPDES permit and could include three primary goals: inform, educate and engage. The Department is evaluating this issue and is in the process of preparing updated NJPDES permit language to advance this issue for the next permit renewal as part of a stakeholder process. Future permit language will likely include specific requirements for advance advertisement of public meetings. Provide any suggestions as to how to better inform the public of meetings. Provide input on the viability of public input on this topic.

Response 40: The permittees agree public input is important and made a great effort both individually and collectively to inform the public during the planning process. The permittees will pass along any suggestions in this area. It is acknowledged that one element for future public participation could include public input on the siting of green infrastructure projects. However, it should also be noted that the scheduling of future public participation would need to be considered in the overall context of the implementation schedule.