

**SELECTION AND IMPLEMENTATION OF ALTERNATIVES FOR LONG
TERM CONTROL PLANNING FOR COMBINED SEWER SYSTEMS -
REGIONAL REPORT**

**Submitted on behalf of the following participating Permittees
By the Passaic Valley Sewerage Commission:**

**Town of Guttenberg (NJ0108715)
North Bergen Municipal Utilities Authority (Woodcliff) (NJ0029084)**

**Passaic Valley Sewerage Commission
Essex County
600 Wilson Avenue
Newark, New Jersey**



"Protecting Public Health and the Environment"

September 2020

ES EXECUTIVE SUMMARY

ES.1 Purpose

The Township of North Bergen and Town of Guttenberg have jointly prepared this Long Term Control Plan (LTCP) for controlling Combined Sewer Overflows (CSOs) in the North Bergen Municipal Utilities Authority (NBMUA) Woodcliff - Guttenberg Service Area, referred to as the Woodcliff - Guttenberg Service Area from this point forward.

ES.2 Background

The NBMUA provides wastewater collection and treatment to the Township of North Bergen and the Town of Guttenberg. The Combined Sewer Systems (CSSs) and separate sewer systems are owned by the municipalities; however, the NBMUA is the New Jersey Pollutant Discharge Elimination System (NJPDES) Permittee and Operator for the Woodcliff Sewage Treatment Plant (STP).

The Woodcliff - Guttenberg Service Area comprises combined sewer areas and separate sewer areas from the Town of Guttenberg and the portion of the Township of North Bergen that drain towards the Hudson River. The remainder of the Township of North Bergen drains towards the Hackensack River. This portion is within the Passaic Valley Sewerage Commission (PVSC) Treatment District and discussed in the PVSC Regional LTCP.

Combined and separate sewage in the Woodcliff – Guttenberg Service Area drains to the Woodcliff STP. The CSS includes one CSO outfall owned by NBMUA and one CSO outfall owned by Guttenberg.

The NJPDES Permits issued to each municipality include requirements for the NBMUA and Guttenberg to cooperatively develop a CSO LTCP with specific submittal requirements enumerated under Part IV, Section D.3.b. This report constitutes the Regional LTCP encouraged by the Permits. The individual Selection and Implementation of Alternatives Report (SIAR) for each municipality, included as **Appendices A and B** to this report, fulfill the SIAR submittal required under each Permit submittal schedule. To date, all required reports scheduled by the Permit have been submitted and approved by the New Jersey Department of Environmental Protection (NJDEP) or have been submitted and are under review by NJDEP and awaiting comments or final approval.

ES.3 Approach

The approach to the Woodcliff Regional LTCP was formed in accordance the municipalities' NJDPES Permits and the guidelines of the United States Environmental Protection Agency's (USEPA's) CSO Policy. The CSO Policy establishes a framework for the coordination, planning, selection, and implementation of CSO controls required for Permittee compliance with the Clean Water Act (CWA). The CSO Policy describes three major steps in the overall LTCP approach: system characterization, development and evaluation of alternatives, and selection and implementation of controls.

The CSO Policy also states that “In addition to considering sensitive areas, the long-term control plan should adopt either the Presumption Approach or the Demonstration Approach.” Both municipalities elected for the Presumption Approach. Under this approach, CSO controls are presumed to protect the water quality based requirements of the CWA if at least 85% of the combined sewage collected in the CSS during precipitation events is captured, provided the permitting authority determines that such presumption is reasonable based upon the data and analyses conducted for characterization, monitoring and modeling of the collection system as well as the consideration of sensitive areas.

The proposed LTCP meets the presumptive 85% level of control, based on hydrologic and hydraulic (H&H) modeling of a typical year per USEPA guidelines. 2004 was selected as the typical year based on analysis of a 46-year period from 1970 to 2015 as detailed in the Typical Hydrologic Year Report included in **Appendix F** of this report.

ES.4 Screening of CSO Control Technologies

In order to determine the appropriate CSO control technologies, a screening of CSO technologies was completed to determine those technologies that have the greatest potential to meet the requirements of the NJPDES Permit. This screening did not consider cost, and only excluded CSO control technologies not technically or physically appropriate for the NBMUA Woodcliff - Guttenberg Service Area. After screening, the following technologies were advanced for further consideration:

- STP Treatment Capacity Upgrade
- I/I Reduction
- Disinfection
- Green Infrastructure (GI)
- Sewer Separation
- Storage Tanks
- Storage Tunnels
- Combinations of the above technologies

The CSO Control Technologies screening process is further detailed in the Woodcliff Regional Development and Evaluation Alternatives Report (DEAR) for the Woodcliff – Guttenberg Service Area included in **Appendix D** and in Section C of this report.

ES.5 Development and Evaluation of CSO Control Alternatives

The development and evaluation of CSO control alternatives was based on several factors both monetary and non-monetary for future selection of the CSO control alternative that would constitute the final Long Term Control Plan. The factors used to evaluate the alternatives were as follows:

- Remaining Overflow Volume and Frequency
- Ability to Meet Water Quality Standards
- Siting/Land Availability
- Institutional Issues
- Public Receptiveness
- Cost

The Woodcliff DEAR and Section C of this report provide further detail on the alternative development and evaluation process.

ES.6 Public Participation

During the development of the LTCP, the CSO municipalities within the Woodcliff-Guttenberg Service area jointly conducted various public outreach activities in order to implement a process that actively involves the public. The diverse set of public activities includes creation of a Supplemental CSO team to serve “as an informal work group [to act] as a liaison between the general public and the decision makers for the Permittee,” as required by NJPDES Permit Part IV.G.2.C. The Supplemental CSO Team comprises invited members of the impacted and interested public, such as rate payers, industrial users, and residents in proximity of CSOs and residents who use and enjoy the upstream and downstream waters.

Other public measures include regular interest group meetings, direct solicitation for input from non-CSO Permittees, formation of a Model Evaluation Group (MEG), social media outreach, briefings for elected and appointed officials, and participation in water resource and utility management conferences.

ES.7 Recommended Long Term Control Plan

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 SIAR for NBMUA Woodcliff - Guttenberg Service Area, appended to this report. The selected alternative constitutes the recommended CSO Long Term Control Plan.

The Woodcliff Regional LTCP consists of expanding the Woodcliff STP from 8 MGD to 10 MGD with additional localized CSO control technologies to be implemented by Guttenberg and NBMUA. **Table ES-1** summarizes the various selected improvements that make up the Woodcliff Regional LTCP.

Table ES-1: Woodcliff Regional Selected LTCP CSO Control Technologies

NBMUA and Town of Guttenberg Regional Alternative	
Description	% Capture
Expansion of Woodcliff Sewage Treatment Plant	92%
I/I Reduction	89%
Galaxy Towers Storm Water Separation	89%
Galaxy Towers Sanitary Sewer Separation	89%
Upgrades at Netting Chamber	-
Green Infrastructure: Green Roofs	89%
Green Infrastructure: Planter Boxes	89%

Additionally, 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 NBMUA and Guttenberg 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. NBMUA and Guttenberg 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.

ES.8 Budgeting and Funding

The total capital cost associated with the Recommended LTCP is \$26.06 million. The total costs borne by each municipality will be equal to the proposed technologies in addition to the cost allocated for the Woodcliff STP. The agreement between the Permittees on how to allocate these costs is reflected in Section I as well as **Appendices I and J**. NBMUA is undertaking improvements at the Woodcliff STP and a portion of these costs will be passed through to Guttenberg residents through sewer rate increases.

The RI indicates a mid-range burden for both Permittees under the EPA framework. The Financial Capability Assessment for each Permittee under the Municipal Plan is presented in the individual SIARs for each municipality and the FCA memos appended to this report (See **Appendices A, B, I and J**)

ES.9 Implementation Schedule

Table ES-2 presents the proposed schedule and associated capital cost opinion for implementation of the Recommended LTCP. The proposed milestone is anticipated to be implemented and placed into operation by December 31 of the associated year.

TABLE ES-2: Long-Term CSO Control Plan Schedule

Year	Municipality	Milestone	Cost
2020	Guttenberg	I/I Reduction (Project #1)	\$300,000
2021	NBMUA and Guttenberg	Expansion of the NBMUA Woodcliff Sewage Treatment Plant	\$23,000,000 ¹
	Guttenberg	Galaxy Towers Storm Water Separation	\$400,000
	Guttenberg	I/I Reduction (Project #2)	\$300,000
2022	Guttenberg	Upgrades at Netting Chamber	\$125,000
	Guttenberg	I/I Reduction (Project #3)	\$300,000

Year	Municipality	Milestone	Cost
2023	Guttenberg	I/I Reduction (Project #4)	\$300,000
	Guttenberg	Galaxy Towers Sanitary Sewer Separation	\$500,000 ²
2024	Guttenberg	I/I Reduction (Project #5)	\$300,000
2025	Guttenberg	Green Roof Ordinance for High-Rises	See Note 3
	Guttenberg	Green Infrastructure: Planter Boxes (Year 1 of 5)	\$20,000
2026	Guttenberg	Green Infrastructure: Planter Boxes (Year 2 of 5)	\$20,000
	NBMUA	Green Infrastructure: Project 1	\$217,500
2027	Guttenberg	Green Infrastructure: Planter Boxes (Year 3 of 5)	\$20,000
2028	Guttenberg	Green Infrastructure: Planter Boxes (Year 4 of 5)	\$20,000
2029	Guttenberg	Green Infrastructure: Planter Boxes (Year 5 of 5)	\$20,000
2031	NBMUA	Green Infrastructure: Project 2	\$217,500

¹ \$23,000,000 represents the approximate capital cost opinion of the construction, which is being financed by NBMUA and passed on to Guttenberg via rate increases. The portion for wet weather improvements will cost approximately \$4,600,000.

² The project will be undertaken and financed by Galaxy Towers and the timing is approximate.

³ New zoning ordinance incentivizing green roofs in newly zoned high-rise areas.

SECTION A - INTRODUCTION AND BACKGROUND

A.1 SUMMARY OF CHANGES

This report discusses the Regional Long Term Control Plan (LTCP) for the Woodcliff - Guttenberg Service Area served by the North Bergen Municipal Utilities Authority (NBMUA) Woodcliff Sewage Treatment Plant (STP). This LTCP, from here on referred to as the Woodcliff Regional LTCP, comprises the selected Combined Sewer Overflow (CSO) Control alternatives by each municipality, through their individual Selection and Implementation of Alternatives Report (SIAR) included in this document as **Appendix A** and **Appendix B**. In future versions of this report, this section will include summaries of changes and when they were incorporated as appropriate.

A.2 TITLE OF PLAN AND APPROVAL

Title: Woodcliff Regional Long Term Control Plan Report

Preparer:

Project Officer:



Michael J Hope, PE, Greeley and Hansen LLC



Date

QA Officer:




Timothy J Dupuis, PE, CDM Smith



Date

Passaic Valley Sewerage Commission:

**PVSC
Program Manager:**

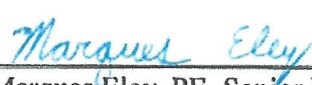


Thomas Laustsen, PE, Chief Operating Officer, PVSC



Date

**PVSC
QA Officer:**



Marques Eley, PE, Senior Engineer, PVSC



Date

New Jersey Department of Environmental Protection

DEP Permits:

Joseph Mannick, CSO Coordinator

Date

DEP QA:

Marc Ferko, Office of Quality Assurance

Date

Woodcliff Regional Long Term Control Plan Report

Submitted by
Passaic Valley Sewerage Commission:

NJPDES Number NJ0029084 (North Bergen - Woodcliff)

Approval of this submittal:

Permittee:



Frank Pestana



Date

Executive Director, North Bergen Municipal Utilities Authority

NJPDES Certification:

Without prejudice to any objections timely made to permit conditions, I certify under penalty of law that this document and all attachments were prepared either: (a) under my direction or supervision; or (b) as part of a cooperative performed by members of the NJ CSO group effort in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information 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:



Frank Pestana



Date

Executive Director, North Bergen Municipal Utilities Authority


Selection and Implementation of Alternatives Regional Report

**Submitted on behalf of the following participating Permittee by
Passaic Valley Sewerage Commission:**

NJPDES Number NJ0108715 (Guttenberg)

Approval of this submittal:

Permittee:



Frank Pestana
Licensed Operator, Town of Guttenberg




Date

NJPDES Certification:

Without prejudice to any objections timely made to permit conditions, I certify under penalty of law that this document and all attachments were prepared either: (a) under my direction or supervision; or (b) as part of a cooperative performed by members of the NJ CSO group effort in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information 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:



Frank Pestana
Licensed Operator, Town of Guttenberg



Date

A.3 DISTRIBUTION LIST

Passaic Valley Sewerage Commission

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Patricia Lopes, Director of Process Control Engineering and Regulatory Compliance

Marques Eley, PE, Senior Engineer

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Guttenberg: Frank Pestana, Licensed Operator
Cosmo Cirillo, Town Administrator
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New Jersey Department of Environmental Protection

Dwayne Kobesky, Surface Water Permitting

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Appendix B Selection and Implementation of Alternatives Report for Town of Guttenberg
Appendix C System Characterization Report NBMUA Woodcliff and Guttenberg
Appendix D Development and Evaluation of Alternatives Woodcliff Regional Report
Appendix E Public Participation Process Report
Appendix F PVSC Typical Hydrologic Year Report
Appendix G Calibration and Validation of the Pathogen Water Quality Model (PWQM) for the
Passaic Valley Sewerage Commission
Appendix H PVSC Identification of Sensitive Areas Report
Appendix I Final Financial Capabilities Assessment for NBMUA-Woodcliff
Appendix J Final Financial Capabilities Assessment for the Town of Guttenberg

A.6 INTRODUCTION AND BACKGROUND

The Township of North Bergen and the Town of Guttenberg are two of 21 municipalities in the State of New Jersey with a Combined Sewer System (CSS). Unlike modern wastewater collection systems with separate sewer systems for sanitary and storm water flow, CSSs combine sanitary and storm water flow in a common network. During wet weather events when the hydraulic capacity of the CSS is exceeded, overflow is discharged into nearby waterways; this discharge is known as a Combined Sewer Overflow (CSO).

Under the 1972 United States Environmental Protection Agency (USEPA) Clean Water Act (CWA), CSOs are prohibited without a permit. In the state of New Jersey, the New Jersey Department of Environmental Protection (NJDEP) administers New Jersey Pollutant Discharge Elimination System (NJDPDES) Permits to the CSS operators. Permittees are required to develop a plan for controlling CSOs. The plan for controlling CSOs is known as a Long Term Control Plan (LTCP).

This report constitutes the Woodcliff Regional LTCP submission for the Town of Guttenberg and the eastern portion of the Township of North Bergen within the Woodcliff - Guttenberg Service Area. This service area is defined as the wastewater collection system tributary to the Woodcliff Sewage Treatment Plant (STP) that is owned and operated by the North Bergen Municipal Utilities Authority (NBMUA). The Selection and Implementation of Alternatives Report (SIAR) for each of the two Permittees (NBMUA and the Town of Guttenberg), are included in this report as **Appendix A** and **Appendix B**.

The Township of North Bergen is divided by topography into two areas: the western and central portion of the Township drains towards the Hackensack River and the eastern portion drains towards the Hudson River. The western and central portion of the Township is, therefore, within the Passaic Valley Sewerage Commission (PVSC) Treatment District and is, therefore, not discussed in this report. The eastern portion of the Township is within the Woodcliff - Guttenberg Service Area and is discussed in this report. The CSO outfalls in the Township of North Bergen are regulated under two NJDPES permits; one permit for the PVSC Treatment District and one permit for the Woodcliff - Guttenberg Service Area. The Woodcliff - Guttenberg Service Area is shown in **Figure A-1**.

The CSSs within the Woodcliff - Guttenberg Service Area are owned by their respective municipalities; however, the NBMUA owns and operates the Woodcliff STP facilities. The Town of Guttenberg, in addition to owning its own CSS, owns its netting chamber. The service area includes one CSO outfall owned by NBMUA (NB004) and one CSO outfall owned by the Town of Guttenberg (GU001). The NBMUA CSO outfall receives CSS flow from regulators NB-1 and NB-2 and the Town of Guttenberg outfall receives CSS flow from regulator GU-1. Both CSO outfalls are permitted to discharge into the Hudson River when the CSS hydraulic capacity is exceeded. A general flow schematic of the Woodcliff - Guttenberg Service Area CSS is shown on **Figure A-2**.

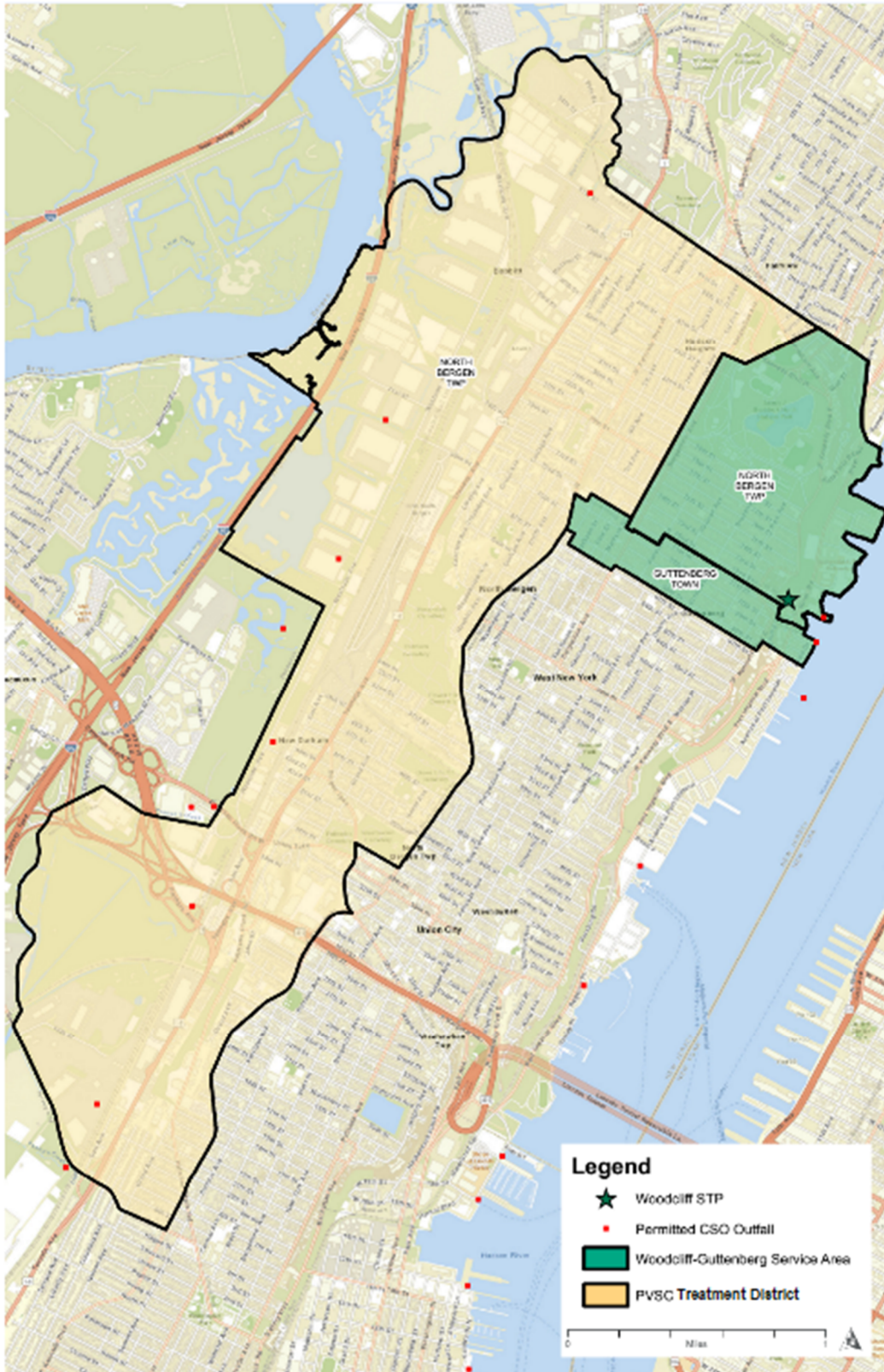


Figure A-1: Woodcliff – Guttenberg Service Area

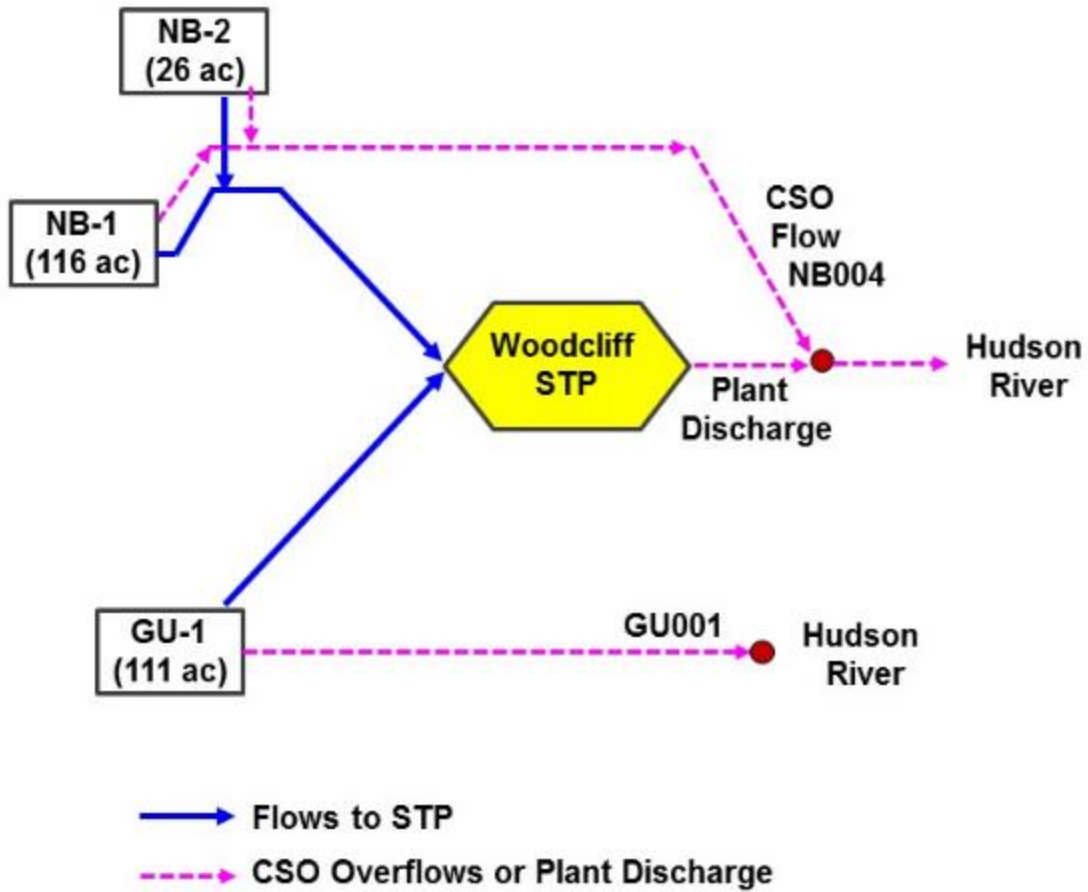


Figure A-2: Flow Schematic of the Woodcliff – Guttenberg Service Area CSS

A.7 PURPOSE OF REPORT

In accordance with the NBMUA (Woodcliff) and the Town of Guttenberg NJPDES Permits, a Final LTCP including a Selection and Implementation of Alternatives Report (SIAR) for each of the Permittees is required by June 1, 2020; however, due to the impacts of the SARS-CoV-2 virus Global Pandemic, the NJDEP has granted an extension for submittal of the LTCP report to October 1, 2020.

The NJPDES Permits for the NBMUA (Woodcliff) and the Town of Guttenberg encourage collaboration among Permittees within a hydraulically connected sewer system for the development of a Regional LTCP. This Woodcliff Regional LTCP compiles and summarizes the results of the two individual SIARs in order to provide a singular, comprehensive LTCP for the Woodcliff - Guttenberg Service Area and satisfy the requirements of the NJPDES Permits.

A.8 LTCP PLANNING APPROACH

An LTCP planning approach was developed by NBMUA (Woodcliff) and the Town of Guttenberg to ensure the individual SIARs and Regional LTCP adequately address all requirements enumerated under their NJPDES permits. The LTCP Planning Approach adopted by NBMUA (Woodcliff) and the Town of Guttenberg features the following aspects, in alignment with the Permit requirements:

1. Characterization, Monitoring, and Modeling of the CSS

Completed a comprehensive characterization study of the CSS including sampling, monitoring, analysis of historical data and modeling to establish baseline conditions and evaluate the efficacy of CSO control technologies selected for implementation.

a. Water Quality Modeling (WQM)

Completed the Water Quality Model (WQM) simulations to determine the impact of the CSOs on the quality of the waterbodies.

b. Hydrologic and Hydraulic (H&H) Model Development

Created a combined H&H model of the entire Service Area including the preferred alternative.

2. Public Participation Process

Engaged and invited affected/interested public to participate, provide input, and participate on a Supplemental CSO Team to provide input to the Permittees on the LTCP development.

3. Consideration of Sensitive Areas

A study of the Sensitive Areas within the service area and a report was submitted in accordance with the Permit CSO Reports Submittal Schedule.

4. Evaluation of Alternatives and Maximizing Treatment at the STP

A reasonable range of CSO control alternatives were developed and evaluated and submitted individually by each Permittee as well as regionally and were submitted in accordance with the Permit CSO Reports Submittal Schedule through the Woodcliff Regional Development and Evaluation of Alternatives Report (DEAR). Maximizing

Treatment at the STP was included as part of the evaluation in observance of the Permit LTCP requirements.

5. Cost/Performance Considerations

Based on the H&H and WQM results of the DEAR CSO Control Alternatives, the Permittees refined the alternatives and developed costs for each while evaluating performance considerations such as impacts to water quality and CSO volume capture (reduction) to evaluate the appropriate level of control.

Subsequent to the submittal of the DEAR, the following steps were conducted to finalize the LTCP discussed in this report:

1. District Meetings

Conducted bi-weekly meetings with the PVSC Treatment District to further develop Regional Alternatives evaluated during the DEAR. The Regional Alternatives were moved forward for further review and evaluation in subsequent aspects.

2. Financial Capability Assessment (FCA)

Developed a financial capability analysis (FCA) for each of the Permittees to determine affordability.

3. Hydrologic and Hydrologic (H&H) Model and WQM Results Validation and LTCP Expert Evaluation

An H&H model was built, updated, validated, and calibrated for the Service Area. A water quality model was also built, updated, validated, and calibrated for all receiving streams. A Model Evaluation Group (MEG) reviewed both models in order to validate the methodology and calibration/validation results. The calibration and validation results of the H&H Model were submitted as part of the System Characterization Report (see **Appendix C**), which was approved by NJDEP on April 12, 2019. The results of the calibration and validation of the WGW was submitted to NJDEP as part of the Calibration and Validation of the Pathogen Water Quality Model (PWQM) for the Passaic Valley Sewerage Commission (see **Appendix G**), and is currently pending approval. Additional detail for both of these models, as well as the MEG, is included in Section F of this report.

4. Incorporate Feedback From LTCP Experts

Based on experts' feedback and coordination with the Permittees, identifying the most cost effective regional solution and where localized solutions would have the greatest localized impact, the alternatives were further developed, H&H model re-run, and costs analyzed.

5. Update to FCA

An update to the FCA was performed based on the updated alternatives costs.

6. NJDEP Meeting to Confirm Acceptability of Alternatives

Upon further development of alternatives, a meeting with NJDEP was held to determine the acceptability of alternatives in terms of CSO reduction.

7. Mayoral Meetings to Present Alternatives

Preliminary selected alternatives were presented to the Mayors from the Service Area for approval of a regional agreement.

8. Public Participation

Throughout the entire development of the LTCP, including the evaluation of the alternatives, public input was solicited through a variety of mediums.

9. Implementation Schedule

Upon agreement by the Permittees and the municipalities on the Selected Alternatives that will comprise the LTCP, an implementation schedule was developed for each of the projects selected.

10. LTCP Finalization

Upon selection of the alternatives, updates to the FCA, and development of an implementation schedule, the individual SIARs and Final LTCP were completed and are presented in this report.

The operational plan and compliance monitoring program required by the Permit as part of the LTCP are to be developed upon NJDEP approval of the LTCP, in accordance with the Permits.

SECTION B - REGULATORY REQUIREMENTS

B.1 INTRODUCTION

This section discusses the regulatory requirements governing the LTCP for the Woodcliff – Guttenberg Service Area Permittees. The Permittees and their associated ND PES permit numbers are listed below in **Table B-1**.

Table B-1: Permittees Covered Under this Development and Regional Alternatives Report

Municipality	NJPDES #
North Bergen MUA (Woodcliff)	NJ0029084
Town of Guttenberg	NJ0108715

B.2 NJPDES PERMIT REQUIREMENTS

Under Section 402 of the CWA, all point source discharges to the waters of the United States must be permitted. USEPA Region II has delegated permitting authority in New Jersey to NJDEP. The permits are reissued on a five-year cycle. All 21 New Jersey municipalities and municipal authorities with CSSs, or Public Owned Treatment Works (POTW) that accept flow from a CSS, were issued new permits in 2015 that set forth the requirement for the completion of a LTCP including a SIAR by June 1, 2020, currently extended to October 1, 2020 as noted in Section A.

The NJPDES permits issued to each municipality include requirements for the NBMUA (Woodcliff) and the Town of Guttenberg to cooperatively develop a CSO LTCP to reduce CSO discharges to the receiving waters.

Part IV, Section D.3.b. of the NBMUA’s (Woodcliff) and Town of Guttenberg’s NJPDES Permits requires the completion of a LTCP to be prepared in accordance with Part IV, Sections G.1 through G.9 of the permit. Those sections are listed below for reference:

- Section G.1 Characterization, Monitoring and Modeling of the Combined Sewer System
- Section G.2 Public Participation Process
- Section G.3 Consideration of Sensitive Areas
- Section G.4 Evaluation of Alternatives
- Section G.5 Cost/Performance Considerations
- Section G.6 Operational Plan
- Section G.7 Maximizing Treatment at the Existing STP
- Section G.8 Implementation Schedule
- Section G.9 Compliance Monitoring Program (CMP)

Section G.6 through Section G.8 state that the Selection and Implementation of Alternatives must also comply with the requirements of Subsection D.3.a and Section G.10, recited below:

- Subsection D.3.a Long Term Control Plan Submittal Requirements
“The Department encourages a single LTCP to be developed and submitted on behalf of all of the Permittees in a hydraulically connected sewer system.”
- Section G.10 Permittee’s LTCP Responsibilities
“Where multiple Permittees own/operate different portions of a hydraulically connected CSS, the Permittee is required to work cooperatively with all other Permittees to ensure the LTCPs are consistent. The LTCP documents must be based on the same data, characterization, models, engineering and cost studies, and other information, where appropriate. Each Permittee is required to prepare the necessary information for the portion of the hydraulically connected system that the Permittee owns/operates and provide this information to the other Permittees within the hydraulically connected system in a timely manner for LTCP submission.

The specific requirements for the LTCP are outlined in Sections G.2 through G.8. These requirements are identified in **Table B-2**, along with the Sections of this report in which those requirements are addressed.

Table B-2: Review of Requirements of the LTCP

Permit Section	Permit Requirement	Report Section
Part IV G.1.a	“The permittee, as per D.3.a and G.10, shall submit an updated characterization study that will result in a comprehensive characterization of the CSS developed through records review, monitoring, modeling and other means as appropriate to establish the existing baseline conditions, evaluate the efficacy of the CSO technology based controls, and determine the baseline conditions upon which the LTCP will be based. The permittee shall work in coordination with the combined sewer community which is hydraulically connected to this STP, for appropriate Characterization, Monitoring and Modeling of the Sewer System.”	Section C: Existing Conditions and Appendix C
Part IV G.2.a	“The permittee shall submit the Public Participation Process Report to include appropriate input and participation with other hydraulically connected communities, in accordance with D.3.a and G.10.”	Section G: Public Participation
Part IV G.3.a	“The permittee's LTCP shall give the highest priority to controlling overflows to sensitive areas, in accordance with D.3.a and G.10. 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.”	Section C.5: Sensitive Areas and Appendix C
Part IV G.4.a	“The permittee shall evaluate a reasonable range of CSO control alternatives, in accordance with D.3.a and G.10. that will meet the water quality-based requirements of the CWA using either the Presumption Approach or the Demonstration Approach (as described in Sections G.4.f.and G.4.g).”	Section D: Screening of CSO Control Technologies and Appendix D

Permit Section	Permit Requirement	Report Section
Part IV G.4.b	“The permittee shall submit, as per Section D.3.b.v, the Evaluation of Alternatives Report that will enable the permittee, in consultation with the Department, the public, owners and/or operators of the entire collection system that conveys flows to the treatment works, to select the alternatives to ensure the CSO controls will meet the water quality-based requirements of the CWA, will be protective of the existing and designated uses in accordance with N.J.A.C. 7:9B, give the highest priority to controlling CSOs to sensitive areas, and address minimizing impacts from SIU discharges.”	Section E: Evaluation of Alternatives and Appendix D
Part IV G.5.a	“The permittee shall submit in accordance with the submittal requirements at Sections D.3.a. and D.3.b.v., the cost/performance considerations that demonstrate the relationships among proposed control alternatives that correspond to those required in accordance with Section G.4. This shall include an analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs. If the permittee chooses to pursue the "Presumption Approach" of 'no more than an average of four discharge events per year', the permittee is not required to conduct this analysis for the other number of events (i.e. 0, 7, 10, 20). This analysis, often known as "knee of the curve", shall be among the considerations used to help guide selection of controls.”	Section H: Selection of Recommended LTCP
Part IV G.6.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.”	Post Final LTCP Approval
Part IV G.7.a	“The LTCP shall include the maximization of the removal of pollutants during and after each precipitation event at the STP, in accordance with D.3.a and G.10, ensuring that such flows receive treatment to the greatest extent practicable utilizing existing tankage for storage, while still meeting all permit limits.”	Section C: Existing Conditions
Part IV G.7.b	“The Permittee shall incorporate the receiving STP's plan for maximizing flow and treatment at the STP.”	Section J: Recommended Long Term Control Plan
Part IV G.8.a	“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.”	Section J: Recommended Long Term Control Plan
Part IV G.8.b	“Upon Departmental approval of the LTCP, the Permittee shall begin implementation of the LTCP in accordance with the schedule contained therein.”	Section J: Recommended Long Term Control Plan

Permit Section	Permit Requirement	Report Section
Part IV G.8.c	"In accordance with Section D.3.b.vi., the Permittee shall submit an implementation schedule, including yearly milestones."	Section J: Recommended Long Term Control Plan
Part IV G.8.c.i	"The Permittee shall consider adequately addressing areas of sewage overflows, including to basements, streets and other public and private areas."	Section H: Selection of Recommended LTCP
Part IV G.8.c.ii	"The Permittee shall consider CSO overflows that discharge to sensitive areas as the highest priority."	Section C: Existing Conditions
Part IV G.8.c.iii	"The Permittee shall consider use impairment of the receiving water."	Section C: Existing Conditions
Part IV G.8.c.iv	"The Permittee shall consider the Permittee's financial capability including, but not limited to, consideration of the factors: median household income, total annual wastewater and CSO control costs per household as a percent of median household income, overall net debt as a percent of full market property value, property tax revenues as a percent of full market property value, property tax collection rate, unemployment, and bond rating."	Section I: Financial Capability
Part IV G.8.c.v	"The Permittee shall consider grant and loan availability."	Section I: Financial Capability
Part IV G.8.c.vi	"The Permittee shall consider previous and current residential, commercial, and industrial sewer user fees and rate structures."	Section I: Financial Capability
Part IV G.8.c.vii	"The Permittee shall consider other viable funding mechanisms and sources of financing."	Section I: Financial Capability
Part IV G.8.c.viii	"The Permittee shall consider Resources necessary to design, construct and/or implement other water related infrastructure improvements as part of an Asset Management Plan as per Part IV.F.1"	Section L: Revision of Operation and Maintenance Plans
Part IV G.9.a	The monitoring information collected from the ambient baseline monitoring phase of the CMP, in accordance with D.3.a., will be compared to subsequent CMP events during and after LTCP implementation to evaluate the effectiveness of implemented CSO controls.	Post Final LTCP Approval

B.2.1 Nine Minimum Controls

Under their NJPDES permits, Permittees are required to implement and document implementation of the nine minimum controls (NMCs). The NMCs are CSO controls developed by the EPA that require minimal cost and construction time. The NMCs consist of the following:

1. Proper operation and regular maintenance
2. Maximizing the use of the collection system for storage where feasible
3. Review and modification of the Industrial Pretreatment Program to minimize CSO impacts
4. Maximization of flow to the wastewater treatment plant
5. Prohibition of CSOs during dry weather
6. Control of solids and floatables (addressed by NJDEP’s requirement of screening or other facilities in earlier permit cycles);
7. Pollution prevention
8. Public notification
9. Monitoring CSO impacts and controls

The Town of Guttenberg and NBMUA (Woodcliff) submitted their NMC programs under a previous permit cycle. The LTCP has been developed to be consistent with the NMCs. CSO control technologies already in place, scheduled to be implemented, or mandated by the NMCs were removed from consideration in the LTCP during the DEAR screening process.

B.3 USEPA’S CSO POLICY

USEPA’s CSO Policy (the “CSO Policy”) was issued in April of 1994 (59 FR 18688 - 18698) to elaborate on the 1989 National CSO Control Strategy and to expedite compliance with the requirements of the CWA. The CSO Policy provided guidance to municipal Permittees with CSOs, to the state agencies issuing National Pollution Discharge Elimination System permits (e.g., NJDEP and NJPDES permits) and to state and interstate water quality standards authorities (e.g., the Interstate Environmental Commission). The CSO Policy establishes a framework for the coordination, planning, selection, and implementation of CSO controls required for Permittee compliance with the CWA.

The CSO Policy also states that “In addition to considering sensitive areas, the long-term control plan should adopt either the Presumption Approach or the Demonstration Approach.” In accordance with the CSO Policy, and the conditions of the permit, the 85% volume capture condition of the Presumption Approach was adopted by the Permittees. The Presumption and Demonstration approach, including the process for selecting the approach, are discussed in further detail in Section H of this report.

B.4 LOCAL AGREEMENTS

Because the Town of Guttenberg does not own its own sewerage facility, it contracts out operation of its CSS and wastewater treatment to NBMUA. NBMUA conveys and treats wastewater from the Town of Guttenberg at the Woodcliff STP and charges a fixed rate per gallon treated, which is billed to the Town of Guttenberg residents.

B.5 NEED FOR REGIONAL APPROACH

Although NBMUA (Woodcliff) and the Town of Guttenberg own and maintain independent yet hydraulically connected sections of the Woodcliff CSS, they have acknowledged the need for a regional approach. The Woodcliff STP CSO communities have collaborated and worked

cooperatively to ensure consistency in the development, selection, and implementation of their respective LTCPs and Regional LTCP alternatives per the requirements of their NJPDES permits.

The following outlines the owner/operators of the CSSs and control facilities from the CSO Permittees who have committed to this regional approach.

Town of Guttenberg

Owner of CSS: Town of Guttenberg

Operator of CSS: NBMUA

Owner of Regulators: Town of Guttenberg

Operator of Regulators: NBMUA

Township of North Bergen

Owner of CSS: North Bergen Township

Operator of CSS: NBMUA

Owner/Operator of Regulators: NBMUA

Owner/Operator of Woodcliff STP: NBMUA

SECTION C - EXISTING CONDITIONS

C.1 NBMUA WOODCLIFF SEWAGE TREATMENT PLANT

The NBMUA owns and operates the Woodcliff STP and receives flows from the eastern portion of the Township of North Bergen and the Town of Guttenberg. The plant is permitted to discharge its effluent wastewater to the Hudson River. The plant outfall is identified in the NBMUA Woodcliff NJPDES permit as Outfall No. 001A.

C.1.1 Current Flows and Current Capacity

The existing facility has a permitted capacity of 2.91 MGD and currently discharges a monthly average flow of approximately 2.77 MGD.

C.1.2 NBMUA Woodcliff STP NJPDES Permit Requirements

The Woodcliff STP is currently undergoing an upgrade to the facilities. As a result of this upgrade, NBMUA has submitted a request to the NJDEP to update the existing permit conditions specifically re-rating of the Woodcliff STP permitted capacity. The NJDEP is considering this modification to the existing permit (subsequently modified in 2015) to incorporate requirements for an expanded average monthly flow of 3.46 MGD (Final Construction Phase) from the current flow of 2.91 MGD (Initial Construction Phase). The Permittee has submitted a No Feasible Alternatives (NFA) analysis to the NJDEP, and NJDEP has subsequently approved, for the use of an interim bypass line to accept additional wet weather flow if allowed by a Treatment Works Approval.

The NJDEP will consider this permit change request from NBMUA to rerate the flow capacity from 2.91 MGD to 3.46 MGD conditioned upon NBMUA providing six (6) consecutive months of analyses that demonstrates compliance with the acute toxicity limit set forth in the permit and complies with all other statutory and regulatory requirements applicable to a flow capacity re-rating.

An aerial view of the existing Woodcliff STP is shown below in **Figure C-1**.

C.2 SERVICE AREAS

C.2.1 Combined Sewer Service Area

The Woodcliff - Guttenberg Service Area comprises combined sewer areas and separate sewer areas that contribute flow to the Woodcliff STP. The Woodcliff - Guttenberg Service Area is made up of 305 total acres contributing area, 252 acres of combined sewer area and 53 acres of separated sewer area. The combined sewer area makes up approximately 83% of the total contributing area; 141 acres from the North Bergen Woodcliff area and 111 acres from the Town of Guttenberg.



Figure C-1: The Woodcliff Sewage Treatment Plant

The NBMUA (Woodcliff) STP is permitted to discharge combined sewage from two regulators (NB-1 and NB-2) to one CSO outfall pipe. The outfall pipe passes to the north of the Woodcliff STP bending south on River Road to a manhole, combining with the treatment plant effluent. The combined STP effluent/CSO outfall pipe then proceeds east discharging to the Hudson River. The Town of Guttenberg is permitted to discharge wet weather flows exceeding CSS capacity to one CSO outfall the Hudson River under NJPDES Permit No. NJ0108715. A netting system is installed at the outfall for solids and floatables removal.

The Permittees, their service area acreage and the number of CSO outfall are summarized in **Table C-1** below.

Table C-1: Combined and Separate Sewer Service Area

Permittee	Total Contributing Area (acres)	Contributing Area (acres)		Number of CSOs Located within Service Area
		Combined	Sanitary	
NBMUA Woodcliff	181	141	40	1
Guttenberg	124	111	13	1
Total	305	252	53	2

NOTE: The total acreage in Table C-1 includes only the sub-catchment areas in the model that contribute flow to the Woodcliff STP. The acreage does not include rivers, creeks or un-sewered areas within a municipality.

C.2.2 Separate Sewer Service Area

Approximately 17% of the Woodcliff - Guttenberg Service Area consists of separate sanitary sewer systems. The contributing area by municipality is summarized in **Table C-1**. All the separate sewers from each municipality are hydraulically connected to the NBMUA Woodcliff STP.

C.3 SYSTEM CHARACTERIZATION

C.3.1 System Characterization Work Plan for the LTCP

The System Characterization Work Plan for the LTCP was submitted as part of the System Characterization and Landside Modeling Program Quality Assurance Project Plan (QAPP). The QAPP describes work plans for data generation and acquisition, assessment and oversight, data validation and usability, and collections system modeling.

The System Characterization Work Plan was submitted to the NJDEP cooperatively for North Bergen MUA Woodcliff STP and the Town of Guttenberg on December 18, 2015. The NJDEP provided comments and the report was revised on March 22, 2016. The report was ultimately approved by the NJDEP on October 12, 2016.

C.3.2 System Characterization Report

The objective of the System Characterization Report (SCR) is to provide NJDEP and the Permittees with a comprehensive and empirical understanding of the physical nature and hydraulic performance of their respective sewerage systems for use in optimizing the performance of the current systems and in the development of CSO control alternatives. The SCR incorporated the results of the QAPP for the System Characterization and Landside Modeling Program, a summary of the Baseline Monitoring and Modeling Plan program, and the System Characterization mapping of the combined and separate sewer areas within the Woodcliff - Guttenberg Service Area. The SCR was submitted to the NJDEP on behalf of the Permittees on January 24, 2019. The NJDEP provided comments on February 27, 2019, and ultimately approved the SCR on April 18, 2019. The SCR is included as **Appendix C**.

C.3.3 Receiving Waters Characterization

Characteristics of the receiving waters include description of the designated use, shoreline characteristics, identification of the waters on the impaired waters of New Jersey and a summary

of the sensitive areas within the receiving water. The USEPA CSO Control Policy Guideline requires that highest priority is given to CSOs that discharge to sensitive areas.

The major receiving water body impacted from the Woodcliff - Guttenberg Service Area CSOs is the Lower Hudson River. The Lower Hudson River and its tributaries belong to the Hudson River drainage basin. Drainage basins or watersheds are areas that are separated by drainage divides. Within a watershed, all surface water drains to a single outlet such as a river. The NJDEP has categorized all CSO receiving waters into Watershed Management Areas (WMA) 1 through 20 and refers to these designations in the 303(d) list of impaired waters. The Lower Hudson River is considered part of the NJDEP Watershed Management Area 05. The Woodcliff – Guttenberg Service Area CSO outfalls to the Hudson River are shown in **Figure C-2**.

CSO receiving waters are waterbodies that either receive direct CSO discharges, or receive flow from tributaries with CSOs. The receiving waters include the Woodcliff - Guttenberg Service Area and expands from this service area to include receiving and adjacent downstream waters that may be potentially affected by CSOs from the various combined sewer service areas. The downstream confluence of the Hudson River is the Upper New York Harbor which is potentially affected by the Woodcliff - Guttenberg CSO Service Area discharges. The Hudson River is located within the Passaic, Hackensack, and New York Harbor Complex. **Table C-2** lists the CSO outfalls for the Permittees and the waterbody into which they discharge.

Table C-2: CSO Outfall Receiving Waters

NJPDES	Permittee	CSO Number	Receiving Water Body
NJ0108715	Town of Guttenberg	GU001	Hudson River
NJ0029084	NBMUA (Woodcliff)	NB004	Hudson River

Three Pollutants of Concern (POC) were determined to apply to the Woodcliff - Guttenberg Service Area’s receiving water. These three POC are parameters typically associated with CSO discharges. The NJDEP determined POC for the Hudson River relative to the NBMUA (Woodcliff) and Guttenberg CSO discharges are Fecal Coliform, Escherichia coli (E. coli) and Enterococcus.

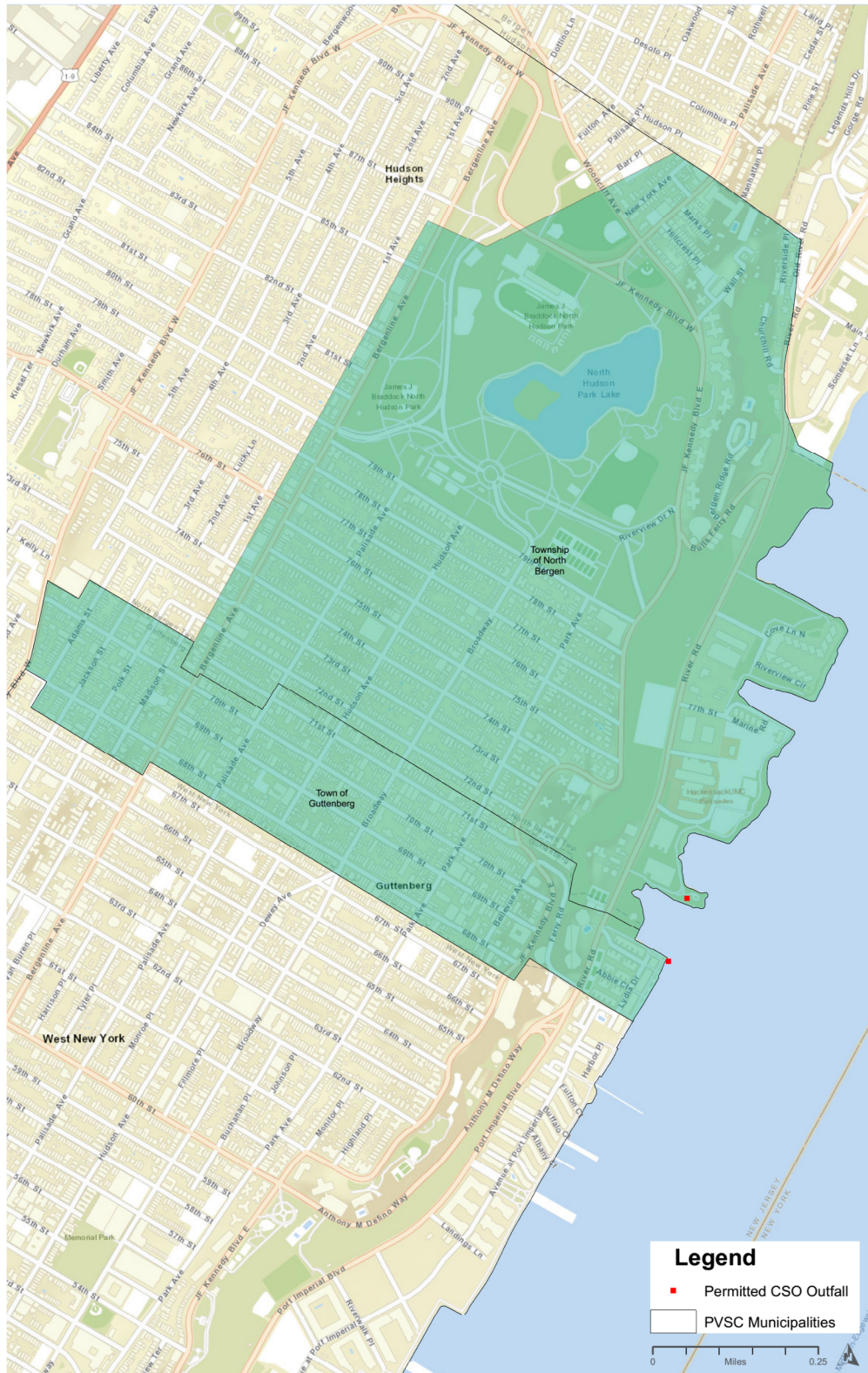


Figure C-2: Woodcliff - Guttenberg Service Area and Outfalls

C.3.4 Sewer System Characterization

Section D.3.b.i of the NJPDES Permit for each Permittee require submittal of a System Characterization Work Plan to the NJDEP 6 months from the effective date of the permit. To meet this requirement a System Characterization and Landside Modeling Program QAPP was submitted for the NBMUA and the Town of Guttenberg to be executed and performed by the PVSC. The System Characterization and Landside Modeling Program includes the rainfall monitoring, wastewater sampling, collections system monitoring, modeling, and other work necessary to characterize the CSO discharges from the participating municipalities and for development of a collections system model for the purposes of evaluating CSO control alternatives and developing a CSO LTCP.

The NBMUA (Woodcliff) and Guttenberg SCR documents detail a thorough understanding of the Permittees’ respective sewerage systems, the systems’ responses to precipitation events of varying duration and intensity, the characteristics of system overflow events, and water quality issues associated with CSOs emanating from the systems. The latest revision of the SCR for NBMUA (Woodcliff) and Town of Guttenberg provides a more comprehensive summary of the system characterization. An overview of the organization and contents of the SCR are provided in **Table C-3**.

Table C-3: System Characterization Report Contents and Organization

Section		Topics Covered
A	Introduction and Background	Documents the program organization, key responsible individuals, problem definition, background, project description, summary and table of contents.
B	Regulatory Requirements	Describes regulatory requirements and context of the System Characterization Report.
C	Overview of Wastewater Facilities and Service Area	Characterizes the municipalities that are the subject of this system characterization report and current wastewater treatment facilities within the service area.
D	Characteristics of the Combined Sewer System	Characterizes the municipal collection sewers, sewer mains, and appurtenances such as pump stations, existing CSO control facilities, regulator structures, and CSO outfalls.
E	Collection of Precipitation and Sewer Flow Monitoring	Documents the precipitation and flow monitoring programs, data analyses, integration of wastewater treatment plant operational data, data validation and QA/QC and presents the results of the analyses.
F	Characteristics of the Receiving Waters	Describes the watersheds, physical characteristics, and hydrodynamics of the receiving stream. Also describes the designated uses and current water quality compliance (e.g. 303(d) listings) and achievement of designated use status.
G	Collection of Water Quality Data	Documents the regulatory requirements for wastewater and water quality data collection, historic water quality data collection, the CSO and water quality monitoring program and related QAPP and wastewater quality results.

Section		Topics Covered
H	Typical Hydrologic Period	Documents the requirements for and selection of the typical year and summarizes the hydrologic characteristics of the typical year.
I	Hydrologic and Hydraulic Modeling	Documents the development and scope of the H&H model used in this system characterization and to be used in the development of CSO control alternatives. The documentation includes model inputs, sensitivity analyses, model calibration and validation and modeling results.
J	References	
K	Abbreviations	

C.4 TYPICAL HYDROLOGIC YEAR

The year 2004 was selected as the recommended typical hydrologic year for the NBMUA Woodcliff - Guttenberg Service Area. The selection of the typical hydrologic year was based on the historical records in the past 46 years from 1970 through 2015 as detailed in the Typical Hydrologic Year Report in **Appendix F** of this report. In order to be more conservative, the typical year was selected from years with an annual precipitation depth greater than the average value.

Among the qualifying periods, the year 2004 ranked first in the parameters described in **Table C-4** and contains a wide range of storms and antecedent conditions. Additionally, the year 2004 has close to an average CSO volume and event number based on the hydrologic and hydraulic model results. A summary of the parameters and the percent difference is shown below in **Table C-4**.

Table C-4: Summary of the Recommended Typical Hydrologic Year - 2004

Parameters	2004
Annual Precipitation*	48.37 in (4.5% greater than average 46.27)
Number of Events ≥ 0.2 " Rainfall Depth	54 (5% greater than average 51.2)
Number of Events ≥ 0.1 " Rainfall Depth	73 (11% greater than average 66)
5 th Largest Storm Volume (in.)	1.63 in. (5% less than average 1.70)
Rainfall Volume for 85% Capture (in.)	1.18 in. (12% less than average 1.35)
Back-to-Back Storm Events	12 (14% greater than average 10.5)
Max Peak Intensity of 5 th Largest Storm & Smaller	0.99 in/hr (9.5% greater than average 0.90)
Extreme Storm (Number of events)	1 Year Storm (2) 2 Year Storm (1) (31% greater than average of 2.2)
Average Rainfall Duration	10.3 hr (4.8% less than average 10.8)
Average Rainfall Intensity	0.084 in/hr (3.8% greater than average 0.081)

Note:* Includes snowfall

C.5 SENSITIVE AREAS

The USEPA's CSO Control Policy "expects a Permittee's long-term CSO control plan to give the highest priority to controlling overflows to sensitive areas" (Section II.C.3).

In compliance with this condition, a Sensitive Areas Report was prepared on behalf of the Permittees. The study involved a comprehensive review of online databases, direct observations and correspondence with regulatory agencies and local environmental organizations to identify potential Sensitive Areas within the Woodcliff - Guttenberg CSS Service Area and in the associated receiving waters.

The results of the study are summarized below:

- Zero Outstanding National Resource Waters were located within the Service Area.
- Zero National Marine Sanctuaries were located within the Service Area.
- One habitat for an endangered species was located in the Service Area.
- Zero waters designated for primary contact were located within the Service Area.
- Zero operating commercial shellfish harvesters were located within the Service Area.
- Zero drinking water intakes were located in the Service Area.

Further investigation concluded, that although the Shortnose sturgeon are an endangered species known to habituate the Hudson River, the current water quality and habitat protections are viewed as adequate to maintain a healthy sturgeon population. As a result, the study concluded that no prioritization of CSO based on sensitive areas is necessary within the Woodcliff – Guttenberg Service Area.

For additional detail on the identification of sensitive areas process refer to the Identification of Sensitive Areas Report, which is included as **Appendix H**.

SECTION D - SCREENING OF CSO CONTROL TECHNOLOGIES

In order to determine the appropriate CSO control technologies, a review of CSO technologies was completed in the Development and Evaluation of Alternatives Report (DEAR), dated October 25, 2019, to determine those technologies that have the greatest potential to meet the requirements of the NJPDES Permit for the following Municipalities shown in **Table D-1**. This DEAR was approved by the NJDEP on January 24, 2020 and can be found in **Appendix D** of this Report.

Table D-1: NJPDES Permit Numbers

Municipality	NJPDES #
North Bergen MUA (Woodcliff)	NJ0029084
Town of Guttenberg	NJ0108715

This screening of technologies did not consider cost or the cost effectiveness and was only intended to exclude CSO control technologies not technically or physically appropriate for the NBMUA (Woodcliff) Service Area. The screening of CSO control technologies was also presented to the public at a Regional Supplemental CSO Team Meeting for public input. Public input indicated that community benefits should be added to the preliminary screening criteria. The screening criteria was revised to include this input. The results of this screening brought several CSO control technologies forward for consideration in the development of the LTCP. These control technologies are further discussed in Section E of this report.

D.1 Evaluation Methodology

Each CSO control technology evaluated in this section was assigned a value based on its effectiveness at achieving the primary goals defined above. The categories used to assign goal effectiveness are as follows:

- **High:** These CSO control technologies are highly effective and are among the best technologies to achieve primary CSO control goals. For this reason, these technologies are highly likely to be considered for further evaluation.
- **Medium:** These CSO control technologies are moderately effective at achieving the primary CSO control goals, but are not considered among the most effective technologies to achieve those goals. These technologies may or may not be considered for further evaluation.
- **Low:** These CSO control technologies are projected to have a minor impact on achieving the primary CSO control goals. These technologies will need other positive attributes to support achieving CSO control measures to be considered for further evaluation.
- **None:** The CSO control technology will have no impact or a negative impact on the primary CSO control goals. It is unlikely that these technologies will be considered for further evaluation.

Additionally, the positive impacts that each of the technologies would have on the community beyond achieving the primary goals described above were evaluated. The community benefits were identified using as a reference the New Jersey DEP Division of Water Quality's report

entitled “Evaluating Green Infrastructure: A Combined Sewer Overflow Control Alternative for Long Term Control Plans,” and the New Jersey Green Infrastructure Municipal Toolkit website. Public input received on the screenings of technologies also requested that community benefits were considered. As such, community benefits were incorporated in the evaluation methodology and were identified to include aesthetic improvements, improvements to water quality, reduction of flooding potential, and alignment with sustainable community principles, among others.

CSO control technologies were recommended for further evaluation based on multiple factors.

- The first factor was the goal-effectiveness value that generally quantifies the effectiveness a technology would have towards achieving a CSO control goal. These goal-effectiveness values are described above.
- The second factor depended upon the CSO control technology requiring further evaluation pursuant to the NJPDES Permit. The permit identifies certain technologies that must be evaluated further before approval.
- The third factor in determining whether a technology would be evaluated further was the current or future implementation and operation of that technology. If the technology is currently in place, will be implemented, or is mandated by the Nine Minimum Controls, then further evaluation was not required.
- The fourth and final factor was the feasibility of implementation, particularly in terms of land/infrastructure ownership.

The community benefits identified for each technology also played an important role in determining whether implementation of the technology would be beneficial and recommended to be moved forward for further analysis.

CSO technologies found to be highly effective in one or all evaluation factors were recommended for further investigation. A CSO technology that would not achieve a “medium” effectiveness for water quality goals would not be recommended for further evaluation. This screening methodology was presented to the public at the October 2018 PVSC Regional Supplemental CSO Meeting. Input was requested from the public and the public feedback was considered in this evaluation.

D.2 SCREENING OF CONTROL TECHNOLOGIES

Table D-2 through **Table D-4** provide a summary of the comprehensive screening of CSO control technologies process from the Woodcliff Regional DEAR. The CSO control technologies summarized in this section present assigned values based on their effectiveness at reaching primary CSO control goals. CSO Control technologies recommended for further evaluation are shaded in these summary tables. CSO Control technologies not shaded or designated for further evaluation but that were being already implemented at the time of the screening process, are identified in the second to last column in each of the tables. Descriptions of the goal effectiveness categories and the evaluation methodology are located in **Subsection D.1**.

Table D-2, **Table D-3**, and **Table D-4** also contain a brief description of the implementation and operation factors for the different CSO technologies and provide a summary of those CSO control technologies moving forward in alternatives evaluation in **Section C**.

Table D-2: Source Control Technologies Screening Table

Source Control Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	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	<ul style="list-style-type: none"> Reduced surface flooding 	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	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding 	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	No	No
	Catch Basin Modification (Leaching)	Low	Low	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding 	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	<ul style="list-style-type: none"> Reduced surface flooding Align with goals for a sustainable community 	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	<ul style="list-style-type: none"> Align with goals for a sustainable community 	Inexpensive; easy to implement; public education. Is only as effective as the public's input and understanding of the message. Public outreach programs would have a more effective result.	Yes	No	No
	Community Cleanup Programs	None	None	<ul style="list-style-type: none"> Water quality improvements Align with goals for a sustainable community 	Inexpensive; sense of community ownership; educational Best Management Practice (BMP); aesthetic enhancement. Community cleanups are inexpensive and build ownership in the city.	Yes	No	No
	Public Outreach Programs	Low	None	<ul style="list-style-type: none"> Align with goals for a sustainable community 	Public education program is ongoing. Permittee should continue its public education program as control measures demonstrate implementation of the NMC.	Yes	No	No
	FOG Program	Low	None	<ul style="list-style-type: none"> Water quality improvements Improves collection system efficiency 	Requires communication with business owners; Permittee may not have enforcement authority. Reduces buildup and maintains flow capacity. Only as effective as business owner cooperation.	Yes	No	No
	Garbage Disposal Restriction	Low	None	<ul style="list-style-type: none"> Water quality improvements 	Permittee 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.	Yes	No	No
	Pet Waste Management	Medium	None	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Water quality improvements 	The N.J.A.C. prohibits the discharge of hazardous waste to the collection system.	Yes	Yes	No

Source Control Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	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	<ul style="list-style-type: none"> Water quality improvements 	In building code; reduces sediment and silt loads to waterways; reduces clogging of catch basins; little Operations and Maintenance (O&M) required; contractor or owner pays for erosion control. A Soil Erosion & Sediment Control Plan Application or 14-day notification (if Permittee covered under permit-by-rule) will be required by NJDEP per the N.J.A.C.	Yes	No	No
	Illegal Dumping Control	Low	None	<ul style="list-style-type: none"> Water quality improvements Aesthetic benefits 	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	No	No
	Pet Waste Control	Medium	None	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding 	Requires resources to enforce pet waste ordinances. Public education and outreach are a more efficient use of resources, but this may also provide an alternative to reducing bacterial loads.	Yes	No	No
	Litter Control	None	None	<ul style="list-style-type: none"> Property value uplift Water quality improvements Reduced surface flooding 	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 are a more efficient use of resources.	Yes	No	No
	Illicit Connection Control	Low	Low	<ul style="list-style-type: none"> Water quality improvements Align with goals for sustainable community 	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	No	No
Good Housekeeping	Street Sweeping/Flushing	Low	None	<ul style="list-style-type: none"> Reduced surface flooding 	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	<ul style="list-style-type: none"> Reduced surface flooding Aesthetic benefits 	Requires additional seasonal labor. Leaf collection maximizes flow capacity and removes nutrients from the collection system.	Yes	No	No
	Recycling Programs	None	None	<ul style="list-style-type: none"> Align with goals for sustainable community 	Most Cities have an ongoing recycling program.	Yes	Yes	No
	Storage/Loading/Unloading Areas	None	None	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Protect surface waters Protect public health 	PVSC has established a pretreatment program for industrial users subject to the Federal Categorical Pretreatment Standards 40 CFR 403.1.	Yes	No	No
Green Infrastructure (GI) Buildings	Green Roofs	None	Medium	<ul style="list-style-type: none"> Improved air quality Reduced carbon emissions Reduced heat island effect Property value uplift Local jobs Reduced surface flooding Reduced basement sewage flooding Align with goals for a sustainable community 	Adds modest cost to new construction; not applicable to all retrofits; low operational resource demand; will require the Permittee 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	Yes

Source Control Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction					
Green Infrastructure Buildings	Blue Roofs	None	Medium	<ul style="list-style-type: none"> Reduced heat island effect Property value uplift Local jobs Reduced surface flooding Reduced basement sewage flooding Align with goals for a sustainable community 	Adds modest cost to new construction; not applicable to all retrofits; low operational resource demand; will require the Permittees 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	<ul style="list-style-type: none"> Reduced surface flooding Reduced basement sewage flooding Align with goals for a sustainable community Water saving 	Simple to install and operate; low operational resource demand; will require the Permittees 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	Yes
Green Infrastructure Impervious Areas	Permeable Pavements	Low	Medium	<ul style="list-style-type: none"> Improved air quality Reduced carbon emissions Reduced heat island effect Property value uplift Water quality improvements Reduced surface flooding Reduced basement sewage flooding Align with goals for a sustainable community 	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	No
	Planter Boxes	Low	Medium	<ul style="list-style-type: none"> Improved air quality Reduced carbon emissions Reduced heat island effect Property value uplift Reduced surface flooding Reduced basement sewage flooding Align with goals for a sustainable community 	Site specific; good BMP; minimal vegetation & mulch O&M requirements with regular overflow and underdrain cleaning; effective at containing, infiltrating and evapotranspiring 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	<ul style="list-style-type: none"> Improved air quality Reduced carbon emissions Reduced heat island effect Property value uplift 	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	Yes	No	No

Source Control Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction					
				<ul style="list-style-type: none"> ▪ Local jobs ▪ Passive and active recreational improvements ▪ Reduced surface flooding ▪ Reduced basement sewage flooding ▪ Community aesthetic improvements ▪ Reduced crime ▪ Align with goals for a sustainable community ▪ Increased pedestrian safety through curb retrofits 	means land can be utilized in more effective ways with the existing infrastructure.			
	Free-Form Rain Gardens	Low	Medium	<ul style="list-style-type: none"> ▪ Improved air quality ▪ Reduced carbon emissions ▪ Reduced heat island effect ▪ Property value uplift ▪ Passive and active recreational improvements ▪ Reduced surface flooding ▪ Reduced basement sewage flooding ▪ Community aesthetic improvements ▪ Reduced crime ▪ Align with goals for a sustainable community 	Site specific; good BMP; minimal vegetation & mulch O&M requirements with regular overflow and underdrain cleaning; effective at containing, infiltrating and evapotranspiring 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 D-3: Collection System Technologies Screening Table

Collection System Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	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	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	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	Yes	Yes
	Advanced System Inspection & Maintenance	Low	Low	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	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	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	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	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding 	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 Biochemical Oxygen Demand (BOD) levels.	Yes	Yes	No
Combined Sewer Separation	Roof Leader Disconnection	Low	Low	<ul style="list-style-type: none"> Reduced basement sewage flooding 	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	<ul style="list-style-type: none"> Reduced basement sewage flooding 	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	No	No
	Combined Sewer Separation	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding Reduced surface flooding 	Very disruptive to affected areas; requires homeowner participation; sewer asset renewal achieved at the same time; labor intensive.	No	No	Yes
Combined Sewer Optimization	Additional Conveyance	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	Additional conveyance can be costly and would require additional maintenance to keep new structures and pipelines operating.	No	No	No
	Regulator Modifications	Medium	Medium	<ul style="list-style-type: none"> Water quality improvements 	Relatively easy to implement with existing regulators; mechanical controls will require O&M. May increase risk of upstream flooding. Permittees have an ongoing O&M program and system wide replacement program for CSO regulators and tide gates.	Yes	Yes	No
	Outfall Consolidation/Relocation	High	High	<ul style="list-style-type: none"> Water quality improvements Passive and active recreational improvements 	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	No
	Real Time Control	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	Requires periodic inspection of flow elements; highly automated system; increased potential for sewer backups. Real Time Control is only effective if additional storage capacity is present in the system.	Yes	No	No

Table D-4: Storage and Treatment Technologies Screening Table

Storage and Treatment Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction					
Linear Storage	Pipeline	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding Local jobs 	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	No	Yes
	Tunnel	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding 	Requires small area at ground level relative to storage basins; disruptive at shaft locations; increased O&M burden.	No	No	No
Point Storage	Tank (Above or Below Ground)	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	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	No
	Industrial Discharge Detention	Low	Low	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Water quality improvements 	Easy to implement; labor intensive; potential negative aesthetic impact; requires additional resources for inspection and maintenance. Netting will only address floatables.	Yes	Yes	Yes
	Contaminant Booms	None	None	<ul style="list-style-type: none"> Water quality improvements 	Difficult to maintain requiring additional resources. Contaminant booms will only address floatables.	Yes	No	No
	Baffles	None	None	<ul style="list-style-type: none"> Water quality improvements 	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	<ul style="list-style-type: none"> Water quality improvements Reduced basement sewage flooding 	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	No
	High Rate Physical/Chemical Treatment (High Rate Clarification Process - ActiFlo)	None	None	<ul style="list-style-type: none"> Water quality improvements 	Challenging controls for intermittent and highly variable wet weather flows; smaller footprint than conventional methods. This technology primarily focuses on Total Suspended Solids (TSS) & BOD removal but does not help reduce the bacteria or CSO discharge volume.	Yes	No	No
Treatment-Wastewater	High Rate Physical (Fuzzy Filters)	None	None	<ul style="list-style-type: none"> Water quality improvements 	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
	Additional Treatment Capacity	High	High	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding 	May require additional space; increased O&M burden.	No	No	Yes

Storage and Treatment Technologies (from the Woodcliff Regional DEAR)								
Technology Group	Practice	Primary Goals		Community Benefits	Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction					
Reclamation Treatment Plant				<ul style="list-style-type: none"> Reduced basement sewage flooding 				
	Wet Weather Blending	Low	High	<ul style="list-style-type: none"> Water quality improvements Reduced surface flooding Reduced basement sewage flooding 	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	Yes	Yes
Treatment-Industrial	Industrial Pretreatment Program	Low	Low	<ul style="list-style-type: none"> Water quality improvements Align with goals for a sustainable community 	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

SECTION E - EVALUATION OF ALTERNATIVES

E.1 INTRODUCTION

After the initial screening of CSO control technologies, the NBMUA (Woodcliff) and Town of Guttenberg assembled and evaluated a range of CSO control alternatives from the advanced technologies in their respective DEARs. The purpose of the DEAR is to provide a comprehensive evaluation of CSO control alternatives *“that will enable the Permittee, in consultation with the Department, the public, owners and/or operators of the entire collection system that conveys flows to the treatment works, to select the alternatives to ensure the CSO controls will meet the water quality-based requirements of the Clean Water Act (CWA), will be protective of the existing and designated uses in accordance with New Jersey Administrative Code (N.J.A.C.) 7:9B, give the highest priority to controlling CSOs to sensitive areas, and address minimizing impacts from SIU discharges.*

The Woodcliff Regional DEAR then evaluated, compared, and incorporated specific features of the local alternatives into a regional alternative for the Woodcliff STP Service Area. The Regional DEAR was submitted to the NJDEP on behalf of the two Permittees on June 28, 2019. The NJDEP provided comments on September 10, 2019 and approved the final report on January 24, 2020.

This section summarizes the development and evaluation of the regional alternatives presented in the Woodcliff Regional DEAR. For details refer to the Woodcliff Regional DEAR included as **Appendix D**.

E.2 DEVELOPMENT OF ALTERNATIVES

The preliminary alternatives were developed using the overflow control technologies identified as feasible for implementation by the NBMUA (Woodcliff) and Guttenberg DEARs. The control technologies used for alternatives include storage tanks, Peracetic Acid (PAA) disinfection, upgrades to the Woodcliff STP, inflow and infiltration (I/I) reduction, separation of the Galaxy Towers sanitary and storm water systems, and green infrastructure. The resulting alternatives for the two Permittees in the Woodcliff – Guttenberg Service Area are listed in **Table E-1** below.

Table E-1: Woodcliff - Guttenberg Service Area Alternatives from the Woodcliff Regional DEAR

NBMUA	
Alternative	Description
No. 1	Upgrade of Woodcliff Sewage Treatment Plant ¹
No. 2	Storage Tanks
No. 3	PAA Disinfection
No. 4	Green Infrastructure Cover
Town of Guttenberg ²	
Alternative	Description
No. 1	Reduction of Infiltration/Inflow
No. 2	Upgrade of Woodcliff Sewage Treatment Plant ¹
No. 3	Galaxy Towers Sanitary Sewer Separation
No. 4	Galaxy Towers Storm Water Separation

No. 5	Upgrades at Netting Chamber
No. 6	Green Infrastructure ³
	Green Roofs
	Rain barrels
	Planter Boxes
NBMUA and Town of Guttenberg Regional Alternative	
Alternative	Description
No. 1	Upgrade of Woodcliff Sewage Treatment Plant ¹

¹Ongoing efforts in the upgrades to the Woodcliff STP include an expansion and 2MG wet weather bypass.

²None of the alternatives were able to reduce the number of overflow events to 20 or less.

³Assumes an implementation rate of 10-15% by property owners.

E.3 REGIONAL ALTERNATIVES

The regional alternative in the Woodcliff Regional DEAR consists of the upgrade of the Woodcliff STP. The treatment capacity, average annual overflow events volumes and annual CSO event frequencies associated with the Woodcliff STP upgrades are provided in **Appendix A**. Section H of this report describes the process that took place from the Evaluation of Alternatives step to the Selection and Implementation of Alternatives that constitute this LTCP.

SECTION F - POLLUTANT LOADS AND PREDICTED WATER QUALITY

F.1 INTRODUCTION

This section describes the models used to evaluate the hydraulic and water quality impact of the CSO control technologies on the receiving waters. As previously stated in Section A.8, a Model Evaluation Group (MEG) reviewed an H&H model and a water quality model for all receiving streams. This validated the methodology and calibration/validation results as a part of the LTCP planning approach.

The MEG is composed of recognized experts in hydrologic, hydraulic, hydrodynamic, and water quality monitoring and modeling, formed to provide technical review and guidance. The following individuals are part of the MEG:

- Dr. Alan Blumberg, Stevens Institute of Technology;
- Dr. Steve Chapra, Tufts University; and
- Dr. Wayne Huber, Oregon State University, emeritus.

The MEG's stated mission was as follows:

"The Model Evaluation Group (MEG) will review all significant technical aspects of the PVSC Long Term Control Plan model development. Model development will consist of three distinct components: Landside, Hydrodynamic, and Water Quality. The goal is to ensure that these model components are technically viable for use by the engineering team in the assessment of engineering alternatives and withstand regulatory and public scrutiny. The MEG will provide guidance, where appropriate, to improve or enhance the approaches and methodologies that lead to model development. The MEG will judge, individually and jointly, the technical acceptability of the major model components. If a component is deemed unacceptable, the MEG will outline steps to improve the technical acceptability of the model components."

Workshop meetings with the MEG, PVSC and their consultants, and the New Jersey Department of Environmental Protection were held to discuss the development and use of each of the models, as well as to receive feedback and input regarding the monitoring and modeling work. These meetings were held on the following dates:

- February 5, 2016;
- March 17, 2017;
- September 15, 2017;
- December 5, 2018; and
- November 21, 2019

The MEG provided various comments related to the updating, calibration, and validation of the hydrologic and hydraulic model. Updates to the model configurations were made in response to these comments. The original comments and responses are documented in the System Characterization Report, which is included as **Appendix C**.

F.2 HYDROLOGIC AND HYDRAULIC (H&H) MODEL

F.2.1 H&H Model Methodology

As part of the collaborative approach to the LTCP, the CSO communities elected to integrate their existing, disparate models into one comprehensive regional model. This integrated LTCP model includes the service area conveyed to the NBMUA eastern service area and Guttenberg service area conveyed to the NBMUA Woodcliff STP.

Prior to these comprehensive modeling efforts, two H&H models were previously developed separately for the North Bergen Woodcliff area and the Town of Guttenberg service areas. Detailed modeling information including communities, Permittees, STP, and modeling software are summarized in **Table F-1**.

Table F-1: PVSC WRRF & Woodcliff STP Pre-LTCP Model Summary

	Model	Community	WRRF	Permittee	Software	County
1	North Bergen (Woodcliff)	Township of North Bergen	NBMUA Woodcliff STP	North Bergen MUA	PC-SWMM	Hudson
2	Guttenberg	Town of Guttenberg		Town of Guttenberg	SWMM	Hudson

F.2.2 Regional Model Integration

H&H modeling of the NBMUA eastern service area was included as a part of the integrated PVSC LTCP model. The PVSC LTCP model is not a part of this report and is only discussed as it relates to the integrated Woodcliff STP model since both models are included in the same overall model platform as discussed further herein. Integrating the Woodcliff STP service areas and PVSC Water Resources Recovery Facility (WRRF) service areas in the same model provides the benefits of reducing effort associated with multiple models simulation time, post processing model results, quality control, and iterations to converge upon boundary conditions with hydraulically connected systems.

The Woodcliff STP Model was created as a subset of the newly developed PVSC LTCP H&H model in InfoWorks ICM v9.0. Both the pre-LTCP NBMUA Woodcliff and Guttenberg models were integrated into the PVSC LTCP regional model. Separate sewer service areas contributing flows to the Woodcliff STP were also included in the final model.

F.2.3 H&H Model of Regional Alternatives

The calibrated regional model was simulated for the selected typical year of 2004 for evaluating the collection system performance under the existing conditions. The estimated percent capture for the typical year is approximately 89.8% for the baseline conditions. The percent capture is presented below in **Table F- F-2**.

Table F-2: Typical Year % Capture

	Woodcliff STP
Total WWF Volume (MG)	229
Total CSO Volume (MG)	25
% Capture	89.8%

The results from this regional model were used as the baseline for comparison in evaluating the CSO Control Alternatives.

F.3 WATER QUALITY MODEL

Although a presumptive level of control of 85% was selected as the alternatives approach for this LTCP, a Pathogens Water Quality Model (PWQM) was developed, calibrated, and validated to provide support for the development of LTCPs for the NJ CSO Group. Details concerning the NJ CSO Group are included in Section G.2.2 of this report. The PWQM is based on an existing hydrodynamic model of the NY-NJ harbor complex that has been calibrated, validated, and peer-reviewed (Blumberg et al., 1999). The underlying source code for the hydrodynamic model portion of PWQM is the Estuarine, Coastal and Ocean Model with Sediment Transport (ECOMSED). The model domain also includes portions of New York Harbor and Raritan Bay as necessary to avoid boundary effects that would contaminate the model results in the region of interest. The hydrodynamic model portion of PWQM included freshwater inputs provided by H&H models developed for northern NJ and New York City, and USGS river gages. Meteorological forcings were based on NOAA's North American Regional Reanalysis (NARR) Dataset. Temperature and salinity boundary conditions were based on climatological data from World Ocean Atlas 2013 (WOA2013, <https://www.nodc.noaa.gov/OC5/woa13/>), published by NOAA. Details on the assignment of water elevation boundaries are provided in the Calibration and Validation of the Pathogen Water Quality Model (PWQM) report in **Appendix G**.

For the LTCP, the following state-variables were modeled with the water quality model portion of PWQM:

1. Salinity
2. Conservative Tracer
3. E. Coli
4. Fecal Coliform
5. Enterococcus

Salinity provides a check that the hydrodynamic model and water quality model are interfacing properly. The conservative tracer can be used to determine dilution. The three fecal indicator bacteria (FIB) were chosen because each one is used for a water quality criterion in the study area. Aside from these state-variables, other primary inputs to the water quality model include CSOs, stormwater, WWTP/STP/WRRF, rivers/boundary conditions, dry-weather loads, and other sources. Loads were developed for three periods: calibration, validation, and baseline.

The calibration period for PWQM is the calendar year 2016, the period when the majority of the baseline compliance monitoring was performed. The validation period is the calendar year 2017, when additional baseline compliance monitoring occurred. The year of 2004 represents a "typical" rainfall year based on precipitation data from Newark Liberty International Airport and was used to establish Baseline Conditions. For details on the PWQM refer to the Calibration and Validation of the PWQM report in **Appendix G**.

F.3.1 WQM Methodology

The water quality model source code underlying the water quality model portion of PWQM is Row Column AESOP (RCA). RCA originates from the Water Analysis Simulation Program (WASP) developed by Hydrosience in the 1970's. RCA code has been used to develop numerous models inside and outside of the NY-NJ Harbor system.

There are 182 NJ CSO outfalls assigned in the model. As part of the CSO LTCP process, hydrologic and hydraulic (H&H or landside) models of the northern NJ communities' CSSs were upgraded and integrated for use in the sewer system characterizations. An InfoWorks stormwater model covering the separated portion on the NJ side of the NY-NJ Harbor system was developed to calculate flows and runoff from the separated areas of northern NJ that flow into the CSO affected waterbodies. The model included the area from the New York border south to the Raritan River. The model included 73 subcatchments corresponding to National Hydrography Dataset boundaries shown in **Figure F-1**.

F.3.1.1 Baseline Attainment

Baseline conditions are based on the use of a "typical" rainfall condition. As previously stated in Section C.4, analysis of precipitation records indicated that 2004 rainfall conditions at Newark Liberty International Airport most closely reflected typical year conditions. River flow was used in the analysis to choose the typical year, so river flow and water elevations for 2004 are part of the baseline condition.

Additionally, to create a consistent baseline, the InfoWorks models were set up using "existing" 2015 infrastructure. New NJPDES permits were issued in 2015, so any infrastructure upgrades after this date are considered part of the LTCP.

Finally, baseline conditions assume that the non-CSO sources of bacteria to the NY-NJ harbor system remain unmitigated. As a result, the approach to developing the stormwater, river, and dry-weather loads remained the same and no efforts were made to reduce bacteria loads from the other sources.

F.3.1.2 Component Analysis

Components are defined as the various source categories of pollutants to the receiving water. A component analysis can quantify the impacts of the source categories (either geographical, type, or both) to assess which are most influential in affecting water quality for a particular time or location. This analysis is helpful to establish the level of load control to target during LTCP development.

The PWQM was applied to simulate eight component source categories to assess the impacts of these sources on water quality. The following source categories were evaluated: CSO, stormwater and runoff, the Hudson River, other rivers, NJ STPs, NY/CT STPs, dry-weather loads, and sources from New York City. For the component analysis each source component category was modeled separately to assess each component's contribution to the receiving water bacteria concentrations. The component analysis provides information as to the importance of the various pollution sources in locations throughout the model domain.

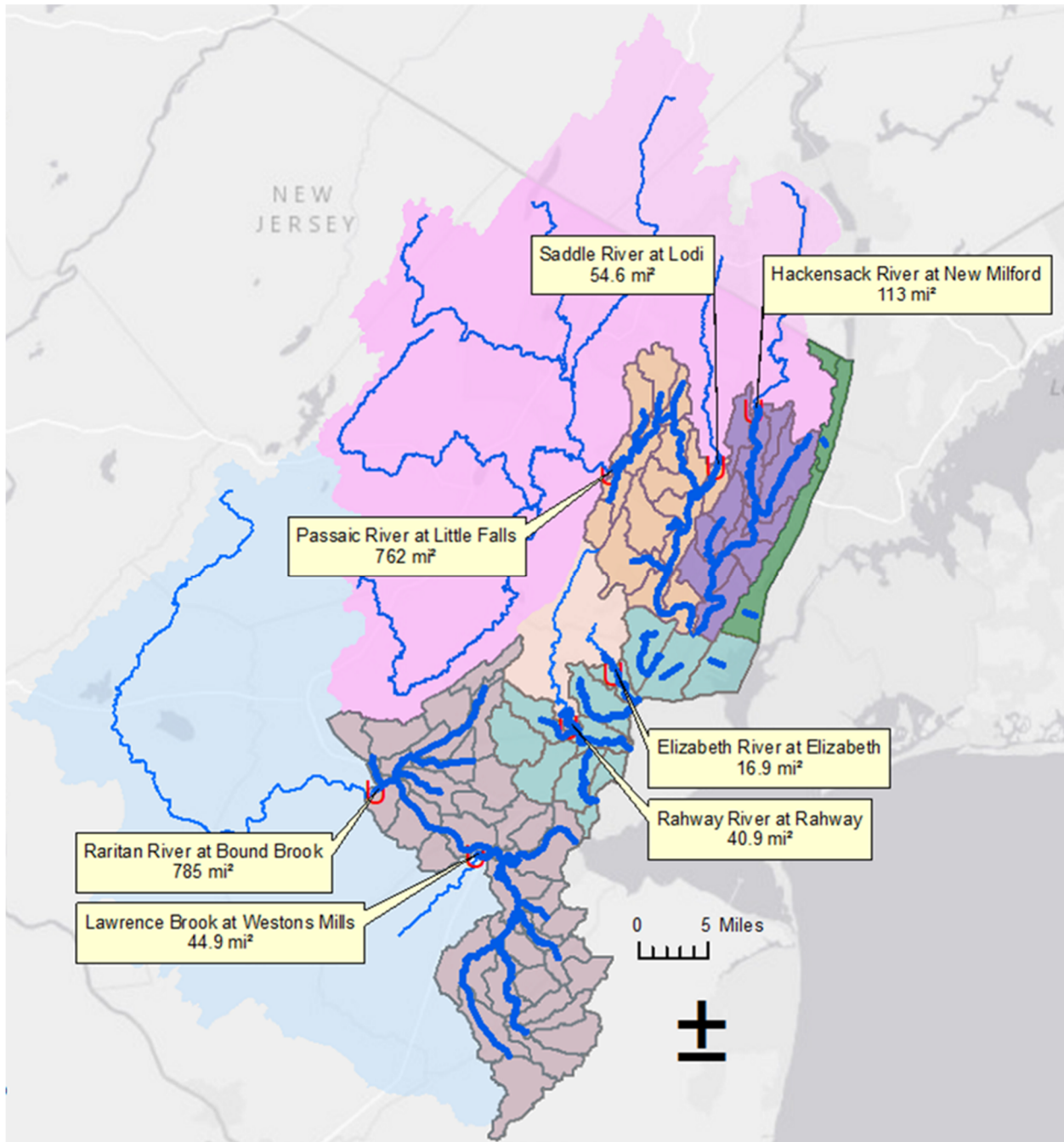


Figure F-1: Stormwater/Runoff Model Coverage Area

In general, the component analysis shows that different categories dominate the bacteria loading in various portions of the project area. In some cases, CSOs are a significant contributor to the bacteria concentrations, but these locations are often areas where the 30-day geometric mean criterion is not exceeded, or criterion exceedances occur due to contributions from other sources.

F.3.1.3 Projection Analysis

The use of a 100% CSO Control scenario is part of a “gap analysis.” 100% CSO control is the maximum level of control that can be attained for CSOs and results in the maximum possible improvement in water quality conditions due to CSO control during the typical hydrologic year. CSOs could still theoretically occur when there are storms that generate peak flows in excess of those experienced during the typical year.

If CSOs were the primary reason for non-attainment of water quality criteria, then some level of CSO control between baseline conditions and 100% control could conceivably result in attainment of the criteria. This level of CSO control would close the gap between attainment and non-attainment of water quality criteria. In many cases, other sources of bacteria, such as stormwater, are large enough that even 100% CSO control is not enough to meet criteria. In this case, the 100% CSO Control scenario shows the highest level of water quality that can be achieved by CSO control only, and additional control scenarios can be analyzed that can be incorporated into a cost-benefit analysis.

The 100% CSO Control scenario was run for the receiving waters with results organized by the classification of the surface water as established under the Surface Water Quality Standards (SWQS), N.J.A.C. 7:9B. NJDEP classifies freshwaters as FW1 waters (not subject to any man-made wastewater discharges) and FW2 waters (all other freshwaters except Pinelands waters). Saline waters are classified as saline estuarine (SE) and saline coastal (SC). SE waters are further classified as SE1, SE2, and SE3 waters based on their ability to support recreation, shellfish harvesting, and warm water fish species.

Two Hudson River Assessment Units (02030101170010-01, 02030101170030-01) along the Hudson River, an SE2 waterbody corresponding to the Woodcliff STP, both show 100% attainment in baseline and the 100% CSO Control scenario. The full details of the modeling results can be found in the Calibration and Validation of the PWQM for the Passaic Valley Sewerage Commission in **Appendix G**.

F.4 CSO OVERFLOW PREDICTIONS

In addition to the baseline conditions, the H&H model was used to simulate the CSO volume and frequency for each of the control alternatives. The results of this model were used to evaluate the performance of each alternative as further described under Section H.4.2.

SECTION G - PUBLIC PARTICIPATION

G.1 INTRODUCTION

The Public Participation Process Report outlines the public participation program and the associated activities. The goals for the program are to foster public awareness and to facilitate public involvement in the decision-making process to develop and select the final LTCP. The Public Participation Process Report was submitted to the NJDEP on behalf of the Permittees on June 25, 2018. The NJDEP provided comments on December 14, 2018, and the report was revised on January 25, 2019. The report was approved by the NJDEP on March 29, 2019 and is attached as **Appendix E**

The Public Participation process for the Woodcliff - Guttenberg Service Area has been carried in conjunction with the CSO Permittees within the PVSC Treatment District, to foster discussion across the region that can benefit the public within both hydraulic connected sewer systems.

G.2 PUBLIC INPUT FOR SELECTION OF ALTERNATIVES

G.2.1 PVSC Treatment District Supplemental CSO Team

The Supplemental CSO Team is an important part of the LTCP development process. The overall goal of the Supplemental CSO Team is to “work as an informal work group as a liaison between the general public and the decision makers for the Permittee” as required by NJPDES Permit Part IV.G.2.C.

Since the submission and approval of the Public Participation Report, some new members have joined the Supplemental CSO Team and others have requested to no longer participate. A current listing of the members of the Supplemental CSO Team and the organizations to which they belong as of the writing of this report are listed in Table G-1:

**Table G-1: Members of the Supplemental CSO Team
(alphabetically by organization)**

Name	Representing
Dan Smerda	Bayonne Water Guardians
Lisha Smerda	Bayonne Water Guardians
Nancy Kontos	Bunker Hill Special Improvement District
Ruben Gomenz	City of Paterson Economic Development
Sheri Ferreira	Greater Paterson Chamber of Commerce
Captain Bill Sheehan	Hackensack Riverkeeper
Janet Castro	Hudson Regional Health Commission/Township of North Bergen
Drew Curtis	Ironbound Community Corporation
Alison Cucco	Jersey City Environmental Commission
Jorge Santos	Newark Community Economic Development Corporation
Nicole Miller	Newark DIG

Name	Representing
Robin Dougherty	Newark Greater Conservancy/Newark Business Partnership
Betty Boros	New Jersey Business & Industrial Association
Mo Kinberg	NJ Future
Tom Stampe	North Bergen Green Team
Michele Langa	NY/NJ Baykeeper
Harvey Morginstin	Passaic River Boat Club & Passaic River Superfund CAG
Laurie Howard	Passaic River Coalition
Ben Delisle	Passaic River Rowing Association
Sue Levine	Paterson Smart
Christopher Obropta, Ph.D.	Rutgers University
Leslie Brunell	Stevens Institute of Technology
Pat Hester-Fearon	Town of Kearny
Christopher Vasquez	Town of Kearny
Christopher Pianese	Township of North Bergen

Supplemental CSO Team Public Meetings that were held after the submission of the Public Participation Report are presented in Table G-2:

Table G-2: Dates and Locations of Supplemental CSO Team Public Meetings

Meeting Number	Date	Location	City
1	October 5, 2016	Harrison Elks Lodge	Harrison
2	January 10, 2017	Bayonne Public Library	Bayonne
3	April 11, 2017	The Hamilton Club at Passaic County Community College	Paterson
4	July 11, 2017	Newark City Hall	Newark
5	October 16, 2017	PVSC WRRF	Newark
6	January 9, 2018	North Bergen Municipal Building	North Bergen
7	April 17, 2018	Jersey City Council Chambers	Jersey City
8	July 31, 2018	Kearny Town Hall	Kearny
9	October 16, 2018	PVSC WRRF	Newark
10	January 22, 2019	East Newark Senior Citizen Center	East Newark
11	March 7, 2019	North Jersey Transportation Planning Authority Conference Room	Newark
12	May 28 2019	Bayonne Washington School	Bayonne
13	July 31, 2019	The Ironbound Early Learn Center	Kearny
14	January 9, 2020	Harrison High School	Harrison
15	June 17, 2020	Virtual Meeting Facilitated through Microsoft Teams	Online
16	September 2, 2020	Virtual Meeting Facilitated through Microsoft Teams	Online

Meetings will continue to be held throughout the development of the LTCP.

Table G-3 lists a summary of the topics presented at all 16 meetings, as well as discussion items, concerns, and/or comments raised by the Supplemental CSO Team members and/or the public.

Table G-3: Supplemental CSO Team Public Meetings

Public Meeting No.	No. of Attendees	Presentation Topics	Public Concerns / Comments
1	23 (11)	<ul style="list-style-type: none"> • Introduction to the Permittees • Passaic Valley Sewerage Commission Service Area • Supplemental CSO Team Roster • Overview of Separate and Combined Sewer Systems • Regulatory Background • Program Progress to Date • Branding of LTCP Program • Next Steps • Questions and Final Discussion 	<ul style="list-style-type: none"> • Supplemental CSO Team should set some ground rules for the group and establish what it expects from PVSC and the project team and create accountability on both sides • Suggested the creation of a clear definition of the relationship between the Supplemental CSO Team, PVSC and the consultants • For the alternatives analysis, Supplemental CSO Team input is expected to be weighed against a cost-benefit analysis • Suggested the creation of a guide for community engagement • All meeting documents were requested to be sent to the Supplemental CSO Team in advance so that the team has time to review • Team requested to be updated on the water quality model at future meetings
2	44 (13)	<ul style="list-style-type: none"> • Introduction • Supplemental CSO Team Roster • Overview of the SharePoint Site • Recap of the October 5, 2016 Supplemental CSO Meeting • History of Combined Sewers in the Passaic Valley Sewerage Commission District • NJDEP – New Jersey CSO Permits • Permit Responsibilities • Highlights from CSO LTCPs from Elsewhere in the U.S. • Status Update on the PVSC District LTCP • Branding of LTCP Program 	<ul style="list-style-type: none"> • Discussion about why the flow monitoring lasted for a 12-week period and adequacy of rain events to calibrate the water quality model • Concern about inspections of sewer interceptors • Discussed the reporting requirements for permittees in terms of Nine Minimum Control compliance • It was confirmed that population growth is a factor in the model and LTCP • Sewer separation can be costly • Concern that warning signs for CSOs aren't visible enough • Discussion about Supplemental Team's input on deliverables • Concern about how alternatives analysis will be discussed with the community at large

Public Meeting No.	No. of Attendees	Presentation Topics	Public Concerns / Comments
			<ul style="list-style-type: none"> • Discussion about how payment for sewer usage and improvements is distributed within the PVSC communities • Branding and logo was discussed
3	29 (12)	<ul style="list-style-type: none"> • Introduction and Recap • Branding Update • Project Schedule • Green Infrastructure (GI) for CSO Control • Supplemental CSO Team Member Presentations • Paterson SMART 	<ul style="list-style-type: none"> • Discussion about the most effective methods of GI • Concern that public outreach is the most important part of GI. Consulting with the public would hopefully help implementation issues • GI can create jobs and build a relationship between the general public and the government • Brainstorming best uses for porous pavement • Discussion of GI costs and permit requirements
4	43 (13)	<ul style="list-style-type: none"> • Introduction and Recap • NJ CSO Permit Overview (NJDEP) • Water Quality Standards (NJDEP) • Hydrologic and Hydraulic Models 	<ul style="list-style-type: none"> • Discussion about the flow monitoring that was completed for use in the model • The model was discussed. • Discussion regarding the details of PVSC's plant outfall • The Team requested a tour of the PVSC WRRF
5	40 (14)	<ul style="list-style-type: none"> • PVSC Plant Tour • Introduction and Recap • Introduction to Alternative Analysis • Stimulating Green Infrastructure on Private Property • Bayonne CSO Treatment Demonstration Project 	<ul style="list-style-type: none"> • PVSC plant tour was provided • Discussion about the pros and cons of the presumption and demonstration approaches • Questions about how funding for GI is gathered and managed • Discussion about end-of-pipe treatment technologies such as peracetic acid
6	34 (11)	<ul style="list-style-type: none"> • Introduction and Recap • LTCP Deliverables due to NJDEP on July 1, 2018 • Cost estimate of the LTCP • Update on the activities performed by the Project Team • Passaic Valley Regional Planning & Design Studio presentation by Rutgers University • PVSC and Rutgers Green Infrastructure Municipal Outreach and Technical Assistance Program 	<ul style="list-style-type: none"> • SCSO Team requested time to review all deliverables and give input before they are submitted to NJDEP • The cost opinions will be included in the LTCP submission. All eight of the CSO communities will be included in the cost opinions • Discussion about the different types of public outreach materials, whether they provide more general or region-specific information and in which languages they are available

Public Meeting No.	No. of Attendees	Presentation Topics	Public Concerns / Comments
7	48 (13)	<ul style="list-style-type: none"> • Introduction and Recap • Water Quality Monitoring Program Overview • Overview of Reports to be submitted to NJDEP on July 1, 2018 • Timeline for Submittals and Supplemental CSO Team Input • NJDEP Guidance Document for Evaluating Green Infrastructure • Social Media for Clean Waterways, Healthy Neighborhoods 	<ul style="list-style-type: none"> • Discussion of contaminant and contamination source identification • Discussion of sampling methodology including weather patterns, specific contaminants, sampling locations, and saline and fresh water body sampling • Discussion regarding the model calibration, the contaminants being modeled, and the accuracy of the model • SCSO team recommended adding Arabic translations to the public outreach materials • Discussion about the effect the GI pilot studies will have on stormwater volume
8	25 (11)	<ul style="list-style-type: none"> • Introduction and Recap • Project Status Update • July 1st Report Submittals • Evaluation of Alternatives • City of Newark Evaluation of Green Infrastructure for CSO Control • Questions and Final Discussion 	<ul style="list-style-type: none"> • Discussed the project status and the timeline • Reviewed the goals of the Evaluation of Alternatives • Discussed green infrastructure
9	29 (9)	<ul style="list-style-type: none"> • Introduction and Recap • Timeline for Evaluation of Alternatives • Preliminary Screenings of Technologies • CSO Bypass Alternative • No Feasible Alternatives Analysis • Jersey City MUA Evaluation of Alternatives for CSO Control • Questions and Discussion 	<ul style="list-style-type: none"> • Discussed Green Infrastructure Alternatives • Reviewed which outfalls would be impacted by various alternatives • Discussed WRRF improvements • The City of Newark is conducting ten community-wide meetings until May 2019
10	34 (10)	<ul style="list-style-type: none"> • Introduction and Recap • Timeline for Evaluation of Alternatives • Preliminary Screenings of Technologies • Reducing CSOs Using a Surface Channel System (Stevens Institute of Technology Research Presentation) • Facilities Inventory and Condition Assessment Program • Green Infrastructure • Harrison Evaluation of Alternatives • Questions and Discussion 	<ul style="list-style-type: none"> • Discussed about community benefits of alternatives and how those community benefits are noted in the screenings of technologies matrix • Discussed maintenance, water quality improvements, impacts to traffic flow during construction, and construction materials of surface level drainage systems. • The group discussed eventually including a cost analysis for alternatives
11	26 (8)	<ul style="list-style-type: none"> • Introduction and Background • Overview of CSO Control Technologies 	<ul style="list-style-type: none"> • Discussed Clean Waterways Healthy Neighborhoods • Reviewed CSO basics

Public Meeting No.	No. of Attendees	Presentation Topics	Public Concerns / Comments
		<ul style="list-style-type: none"> • Evaluation of Alternatives Status Updates • Questions and Discussion 	<ul style="list-style-type: none"> • Discussed Regulatory Background • Reviewed the Long Term Control Plan Requirements • Reviewed the current project status and schedule
12	56 (15)	<ul style="list-style-type: none"> • Introduction and Recap • Harrison Alternatives Analysis • Newark Alternatives Analysis • Presentation and Survey • Questions and Discussion 	<ul style="list-style-type: none"> • Reviewed Surface Piping • Discussed maintenance costs • Comparison of benefits of surface piping versus green infrastructure. • Discussed community engagement in Harrison (Harrison Tide) • Discussion of Peracetic Acid (PAA) Disinfection
13	26 (5)	<ul style="list-style-type: none"> • Update on the July 1, 2019 submittal of the Development and Evaluation of Alternatives Report • Summary of Alternatives to be further developed • Discuss Public Comments on Development and Evaluation of Alternatives Report • Breakout Groups • Discuss next steps for development of Selection and Implementation of Alternatives Report • Questions and Discussion 	<ul style="list-style-type: none"> • Discussed the DEAR • Discussed the further development of the Summary of Alternatives • Discussed public comments on the DEAR • Group discussions were facilitated for each municipality • Reviewed the next steps for the development of the SIAR
14	47(11)	<ul style="list-style-type: none"> • Introduction and Recap • Water Quality Model Results • Microbial Source Tracking Study • Review of Public Comments and Responses for DEAR • Discuss Next Steps for Development of Selection and Implementation of Alternatives Report • Questions and Discussion 	<ul style="list-style-type: none"> • Discussed the results of the water quality model • Presented and discussed the Microbial Source Tracking Study • Discussion of the comments received on the DEAR and the responses to comments • Reviewed the next steps for the development of the SIAR
15	64(16**)	<ul style="list-style-type: none"> • Introduction to Virtual Room and online tools to access information • Project Status and Schedule • Current Alternative Options, Municipal vs. Regional • Performance Summary of Municipal and Regional Alternatives • Cost Summary of Municipal and Regional Alternatives • Next Steps: SIAR • Coordination across Municipalities 	<ul style="list-style-type: none"> • Positive feedback provided by the public on the virtual/online delivery. • Coordination and agreement on cost allocation across municipalities for implementation of the Regional Alternative is a concern • Cost of improvements • Location of the regional interceptor • Implementation of the projects in the municipal alternatives despite selection of the Regional Alternative

Public Meeting No.	No. of Attendees	Presentation Topics	Public Concerns / Comments
16	44(11**)	<ul style="list-style-type: none"> • Introduction and Recap • Project Status and Schedule • Municipal and Regional Alternatives (Recap) • Performance Summary of Alternatives (Recap) • Cost Summary • Next Steps • Questions and Discussion • Breakout Discussions 	<ul style="list-style-type: none"> • Municipalities' Regional Alternative decision • Impact of CSO control technologies on flooding • Cost of improvements and township resources • Would like to provide more input on areas and types of Green Infrastructure • Impacts of storage tanks on surrounding developments • Wanted SCSO events to continue in the future • Interested in reviewing the LTCP as soon as possible

*Number in parentheses indicates number of members of the Supplemental CSO Team present

**This meeting was virtual and had no sign-in sheet. These are the self-identified members of the Supplemental CSO Team present

In addition to the Supplemental CSO Team Public Meetings, the following Draft Reports were provided to the members of the Supplemental CSO Team for review and comment:

- Service Area System Characterization Report
- Public Participation Report
- Identification of Sensitive Areas Report
- Compliance Monitoring Program Report
- Regional Development and Evaluation of Alternatives Report
- Woodcliff Regional Development and Evaluation of Alternatives Report

All Supplemental CSO Team Meetings are open to the public and are advertised in advance. During each Supplemental CSO Team Meeting, the Supplemental CSO Team Members and all members of the public are updated on further LTCP development and are encouraged to provide input on such milestones, including the Selection and Implementation of Alternatives.

G.2.2 NJCSO Group Meetings

The NJCSO Group was originally formed to work cooperatively to fulfill the requirements of the last CSO General Permit. NJCSO Group Permittees and their NJPDES Permit Numbers are listed in the Public Participation Report in **Appendix E**.

Meetings with the NJCSO Group are generally held on a quarterly basis. The various topics that were discussed at the meetings are provided in the Public Participation Report. The NJCSO Group Meetings that were held after the submission of The Public Participation Report are listed in Error! Reference source not found.:

Table G-4 NJCSO Group Meeting Dates

Date		
August 7, 2013	October 19, 2015	September 6, 2018
February 20, 2014	April 6, 2017	February 27, 2019

March 7, 2014	October 16, 2017	September 5, 2019
July 1, 2014	February 2, 2017	November 21, 2019
October 8, 2014	February 20, 2018	February 20, 2020
January 15, 2015	April 5, 2018	August 20, 2020
June 29, 2015	May 3, 2018	

G.2.3 PVSC CSO Sewer District and NBMUA (Woodcliff) Permittees Meetings

NJPDES Permittees located within PVSC’s Sewerage District and the Woodcliff-Guttenberg Service Area hold near monthly meeting to assist in collaboration, CSO compliance, and sharing of public information and/or input. The Permittees that participated in these meetings are listed in the Public Participation Report. Permittee Meetings that were held after the submission of the Public Participation Report are listed in **Table G-5**. Meetings are held biweekly at PVSC.

Table G-5: PVSC CSO Sewerage District and NBMUA (Woodcliff) Permittees Meeting Dates

Date		
July 5, 2018	July 18, 2019	April 16, 2020
August 2, 2018	August 1, 2019	May 7, 2020
October 16, 2018	September 19, 2019	May 21, 2020
November 1, 2018	October 3, 2019	June 4, 2020
January 22, 2019	October 17, 2019	June 18, 2020
February 7, 2019	November 7, 2019	July 16, 2020
March 7, 2019	December 5, 2019	August 6, 2020
April 18, 2019	January 9, 2020	August 20, 2020
May 2, 2019	February 6, 2020	September 3, 2020
May 31, 2019	February 20, 2020	September 17, 2020
June 20, 2019	April 2, 2020	

The various topics that were discussed at the above meetings are provided in the Public Participation Report included in **Appendix E**.

G.2.4 North Bergen Green and Health Family Festival Day

The North Bergen Green and Health Family Festival organized by the NBMUA and the North Bergen Health Department is held yearly in the summer and provides a space to the community to interact, learn about Green initiatives by local schools, NBMUA, and local community groups, and get educated in health and environmental aspects of their community.

The 2019 festival held at the Town’s recreation center on June 12, 2019 and was reportedly attended by more than 3,800 people. Among several activities and learning opportunities, a Rain

Barrel workshop was held to educate residents in alternative ways to reduce impact from runoff onto the waterways. Attendees were also informed on the current impacts runoff have on the natural environment, ways to reduce the impact, and the actions that NBMUA is taking to minimize CSOs.

G.2.5 Opportunities for Public Comment on Draft LTCP

Many forums and opportunities have been made available for public comment. An overview of the major opportunities is summarized in The Public Participation Report.

The majority of comments received thus far on the LTCP have been verbal comments at public meetings. Comments and responses at Supplemental CSO Team Public Meetings are documented in meeting minutes. The other public comments received have been through social media (commenting, liking, or sharing tweets and Facebook posts). No questions or comments have been received from the website contact form.

The number and types of comments received on the Draft LTCP will continue to be tracked and documented. Draft LTCP plans were discussed at SCSO Team Meeting No. 15, providing the Supplemental CSO teams an opportunity for review and feedback. Twenty-five (25) text comments from the virtual chat feature and 3 verbal comments were received during the meeting, and an additional 11 text comments were received after the meeting was adjourned. All comments provided during the meeting were verbally addressed.

Comments were grouped by type and subject matter and addressed jointly in a commentary type response. The goal of this approach was to produce a commentary that is both readable and comprehensive. Groups of comments are as follows:

- Nine Minimum Controls;
- Alternatives Evaluation;
- Sewer Separation;
- Low Impact Development Source Control, Pollution Prevention;
- PVSC Wastewater Resource Recovery Facility;
- CSO Location;
- Flooding;
- Implementability;
- Tunneling;
- Regulatory Compliance;
- Public Participation;
- Financial Capability;
- Schedule;
- Cost of Implementation;
- Water Quality Standards Requirements; and
- Miscellaneous Comments.

G.2.6 Other Public Participation Activities

Other opportunities for public participation in the LTCP include meetings with individual Permittees, municipal action teams, ad hoc stakeholder meetings, collaboration with Rutgers University, the Rain Barrel Program, green infrastructure pilot projects, meetings with the Model Evaluation Group (MEG), meetings with municipal councils, public outreach to separate sewer systems, collaboration with Stevens Institute of Technology, providing the public with information through websites, the CSO Notification System, fact sheets, the LTCP brochure, various LTCP flyers, and the social media plan. Details regarding all other public participation activities conducted under the LTCP are provided in The Public Participation Report and have continued subsequent to the date of The Public Participation Report.

SECTION H - SELECTION OF RECOMMENDED LTCP

H.1 INTRODUCTION

The NJPDES Permits require each municipality to be “responsible for submitting a Long Term Control Plan (LTCP) for their CSO facilities that addresses all nine elements in Part IV.G”. The nine elements are listed below:

1. Characterization, Monitoring, and Modeling of the Combined Sewer System
2. Public Participation Process
3. Consideration of Sensitive Area
4. Evaluation of Alternatives
5. Cost/Performance Considerations
6. Operational Plan
7. Maximizing Treatment at the existing STP
8. Implementation Schedule
9. Compliance Monitoring Program

Although the Town of Guttenberg and NBMUA (Woodcliff) are responsible for their own LTCPs, the municipalities worked cooperatively to coordinate their selected alternatives in developing a regional approach.

H.2 LTCP SELECTION PROCESS

The Town of Guttenberg and NBMUA (Woodcliff) followed the same criteria during the selection process of their recommended alternatives for the final LTCP, including the steps listed in Section A.8 of this report. Both permittees evaluated alternatives on monetary and non-monetary factors including impact on CSO overflows, impact on receiving water quality, non-monetary factors, and costs. This section describes the overall selection process used to select the LTCP.

H.3 APPROACH SELECTION

Part IV, Section G.4.c of each Permittee’s NJDPES 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.”

The two approaches are defined, analyzed, and compared in the following subsections.

H.3.1 Presumption Approach from USEPA’s CSO Policy

Subsection II.C.4.a of the USEPA’s CSO Policy (Presumption Approach) states that:

“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...These criteria are provided because data and modeling

of wet weather events often do not give a clear picture of the level of CSO controls necessary to protect [water quality standards].”

Under the Presumption Approach, CSO controls proposed in the LTCP are presumed to protect water quality in the receiving water bodies if the CSS achieves any of the following three criteria:

- i. *“No more than an average of four overflow events per year, provided that the permitting authority may allow up to two additional overflow events per year. For the purpose of this criterion, an overflow event is one or more overflows from a CSS as the result of a precipitation event that does not receive the minimum treatment specified below; or*
- ii. *The elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events on a system-wide annual average basis; or*
- iii. *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 the paragraph ii above.”*

“Minimum treatment,” as noted in Item “i” above, is defined in Subsection II.C.4.a of the CSO Control Policy as:

- *“Primary Clarification (Removal of floatables and settleable solids may be achieved by any combination of treatment technologies or methods that are shown to be equivalent to primary clarification.);*
- *Solids and floatables disposal; and*
- *Disinfection of effluent, if necessary, to meet [water quality standards], protect designated uses and protect human health, including removal of harmful disinfection chemical residuals, where necessary.”*

H.3.2 Demonstration Approach from USEPA’s CSO Policy

Subsection II.C.4.b of the USEPA’s CSO Policy (Demonstration Approach) states that:

“A Permittee may demonstrate that a selected control program, though not meeting the criteria specified in II.C.4.a. above is adequate to meet the water quality-based requirements of the CWA.”

Under the Demonstration Approach, the municipality would be required to successfully demonstrate compliance with each of the following criteria from the CSO Policy:

- i. *“The planned control program is adequate to meet [water quality standards] and protect designated uses, unless [water quality standards] or uses cannot be met as a result of natural background conditions or pollution sources other than CSOs;*
- ii. *The CSO discharges remaining after implementation of the proposed control program*

will not preclude the attainment of [water quality standards] or the receiving waters' designated uses or contribution to their impairment. Where [water quality standards] are not met in part because of natural background conditions or pollution sources other than CSO discharges, a total maximum daily load, including a waste load allocation and a load allocation or other means should be used to apportion pollutant loads;

- iii. The planned control program will provide the maximum pollution reduction benefits reasonably attainable; and*
- iv. The planned control program is designed to allow cost effective expansion or cost effective retrofitting if additional controls are determined to be necessary to meet [water quality standards] or designated uses.”*

H.3.3 USEPA’s Guidance for Long-Term Control Plan Requirements

The USEPA’s CSO Guidance for Long-Term Control Plan (or “CSO Guidance Document) states that the Demonstration Approach and the Presumption Approach are the two general approaches to attainment of water quality standards (WQS), and that these two approaches provide municipalities with targets for CSO controls that achieve compliance with the CWA, particularly the protection of designated uses.

Section 1.3 of the CSO Guidance Document states:

“Permittees should develop long-term control plans (LTCs) for controlling CSOs. A Permittee may use one of two approaches: 1) demonstrate that its plan is adequate to meet the water quality-based requirements of the CWA (demonstration approach), or 2) implement a minimum level of treatment (e.g., primary clarification of at least 85 percent of the collected combined sewage flows) that is presumed to meet the water quality-based requirements of the CWA, unless data indicate otherwise (presumption approach).”

Section 2.6.2.1 states that:

“Under the [CSO Policy], a municipality should develop an LTC that adopts either the demonstration or the presumption approach to attainment of WQS. The demonstration approach is based on adequately demonstrating that the selected CSOs will provide for the attainment of WQS, including designated uses in the receiving water. The presumption approach does not explicitly call for analysis of receiving water impacts. The presumption approach usually involves at least screening-level models of receiving water impacts, however, because the approach will not apply if the NPDES permitting authority determines that the LTC will not result in attainment of CWA requirements.”

H.3.3.1 Presumption Approach from USEPA’s CSO Guidance for LTCP

For the Presumption Approach, Section 3.2.1 of the USEPA’s CSO Guidance Document states that:

“If the data collected by a community do not provide “...a clear picture of the level of CSO controls necessary to protect WQS”, the presumption approach may be considered. Use of the presumption approach is contingent, however, on the municipality presenting sufficient data to the NPDES permitting authority to allow the agency to make a reasonable judgment that WQS will probably be met with a control plan that meets one of the three presumption criteria.”

Furthermore, the CSO Guidance Document states:

“Use of the presumption approach does not release municipalities from the overall requirement that WQS be attained. If data collected during system characterization suggest that use of the presumption approach cannot be reasonably expected to result in attainment of WQS, the municipality should be required to use the demonstration approach instead. Furthermore, if implementation of the presumption approach does not result in attainment of WQS, additional controls beyond those already implemented might be required.”

H.3.3.2 Demonstration Approach from USEPA’s CSO Guidance for LTCP

For the Demonstration Approach, Section 3.2.1 of the USEPA’s CSO Guidance Document states that:

“Generally, if sufficient data are available to demonstrate that the proposed plan would result in an appropriate level of CSO control, then the demonstration approach will be selected. 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.”

The Demonstration Approach is consistent with the total maximum daily load (TMDL) development approach and may be used in the TMDL process where the WQS and designated uses are not met in part because of natural background conditions or pollution sources other than CSOs. Section 3.2.1.1 of the CSO Guidance Document states:

“The demonstration approach encourages the development of total maximum daily loads and/or the use of a watershed approach throughout the LTCP process. In conducting the existing baseline water quality assessments as part of the system characterization, for example, the specific pollutants causing nonattainment of WQS, including existing or designated uses, would be identified, and then the sources of these pollutants could be identified and loads apportioned and quantified.”

H.3.4 NJPDES Permit Approach Selection

Part IV, Section G.4.a of the Permittee’s NJDPES Permit states:

“The permittee shall 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 (as described in Sections G.4.f. and G.4.g).”

The descriptions of both approaches in the Permit are identical to those found in the USEPA’s CSO Policy detailed in Sections H.3.1 and H.3.2 of this report.

H.3.5 Comparison of the Two Approaches

Table H-1 summarizes the major differences between the Presumption Approach and the Demonstration Approach.

Table H-1: Comparison of the Presumption Approach and Demonstration Approach

Item	Presumption Approach	Demonstration Approach
Criteria	<ul style="list-style-type: none"> Meet one of three criteria and compliance is presumed: <ol style="list-style-type: none"> 1) No more than an average of 4 overflow events per year; 2) 85% capture (by volume) 3) Elimination or removal of the mass of pollutants, identified as causing water quality impairment. 	<ul style="list-style-type: none"> Number of CSO events, flow or pollutant loading limited by a proposed CSO system Waste Load Allocation which will not preclude the attainment of Water Quality Standards (WQS). Relies on data collection and model simulation to demonstrate that the proposed LTCP results in meeting the current WQS and designated uses.
Monitoring Data Collection	<ul style="list-style-type: none"> Flow metering of the collection system and/or water quality sampling of CSOs. 	<ul style="list-style-type: none"> Flow metering of the collection system and water quality sampling of CSOs and receiving water bodies.
Modeling	<ul style="list-style-type: none"> Combined sewer system (CSS) hydrologic and hydraulic (H&H) model. 	<ul style="list-style-type: none"> CSS H&H Model and Receiving Water Quality Model(s).
Pollutant Sources Evaluated	<ul style="list-style-type: none"> Only CSOs. 	<ul style="list-style-type: none"> The contributing pollutant sources in the watershed including urban stormwater, agricultural (if any), wildlife, etc.

The Demonstration Approach takes a holistic watershed based approach to understand the pollutant sources and their relative contributions, so that appropriate level of controls can be cost-effectively applied to each pollutant source instead of focusing on just the CSOs. The Demonstration Approach can help to understand where the current CSO program is in terms of meeting the WQS and demonstrate the impact of future WQS changes on the CSO controls. Under the Demonstration Approach, the Permittee must document that their CSO control program is adequate to meet the water quality-based requirements of the CWA.

Use of the Presumption Approach for a particular water body is allowed when approved by the NJDEP that the specific presumption(s) to be used in a particular water body are reasonable pursuant to Section II.C.4.a of the CSO Policy.

Certain tasks must be completed regardless if the Presumption or Demonstration Approach is used, such as system characterization, sewer and Geographic Information System (GIS) mapping, and the evaluation of alternatives. However, the study phase for the Demonstration Approach also requires water quality sampling and water quality modeling of the receiving waters. These tasks have been previously completed and the Reports and/or submittals that document the findings of each of these tasks have been submitted to the NJDEP in accordance with the NJPDES Permits.

H.3.6 NBMUA (Woodcliff) Sewer District Hydraulically Connected Groups

Table H-2 summarizes the NJPDES, Permittee name, CSO numbers, hydraulically connected group, and receiving water body.

Table H-2: Summary of CSO Discharge Locations

NJPDES	Permittee	CSO Number	Receiving Water Body
NJ0108715	Town of Guttenberg	GU001	Hudson River
NJ0029084	Township of North Bergen	NB004	Hudson River

H.3.7 Selected Approach

In consideration of the complexity in characterizing the impacts of natural background conditions and CSO and non-CSO pollutant sources from other parties on the ability to achieve water quality standards and support designated uses, the Town of Guttenberg and NBMUA both elected to adopt criteria ii of the Presumption Approach in the formation of their local LTCP. The NJPDES permit defines criteria ii as follows:

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

Presumption Approach criteria ii provides a metric (85% capture) that simplifies the LTCP development process by eliminating the need to analyze the impacts of outside pollutant sources, as required under the Demonstration Approach, to achieve NJPDES Permit compliance. This approach allows the Permittees to primarily focus on the performance of their collection and treatment facilities by applying nationally accepted industry practices in support of each phase of developing this LTCP.

H.4 SELECTION OF ALTERNATIVES

H.4.1 Description

This section details the factors, both monetary and non-monetary, and procedures that went into how the selection process was carried out to identify the recommended alternative(s) for inclusion in the final LTCP.

H.4.2 Remaining Overflows

The primary criteria for evaluation of alternatives is the technology’s effectiveness in reducing the volume and frequency of overflow events. At a minimum, the selected alternatives must be

capable of meeting the 85% capture rate required under the Presumption Approach. Performance of alternatives at reducing CSO discharges was evaluated using the Infoworks model described in Section F.

Technologies that do not impact the volume or frequency were not excluded, as they may contribute other benefits to the municipalities including, but not limited to, the ability to meet water quality standards or hydraulic benefits to the overall CSS system.

H.4.3 Ability to Meet Water Quality Standards

Based upon the findings of previous studies and reports submitted and approved by NJDEP (including the System Characterization Report, the Receiving Water Quality Modeling Report and the Baseline Compliance Monitoring Program Report, among others), the CSO discharges are not precluding the attainment of water quality standards on the Hudson River under baseline conditions.

H.4.4 Non-Monetary Factors

There are several non-monetary factors that were considered in selecting the elements of the LTCP. These factors include siting, institutional issues, implementation, and public input. A brief description of these factors is included below. For a detailed description refer to the Woodcliff Regional DEAR which is included as **Appendix D**.

Siting is a constraint for both municipalities, as both are densely populated with a paucity of available space. With very few large lots, undeveloped lots, and public land not dedicated to municipal buildings or urban parks, large-scale projects such as tanks or treatment plants rely heavily on the Township of North Bergen, with the Town of Guttenberg favoring decentralized, small projects. As a result, the municipalities favored decentralized, small projects or utilization of existing dedicated space (i.e. Woodcliff STP Expansion).

A significant institutional factor in the selection of the LTCP is the existing resources of the municipalities. Because the Town of Guttenberg does not have its own sewer department, additional consideration was given to non-technical and low-maintenance installations in Guttenberg that could be fulfilled by the Town of Guttenberg Department of Public Works. Implementation refers to scheduling, phasing, and constructability concerns. Large, one time projects were evaluated for the potential to implement smaller parts over a period of time or combination with smaller projects for affordability and to provide immediate relief to CSO problems. Constructability concerns were initially discussed in the screening of CSO control technologies portion of this report.

Public input is a significant factor in the development of the LTCP and was continuously solicited during the review of technologies through the implementation of the LTCP Public Participation Plan (PPP), as described in Section G. For instance, additional consideration was given to green infrastructure based on the high level of expressed public interest. Based on high public interest in green infrastructure, additional projects have been evaluated for LTCP implementation.

H.4.5 Cost Opinion

A “knee-of-the-curve” analysis is not appropriate to the Town of Guttenberg, because all of the scalable CSO strategies (including tanks, pipeline storage, and outfall-based treatment) were all eliminated from consideration as part of the DEAR due to various siting, technical or operational reasons. All control technology alternatives evaluated have only one cost (i.e. either they are completed or not). As a result, projects were selected for the LTCP based upon whether they improved the performance of the system (based upon number of overflows and percent capture) subject to the overall affordability to the Town of Guttenberg, based upon the Financial Capacity Analysis (see Section E of this Report).

The Town of Guttenberg has already committed to several of the projects (I/I reduction, separation of Galaxy Towers storm and sanitary flow). These projects were automatically included in the LTCP selection below. The other “gray” project (Upgrades at Netting Chamber) was deemed affordable by the Town of Guttenberg and selected as part of the LTCP. The Green Infrastructure projects were selected based upon a determined affordable budget amenable to the Town and the scope scaled as necessary to meet the budget.

H.5 DESCRIPTION OF RECOMMENDED LTCP

The primary element of the regional LTCP is the upgrade to the Woodcliff STP to expand its current dry capacity of 2.91 MGD to 3.56 MGD and its wet weather capacities of 8 MGD to 10 MGD. The upgrade replaces the secondary Lamella clarifiers with a membrane filtration system sized to a dry weather flow of 3.46 MGD with a wet weather flow of 8 MGD. In addition to this, the plant will also have a 2 MGD wet weather bypass that is blended with the plant effluent prior to discharge for a total STP capacity of 10 MGD. The expansion is currently under construction and projected to be operational in 2021. Capital cost for expansion is being borne by the NBMUA, but cost will be paid by Guttenberg consumers in the form of NBMUA’s rate structure.

In addition to the common STP expansion, the municipalities are implementing localized CSO control technologies. These other technologies will also provide benefits to the municipalities at reasonable costs.

The Town of Guttenberg will implement “gray” infrastructure through I/I reduction projects, Galaxy Towers’ storm and sanitary separation, and netting chamber improvements. The I/I reduction projects will reduce flow to the Woodcliff STP and also fulfill the mandates of the Administrative Consent Order (ACO) between the Town of Guttenberg and USEPA. Five projects remain under the ACO, with one project annually through 2024; the actual sewers involved may change as a result of the current video inspection work, which would likely increase the effectiveness of the work as the most critical lines are prioritized.

The Galaxy Towers storm flow separation and the Netting Chamber Improvements will directly address a localized flooding and unpermitted discharge issue occurring in the CSO line near River Road; the Galaxy Towers work will also reduce the volume but not the number of CSO events. The Galaxy Towers work is anticipated to be completed in 2021; the netting chamber work is planned to be performed within 12-24 months after Galaxy Towers work is complete.

The “green” portions of the Guttenberg LTCP will likely be pursued after the “gray” elements, as the “gray elements all have short-term schedules and immediate financing needs. The green roof ordinance will likely be established along with the new R-5 zoning being developed by the Town. The planter box work will be done as a five-year program, with a certain number of boxes being installed each year under a budget to be established by the Town (current estimate is approximately \$20,000 per year over five years).

NBMUA will implement green infrastructure as a complementary CSO control technology to the plant expansion. This alternative was evaluated in the DEAR to find out if green infrastructure could have a significant impact on CSO volume and frequency reduction. The evaluation showed that a relatively small reduction is achievable with green infrastructure. As a result, North Bergen has decided to implement green infrastructure, but on a limited basis.

SECTION I - FINANCIAL CAPABILITY

I.1 Introduction

This section of the Woodcliff Regional LTCP quantifies the projected affordability impacts of the proposed long term CSO controls for Guttenberg and the portion of North Bergen CSS served by the Woodcliff STP. This section is excerpted from memoranda prepared by PVSC for the Town of Guttenberg and the Township of North Bergen / North Bergen MUA which are incorporated as **Appendices I and J** of this report.

I.2 Methodology

I.2.1 USEPA's Two Step Process

The Financial Capability assessment is a two-step process including *Affordability* which evaluates the impact of the CSO control program on the residential ratepayers and *Financial Capability* which examines a Permittee's ability to finance the program. Affordability is measured in terms of the Residential Indicator (RI) which is the percentage of median household income spent on wastewater services. Total wastewater services exceeding 2.0% of the median household income are considered to impose a high burden by USEPA. The financial capability analysis uses metrics similar to the municipal bond rating agencies.

I.2.2 Dynamic FCA Modeling Approach

EPA's November 24, 2014 memorandum encourages the use of a time-based ("dynamic" model per the memo) model to supplement the snapshot approach. PVSC has developed time-based models for Guttenberg and North Bergen that calculate annual costs and revenue requirements based on assumed program costs, schedules and economic variables such as interest and inflation rates. The residential indicator is calculated for each year based upon the costs per typical residential users which changes annually based on the annual system revenue requirements.

I.2.3 Evolving Analytical Framework

USEPA encourages the use of additional information and metrics to more accurately capture the impacts of the proposed CSO controls on the Permittee and its residents. Therefore, this FCA includes information on the impacts of future costs among lower income residents and within the context of local costs of living.

Detailed discussion and analysis of the FCA for the Woodcliff STP service area can be found in the FCA Memorandums specifically written for Guttenberg and North Bergen in **Appendices I and J**.

I.3 Affordability Assessment

I.3.1 Current Baseline Conditions

Town of Guttenberg

The estimated annual cost for wastewater services for a typical single-family residential user for 2019 is \$535, including \$526 from sewer rents and \$9 in Town property taxes going towards sewer system operation, maintenance and improvements. This estimate is based on typical

residential potable water usage is 4,500 gallons monthly. Based on the estimated MHI of \$59,100 the Residential Indicator was approximately 0.9% in 2019, what the EPA guidance defines as a low burden. By definition the current residential indicator for one half of the households is greater than the 0.9%.

In Guttenberg, 16.8 percent of the population was living below the poverty line. The total Census households are broken out by income brackets on **Table I-1** below, along with the respective current Residential Indicators by income bracket. The RI for each bracket was calculated from the mid-point income within the bracket. As may be noted, the calculated 2019 RI for around 5,100 households exceeded than 2.0%.

Table I-1: Analysis of the Current Residential Indicator

Income Bracket	Households		Bracket Average Income	Bracket RI at Typical Cost per Household
	Number	Cumulative		
Less than \$10,000	304	304	\$5,000	8.23%
\$10,000 to \$14,999	209	513	\$12,500	3.29%
\$15,000 to \$24,999	538	1,051	\$20,000	2.06%
\$25,000 to \$34,999	302	1,353	\$30,000	1.37%
\$35,000 to \$49,999	711	2,064	\$42,500	0.97%
\$50,000 to \$74,999	954	3,018	\$62,500	0.66%
\$75,000 to \$99,999	496	3,514	\$87,500	0.47%
\$100,000 to \$149,999	536	4,050	\$125,000	0.33%
\$150,000 to \$199,999	255	4,305	\$175,000	0.24%
\$200,000 or more	250	4,555	\$200,000	0.21%
Total	4,555	*Costs per household include sewer rents and municipal taxes supporting wastewater services		

PVSC has developed a time-based model that calculates annual costs and revenue requirements based on assumed program costs, schedules and economic variables such as interest and inflation rates. The residential indicator is calculated for each year based upon the costs per typical residential users which changes annually based on the annual system revenue requirements.

The estimated inflationary impacts on wastewater costs per typical single family residential user without additional CSO control costs are shown on **Table I-2**. The costs are projected to the year 2030 based on Guttenberg’s LTCP implementation schedule which targets the completion of capital improvements through 2029. The projected cost per typical single family residential user are projected to increase from \$535 in 2019 to \$1,065 in 2030 due to inflation and the costs of Guttenberg’s 42% share of the \$23 million upgrade and expansion of the North Bergen MUA’s Woodcliff Sewage Treatment Plant which is currently underway.

Table I-2: Projected Residential Indicator in 2030 without Additional CSO Control Costs - Guttenberg

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2030
RI	0.90%	1.16%
Annual \$	\$535	\$1,065

North Bergen Township

The estimated annual cost for wastewater services for a typical single-family residential user for 2019 is \$557. This estimate is based on typical residential potable water usage is 4,500 gallons monthly. Based on the estimated MHI of \$59,600 the Residential Indicator was approximately 0.9% in 2019, or at the border between what the EPA guidance defines as a low burden and a medium burden. By definition the current residential indicator for one half of the households is greater than the 0.9%.

In North Bergen, 15.8% of the population was living below the poverty line. This exceeds the national average poverty rate of 14.6%. The total Census households are broken out by income brackets on **Table I-3** below, along with the respective current Residential Indicators by income bracket. The RI for each bracket was calculated from the mid-point income within the bracket. At the lowest income levels, the current RI is already between 2.6% and 10.6%.

Table I-3: Analysis of the Current Residential Indicator

Income Bracket	Households		Bracket Average Income	Bracket RI at Typical Cost per Household
	Number	Cumulative		
Less than \$10,000	1,887	1,887	\$5,000	10.57%
\$10,000 to \$14,999	1,050	2,937	\$12,500	4.23%
\$15,000 to \$24,999	2,117	5,054	\$20,000	2.64%
\$25,000 to \$34,999	2,004	7,058	\$30,000	1.76%
\$35,000 to \$49,999	2,623	9,681	\$42,500	1.24%
\$50,000 to \$74,999	4,171	13,852	\$62,500	0.85%
\$75,000 to \$99,999	2,859	16,711	\$87,500	0.60%
\$100,000 to \$149,999	3,290	20,001	\$125,000	0.42%
\$150,000 to \$199,999	1,007	21,008	\$175,000	0.30%
\$200,000 or more	924	21,932	\$200,000	0.26%
Total	21,932			

The estimated inflationary impacts on wastewater costs per typical single family residential user without additional CSO control costs are shown on **Table I-4**. The costs are projected to the Year 2041 based on the LTCP implementation schedule for North Bergen’s Municipal Control Alternative which targets the completion of capital improvements through 2040.

Table I-4: North Bergen Projected Residential Indicator in 2041 without Additional CSO Control Capital Expenditures

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2041
RI	0.9%	1.3%
Annual \$	\$557	\$1,231

The Year 2041 also corresponds to the completion of the potential regional control alternative in 2040. The regional alternative would result in lowered overall costs for the control of CSOs within the PVSC service area. Under this approach both the costs of the regional facilities such as a relief interceptor and the resultant savings would be allocated amongst the PVSC municipalities with CSSs. As the basis of this allocation remains under discussion as of the writing of this SIAR, the FCA focuses on implementation of the Municipal Control Alternative. Should the Permittees come to agreement on the cost allocation for the Regional Control Plan, the FCA will be revisited to reassess the affordability and schedule for implementation of the LTCP.

Assuming inflation, the projected cost per typical single family residential user are projected to increase from \$557 in 2019 to \$1,231 in 2041.

I.3.3 Financial Capability Assessments

The second part of the financial capability assessment - calculation of the financial capability indicator for the Permittee - includes six items that fall into three general categories of debt, socioeconomic, and financial management indicators. The six items are:

- Bond rating
- Total net debt as a percentage of full market real estate value
- Unemployment rate
- Median household income
- Property tax revenues as a percentage of full market property value
- Property tax revenue collection rate

Each item is given a score of three, two, or one, corresponding to ratings of strong, mid-range, or weak, according to EPA-suggested standards. The overall financial capability indicator is then derived by taking a simple average of the ratings. This value is then entered into the financial capability matrix to be compared with the residential indicator for an overall capability assessment.

Town of Guttenberg

As shown on Table I-5, the overall score for the financial indicators is 2.0 yielding an EPA Qualitative Score of “midrange”. This calculation is based on the use of the indicators that are applicable to Guttenberg.

Table I-5: Permittee Financial Capability Indicator Benchmarks

Indicator	Rating	Numeric Score
Bond Rating	Strong	3
Overall Net Debt as a Percent of Full Market Property Value	Midrange	2
Unemployment Rate	Midrange	2
Median Household Income	Midrange	2
Property Tax as a Percent of Full Market Property Value	Midrange	2
Property Tax Collection Rate	Weak	1
Total		12
Overall Indicator Score: (numeric score / number of applicable indicators)		2.0
EPA Qualitative Score		Midrange

North Bergen Township

As shown on **Table I-6** below, the overall score for the financial indicators is 2.0 yielding an EPA Qualitative Score of “midrange”.

Table I-6: Permittee Financial Capability Indicator Benchmarks

Indicator	Rating	Numeric Score
Bond Rating	Strong	3
Overall Net Debt as a Percent of Full Market Property Value	Strong	3
Unemployment Rate	Weak	1
Median Household Income	Midrange	2
Property Tax as a Percent of Full Market Property Value	Midrange	2
Property Tax Collection Rate	Strong	3
Total		14
Overall Indicator Score: (numeric score / number of applicable indicators)		2.3
EPA Qualitative Score		Midrange

The derivations of these scores are presented in the detailed FCA memorandum presented in **Appendices I and J** of this report. As each of the financial indicators are generally based upon publicly available data from 2019 or earlier, this analysis does not reflect the current and lingering impacts of the COVID-19 pandemic and should be revisited upon memorializing the LTCP implementation schedule in Guttenberg’s or North Bergen MUA’s next NJPDES Permits.

I.4 Other Economic & Demographic Factors

In addition to following EPA guidelines for completion of the financial capability assessment matrix, a discussion of socioeconomic trends in Guttenberg and North

Bergen is essential to the consideration of scheduling and compliance levels with CSO guidelines

I.4.1 Cost of Living Factors

Specific cost of living comparisons of Guttenberg and North Bergen with national averages are not available. However, the cost of living for the Cities of Elizabeth and Newark is approximately 30% higher than the national average.¹ Using this value as a proxy, the household at the median Guttenberg household income faces costs of living that are about 30% higher than the national average while earning an income that is about 6% lower than the national median income. Put another way, adjusting for the cost of living, the effective MHI in Guttenberg is about 73% of the national MHI.

I.4.1.1 Housing Costs

Housing costs in Guttenberg and North Bergen are approximately 169%² of the national average. The Residential Indicator is a national screening parameter and does not account for localized factors which erode the effective household income. Based upon a 2017 study³ by the National Low Income Housing Coalition, the fair market value of a two bedroom apartment in Hudson County was \$1,519 per month which works out to 29% of the Guttenberg median household income.

I.4.1.2 Local Tax Burdens

Town of Guttenberg

Based on an average market value of a single-family home within Guttenberg of \$330,250,⁴ the current property tax levy is about \$5,400. This compares with a national average local property tax levy of \$3,500 for a similarly priced home. Moreover, as housing prices are higher in the New York - Newark metropolitan area than nationally, houses costing well over the national median value of \$193,500 are purchased by families of modest incomes.

North Bergen Township

The average residential tax for 2017 in North Bergen was \$7,654. This includes North Bergen municipal purpose taxes of \$3,424 along with Hudson County and school district taxes.⁵ This compares with a national average local property tax levy of \$3,500 for a similarly priced home. Moreover, as housing prices are higher in the New York - Newark metropolitan area than nationally, houses costing well over the national median value of \$193,500 are purchased by families of modest incomes.

The high housing costs and tax burdens facing Guttenberg and North Bergen households reduces their effective household income. Consequently, measuring the household burden imposed by wastewater costs as a percentage of the median household income may underestimate the

¹ <http://www.infoplease.com/business/economy/cost> of living - index.us-cities.html

² Using the Newark - Elizabeth cost of living indices.

³ Out of Reach 2017 - The High Cost of Housing National Low Income Housing Coalition.

⁴ 2017 NJDCA User Friendly Budget sheet UFB-1

⁵ Source: 2017 NJDCA User Friendly Budget sheet UFB-1

financial burden of the projected wastewater costs per household. As was noted in an analysis of the impacts of CSO controls in the Boston region:

“The greater are the costs of other necessities as a share of MHI, the greater will be the economic burden associated with sewer charges equal to a given percent of MHI.”⁶

I.4.2 Poverty Factors

I.4.2.1 Poverty Rate

In 2017 16.8% of the populations in Guttenberg and 15.8% of the population in North Bergen were living below the poverty line. These figures compare to the national average poverty rate of 14.6%.

I.4.2.2 New Jersey Department of Community Affairs Municipal Revitalization Index

New Jersey’s Municipal Renewal Index⁶⁻⁷ measures the social, economic, physical and financial conditions of the 565 municipalities within New Jersey. The MRI is compiled by the NJ Department of Community Affairs and is used in the distribution of needs based funding. Six primary along with four secondary criteria are used:

Primary Criteria

- Children on TANF (Temporary Assistance for Needy Families) per 1,000 persons
- Unemployment Rate
- Poverty Rate
- High school diploma or higher
- Median Household Income
- Percent of households receiving SNAP (food stamps)

Secondary Criteria

- Ten year rate of change in population
- Non-seasonal housing vacancy rate
- Equalized three year effective property tax rate
- Equalized property valuation per capita

The 2017 state-wide MRI rankings for the combined sewer municipalities within the PVSC service area are shown on **Table I-7**. Guttenberg and North Bergen have rankings of 70th and

⁶ Assessment of the Economic Impact of Additional Combined Sewer Overflow Controls in the Massachusetts Water Resource Authority Service Area (page 13) prepared by Robert N. Stavins, Genia Long, and Judson Jaffee. Analysis Group Incorporated, August 2004.

⁶⁻⁷ Measuring Distress in New Jersey: the 2017 Municipal Revitalization Index Office of Policy and Regulatory Affairs, New Jersey Department of Community Affairs.

80th most distressed municipality respectively out of 565 which puts them in the top (least resourced) 12% and 14% of all New Jersey municipalities.

Table I-7: Municipal Renewable Index for the PVSC Combined Sewered Municipalities

Municipality	2017 Municipal Revitalization Index			Percentile of Least Resourced Municipalities
	MRI Score	MRI Distress Score	MRI Rank	
Guttenberg	-5.12	41.8	70	12%
North Bergen	-4.65	40.5	80	14%

I.5 Future Conditions

I.5.1 Impacts of the Selected CSO Control Strategies on Guttenberg and North Bergen

Town of Guttenberg

Guttenberg has identified a long term CSO control strategy that will achieve 85% capture of wet weather flows during the typical year. These controls are summarized on **Table I-8**.

Table I-8: Guttenberg’s Selected CSO Controls

Wet Weather Control Types	Capital Costs	Incremental Annual O&M Costs (\$ millions)
I/I Reduction - Projects 1 - 5	\$1,500,000	None Identified
Galaxy Towers Storm Water Separation.	\$400,000	
Netting Chamber Upgrade	\$125,000	
GSI Planter Boxes	\$100,000	
Totals	\$2,125,000	

Implementation of the \$2.13 million Municipal Control Alternative results in projected annual costs per typical single family user of \$832 (without inflation) and a residential indicator of 1.6% in 2030, the first year after the projected full implementation of the controls ending in 2029. Accounting for inflation, annual costs would grow to \$1,118 with a residential indicator of 1.6% in 2030 as shown in **Table I-9**.

Table I-9: Guttenberg’s Projected Residential Indicator Upon Full Implementation of the Municipal Control Alternative

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2030			
		No LTCP		LTCP Implementation Completed in 2029	
		With Inflation	Without Inflation	With Inflation	Without Inflation
RI	0.90%	1.5%	1.4%	1.6%	1.6%
Annual \$	\$535	\$1,065	\$785	\$1,118	\$832

This analysis does not reflect the current and lingering financial impacts as a result of the COVID -19 pandemic and should be revisited upon memorializing the LTCP implementation schedule in the Town’s next NJPDES Permit.

North Bergen Township

North Bergen has identified a long term CSO control strategy that will achieve 85% capture of wet weather flows during the typical year utilizing controls within and implemented by North Bergen. PVSC and the PVSC combined sewer municipalities have also developed a potential regional control strategy that would result in lower overall capital costs. These controls are summarized on **Table I-10**.

Table I-10: North Bergen’s Selected CSO Controls

Wet Weather Control Types	Municipal Control Alternative	
	Capital Costs (\$ millions)	Incremental Annual O&M Costs (\$ millions)
Storage Tank at NB003 (5.0 MG)	\$26.5	\$0.14
Storage Tank at NB008 (0.8 MG)	\$8.0	\$0.06
Closure of outfall NB014	\$0.1	\$0.0
Green infrastructure (1.0 ac)	\$0.4	\$0.0
Totals	\$35.0	\$2.0

Implementation of the \$35 million North Bergen Municipal Control Alternative results in projected annual costs per typical single family user of \$701 (without inflation) and a residential indicator of 1.2% in 2041, the first year after the projected full implementation of the controls ending in 2040. Accounting for inflation, annual costs would grow to \$1,280 with a residential indicator of 1.4% in 2041 as shown in **Table I-11**.

Table I-11: North Bergen’s Projected Residential Indicator Upon Full Implementation of the Municipal Control Alternative

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2041			
		No LTCP		LTCP Implementation Completed in 2040	
		With Inflation	Without Inflation	With Inflation	Without Inflation
RI	0.9%	1.3%	1.1%	1.4%	1.2%
Annual \$	\$557	\$1,231	\$654	\$1,280	\$701

This analysis does not reflect the current and lingering financial impacts as a result of the COVID -19 pandemic and should be revisited upon memorializing the LTCP implementation schedule in North Bergen’s next NJPDES Permit.

1.5.2 Affordability Impacts by Household Income Brackets

Town of Guttenberg

When the Residential Indicator is 1.6% of median household income, by definition half of the households in Guttenberg would be paying more than 1.6% of their household incomes for wastewater services. In areas with large percentages of low-income households, the impacts of a 1.23% RI can be severe. As shown on **Table I-12** around 1,350 households would be paying over 2.4% of their household incomes for wastewater services.

Table I-12: Impact of the Future Guttenberg CSO Controls on the Residential Indicator Upon Implementation of the LTCP - Guttenberg

Income Bracket	Households		Estimated Population		RI Resulting from \$2.1 Million in Capital Expenditures Through 2029	Bracket Average Income
	Number	Cumulative	Number	Cumulative		
Less than \$10,000	304	304	842	842	18.4%	\$5,000
\$10,000 to \$14,999	209	513	579	1,422	7.4%	\$12,500
\$15,000 to \$24,999	538	1,051	1,491	2,912	4.6%	\$20,000
\$25,000 to \$34,999	302	1,353	837	3,749	3.1%	\$30,000
\$35,000 to \$49,999	711	2,064	1,970	5,719	2.2%	\$42,500
\$50,000 to \$74,999	954	3,018	2,644	8,363	1.5%	\$62,500
\$75,000 to \$99,999	496	3,514	1,374	9,737	1.1%	\$87,500
\$100,000 to \$149,999	536	4,050	1,485	11,222	0.7%	\$125,000

Income Bracket	Households		Estimated Population		RI Resulting from \$2.1 Million in Capital Expenditures Through 2029	Bracket Average Income
	Number	Cumulative	Number	Cumulative		
\$150,000 to \$199,999	255	4,305	707	11,929	0.5%	\$175,000
\$200,000 or more	250	4,555	693	12,622	0.5%	\$200,000
Total	4,555		12,622			

North Bergen Township

When the Residential Indicator is 1.4% of median household income, by definition half of the households in North Bergen would be paying more than 1.4% of their household incomes for wastewater services. In areas with large percentages of low income households, the impacts of a 1.4% RI can be severe. As shown on **Table I-13** around 7,100 or about one third of the households would be paying well around 2.8% or more of their household incomes for wastewater services.

Table I-13: Impact of the Municipal Control Alternative on the Residential Indicator

Income Bracket	Households		Estimated Population		RI Resulting from \$35 Million in Capital Expenditures Through 2040	Bracket Average Income
	Number	Cumulative	Number	Cumulative		
Less than \$10,000	1,887	1,887	5,229	5,229	16.2%	\$5,000
\$10,000 to \$14,999	1,050	2,937	2,910	8,138	6.5%	\$12,500
\$15,000 to \$24,999	2,117	5,054	5,866	14,005	4.1%	\$20,000
\$25,000 to \$34,999	2,004	7,058	5,553	19,558	2.7%	\$30,000
\$35,000 to \$49,999	2,623	9,681	7,268	26,826	1.9%	\$42,500
\$50,000 to \$74,999	4,171	13,852	11,558	38,384	1.3%	\$62,500
\$75,000 to \$99,999	2,859	16,711	7,922	46,306	0.9%	\$87,500
\$100,000 to \$149,999	3,290	20,001	9,117	55,422	0.6%	\$125,000
\$150,000 to \$199,999	1,007	21,008	2,790	58,213	0.5%	\$175,000
\$200,000 or more	924	21,932	2,560	60,773	0.4%	\$200,000
Total	21,932		60,773			

I.5.3 Financial Capability Matrix

Town of Guttenberg

It was established previously that total capital expenditures for the Municipal Control Alternative through 2029 of \$2.1 million would cause the projected Residential Indicator in 2030 be 1.23% which would constitute a medium burden under the EPA criterion. The overall Guttenberg financial capability rating considered to be midrange under the EPA framework. The intersection of these two ratings on the EPA financial capability matrix places the Guttenberg sewer system in the category of medium financial burden, as shown on **Table I-14**.

Table I-14: The Financial Capability Matrix (Shaded areas indicate Guttenberg’s Ratings)

Permittee Financial Capability Indicators Score	Residential Indicator		
	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

North Bergen Township

It was established previously that the proposed CSO control capital expenditures for the \$35 million North Bergen Municipal Control Alternative would result in a Residential Indicator of 1.4% for the North Bergen. This RI indicates a mid-range burden under the EPA framework. The overall North Bergen financial capability rating would be considered to be midrange under the EPA framework. The intersection of these two ratings on the EPA financial capability matrix places the North Bergen sewer system in the category of medium financial burden, as shown on **Table I-15**.

Table I-15: The Financial Capability Matrix (Shaded areas indicate North Bergen’s Ratings)

Permittee Financial Capability Indicators Score	Residential Indicator		
	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

I.5.4 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 Town of Guttenberg and Guttenberg’s financial capability to finance the CSO control program are premised on the baseline financial conditions of Town of Guttenberg 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.

I.5.4.1 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 Town of Guttenberg 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 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.”⁸

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 Town of Guttenberg’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 Town of Guttenberg to fund the CSO LTCP.

I.5.4.2 Potential Median Household Income Impacts

The impacts of the pandemic on median household incomes in Town of Guttenberg 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.⁹
- The U.S. unemployment rates rose from 5.0% in December of 2007 to 9.9% in December of 2009.¹⁰
- 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%.¹¹

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

⁸ NACWA press release: [Coronavirus Impacting Clean Water Agencies; Local Utilities and Ratepayers Need Assistance](#) March 20, 2020

⁹ Source: [Fact Sheet: Income and Poverty Across the States, 2010](#) Joint Economic Committee, United States Congress, Senator Robert P. Casey, Jr. Chairman.

¹⁰ Source: Bureau of Labor Statistics data series LNS1400000

¹¹ Source: Federal Reserve Economic Data (FRED) data series: A792RC0A052NBEA

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.

I.5.4.3 Implications for the Long Term CSO Control Program

The Town of Guttenberg and North Bergen Township anticipate 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.

Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, The Town of Guttenberg and North Bergen Township 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 their control. 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.

I.5.5 Implementation Feasibility Implications

The 1997 EPA guidance indicates that ratepayers and Permittees who are highly burdened future expenditures added to their current wastewater treatment, conveyance, and collection costs can be allowed 15 years to complete capital projects to handle CSOs. In extreme cases, the guidance suggested a 20-year compliance schedule might be negotiated.¹²

Town of Guttenberg

The affordability analysis detailed above has documented that the \$2.1 million (current dollars) in capital expenditures under Guttenberg's Municipal Control Alternative along with related operation and maintenance costs would result in a Residential Indicator of 1.23%, within the EPA "medium burden" criterion.

While the affordability analysis detailed above has documented that the selected \$2.1 million (current dollars) Municipal Control Alternative along with related operation and maintenance costs would result in a Residential Indicator of "medium impact" under EPA's criteria; the reality of the high poverty rates, low household incomes compared to the rest of New Jersey and nationally and the high costs of living in Guttenberg argue strongly that the EPA metric understates the impacts of the CSO control costs on the residents of the Town. Guttenberg is likely to remain financially distressed due to structural economic factors beyond its direct control and its ability to afford and finance future CSO control facilities is restricted. As evidenced by its New Jersey Municipal Revitalization Index score in the top 12th percentile, Guttenberg's capacity for additional CSO controls, beyond those proposed in the SIAR, is limited.

¹² Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, EPA 832-B-97-004, Page 46.

North Bergen Township

The affordability analysis detailed above has documented that the \$35 million (current dollars) in capital expenditures under North Bergen’s Municipal Control Alternative along with related operation and maintenance costs would result in a Residential Indicator of 1.4% which is within the EPA “medium burden” range.

While the affordability analysis detailed above has documented that the selected \$35 million (current dollars) Municipal Control Alternative along with related operation and maintenance costs would result in a Residential Indicator of “medium impact” under EPA’s criteria; the reality of the high poverty rates, low effective household incomes compared to the rest of New Jersey and nationally and the high costs of living in North Bergen argue strongly that the EPA metric understates the impacts of the CSO control costs on the residents of North Bergen. North Bergen is and is likely to remain financially distressed due to structural economic factors beyond its direct control and its ability to afford and finance future CSO control facilities is restricted. As evidenced by its New Jersey Municipal Revitalization Index score in the top 98th percentile, North Bergen’s capacity for additional CSO controls, beyond those proposed in the SIAR, is limited.

SECTION J - RECOMMENDED LONG TERM CONTROL PLAN

J.1 INTRODUCTION

The conclusion reached from the Selection of the Recommended LTCP (Section H) was a selected plan for the completion of implementing the CSO control technologies as capital projects in an affordable manner. The purpose of this section is to discuss the overall execution of the LTCP, including the financial capabilities of the Woodcliff - Guttenberg Service Area Permittees and the impact of the selected plan to determine how and when the Permittees will be able to implement the chosen control technologies. This implementation will provide a path for the completion of these capital projects within 10 years.

J.2 RECOMMENDED LTCP

As noted in Section H.5, the following projects / elements were selected as part of the Regional Woodcliff Long-Term CSO Control Plan as shown on **Table J-1**:

Table J-1: Regional Woodcliff LTCP

NBMUA (Woodcliff)			
Description	% Capture	CSO Reduction Volume (MGY)	Cost
Upgrade of Woodcliff Sewage Treatment Plant ¹	92%	1.1	\$23,000,000 ¹
Green Infrastructure	0%	0	\$435,000
Town of Guttenberg			
Description	% Capture	CSO Reduction Volume (MGY)	Cost
Upgrade of Woodcliff Sewage Treatment Plant ¹	92%	3.12	\$9,660,000 ¹
Reduction of Infiltration/Inflow	89%	1.95	\$1,500,000
Galaxy Towers Sanitary Sewer Separation	89%	0	\$500,000 ²
Galaxy Towers Storm Water Separation	89%	0.94	\$400,000
Upgrades at Netting Chamber	-	0	125,000
Green Infrastructure:			
Green Roofs	89%	0.03	N/A ³
Planter Boxes	89%	0.10	\$100,000 ⁴
Total			\$26,060,000

¹\$23,000,000 represents the approximate capital cost opinion of the construction, which is being financed by NBMUA and passed on to Guttenberg via rate increases. The portion for wet weather improvements will cost approximately \$4,600,000.

²To be financed by Galaxy; no cost to Guttenberg

³To be implemented via ordinance incentivizing green roofs in newly zoned high-rise areas

⁴Implemented at \$20,000 per year over five years

J.3 IMPLEMENTATION COST OPINION

The total capital cost associated with the Recommended LTCP is \$26.06 million. As discussed previously, the total costs borne by each municipality will be equal to the proposed technologies in addition to the cost allocated for the Woodcliff STP. The agreement between the Permittees on how to allocate these costs is reflected in Section I as well as **Appendices I and J**. NBMUA

is undertaking improvements at the Woodcliff STP and a portion of these costs will be passed through to Guttenberg residents through sewer rate increases.

J.4 FINANCIAL IMPACTS

The RI indicates a mid-range burden for both Permittees under the EPA framework. The Financial Capability Assessment for each Permittee under the Municipal Plan is presented in the individual SIARs for each municipality and the FCA memos appended to this report (See **Appendices A, B, I and J**)

J.5 IMPLEMENTATION SCHEDULE

The following **Table J-2** presents the proposed schedule for implementation of the Recommended LTCP. The proposed milestone is anticipated to be implemented by December 31 of the associated year.

Table J-2: Long-Term CSO Control Plan Schedule

Year	Municipality	Milestone	Cost
2020	Guttenberg	I/I Reduction (Project #1)	\$300,000
2021	NBMUA and Guttenberg	Expansion of the NBMUA Woodcliff Sewage Treatment Plant	\$23,000,000 ¹
	Guttenberg	Galaxy Towers Storm Water Separation	\$400,000 ²
	Guttenberg	I/I Reduction (Project #2)	\$300,000
2022	Guttenberg	Upgrades at Netting Chamber	\$125,000
	Guttenberg	I/I Reduction (Project #3)	\$300,000
2023	Guttenberg	I/I Reduction (Project #4)	\$300,000
	Guttenberg	Galaxy Towers Sanitary Sewer Separation	\$500,000
2024	Guttenberg	I/I Reduction (Project #5)	\$300,000
2025	Guttenberg	Green Roof Ordinance for High-Rises	See Note 3
	Guttenberg	Green Infrastructure: Planter Boxes (Year 1 of 5)	\$20,000
2026	Guttenberg	Green Infrastructure: Planter Boxes (Year 2 of 5)	\$20,000
	NBMUA	Green Infrastructure: Project 1	\$217,500
2027	Guttenberg	Green Infrastructure: Planter Boxes (Year 3 of 5)	\$20,000
2028	Guttenberg	Green Infrastructure: Planter Boxes (Year 4 of 5)	\$20,000
2029	Guttenberg	Green Infrastructure: Planter Boxes (Year 5 of 5)	\$20,000
2031	NBMUA	Green Infrastructure: Project 2	\$217,500

¹ \$23,000,000 represents the approximate capital cost opinion of the construction, which is being financed by NBMUA and passed on to Guttenberg via rate increases. The portion for wet weather improvements will cost approximately \$4,600,000.

² The project will be undertaken and financed by Galaxy Towers and the timing is approximate

³ New zoning ordinance incentivizing green roofs in newly zoned high-rise areas.

J.6 BASIS FOR LTCP DEVELOPMENT AND IMPLEMENTATION SCHEDULE

The schedule in **Table J-2** was developed to incorporate existing projects, including:

1. The I/I work currently mandated by the Town of Guttenberg’s Administrative Consent Order (ACO) with the EPA, with one project per year until 2024;
2. The Woodcliff STP Expansion and upgrades work, which is under construction and nearly complete (startup is anticipated in 2021); and
3. The current schedule for the Galaxy Towers storm water separation, which is anticipated to be completed by 2021.

The remainder of work was scheduled around these fixed dates. The work at the netting chamber is anticipated to follow the Galaxy Towers storm water separation work and has been scheduled for 2022.

Because these projects were front-loaded in the schedule timeline (and since they have a much greater impact on CSO reduction), the Green Infrastructure projects were shifted to the second half of the implementation schedule. The green roof ordinance is anticipated to be developed in coordination with the re-zoning ordinance with its actual placement within this timeline may be earlier or later depending on the progress of the rezoning.

The planter box program was intended to continue the Town’s investment in CSO reduction after the completion of the “gray” projects, and is designed to be flexibly implemented - the current schedule calls for about 20 large boxes to be installed each year. Overall, the 100 boxes should be considered as a minimum commitment from the Town of Guttenberg (20/year for 5 years).

J.7 CSO REDUCTION VERSUS TIME

Taken together, the elements of the LTCP will reduce the volume of CSO events in Guttenberg by approximately 30%, and the number of events by approximately 25% over baseline conditions. **Figure J-1** below displays the cumulative impact of the Plan elements over time as they are completed. The LTCP elements are scheduled so that the higher-impact projects come earlier in the process, maximizing the total CSO volume captured over the ten-year implementation schedule.

J.8 PERFORMANCE CRITERIA

Upon completion of the CSO projects described in Subsection J.2, 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 system wide basis for the Typical Year. Wet weather capture will be determined on a system wide basis using an updated H&H model that will be calibrated using post construction monitoring data and evaluated over the model Typical Year, which has been previously approved by the NJDEP. This is the performance criteria that will be used for the LTCP capital projects.

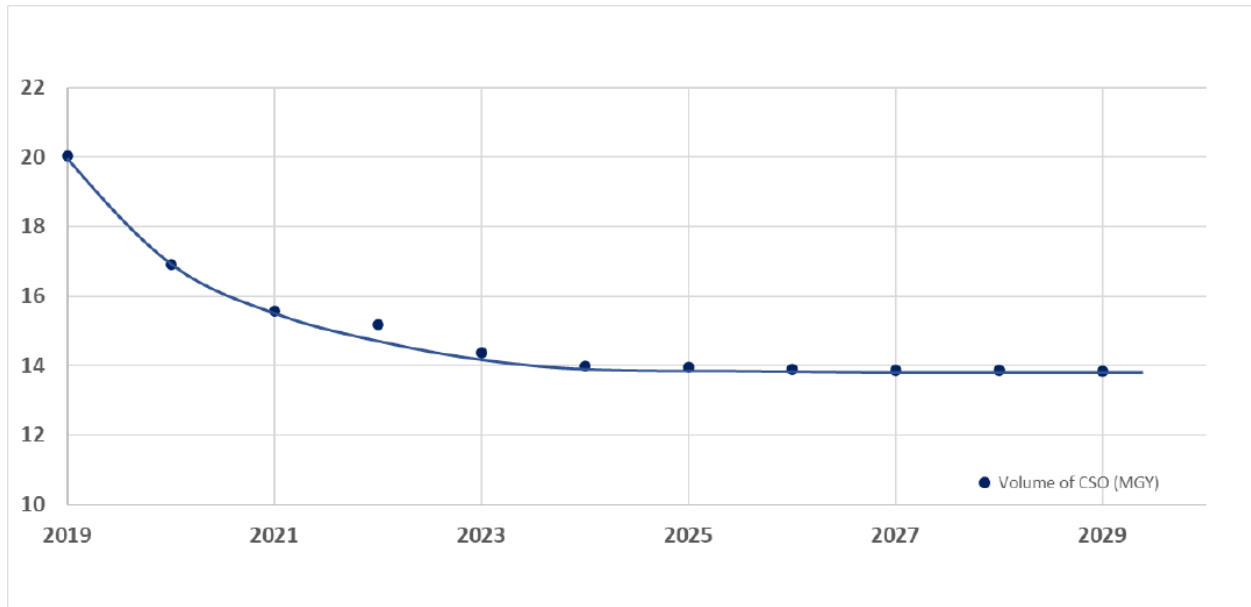


Figure J-1: Reduction of CSO Volume (MGY)

SECTION K - POST-CONSTRUCTION COMPLIANCE MONITORING PLAN

K.1 INTRODUCTION

The Town of Guttenberg and NBMUA 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 Subsection J.8.
- 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 CSOs for each receiving water body.

K.2 OVERVIEW OF APPROACH

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 Subsection J.8 and further discussed in this Section, and will be used to verify that NBMUA and the Town of Guttenberg 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 PCCMP has been developed for the NBMUA Woodcliff STP Service Area and the remaining CSO discharges to the Hudson River. 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.

As mentioned in Section F of this report, based on the two Hudson River Assessment Units (02030101170010-01, 02030101170030-01), an SE2 waterbody corresponding to the Woodcliff STP, both show 100% attainment of fecal coliform WQS for the baseline and 100% CSO control scenarios during the typical rainfall year (2004). 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 “typical year” conditions.

NBMUA and Guttenberg 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.

For the purposes of addressing the NJPDES Permit PCCMP ambient monitoring requirements, NBMUA and Guttenberg plan 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 within NBMUA, Guttenberg, and all NJ CSO Group Permittees

K.3 EXISTING DATA SOURCES

A temporary flow monitoring program was conducted from April 2016 to August 2016, installing eighteen flow meters in the PVSC sewer system and three flow meters in the NBMUA Woodcliff STP sewer system. This existing data will be utilized, as needed, as part of the PCCMP.

The three temporary flow meters installed in the Woodcliff STP sewer system consist of two meters in the vicinity of the North Bergen Woodcliff regulator, and one meter in the vicinity of Guttenberg’s regulator. Temporary flow meters will be reinstalled at these regulator sites to collect flow data for the purposes of recalibrating the H&H model and implementing the PCCMP.

K.4 PERFORMANCE CRITERIA AND COMPLIANCE ASSESSMENT

The Performance Criteria developed in Subsection J.8 were based on a percentage of total volume entering the CSS that is “captured” for treatment at the Woodcliff STP, as part of the

Presumption Approach. Upon full implementation of the CSO control measures of the LTCP, the Performance Criteria will be a minimum of 85% capture by volume of the system-wide wet weather volume for treatment at the Woodcliff STP based on the Typical Year (2004). The minimum 85% capture by volume meets the requirements of the Presumption approach, and this minimum capture amount may increase based on the selected CSO control measures detailed in Section J. Actual overflow volume will vary from one year to another after full implementation of the CSO control measures, based on real-life precipitation conditions. Recognizing the hydraulics of the CSS and the interconnection between CSO regulators, CSO control measures that do not achieve the performance criteria as a result of other controls that have yet to be completed will not be fully evaluated until all CSO control measures are constructed.

K.5 POST-CONSTRUCTION COMPLIANCE MONITORING DATA COLLECTION

Temporary flow meters will be installed at select locations within the Woodcliff STP Service Area. **Table K-1** summarizes the type, location, ownership, and, frequency of the flow meters, and rain gauges to be implemented.

Table K-1: Flow Meter Identification and Locations

Monitoring Type	Municipality	Meter Identification	Location	Frequency
CSO Overflow Monitoring (3 Locations)	Guttenberg	Guttenberg 001A (G-1)	Near 70th and JFK Blvd E	Monitor for 6 month period every 5 years*
	North Bergen	North Bergen 004A (NBW-1)	Near 73rd and JFK Blvd E	Monitor for 6 month period every 5 years*
	North Bergen	North Bergen 004B (NBW-2)	Near 74th and JFK Blvd E	Monitor for 6 month period every 5 years*
Rainfall Monitoring	North Bergen and Guttenberg	Newark Airport and/or Local Rain Gauge	Existing Rain Gauge at Newark Airport and/or Local Rain Gauge	Monitor for 1-year period every 5 years*
Ambient In-Stream Monitoring	North Bergen and Guttenberg	NJ/NY Harbor Dischargers Group Sampling Locations	NJ/NY Harbor Dischargers Group Sampling Locations (at current time)	Based on NJ/NY Harbor Dischargers Group Frequency (at current time)

*While it is anticipated that monitoring may occur approximately every 5 years, the frequency of monitoring will be dependent upon the implementation of projects that are to be evaluated for effectiveness. Exact meter locations will be determined at the time of monitoring.

K.6 PERFORMANCE ASSESSMENT

To demonstrate compliance under the Presumption Approach, NBMUA and Guttenberg 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 NBMUA Woodcliff STP-Guttenberg collection system and to demonstrate compliance with the performance criteria identified in Subsection K.4, a minimum of 85% capture by volume of the system-wide wet weather volume during the Typical

Year (2004). An H&H model will also be used to assess the performance of green infrastructure control measures. NBMUA and Guttenberg 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.

K.6.1 Approach

NBMUA and Guttenberg will evaluate the performance of the CSO control measures through the use of its H&H model. The following steps will be used to determine compliance with the Performance Criteria:

1. Collect flow monitoring and rainfall data during post-construction monitoring period of each phase of CSO control measures. Perform QA/QC on the data.
2. Once every five years, update the H&H model to include all completed CSO control measures and any other modifications to the CSS since the H&H model was calibrated for this LTCP.
3. Recalibrate and/or validate the updated H&H model, if needed, using the flow and rainfall data collected during the 12-month post-construction monitoring period.
4. Perform continuous simulation using the updated H&H model for the typical year and calculate percent capture for verification of compliance with the 85% capture requirements of the Presumption Approach.

K.6.2 Adaptive Management Plan

NBMUA and Guttenberg are confident that the CSO control measures implemented prior to the final 2031 post construction monitoring period 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 NBMUA and/or Guttenberg 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 part of each PCCMP Reports for each of the 5-year monitoring periods. Generally, these 5-year 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, as further described in Subsection K.6.3.

NBMUA and Guttenberg 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. NBMUA and Guttenberg 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, NBMUA and/or Guttenberg shall implement those measures in accordance with the schedule set forth in the Adaptive Management Plan.

K.6.3 REPORTING

The PCCMP will evaluate whether the CSO control measures are achieving the Performance Criteria and assess CSO capture volumes of remaining NBMUA and Guttenberg CSO discharges to the Hudson River. The progress and evaluation of the CSO control measure implementation will be reported to the NJDEP, and to the public through a series of reports, namely the PCCMP Reports, which will include any necessary adaptive management. NBMUA and Guttenberg will also continue to submit the monthly Discharge Monitoring Reports (DMRs) as required by their respective NJPDES Permits.

The PCCMP Reports shall provide the following information:

- A statement setting forth the deadlines and other terms that NBMUA and Guttenberg was required to meet since the last Reporting Period;
- A general description of work completed within the prior period, and a projection of work to be completed within the succeeding period;
- A summary of principal contacts with NJDEP during the reporting period relating to CSOs or implementation of the LTCP;
- NJPDES permit violations;
- A summary of all flow and hydraulic monitoring data collected by NBMUA and Guttenberg during the five-year reporting period;
- A description of the CSO control measures completed within the five-year reporting period and a projection of CSO control measure work to be performed during the next five-year period; and,
- An evaluation of the effectiveness of the CSO control measures constructed to date, including proposed adjustments to the components of the recommended plan (adaptive management), if needed, and as outlined in Subsection K.6.2.

NBMUA shall submit a PCCMP Report to the NJDEP at the end of each NJPDES Permit cycle (in 5-year increments). The final PCCMP Report will be submitted to the NJDEP for their review and approval within 1-year after the last LTCP project has been implemented (currently scheduled for 2031). The purpose of the Final PCCMP Report shall be to evaluate and document the system-wide performance of NBMUA's and Guttenberg's fully implemented LTCP CSO control measures. The report shall include an assessment of whether the control measures are meeting the Performance Criteria and complying with water-quality based CWA requirements and NBMUA's and Guttenberg's respective NJPDES permits, including the following information:

- A complete Post-Construction Compliance Monitoring Period data summary and analysis;
- A reporting of all of the CSO control measures that have been constructed, implemented, and that are in operation;
- An evaluation of the system-wide CSO control measure performance, and whether the controls meet the Performance Criteria
- A description of any adaptive management actions that need to be implemented to meet the Performance Criteria where they are not being achieved or to manage affordability in the case where the Performance Criteria are being exceeded.

K.7 FUTURE REGULATORY REQUIREMENTS

Given the impacts of upstream loading, it is recommended that any future regulatory effort to further reduce bacteria loadings to the receiving streams be assigned to background and non-CSO contributors.

K.8 PUBLIC NOTIFICATION

In order to advise the public of overflows, the existing notification system will continue to be utilized. This system notifies the public of the occurrence of CSOs based on rainfall monitoring near the representative CSO outfalls. The notification system can be accessed using the following link: <https://njcso.hdrgateway.com/>.

SECTION L - REVISION OF OPERATION AND MAINTENANCE PLANS

L.1 INTRODUCTION

Under their respective NJPDES permits, the municipalities are required to develop and implement a comprehensive Operation and Maintenance (O&M) program for appropriate and consistent operation of their CSS facilities. In compliance with this requirement, the Town of Guttenberg, and NBMUA have developed O&M's which are updated annually. In addition to these annual updates, the Permittees are required to update the O&M's to reflect the changes proposed under the LTCP.

Part IV, Combined Sewer Management, Section G.6.a. of the permit states:

“Upon Department 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 maintain Green Infrastructure, staffing and budgeting, I/I, and emergency plans.”

Fulfillment of this requirement will be addressed upon approval of the Recommended LTCP by NJDEP. The following summarizes the municipalities' current O&M programs and how they will be updated as the CSO control measures are implemented.

L.2 CURRENT OPERATION AND MAINTENANCE PLAN

The Town of Guttenberg and NBMUA have submitted their latest O&M plans to the NJDEP and are in good standing. Verification that the O&M's are in compliance with all permit requirements are provided in the quarterly progress reports submitted to NJDEP.

L.3 OPERATION AND MAINTENANCE PROGRAM UPDATES FOR CSO CONTROL MEASURES

As required by the permit, The Town of Guttenberg and NBMUA will prepare updates to the current O&M manuals to include any new or modified facilities which are a part of this LTCP. These manuals will include a description of the equipment and features of the facility, operating instructions, maintenance guides, and safety considerations. Manuals should be reviewed for the optimization of LTCP capital projects after new projects are brought online.

The updates to the O&M Programs will begin within sixty days of placing the following CSO Control Measures into operation, and will follow a two-step process:

1. Proposed Operation and Maintenance Manual Updates – NBMUA and the Town of Guttenberg will submit to NJDEP for review and commit to providing O&M Manual updates within 90 days of placing the following controls into operation:
 - a. Guttenberg:
 - i. Upgrades at the netting chamber
 - ii. Green Infrastructure
 - b. NBMUA (Woodcliff)
 - i. Woodcliff STP Expansion to 10 MGD

2. Integrated Operation and Maintenance Manual – Once approved by USEPA and/or NJDEP, the municipalities will incorporate the proposed updates into the current O&M Manuals, described in the preceding section.

L.4 STAFFING NEEDS

In developing the LTCP, NBMUA has made preliminary estimates of O&M costs, which include labor. The exact number of staff, and the specific staff responsibilities and qualifications will be determined during the implementation of the LTCP and reviewed as part of the annual budget process. NBMUA anticipates operator experience will increase as similar facilities come online and thereby potentially reduce end-of-program staffing requirements.

The Town of Guttenberg neither currently possesses a sewer department, nor anticipates the need to create one based on the selected local CSO controls. Any costs related to additional staffing needs at the Woodcliff STP is accounted for in the preliminary construction cost and sewer rate. O&M costs of approximately \$5k/year are assumed for the planter boxes once all have been installed. Planter box O&M work will be performed by existing Town of Guttenberg Department of Public Works employees.

SECTION M - REFERENCES

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SECTION N - ABBREVIATIONS

ACO:	Administrative Consent Order
BMP:	Best Management Practice
BOD:	Biochemical Oxygen Demand
CMP:	Compliance Monitoring Program
CSO:	Combined Sewer Overflow
CSS:	Combined Sewer System
CWA:	Clean Water Act
DEAR:	Development and Evaluation of Alternatives Report
DMR:	Discharge Monitoring Report
EPA:	United States Environmental Protection Agency
FCA:	Financial Capability Assessment
GI:	Green Infrastructure
GIS:	Geographic Information System
H&H:	Hydrologic and Hydraulic
I/I:	Inflow and Infiltration
LTCP:	Long Term Control Plan
MEG:	Model Evaluation Group
MG:	Million Gallons
MGD:	Million Gallons per Day
NACWA:	National Association of Clean Water Agencies
NBMUA:	North Bergen Municipal Utilities Authority
NFA:	No Feasible Alternatives
NJPDES	New Jersey Pollutant Discharge Elimination System
NMC:	Nine Minimum Controls
O&M:	Operations and Maintenance
PAA:	Peracetic Acid
PCCMP:	Post Construction Compliance Monitoring Plan
POC:	Pollutants of Concern
POTW:	Public Owned Treatment Works
PPP:	Public Participation Plan
PWQM:	Pathogens Water Quality Model
QAPP:	Quality Assurance Project Plan
RI:	Residential Indicator
SCR:	System Characterization Report
SC:	Saline Coastal
SE:	Saline Estuarine
STP:	Sewage Treatment Plant
SWQS:	Surface Water Quality Standards
RCA:	Row Column AESOP
TMDL:	Total Maximum Daily Load
TSS:	Total Suspended Solids
USEPA:	United States Environmental Protection Agency
WASP:	Water Analysis Simulation Program
WMA:	Watershed Management Areas

WRRF: Water Resources Recovery Facility
WRTP: Wastewater Reclamation Treatment Plant