SELECTION AND IMPLEMENTATION OF ALTERNATIVES REPORT

Camden County Municipal Utilities Authority
City of Camden
Gloucester City

NJPDES Permit Nos.

NJ0026182

NJ01O8812

NJ01O8847

September 2020

Revised September 2023

cdmsmith.com

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Resolution
of

THE CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

Authorizing the Executive Director to Submit the CCMUA Component of the Revised CCMUA, Camden City and Gloucester City Long Term Control Plan

R-23:10-178

Whereas, on September 21, 2020, the CCMUA's Board of Commissioners authorized its Executive Director, via Resolution #R-20:8-126, to submit the CCMUA component of the CCMUA, Camden City and Gloucester City (the permittees) long term control plan Long-Term Control Plan (LTCP) to the New Jersey Department of Environmental Protection (NJDEP); and

Whereas, subsequent to the submission of the LTCP in October of 2020, the NJDEP issued technical comment letters and, at various times, requested other information which the permittees provided; and

Whereas, the permittees received a letter on August 9, 2023, which stated in part "Given that the Department is moving forward with the NJPDES Permit, an updated LTCP is needed to amend the Administrative Record"; and

Whereas, the amended LTCP does not provide for major changes in the scope of the plan, but does provide for firmer scheduling commitments; and

Whereas, the permittees, the NJDEP, and the permittees' consultant CDM Smith, have tentatively agreed on the schedule as described in the revised LTCP; and

Whereas, the Executive Director recommends CCMUA approval of the revised LTCP.

Now, Therefore Be it Resolved by the CCMUA Board of Commissioners that it authorizes its Executive Director to submit to the New Jersey Department of Environmental Protection, the CCMUA component of the revised CCMUA, Camden City and Gloucester City Long-Term Control Plan.

ADOPTED: October 16, 2023

Kim Michelini

Kim Michelini, Secretary

I certify that the above is a true copy of the resolution adopted by the members of the Camden County Municipal Utilities Authority at a meeting held on October 16, 2023.

Kim Michelini

Camden County Municipal Utilities Authority
NJPDES Permit NJ0026182 Submittal
N.J.A.0 7:14A-4.9 Certification Form

Pursuant to the requirements under NJPDES Permit NJ0026182, the Camden County Municipal Utilities Authority, Camden County New Jersey is submitting the following document(s):

Selection and Implementation of Alternatives Report

(Title of Document)

As required under Part IV - Combined Sewer Management Paragraph D.1(c) (Submittals), the Authority is providing the following certification:

> "I certify under penalty of law that this document and all attachments were prepared either: (a) under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted; or (b) as part of a cooperative effort by members of a hydraulically connected system, as is required under the NJPDES Permit, to provide the information requested. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information".

Name: Scott Schreiber, Title: Executive Director

Camden County Municipal Utilities Authority

Signature

October 2, 2024

Date

Camden County Municipal Utilities Authority
NJPDES Permit NJ0026182 Submittal
N.J.A.C 7:14A-4.9 Certification Form

Pursuant to the requirements under NJDPDES Permit NJ0108812, the City of Camden, New Jersey is submitting the following document(s):

Selection and Implementation of Alternatives Report

As required under Part IV – Combined Sewer Management Paragraph D.1(c) (Submittals), the Authority is providing the following certification:

> "I certify under penalty of law that this document and all attachments were prepared either : (a) under m direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted; or (b) as part of a cooperative effort by members of a hydraulically connected system as is required under the NJPDES Permit, to provide the information requested. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there is significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information".

Name: Victor G. Carstarphen , Title: Mayor
City of Camden

Signature

10 - 15 - 2024

Date

Camden County Municipal Utilities Authority
NJPDES Permit NJ0026182 Submittal
N.J.A.C 7:14A-4.9 Certification Form

Pursuant to the requirements under NJPDES Permit NJ0108847, Gloucester City, New Jersey is submitting the following document(s):

Selection and Implementation of Alternatives Report

As required under Part IV - Combined Sewer Management Paragraph D.l(c) (Submittals), the Authority is providing the following certification:

> "I certify under penalty of law that this document and all attachments were prepared either: (a) under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted; or (b) as part of a cooperative effort by members of a hydraulically connected system, as is required under the NJPDES Permit, to provide the information requested. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information."

Name: Dayl R. Baile, Title: Mayor
Gloucester City, New Jersey

Signature

10-17-2024
Date

Executive Summary

Executive Summary Revised September 2023

E.1 Introduction

This document constitutes Camden County Municipal Utilities Authority's (CCMUA) *Revised Selection and Implementation Report* (SIAR) developed on behalf of CCMUA, the City of Camden and Gloucester City (the Cities). Submitted to the New Jersey Department of Environmental Protection (NJDEP) in September of 2020, the original SIAR was the third of the three NJPDES required documents which comprise the Authority's and the Cities' combined sewer overflow (CSO) draft Long Term Control Plan (LTCP). This revised version of the SIAR incorporates responses to NJDEP's review comments on the 2020 report and updates the 2020 report to reflect progress to date on the implementation of the LTCP since September of 2020.

The 2018 System Characterization Report documented the physical nature and baseline performance of the combined sewer system. The 2019 Development and Evaluation of Alternatives (DEAR) evaluated approaches to controlling combined sewer overflows. This SIAR documents the selection of a long term strategy, schedule and institutional framework for implementation of CSO controls. This SIAR maintains the CSO control target of capturing for treatment 85% of the combined sewage generated during precipitation events occurring over the Typical Year. A Typical Year is a statistically determined historical year that is representative of typical weather and other conditions driving the behavior of a sewer system. The combined sewer system addressed by this report is shown on Figure E-1 on the following page.

Due to the unique and challenging circumstances facing Camden and Gloucester, it was apparent to CCMUA, the City of Camden and Gloucester City from the outset that the communities and the environment will be best served by leveraging a coordinated and collaborative approach combining regulatory compliance, sustainable redevelopment and environmental justice. Towards these ends, the program outlined in this SIAR focuses on near term community benefits through:

- Sustainable community redevelopment using green stormwater infrastructure (GSI);
- Reduce street and basement flooding of combined sewage during storms; and
- The optimization of and reinvestment in existing community assets such as the restoration of the Camden sewer system through comprehensive cleaning.

E.2 Long Term Control Strategy

The proposed long term control strategy is the following:

- ***Optimizing the Current System*** – which is well underway. CCMUA has completed the capacity expansion of its Delaware Water Pollution Control Facility #1 (WPCF) from 150 million gallons per day (MGD) to 185 MGD. The wet-weather control benefits of the plant expansion experienced to date are documented in Section 2.4 of this revised SIAR. This project will also enable the potential expansion of wet weather treatment capacity to 220 MGD. Expansion to 220 MGD was determined to be not necessary or cost effective to meet the 85% system-wide typical year.

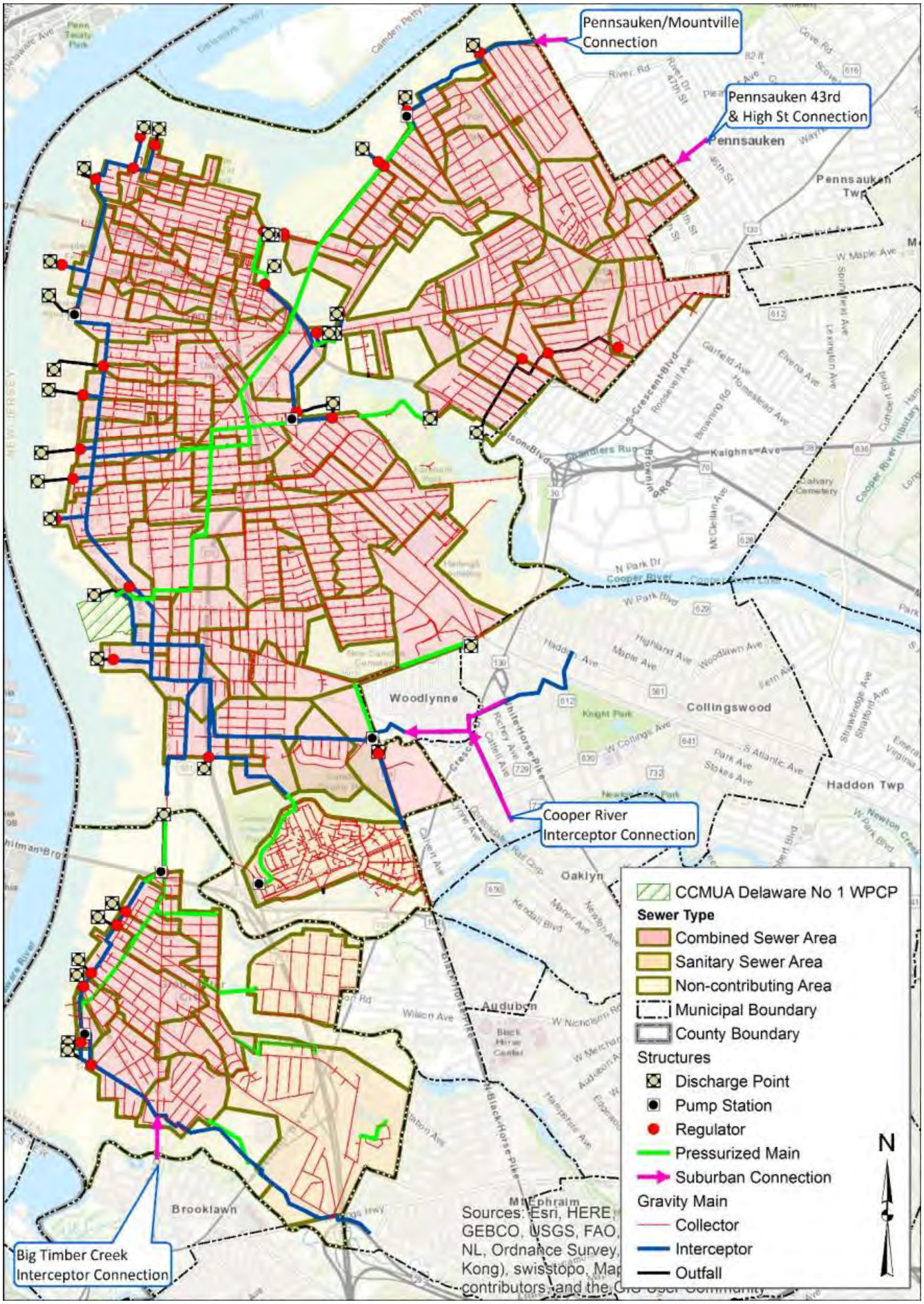


Figure E-1
Camden and Gloucester Sewer Systems Base Map

capture target however in the 2020 SIAR. If warranted, this option could be re-examined during the updating of the structural controls analysis anticipated in the 2027-2028 timeframe.

Meanwhile, the Cities are restoring the hydraulic capacity of ~~its~~ their combined collection sewer systems through the comprehensive remedial cleaning of their combined sewer system and combined sewer outfalls and have completed related capital improvements such as the upgrading of capacity of Camden's Arch Street pump station and the rehabilitation of Camden's twenty-eight regulator structures. CCMUA's and the Cities' proactive LTCP implementation projects pending NJDEP approval of the SIAR or issuance of the post 2021 NJPDES permit are listed on Table 1-1.

A detailed schedule for the completion of the system optimization projects during the forthcoming (2024 – 2028) NJPDES five-year permit cycle is provided in Section 8 of this revised SIAR and also summarized in Section E-10.

- ***Monitor and Evaluate before Building More Controls*** - This SIAR is based on the best available information. A comprehensive and iterative process of measuring and evaluating the efficacy of the on-going projects, GSI and street flooding mitigation will inform future decisions about the need for, size of and technical approaches to building structural (grey) control facilities. Initial flow monitoring in support of the development of the baseline hydrologic and hydraulic (H&H) model and its use to assess system performance was conducted in 2016 and augmented in subsequent years. Upon completion of the comprehensive system-wide remedial cleaning currently under way CCMUA and the Cities will recalibrate the H&H model to reflect then current conditions.
- ***Lead with Green*** – Camden's, Gloucester City's and CCMUA's acclaimed green stormwater infrastructure (GSI) and neighborhood redevelopment efforts will be formalized and expanded with an aggressive goal of a ten percent reduction in the directly connected impervious areas (DCIA) contributing stormwater runoff to the combined sewer system. Details are in Section 3. As of September 2023, green stormwater management projects for approximately 29 acres in the combined sewered areas of Camden and Gloucester City have been completed or are in planning and design since 2017. These projects are listed in Section 3.5.
- ***Address Street Flooding*** – A key control program element is a comprehensive Street Flooding Mitigation Program to serve as the basis for short and long term operational and capital improvements. Details are in Section 4. Street flooding mitigation projects and projects with street flooding benefits since September 2020 are listed in Section 4.4 of this revised SIAR.
- ***Cooper River Water Quality Optimization Program*** – While the Cooper River is a vital environmental, recreational and economic redevelopment asset, eliminating CSOs from the Cooper River is not financially feasible and would not result in water quality compliance. To optimize what is achievable, the development of a **Cooper River Water Quality Optimization Strategy** is proposed. Details are in Section 7. CCMUA implemented a prototype Cooper River sampling program in the summer of 2023. Six sampling locations were selected for 2023 with five along

Cooper River and one on the back channel of the Delaware River. Over the course of eight sampling events in May and June the E.-coli water quality standard of 235 CFU/ 100 ml for single samples and of 126 CFU/100 ml for the geometric means were exceeded in all of the locations upstream of CSO influence during dry weather sampling events.

- ***Additional Structural Controls as Necessary*** – structural controls (e.g., storage tanks) are necessary to raise the level of capture system-wide to no less than 85% of wet weather flows during the Typical Year. The sizing and scheduling of these facilities will be determined based upon the results of the green source water reduction, street flooding remediation and Cooper River optimization efforts described above. Details are in Section 5.

  During the next five-year NJPDES permit cycle (2024 – 2028), based on the post-cleaning flow monitoring and H&H model update, CCMUA and the Cities will update the structural control alternatives analyses conducted to develop the 2020 SIAR. The updated alternatives will provide a more accurate projection of structural control types, costs and construction scheduling. The updated alternatives report will include detailed design and construction schedules. Scheduling is detailed in Section 8 of this revised SIAR.

E.3 Additional Controls Likely Will be Necessary

With the completion of the WPCF expansion, the restoration of the hydraulic capacity of the Camden sewer system, and the ramping up of GSI and flood mitigation efforts, the performance of the combined sewer system will be significantly improved as shown on Table E-1.

Table E-1 – Benefits of the CSO Control Elements Before Satellite Control Facilities

System Performance Metric	Baseline Condition	With System Optimized	Optimized + 10% Reduction in DCIA
WPCF Capacity (Millions of Gallons per Day)	150	185	185
Overflow Volume (Millions of Gallons per Year)	823	582	487
% Wet Weather Capture	69%	78%	81%
Range of Overflow Event Frequencies (min – max (median))	11-70 (47)	8 -71 (45)	6 - 67 (43)
Modeled Street Flooding (Millions of Gallons per Year)	80	33	24

Key benefits of optimizing the current system include:

- A reduction in annual overflow volumes of 243 million gallons per year;
- An increase in the system-wide rate of wet weather capture and treatment from 69% to 78%; and
- Modeled street flooding volume reduced by roughly 60%.

Despite these significant gains, optimizing the current system and the best case implementation of green infrastructure still leaves the system-wide wet weather capture rate at less than 85%. Therefore, over the long term additional controls will be required.

E.4 Getting to 85% System-Wide Capture

Note: *This section is subject to refinement based on the results of the updated structural controls alternatives analyses during the next five-year NJPDES permit cycle (2024 – 2028) as described above.*

E.4.1 Control of CCMUA's C-32 Combined Sewer Overflow

CCMUA proposes to achieve 85% capture in the Delaware River backchannel subsystem through the reduction of wet weather flows from Pennsauken Township and increasing the wet weather flow rates through the Baldwins Run pump station**.** Design work for the separation of combined sewered areas of Pennsauken Township is complete and pending construction permit approval. CCMUA is currently evaluating options for the conveyance of the separated Pennsauken stormwater for discharge to Delaware River back channel through or adjacent to CCMUA's C-32 outfall structure. This conveyance strategy may involve targeted sewer separation in Camden neighborhoods adjacent to Pennsauken or a dedicated stormwater line for the removed Pennsauken stormwater. In either case, CCMUA is studying the optimization of stormwater inlet placement and configuration to mitigate street flooding in East Camden.

E.4.2 Satellite Control Facility Capacity Requirements

For purposes of developing control strategies, the 30 active outfalls within the combined sewer system have been divided into five hydraulically isolated sub-systems as shown on Figure E-2 (following page). While all of the sub-systems are ultimately connected to CCMUA's WPCF, providing the conveyance capacities necessary to convey the required wet weather flows to the treatment plant from the Gloucester City, Cooper River, Delaware River Back Channel and Newton Creek sub-systems would be cost prohibitive. Moreover, site limitations at WPCF preclude expanding the wet weather treatment capacity to what would be needed if these flows could be conveyed cost-effectively (details in Section 2). Therefore, additional satellite controls will be needed for certain CSO discharges to the Cooper River in Camden and to the Delaware River in Gloucester City.

The capacities of additional controls needed to achieve 85% system-wide wet weather capture in all five sub-systems are shown on Table E-2. Either remote (satellite) storage tanks or remote (satellite) treatment facilities would be required. Table E-2 includes capacity requirements with and without the accomplishment of the targeted GSI source reduction. Decisions about the size,

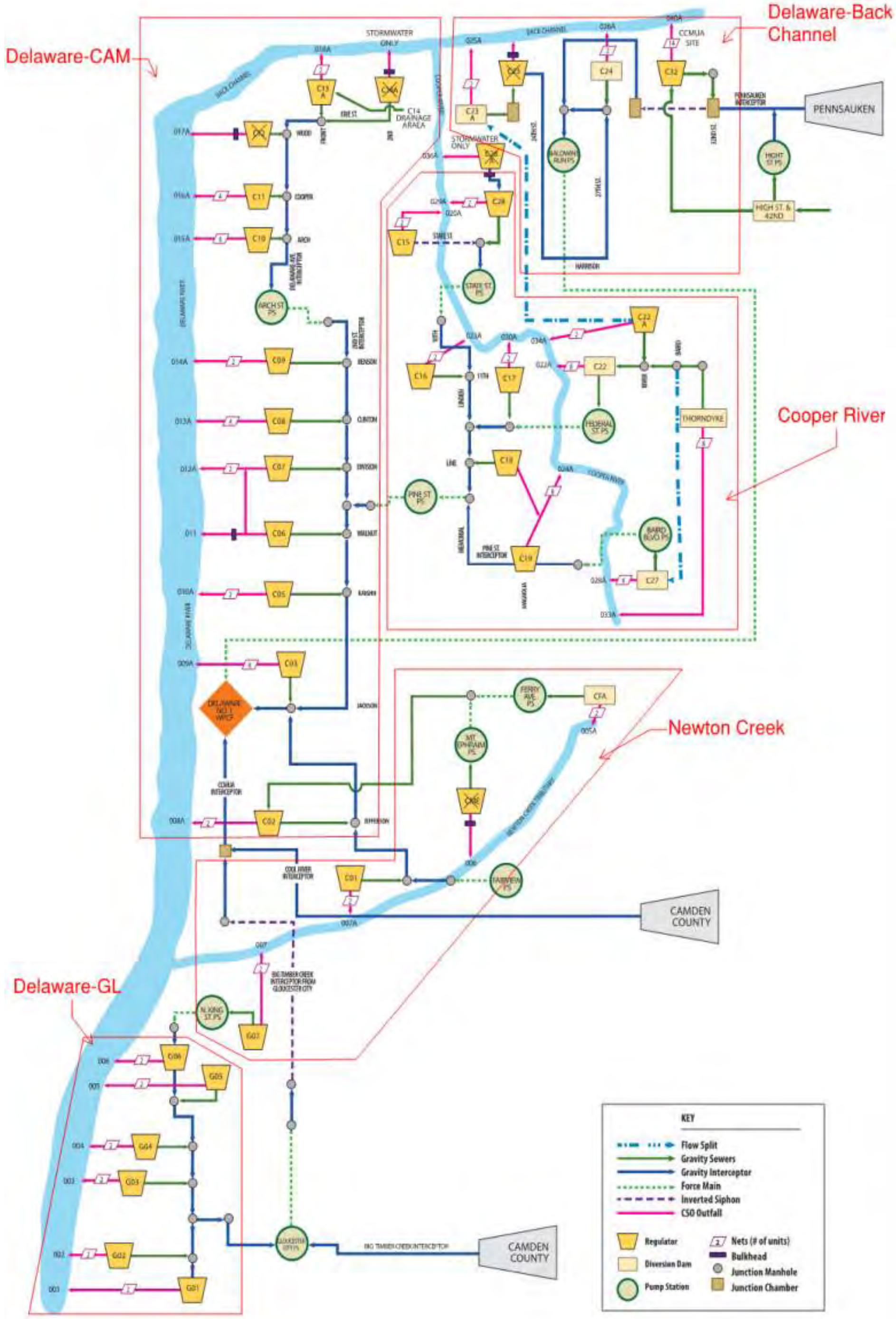


Figure E-2 – Combined Sewer System – Five Subsystems

configuration and type of satellite facilities must be deferred until a long term determination as to the efficacy of GSI source reduction can be ascertained.

Table E-2 – Required Satellite Control Capacities

Sub-System	Serving Sewersheds	With a 10% DCIA Reduction		Without a 10% DCIA Reduction	
		Tanks (Million Gallons)	Treatment (Million Gallons / Day)	Tanks (Million Gallons)	Treatment (Million Gallons / Day)
Delaware River – Gloucester	G-1 and G-4 / G-5	1.1	6.4	1.9	11.2
Cooper River	C-22 / C-22A	1.3	20.0	2.6	21
	C-27 / Thorndyke	3.0	20.4	3.5	38.5
	C-17	NA	NA	0.4	4.8

Satellite facilities are not the ideal solution for CSO control since they pose significant siting, financial and operating burdens on the municipalities which they serve.

E.4.3 Overview of Satellite Control Technologies

Satellite Treatment

USEPA's CSO Policy requires that CSO treatment facilities provide the equivalent of primary clarification analogous to that provided at the WPCF and the disinfection of the treated effluent. The term Enhanced High-Rate Clarification (EHRC) is generally used to describe a physical-chemical process in which coagulants and polymers are added to wastewater to enhance the waste removal process and to reduce the treatment tank detention time, thereby reducing the required physical size of the facility. An example of this technology is shown on Figure E-3.

Satellite Storage

Off-line tank storage can be used to capture all or part of CSO discharge. When system capacity becomes available, flows are then released for conveyance to the treatment plant. When flow volumes exceed the storage capacity, flow will be discharged to CSO outfalls. A typical storage tank arrangement includes a regulator, bar screens, pumping facility and piping to and from the collection system. Design details such as flow distribution, tank flushing, and facility activation also are affected by the overall goals for and hydraulics of the specific site.

Storage tanks are generally fed by gravity and the stored flow is typically pumped back to the interceptor after the storm. This gravity-in / pump-out arrangement minimizes pumping costs (both capital and operating). However, if the existing combined sewers are deep, then the storage tank must be deep and construction becomes more expensive. An example of a typical storage tank under construction is shown on Figure E-4.

Figure E-3 – Example 25 MGD Enhance High Rate Clarification Treatment Facility

Figure E-4 – Examples of Satellite Storage Facility

E.4.4 Preliminary Site Considerations

The preliminary site requirements for the potential satellite treatment or storage facilities described above are shown on Table E-3. Approximate site vicinity and current land use maps for these potential satellite facilities are shown on Figures E-5 through E-8.

Table E-3 Potential Satellite Facilities Vicinity Information

Subsystem		Vicinity of Regulators	Approximate Area Required (acres)	Vicinity Notes
1	Delaware River – Gloucester	G1 or the CCMUA Gloucester City Pump Station	~1.5	A facility would be located either in the vicinity of the G-1 regulator or near the Gloucester City Pump Station. A new pipe would convey wet weather flows from regulators G-4 and G-5 and as needed G-1 to this facility. Current brownfield site.
2	Cooper River	C22 – C22A	~1.5	Brownfield (status unknown) private bus yard, Federal Street pump station.
		C27 - Thorndyke	~1.5	Grassed area of Gateway Park
		C17	~1.5	Only required if green control targets can't be met in the Cooper River sub-system.

Gloucester City – Satellite Facility for Wet Weather Flows from G4/G5 and G-1 Regulators

Additional controls are needed for Gloucester City's volumetrically largest CSOs, namely regulator structures G-4 and G-5. From a technical perspective, the most effective approach would be a satellite facility capturing overflows from G-4 and G-5 in or in the vicinity of Proprietors Park as outlined in the 2019 DEAR report. While hydraulically efficient, this location is not acceptable to Gloucester City. As an alternative, wet weather flows from G-4 and G-5 that would otherwise overflow into the Delaware River could be conveyed by a new pipe to a downstream facility. This facility could be located either in the vicinity of regulator structure G-1 or a bit further upstream in the vicinity of CCMUA's Gloucester City pump station (shown on Figure E-5).

The facility would receive wet weather flows from G-4, G-5 and G-1 and would be sized to achieve the 85% wet weather capture target for Gloucester City. During future facilities planning work that will be required to implement the LTCP, the cost-effectiveness of different options will be evaluated including the number of facilities, the preferred locations, the size and how flow is conveyed from G4/G5 to the facility.

Figure E-5 – Vicinity of potential locations for a Gloucester Satellite CSO Facility and Adjacent Land Use

Cooper River – Camden C-22 /22A and C-27 / Thorndyke Regulators

These four regulators discharge to the Cooper River. C-22 and C-22A are adjacent to the Federal Street pump station and the Federal Street bridge over the Cooper River as shown on Figure E-6.

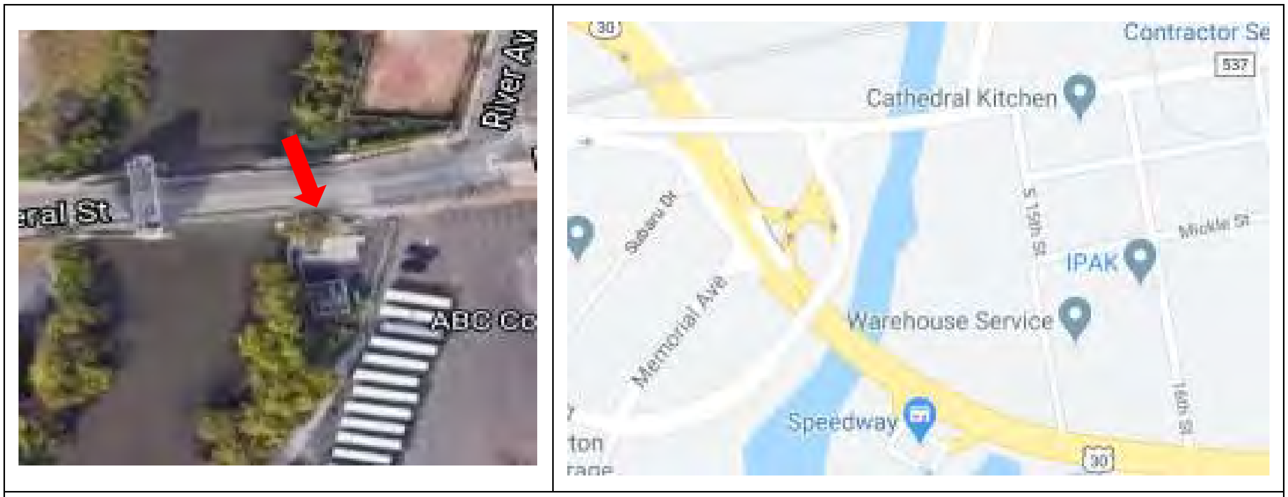


Figure E-6 – Vicinity of the Camden C-22 / C22-A Outfalls

The outfalls for C-27 and Thorndyke are the upstream most in the Camden combined sewage system that discharges to the Cooper River. The potential location for a satellite facility, adjacent to the existing Thorndyke Street netting facility is shown on Figure E-7.

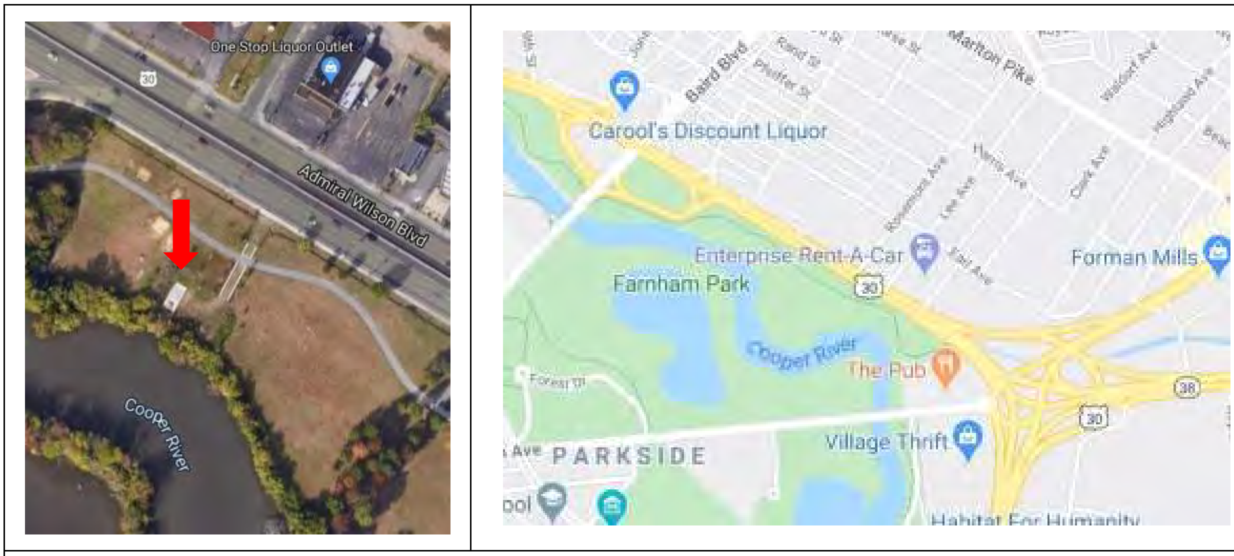


Figure E- 7 – Vicinity of the Camden C-27 and Thorndyke St. Outfalls

Cooper River – Camden C-17 Regulator

If the long term goal of reducing runoff from directly connected impervious in the Cooper River sub-system is not met, an additional satellite treatment facility for the C-17 sewershed will be needed to meet the 85% control objective. The C-17 regulator structure is across the Cooper River and slightly upstream from the C-22 regulator (shown on Figure E-8). Should additional controls for C-17 prove to be necessary in the long term, the cost-effectiveness of upsizing and consolidating either the C-22 or the C-17 satellite facilities and conveying the wet weather flows across the river for treatment or storage could be evaluated.

Figure E- 8 – Vicinity of the Camden C-17

E.4.5 Reduction of Inflow & Infiltration (I&I)

Part IV.F.1.h.1.ii of CCMUA's and the Cities' NJPDES permits require that I&I be identified and reduced to non-excessive levels as defined at N.J.A.C. 7:14A-1.2. It was stated in the approved June 2019 joint Development & Evaluation of Alternatives Report that I&I reduction will not play a major role in long term CSO control due to the high volumes of wet weather flow generated in the combined sewered areas relative to the volume of I/I contributed from the hydraulically connected sanitary sewered areas.

A revised baseline level of I&I in and contributing to the CCMUA / Camden / Gloucester combined sewer systems will be determined through the comprehensive flow monitoring and model update to be completed once the Camden and Gloucester sewers and outfall cleaning is completed. The results of this analysis will be integrated into the revised LTCP model and used in the revised control alternatives analysis to be completed in the 2027-2028 time frame.

E.5 Preliminary System-Wide Cost Estimates (in 2019 dollars)

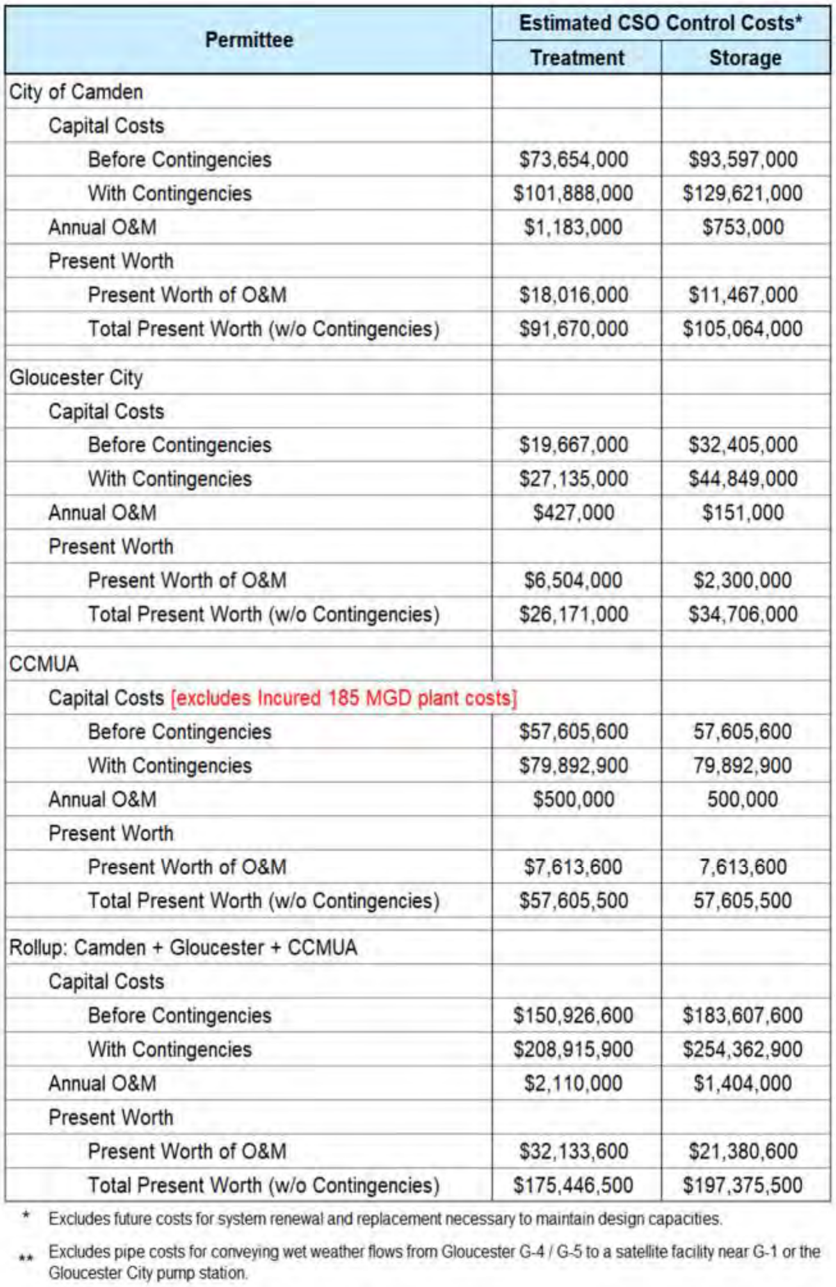
The respective cost estimates for Camden, Gloucester and CCMUA are aggregated and summarized on Table E-4. Aggregated capital costs, including construction contingencies total $208.9 million for the EHRC option and $254.4 million for the storage option, a difference of about 22%. Combined annual incremental O&M costs are estimated to be $2.1 million for treatment and $1.4 million for storage.

E.6 Cost / Performance Considerations

The Cities of Camden and Gloucester and CCMUA have determined to use the Presumption Approach as the regulatory basis for their CSO control strategies and have established the control of 85% of wet weather flows generated during the Typical Year as the CSO control performance target. NJDEP requires that permittees utilizing the Presumption Approach analyze various levels of CSO controls to determine where the increment of pollution reduction achieved in the receiving waters diminish compared to the increased costs. Such an evaluation is often referred to as a "knee of the curve" analysis.

For this analysis, CCMUA and the Cities initially evaluated the relationship between the frequencies of overflows during a Typical Year and the volumes of combined sewage discharged from the overflows. The use of an overflow-event based performance target, e.g. 4 to 6 overflows per year requires that controls be in place at every outfall that exceeds the target frequency under baseline conditions. Therefore, decisions as to where to allocate scarce resources may not be driven by the optimization of overflow reductions.

Table E-4 – System-Wide Roll Up of Cost Estimates



Permittee	Estimated CSO Control Costs*	
	Treatment	Storage
City of Camden		
Capital Costs		
Before Contingencies	$73,654,000	$93,597,000
With Contingencies	$101,888,000	$129,621,000
Annual O&M	$1,183,000	$753,000
Present Worth		
Present Worth of O&M	$18,016,000	$11,467,000
Total Present Worth (w/o Contingencies)	$91,670,000	$105,064,000
Gloucester City		
Capital Costs		
Before Contingencies	$19,667,000	$32,405,000
With Contingencies	$27,135,000	$44,849,000
Annual O&M	$427,000	$151,000
Present Worth		
Present Worth of O&M	$6,504,000	$2,300,000
Total Present Worth (w/o Contingencies)	$26,171,000	$34,706,000
CCMUA		
Capital Costs [excludes Incured 185 MGD plant costs]		
Before Contingencies	$57,605,600	57,605,600
With Contingencies	$79,892,900	79,892,900
Annual O&M	$500,000	500,000
Present Worth		
Present Worth of O&M	$7,613,600	7,613,600
Total Present Worth (w/o Contingencies)	$57,605,500	57,605,500
Rollup: Camden + Gloucester + CCMUA		
Capital Costs		
Before Contingencies	$150,926,600	$183,607,600
With Contingencies	$208,915,900	$254,362,900
Annual O&M	$2,110,000	$1,404,000
Present Worth		
Present Worth of O&M	$32,133,600	$21,380,600
Total Present Worth (w/o Contingencies)	$175,446,500	$197,375,500

* Excludes future costs for system renewal and replacement necessary to maintain design capacities.

** Excludes pipe costs for conveying wet weather flows from Gloucester G-4 / G-5 to a satellite facility near G-1 or the Gloucester City pump station.

The modeling done for this cost-performance analysis indicates that achieving 85% capture system-wide will reduce CSO volumes by roughly 485 million gallons per Typical Year. This level of CSO reduction approximates (and slightly betters) that which would be accomplished with control levels resulting in about ten overflows per year at roughly one half of the capital cost. A cost-control level curve showing the CSO removal volumes at CSO frequency controls ranging from twenty overflows per year down to zero is presented in Figure E-9.

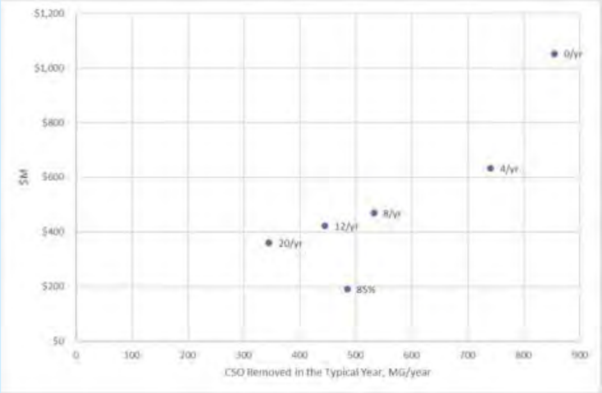


Figure E-9 – Cost / Performance Relationship of Overflow Frequency Based and 85% System-Wide Capture Control Strategies – Typical Year Overflow Reduction Volumes

E.7 Cooper River Designated Use Reclassification

On April 6, 2020 NJDEP finalized a change the use designation of the segment of the Cooper River from the U.S. Route 30 crossing to the confluence with the Delaware River from FW-2NT (fresh-water non-trout) to Category 1 as having exceptional ecological significance due to the presence of the Eastern Pondmussel within this segment of the river.

Figure E-10 – Eastern Pondmussel *(Ligumia 'Nasuta)* – photo source: Conserve Wildlife Foundation of N.J.

The USEPA CSO Control Policy suggests that overflows to such areas be eliminated or relocated wherever physically possible and financially achievable. Six Camden CSO outfalls discharge into the Cooper River downstream of U.S. Route 30. These are shown on Figure E-11.

NOTE – subject to correction, it is the current understanding of CCMUA and the City of Camden that NJDEP does not anticipate requiring the elimination of the discharges from the Cooper River due to the reclassification.

E.8 Affordability and Financial Capability

E.8.1 Overview

Note – The financial and institutional capability assessment presented below represents CCMUA's, the City of Camden's and Gloucester City's best understanding of then current conditions and the impacts of implementing the long term control plan as presented in the September 2020 SIAR. This 2020 analysis will be rendered obsolete by the impacts of a number of subsequent developments:

- Potential changes in the use designations and related in-stream water quality standards for Zone 3 of the Delaware River that would result in new treatment plant effluent limits for nutrients (ammonia), currently under development by USEPA and the Delaware River Basin Commission (DRBC);
- The results of the updated CSO structural control alternatives analyses to be conducted during the forthcoming (2024 – 2028) NJPDES permit cycle upon the completion of system cleaning, flow monitoring, and subsequent revisions to the H&H model;
- USEPA's issuance of revise financial capability guidance in February, 2023;
- Economic changes since 2020 including construction and borrowing cost inflation and an improved potential for federal funding assistance.

CCMUA and the Cities will update the financial and institutional capability assessments as a part of the updated alternatives analyses will occur in the 2027 – 2028 time frame.

Independent affordability and financial capability assessments were performed for Camden, Gloucester and CCMUA to identify the upper limits of what could constitute affordable future capital expenditures, including CSO controls. Lack of affordability does not excuse a permittee from complying with regulatory requirements but provides the basis for negotiating a workable implementation schedule for the LTCP.

The Financial Capability assessment is a two phased process. The residential indicator (RI) is the percentage of a permittee's service area median household income (MHI) expended on wastewater (including stormwater) management. The upper limit of affordability for wastewater services within the Cities and CCMUA will be the point where total wastewater management costs for the typical residential user exceed 2.0% of their respective Median Household Incomes (MHI) based on the EPA metrics shown on Table E-5.

Table E-5 – EPA Residential Indicator

Residential Indicator	Cost per Household
Low Burden	Less than 1.0 percent of MHI
Mid-Range Burden	1.0-2.0 percent of MHI
High Burden	Greater than 2.0 percent of MHI

The financial capability indicator is an assessment of the permittee's debt burden, socioeconomic conditions, and financial operations. These two measures are subsequently entered into a *financial capability matrix*, suggested by EPA, to determine the level of financial burden placed on residential customers and the permittee by the existing and projected future expenditures to operate, maintain, and enhance the wastewater management system.

E.8.2 Current Costs and Residential Indictors

The estimated typical annual cost for wastewater services for a typical single family residential wastewater user account in 2019 for Camden was $448 annually. The cost per residential account in Gloucester was $724 and $526 in the CCMUA service area as shown on Table E-6.

Table E - 6 – Calculated Costs per Typical Residential Wastewater User in 2019

Metric	Permittee		
	Camden	Gloucester	CCMUA
Wastewater Costs per Typical Residential User Account			
Municipal			
Service Charge	$71.2[a]	$372	$174[c]
Collection System	$158[b]		
Subtotal Municipal	$229		
CCMUA	$219	$352	$352
Total	448	$724	$526
Median Household Income	$26,105[d]	$51,152[d]	$69,283[c]
Current Residential Indicator	1.7%	1.4%	0.76%

a Camden service charge of $17.80 per quarter x 4

b Camden collection system charge of $2.20 per 100 cubic feet of water consumption and an estimated monthly water consumption of 6.02 CCF.

c Average for the 37 CCMUA municipalities weighted by the number of Census households. Municipal costs were calculated based on total costs per household as presented in "Assessing the Affordability of Water and Sewer Utility Costs in New Jersey" by Daniel J. Van Abs (Rutgers University) and Tim Evans (NJ Future) published 2018.

d Source: US Census - American Community Survey (2013 - 2017)

E.8.3 Affordability Impacts of CSO Control Alternatives

The capital costs and resulting residential indicators to achieve 85% Typical Year wet weather capture are shown on Tabled E-7.

Table E-7 – Affordability Impacts of the 85% Control Program Capital Costs

Item	Permittee		
	Camden	Gloucester	CCMUA
Estimated Total Capital Costs of 85% Capture Long Term Program by Permittee (in current million dollars)			
Least Cost	$101.9	$27.1	$79.8
Most Cost	$129.6	$44.8	
Projected Residential Indicator After Full Implementation in 2042[a]			

Item	**Permittee**		
	Camden	**Gloucester**	**CCMUA**
	With Inflation		
Least Cost	4.8%	4.0%	0.80%
Most Cost	5.0%	4.7%	
	Without Inflation		
Least Cost	2.5%	3.0%	0.75%
Most Cost	2.6%	3.7%	

[a] 2042 is used for example only. It is based on the approval of the SIAR in 2021 and implementation of the long term control program through 2041. These dates may not be appropriate for Camden and Gloucester.

Key observations about the data in these table include:

- Owing to its number of outfalls on three receiving streams, the projected least capital cost controls for Camden's CSOs are at $102 million are roughly four times those estimated for Gloucester and 30% more than CCMUA.
- Camden's least cost controls would push the Camden residential indicator to at least 2.5% even if inflation is excluded.
- Gloucester's controls would likewise result in Gloucester's residential indicator being at least 3.0% with or without inflation.

As shown on Table E-8, there is a huge gap between the estimated costs of the selected long term control program and the economic and financial resources of the residents and municipal governments of Camden and Gloucester.

E.8.4 Potential Responses to the Affordability Conundrum

A variety of scheduling and financing options to improve on the affordability of the 85% capture program for Camden and Gloucester have been evaluated.

Scheduling Variations

The base case affordability / financial capability assessment assumes a 22 year implementation schedule based on the durations for facilities planning, design and construction shown in Table E-8.

Table E-8 – Base Case Implementation Schedule for Affordability Analysis

Start Date	2021
Facilities Planning	1
Design & Permitting	3
Construction	17
Total Years to Implement LTCP (inclusive)	21

The assumed start date is based on the submittal and approval of the SIAR in 2020 and coincides with the effective date of the next NJPDES permit. The impacts of extending the implementation schedule on the residential indicators depend on whether or not inflation is considered as shown in Table E-9.

Table E-9 – Impacts of Implementation Scheduling on the Residential Indicators

Implementation Duration in Years	Camden Residential Indicator		Gloucester Residential Indicator	
	With Inflation	Without Inflation	With Inflation	Without Inflation
22	4.8%	2.5%	4.0%	3.0%
32	5.9%	2.2%	4.2%	2.2%
42	7.1%	2.1%	4.1%	2.1%

If as is assumed in the base-case affordability model that costs will continue to outpace income growth, affordability decreases as the implementation period is extended. If inflation is not included in the analysis, extending the implementation period does improve affordability, however even with an implementation period extending more than forty years, the residential indicators for both Camden and Gloucester are projected to remain well over the 2.0% high burden threshold.

Annual Pay-as-You-Go Funding

The amounts that each city could spend on an annual basis without causing their respective residential indicators to exceed 2.0% have also been calculated and are shown on Table E-10.

Table E-10 – Maximum Annual Expenditures Without Triggering a 2.0% Residential Indicator

Implementation Duration in Years	Camden		Gloucester Residential Indicator	
	With Inflation	Without Inflation	With Inflation	Without Inflation
22	None	~$1.0 million	$80,000	$530,000
32	None		None	
42	None		None	

External Funding

As documented above, the least capital cost 85% control options would result in residential indicators of well over the 2.0% high burden threshold with or without factoring in inflation. A meaningful CSO control program is not feasible for Camden or for Gloucester without external funding that would effectively reduce the capital expenditures by the two cities. Shown on Table E-11 are the impacts of various levels of external capital funding and/or capital cost reduction on the residential indicators.

Table E-11 – External Funding and/or Capital Cost Reduction Impacts on Residential Indicators

Municipal Cost Reduction	Camden		Gloucester	
	With Inflation	Without Inflation	With Inflation	Without Inflation
0%	4.8%	2.5%	4.0%	3.0%
25%	4.4%	2.3%	3.6%	2.5%
50%	4.1%	2.1%	3.2%	2.2%

Municipal Cost Reduction	Camden		Gloucester	
	With Inflation	Without Inflation	With Inflation	Without Inflation
75%	3.7%	2.0%	2.8%	1.8%
100%	3.5%	1.9%	2.4%	1.6%

The combinations of implementation schedule and external funding or cost reductions that would result in a projected residential indicator of 2.0% or less are highlighted in green. No combinations of schedule and funding work if inflation is included.

E.9 Selected Long Term Control Program

E.9.1 Framework

Through the expansion of CCMUA's WPCF # 1 to 185 MGD, the restoration of the hydraulic capacity of Camden and Gloucester's collection system, flow reduction through green infrastructure and street flooding mitigation, the capture level is projected to reach 81% capture of combined sewage generated during wet weather. This falls short of the 85% capture target that CCMUA, Camden and Gloucester selected as the basis for LTCP compliance under the terms of their respective NJPDES permits.

Long term, additional controls will be necessary for the Cooper River, Delaware River back channel, and the Delaware River Gloucester City sub-systems to achieve 85% system-wide capture. The technical options for doing this have been refined. For purposes of long term control planning these options focus on storage through tanks or treatment and disinfection at remote (satellite) facilities. This September 2020 SIAR ~~is~~ did not make a recommendation between storage and treatment. The choice of control technologies will be determined based on the circa 2027 – 2028 updated control alternatives analyses and pending NJDEP approval, memorialized in the subsequent (2029 – 2033) NJPDES permit cycle.

Whatever the ultimate decision, **due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated above and detailed in Section 6 of this report, these controls will require significant external funding and will likely need to be implemented over the 2034 – 2038 permit cycle or later as may be determined in coordination with NJDEP.**

E.9.2 Control Program Elements

The selected long term control program consists of six program elements that will have phased and overlapping implementation schedules (detailed in Section 8). These five elements are:

1. ***Completion of Current Projects* –** CCMUA has completed the capacity expansion of CCMUA's Delaware Water Pollution Control Facility # 1 to 185 MGD. Camden and Gloucester City are progressing towards the restoration of the hydraulic capacities of their respective combined collection sewer system through the comprehensive sewer and outfall cleaning. Camden has completed the rehabilitation of its 28 regulator structures and has expanded the capacity of its Arch Street Pump Station. CCMUA,

Camden and Pennsauken Township are designing and implementing the separation of combined sewered neighborhoods in Pennsauken and other improvements that will reduce street flooding in Camden's Cramer Hill section and provide for CSO control from CCMUA's C-32 overflow structure which discharges into the back channel of the Delaware River. A detailed list of proactive projects undertaken by CCMUA and the Cities is provided in Section 1 of this revised SIAR.

2. ***Iterative Efficacy Evaluation*** - The evaluation of the efficacy of these current improvements through comprehensive flow monitoring which will inform the refinement and recalibration of the existing hydrologic / hydraulic model to then current conditions. This will establish a new baseline of overflow statistics informed by the wet weather operating history with these capacity improvements in place. Similar evaluations may occur after other milestone projects such as the implementation of the formalized green stormwater infrastructure and the street flooding mitigation program elements. CCMUA has conducted targeted flow monitoring and model extent expansion since the initial SIAR submission in September of 2020 in support of ongoing projects.

3. ***Formalized Green Stormwater Infrastructure Program*** – Accelerating green stormwater infrastructure through a coordinated, formalized and expanded GSI Implementation Program with the goal of achieving a ten percent reduction in the directly connected impervious areas contributing stormwater runoff to the combined sewer system. GSI projects that have been completed or are under planning and design up to 2023 are described in Section 3.5 of this revised SIAR.

4. ***Street Flooding Mitigation Program*** – The development and rapid implementation of a comprehensive Street Flooding Mitigation Program will be developed within the City of Camden to provide an empirical understanding of the frequency, location and extent of street flooding remaining after the Camden sewer system is cleaned. This will serve as the basis for short and long term operational and capital improvements. Street flooding mitigation projects that have been completed or are under planning and design as of 2023 are described in Section 4.4 of this revised SIAR.

5. ***Cooper River Water Quality Optimization Program*** – The Cooper River is an important environmental, recreational and economic asset for the City of Camden's economic redevelopment. Eliminating Camden's CSOs from the Cooper River is not financially feasible and would not result in water quality compliance. CCMUA and the City of Camden are committing to work with the other Cooper River municipalities, stakeholders and NJDEP to develop a **Cooper River Water Quality Optimization Strategy** during the first NJPDES permit cycle after this SIAR is approved. As detailed in Section 7.6, the CCMUA has developed an initial sampling program for the summer of 2023 to evaluate sampling accessible sites and to start developing contemporary data. Results for Cooper River sampling conducted during the summer of 2023 are provided in Section 7.6.

6. ***Additional Structural Controls*** – Within the limitations imposed by affordability constraints, structural controls are needed in two of the five sub-systems that will raise the level of CSO capture in each sub-system and system-wide to no less than 85% of wet weather flows during the Typical Year.

E.10 Implementation Scheduling and Adaptive Management

The implementation scheduling strategy proposed in this SIAR was informed by the following:

- CCMUA and the Cities have already completed key projects focusing on providing significant near-term overflow and street flooding benefits such as the expansion of the WPCF # 1, upgrading the capacity of the Arch Street pump station and regulator rehabilitation by the City of Camden and substantial progress towards the cleaning of the Camden and Gloucester City collection systems and outfalls.
- Upon the completion of remedial system cleaning by the City of Camden and Gloucester City, CCMUA will undertake a comprehensive flow monitoring program and recalibration of the hydrologic / hydraulic model to establish a contemporary baseline of system performance.
- During the 2024 – 2028 NJPDES cycle, the recalibrated model will then be used for an updated evaluation of control alternatives to define the types, locations, and design standards for additional structural CSO controls needed to achieve 85% system-wide capture for the Typical Year. This evaluation will include an updated financial capability assessment and the proposed Construction and Financing Schedule for NJDEP approval and implementation in subsequent five-year permit cycles.
- The projected costs to fully implement the CSO control strategy are far greater than the financial resources currently available to the Cities of Camden and Gloucester ; and
- The complete implementation of the CSO control strategy presented in this SIAR will span multiple five-year NPDES permit cycles; and will be implemented in the midst of climate and other changes and uncertainties. Therefore, ongoing performance monitoring and adaptive management will be required to adjust the control program to match conditions.

The implementation schedule will synchronize projects, milestones and activities to coincide with the five year NJPDES permit cycles. In brief it includes:

First Five Year Permit Cycle (2024 – 2028)

1. Gloucester sewer cleaning completion by 12/31/23
2. Camden sewer cleaning completion by 10/31/24
3. Gloucester outfall cleaning completion in 2025 or early 2026 (dependent upon aquatic species protection requirements)
4. Flow monitoring of entire CCMUA, Camden Gloucester system (dependent on cleaning and weather conditions, anticipate spring and fall of 2025, or spring of 2026 as needed for adequate data)
5. Formalize Green Stormwater Infrastructure Program by 12/31/25 – implementation ongoing thereafter.
6. Formalize Street Flooding Mitigation Program by 12/31/25 – implementation ongoing thereafter.

7. Continue Cooper River water quality monitoring and develop a Cooper River Water Quality Strategy - through June 2028.
8. Update the hydrologic/hydraulic model – 2026.
9. Updated evaluation of structural control alternatives along with the proposed Construction and Financial Schedule and the updated FCA to be completed no later than June 30, 2028.

Second and Third Permit Cycles (2029 – 2033 and 2034 - 2038)

10. Planning, design, permitting, land acquisition, etc. – (NJPDES Cycle 2: 2029 – 2033)
11. Construction of additional structural controls – (NJPDES Cycle 3: 2034 – 2038)
12. Ongoing implementation of GSI and flood mitigation programs as well as periodic system performance and efficacy evaluation through flow monitoring and modeling.

It should be noted that the dates specified above are contingent on reasonable and timely regulatory approvals and other variables beyond the control of CCMUA and the Cities. Detailed design and construction schedules will be included in the updated structural control alternatives analysis.

The implementation schedule outlined above includes an evaluation at the completion of each five year NJPDES permit cycle. Based on these evaluations, CCMUA and the Cities will revise the LTCP as necessary with NJDEP's coordination and approval. This process exemplifies the concept of adaptive management.

Adaptive Management, as defined by the EPA, is "the process by which new information about the health of a watershed is incorporated into the watershed management plan."[E-1] In the context of the SIAR adaptive management assumes that while the CSO control goals will remain constant, the tactical approaches to achieving the goals must be adjustable.

CCMUA and the Cities will also be subject to a variety of other future conditions beyond their controls which may materially affect the benefits, feasibility and scheduling of the CSO controls described in this SIAR, thereby triggering a need to revise the LTCP. Examples of such triggering conditions include:

- External changes requiring modifications to the fundamental planning bases used in the development of the LTCP or in subsequent design due to changing demographics, municipal collection system conditions, climate change and other external changes, etc.;
- Emergent regulatory requirements specific to the receiving streams (e.g. TMDLs) or in general (e.g. the promulgation of a National SSO Policy);
- Emergent economic and other developments and trends that could materially affect the affordability and CCMUA's and the Cities' abilities to finance the CSO controls;
- Changes to water quality standards and guidance that could affect the types and levels of wet weather controls necessary to meet the program objectives;

[E-1] Watershed Analysis and Management Guide for Tribes (2000) EPA Watershed Analysis and Management Project. Step 5 page 1.

- Innovative and alternative technologies that could enhance water quality and/or reduce costs thereby enabling expanded control efforts.
- The unavailability of supplies, materials, contractors or labor necessary to implement the LTCP as scheduled in the LTCP due to conditions beyond CCMUA's and the Cities control such as a natural disaster or other emergency; and
- Local, state or federal legal impediments to the timely or orderly implementation of the LTCP e.g. lengthy litigation over land acquisition or inability to obtain required permits.

CCMUA and the Cities will inform NJDEP upon becoming aware of circumstances such as those listed above as to:

- An analysis of the issues and implications posed by the condition;
- An analysis of the impacts on the implementation of the LTCP or the efficacy of the controls; and
- A proposed plan of action to address the adverse conditions that will preserve CCMUA's and the Cities' compliance with their NJPDES permits and the requirements of the CSO Control Policy.

1

Section 1

Revised Sept 2023

SIAR Introduction

The first version of this SIAR was submitted to NJDEP on September 30, 2020. It was anticipated that the CSO control alternatives and implementation schedules contained herein would be incorporated into the 2021-2025 NJPDES permits. Due to emergent state-wide regulatory issues, the permit renewals for the 21 combined sewer system permittees in New Jersey were delayed; CCMUA and the Cities anticipate that the renewed permits will be issued later in 2023.

1.1 Regulatory Context and Report Objectives

This document constitutes Camden County Municipal Utilities Authority's (CCMUA) ***Selection and Implementation of Alternatives Report*** (SIAR) developed by CCMUA on behalf of CCMUA, the City of Camden and Gloucester City (the Cities) for the required "Evaluation of Alternatives" under Part IV Section G.4 of CCMUA's New Jersey Pollutant Discharge Elimination System (NJPEDS) permit action (Permit number NJ0026182). The scope of this includes the Cities of Camden (Permit NJ0108812) and Gloucester (Permit NJ0108847).

The SIAR constitutes the third and final NJPDES deliverable addressing the control of wet weather overflows from their collective combined sewer systems. The *System Characterization Report* (2018) documented the physical characteristics and baseline performance of the combined sewer system. The 2019 *Development and Evaluation of Alternatives Report* (DEAR) documented the evaluation of combined sewer overflow (CSO) control alternatives that meet the water quality-based requirements of the Clean Water Act. The SIAR builds upon the DEAR and presents CCMUA's and the Cities' selected control strategy and preliminary implementation schedule. These three reports collectively comprise a complete Long Term Control Plan (LTCP) as required in the NJPDES permits.

Due to the unique and challenging circumstances facing Camden and Gloucester, it was apparent to CCMUA, the City of Camden and Gloucester City from the outset that the communities and the environment will be best served by leveraging a coordinated and collaborative approach combining regulatory compliance, sustainable redevelopment and environmental justice. Towards these ends, the program outlined in this SIAR focuses on near term community benefits through:

- Sustainable community redevelopment using green stormwater infrastructure (GSI);
- Reduce street and basement flooding of combined sewage during storms; and
- The optimization of and reinvestment in existing community assets such as the restoration of the Camden sewer system through comprehensive cleaning.

Despite the permitting delay, CCMUA and the Cities have continued to implement projects with near term benefits. These projects as of September, 2023 are shown on Table 1-1. Additional information is provided in Appendix C to this revised SIAR.

Table 1-1 – Proactive CSO Control Projects

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
Cleaning of Camden CSO outfalls	Camden	CCMUA	Estimated ~ 90% complete, projected completion 2023	• 2016 AW inspection report indicated 17 outfalls required dredging, 10 downstream of CSO regulators and 7 storm waters. • Camden City and CCMUA implemented two parallel cleaning and dredging projects to expedite restoring the hydraulic capacities of the affected outfalls.
Camden regulator mechanism rehabilitation	Camden	CCMUA	Completed 2022	• 28 regulators were rehabilitated. • C-1 to C-9 all new mechanical equipment installed. All remaining regulator equipment was removed, and chambers were cleaned and coated.
Arch Street Pump Station capacity expansion	Camden		Completed 2020	• 3 new 100 hp motors • 3 new 24.25” impellers (upsized) • Increased firm capacity from 7,000 GPM per pump to 11,000 GPM per pump.
Initial remedial Camden collection system cleaning	Camden		~ 76% completed (linear footage)	• Ongoing system cleaning to address deferred maintenance prior to 2016. • 179 miles of combined and sanitary collection sewers. • 146 miles (82%) cleaned to date. • Tons removed per mile have increased significantly in recent years, slowing linear progress.
Gloucester System Cleaning	Gloucester City	CCMUA		• Approximately 18 out of 39 miles of sewers have been cleaned and jetted. Gloucester City anticipates that the system-wide cleaning will be completed within 2023. • In August of 2023 CCMUA conducted an inspection of the Gloucester outfall structures and of the regulator structures, resulting in the identification of outfall structures with obstructions. These are expected to be cleaned in 2025 and into 2026 (cleaning schedule subject to aquatic species protection requirements).

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
Completion of the expansion of CCMUA's WPCF # 1 to 185 MGD	CCMUA		Completed	• Reconfiguration of influent chamber to separate the Camden and County interceptor sewers (2020) • Upgraded influent pumps & related power supply equipment.(2021) • Optimization of existing tankage & equipment and removed hydraulic bottlenecks (2020)
Development and Implementation of Green Stormwater Infrastructure (GSI) Program Plan – target reduction of 2% (30 acres).	Camden	CCMUA / Camden Co.	Design	Port Road improvements
		CCMUA	Planning / Design	Harrison Avenue / State Street - Complete Streets Project(s)
		CCMUA, Camden SMART	2017 – 2020 Completed	Various Camden SMART GSI projects totaling **2.75 acres**
			2021 - 2023	Various GSI projects totaling **6 acres**.
	CCMUA	Camden	Planning / conceptual design	C-32 sewershed green stormwater infrastructure
	Gloucester City		Design / planning	• Conceptual design for **4 acre** GSI target area completed in dense older area subject to street flooding bounded by Monmouth, Ellis, ,Mercer and King Streets. • Johnson Blvd. Park improvements to include rain gardens. • Repairs to the rain gardens at the water treatment facility have been completed.
Develop and implementation of Camden Street Flooding Mitigation Program	Camden	CCMUA	Design	Harrison Avenue street flooding mitigation project . Also see flood mitigation under C-32 project.

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
Develop the Cooper River Regional Water Quality Optimization Strategy	CCMUA		on-going	CCMUA developed Cooper River water quality sampling plan and program started May 2023.
Reduction of wet weather flow from Pennsauken into the Camden combined sewer system in sewershed C-32.	CCMUA	Pennsauken, Camden	design	C-32 Program Elements: • Implementation of Pennsauken Sewer Separation projects. • Conveyance of separated Pennsauken stormwater to Delaware back channel in new dedicated pipe and/or • Targeted sewer separation in East Camden to synch with Pennsauken separation. • Includes catch basin location and configuration optimization.

1.2 Overview of the Combined Sewer System

The Combined Sewer System that this SIAR addresses consists of the respective collection systems owned and operated by the Cities of Camden and Gloucester and the portion of the CCMUA's regional conveyance interceptor system that is located within the Cities of Camden and Gloucester. The Camden and Gloucester sewer systems are shown on Figure 1-1.

There are 34 sewersheds within the Camden and Gloucester combined sewer collection systems. These include twenty-seven within the City of Camden and seven in Gloucester City. Each of these sewersheds drain to a regulator structure controlling the amount of wet weather flow that enters into the CCMUA interceptors from the Camden and Gloucester trunk sewers. As of 2018, there are a total of 30 active CSO outfalls located within the two cities, with several outfalls serving more than one regulator structure. Overflows from CSO outfalls discharge into three receiving streams: the Delaware and Cooper Rivers and Newton Creek. Each active outfall has an overflow netting facility controlling the discharge of solids and floatables. Dry weather flows and captured wet weather flows are treated at CCMUA's Delaware No.1 Water Pollution Control Facility (WPCF). The general characteristics of the combined sewer system are summarized on Table 1-2.

Table 1-2– Collection System Overview

Permittee	# Sewer-sheds	Collection System Pipe in Miles[1-1]	Appurtenances				Contributing Area (square miles)
			Active Regulators	Active Outfalls	Pump Stations	Overflow Netting Facilities	
Camden	27[1-2]	173	24	22	8	22	6.6
Gloucester	7	39	7	7	7	7	1.6
CCMUA			1	1	2	1	
Totals	34	212	32	30	17	30	8.2

Improvements completed in 2020 by CCMUA and the City of Camden have resulted in the expansion of CCMUA's Delaware No. 1 WPCF wet weather treatment capacity from 150 (wet weather) to 185 MGD and the restoration of the hydraulic capacities of the Camden and Gloucester City sewer systems, including stormwater inlets and CSO outfalls to current design capacities through comprehensive cleaning. The restoration of the hydraulic capacities is critical to Camden's efforts to reduce street flooding which can occur during wet weather.

The results of these ongoing improvements are summarized on Table 1-3. The projected reduction in CSO volume, increased capture rates and reduction in surface flooding resulting from these early implementation steps may be noted.

Table 1-3 – System Wide Performance Characteristics Used for Control Alternatives Development

System Wide Performance Metrics		Baseline Condition	Upon Completion of Current Improvements*
		Camden Hydraulic Capacity not Restored	*Camden Hydraulic Capacity Restored*
WPCF # 1 Capacity		150 MGD	185 MGD
1	% Capture	66%	76%
2	Overflow Volume (million gallons)	900	618
3	Range of Overflow Frequencies (events)	10-69	10-69
4	Modeled Surface Flooding (million gallons)	94	44

*WPCF # 1 capacity at 185 MGD + Camden collection system hydraulic capacity restoration

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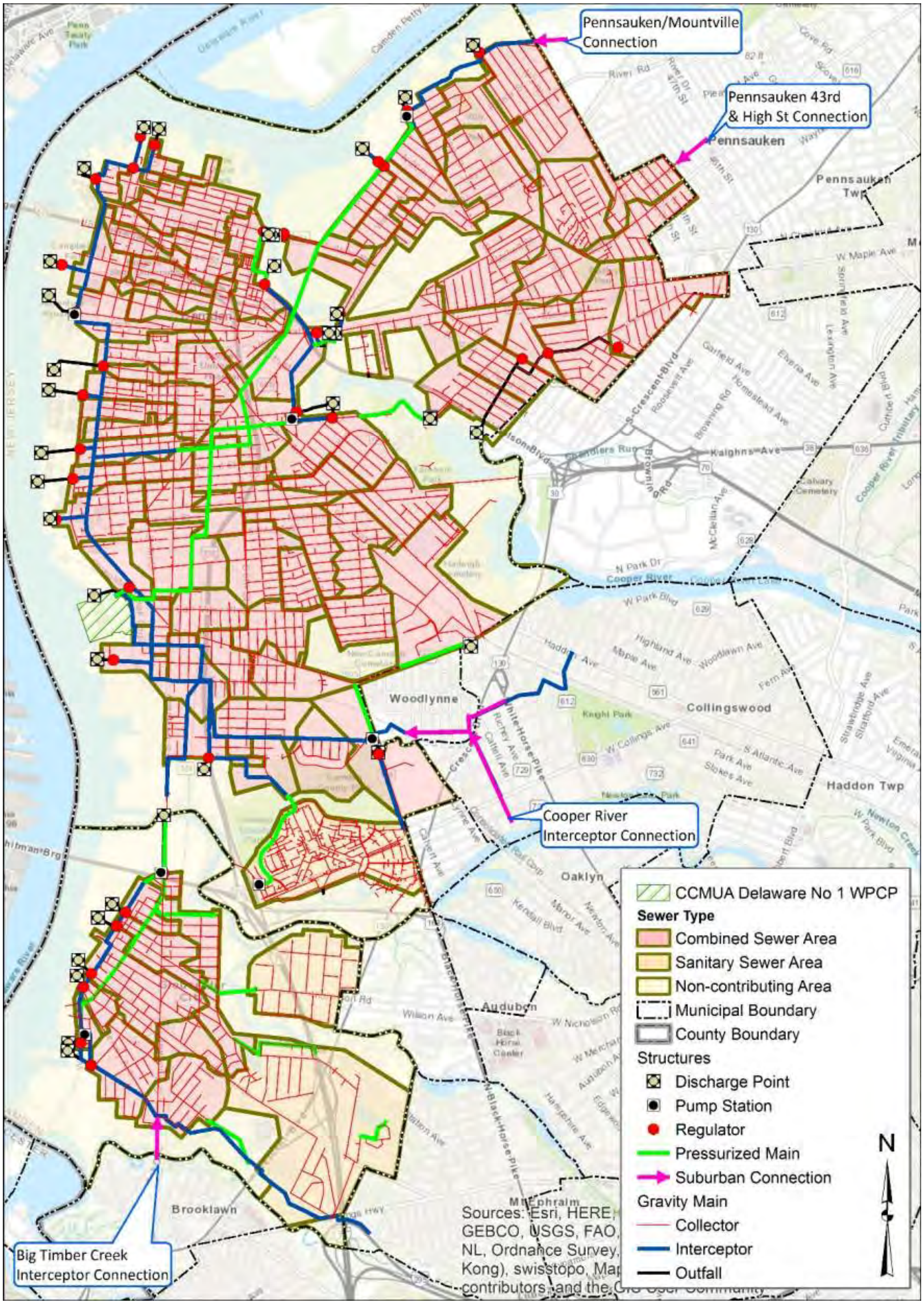
[1-1] Source: Table 2-2 from the Sewer System Inventory and Assessment / Facilities Inventory and Assessment Analysis Final Report prepared by CH2MHill, November 1999-69

[1-2] Includes Camden sewersheds flowing to the C-32 regulator for which CCMUA is the permittee.



Sources: Esri, HERE, GEBCO, USGS, FAO, NL, Ordnance Survey, swisstopo, Map contributors, and the GIS User Community

Figure 1-1
Camden and Gloucester Sewer Systems Base Map

1.3 Previous Studies

This report builds upon the information provided in the previous studies required under the Cities' and the CCMUA's respective NJPDES permits as well as other studies and documents prepared for the Cities and for CCMUA. These are listed in Table ~~1-3~~ 1-4.

Table 1-4 – Previous Studies

Title		NJDEP Approval Date
1	System Characterization Report (SCR)	Jan. 2019
2	Baseline Compliance Monitoring Report	Feb. 2019
3	Baseline Consideration of Sensitive Areas	Jan. 2019
4	Development & Evaluation of Alternatives Report (DEAR)	Nov. 2019

1.4 Overview of Control Alternatives in the DEAR

This Selection and Implementation of Alternatives Report (SIAR) builds upon and incorporates the findings of the 2019 DEAR that:

- The control performance target will be system-wide 85% capture of wet weather combined sewer flow during the typical year;
- All control strategies assume that the hydraulic capacity of the Camden collection system will be restored through the ongoing cleaning of the pipes and the CSO outfalls and that regularly scheduled cleaning will occur to maintain the restored hydraulic capacity;
- All control alternatives will incorporate a target controlling runoff from no less than 10% of the directly connected impervious area within the combined sewer system through green stormwater infrastructure;
- CCMUA's WPCF No. 1 wet weather treatment capacity can be expanded further from the soon to be completed 185 MGD capacity of up to 220 MGD;
- Achieving a 10% reduction in directly connected impervious areas along with the expansion of wet weather treatment capacity up to 185 MGD is projected to bring the system-wide capture rate to 81%. Further expansion to 220 MGD would bring the capture rate to 82%; just short of the 85% target. Moreover, the capture rates in three out of the five sub-systems (Delaware River - Gloucester City, Cooper River and Delaware River-Back Channel) will be well below the 85% capture target without additional controls. The five sub-systems are shown schematically on Figure 1-2.
- Therefore, satellite facilities to raise wet weather capture rates to no less than 85% using storage tanks or enhanced high rate clarification treatment facilities were evaluated.

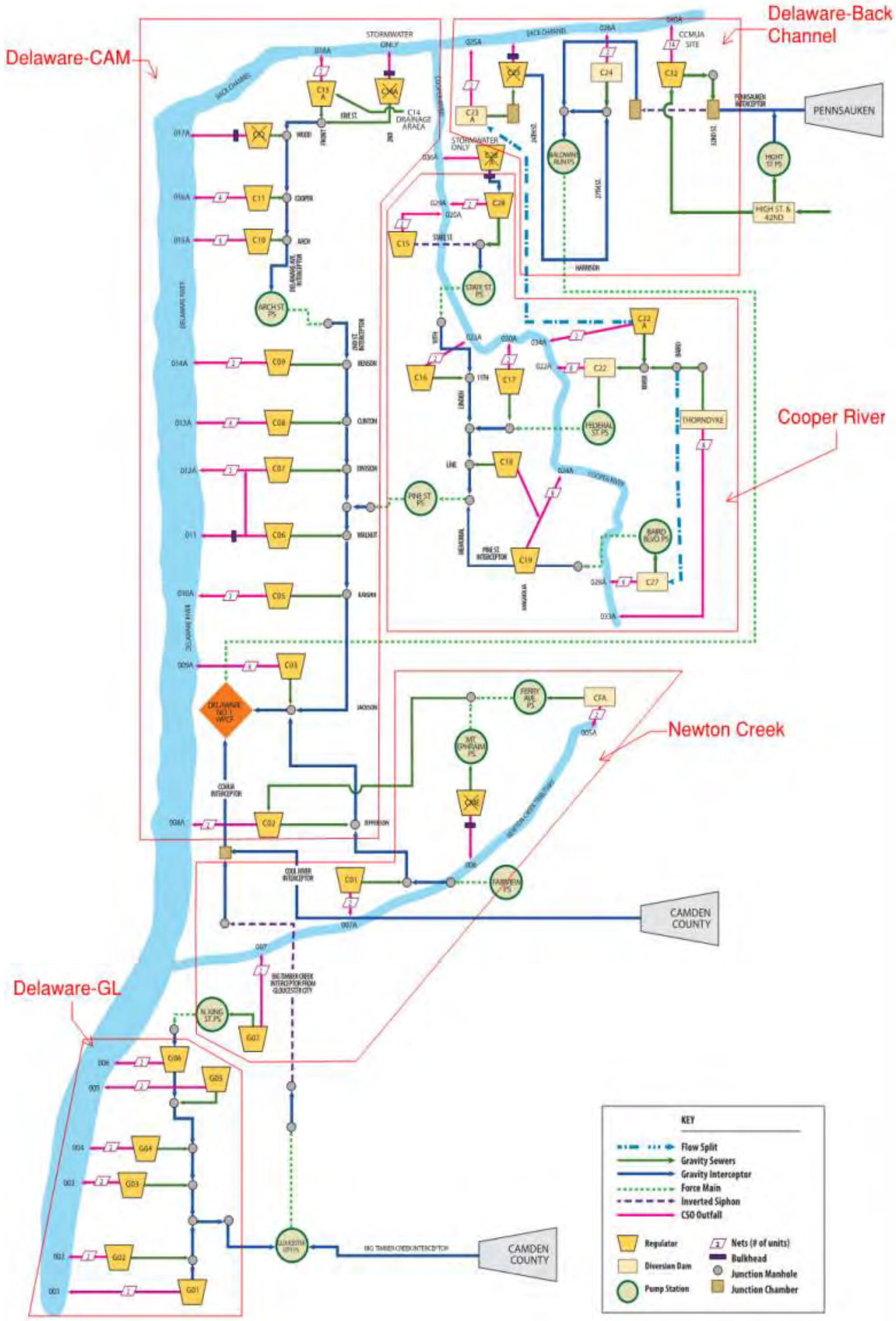


Figure 1-2 – Combined Sewer System – Five Subsystems

1.5 Organization of Report

Table 1-5 provides the locations of the elements referenced under the NJPDES permit within this SIAR. This SIAR combined with the SCR and the DEAR together comprise a complete long term control plan (LTCP) the requirements for which are set forth in Part IV Section G of the NJPDES permits. To verify that all of the Section G requirements have been addressed in the LTCP, references to all relevant Section G requirements are provided.

Table 1-5 – Location of NJPDES Referenced Elements of the LTCP

Permit Section	Permit Requirement	Section Location
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 communities for appropriate Characterization, Monitoring and Modeling of the Sewer System."	Entire SCR
Part IV G.1.b	"The characterization shall include a thorough review of the entire collection system that conveys flows to the treatment works including areas of sewage overflows, including to basements, streets and other public and private areas, to adequately address the response of the CSS to various precipitation events"	SCR Section 2
Part IV G.1.b	"The characterization shall identify the number, location, frequency and characteristics of CSOs"	SCR Section 7
Part IV G.1.b	"The characterization shall identify water quality impacts that result from CSOs"	SCR Section 4
Part IV G.1.d.i	Rainfall Records Analysis	SCR Section 6
Part IV G.1.d.iii	CSO Monitoring	SCR Section 5
Part IV G.1.d.iv	System Hydrologic & Hydraulic Modeling	SCR Sections 3 & 5

Permit Section	Permit Requirement	Section Location
Part IV G.1.d.ii	Combined Sewer System Characterization	SCR - all
G.4.b	• Ensure CSO controls will meet water quality requirements of the CWA; • Protect existing and designated uses; • Prioritize sensitive areas	SIAR Section 7.0
G.4.c	The permittee shall select either the Demonstration or Presumption Approach for each group of hydraulically connected CSOs and identify each CSO group and its individual discharge location.	DEAR 3.0
G.4.d	The Evaluation of Alternatives Report shall include a list of control alternative(s) evaluated for each CSO.	DEAR 5.3
G.4.e	The permittee shall evaluate a range of CSO control alternatives: i. Green infrastructure ii. Increased storage capacity iii. STP expansion, CSO related bypassing and/or storage iv. I/I reduction v. Sewer separation vi. Treatment of the CSO discharge vii. CSO related bypass	DEAR 4.4
G.4.f	The Presumption Approach – documentation of conformance with one of the three criteria.	DEAR 5.4
G.4.g	The Demonstration Approach – Documentation of conformance with all of the four criteria.	Not Applicable
G.5.a	Cost-Performance Considerations – Conduct “Knee of the Curve” analysis for a range of overflow event control levels.	SIAR 5.0

1.6 Stakeholder Involvement in the SIAR Development

1.6.1 Introduction

The City of Camden and Camden County Municipal Utilities Authority (CCMUA) actively and consistently work together to engage, inform and educate the public on the following key issues:

1. Combined Sewage Flooding;
2. Combined Sewage Overflows; and
3. The development of a long term control plan.

Actively engaging with the community predates the start of the Long Term Control Plan (LTCP) process. The Camden SMART (Stormwater Management and Resource Training) Initiative, a voluntary collaboration among the City of Camden, CCMUA, Cooper’s Ferry Partnership, Rutgers Cooperative Extension Water Resources Program, New Jersey Tree

Foundation and the NJ Department of Environmental Protection, was formed in 2011 to protect human health, improve conditions for economic development, improve water quality and enhance the quality of life for the residents of Camden City through the use of green and grey infrastructure. The Camden SMART Initiative also has a robust public outreach component.

The creation of the Camden SMART Initiative began an era of public outreach and education on the combined sewage flooding and overflow issue that continues to grow and thrive. The goals of the Camden City and CCMUA public outreach and education program are as follows:

1. ***Inform*** – bring awareness to the public health threat of combined sewage flooding, water quality issues associated with combined sewage overflows, and the LTCP process.
2. ***Educate*** – delivering basic knowledge on why combined sewage flooding and overflows occur and the steps entities like Camden City and the CCMUA can take to correct these problems.

Camden City and the CCMUA meet the goals of informing and educating in the following ways:

1. Passive, General Public Outreach – websites, flyers, posters;
2. Targeted, General Public Outreach – providing flyers, posters, pamphlets and other educational materials at public events like environmental fairs and through bill inserts;
3. Educational/Workforce Programs – The PowerCorps and Green Ambassador Programs
4. Demonstration Projects – Implementation of Green Infrastructure sites throughout Camden City;
5. Mitigation Projects – The Camden City Rain Barrel Installation Program and water conservation kits; and
6. Forums and Summits – events which gather together stakeholders and interested parties to discuss combined sewage flooding and overflow issues.

The need for engagement, outreach and education varies greatly across the service areas of Camden City and CCMUA and is dictated by the type of sewer system which services the geographic location of a customer's home or business.

Nearly all the residents and business owners of Camden City make up the affected public due to the public health concerns associated with combined sewage flooding. It is important to not only inform the Camden City public that combine sewage flooding exists (so they can avoid if possible) but to educate them on ways (green infrastructure, rain barrels, water conservation) to minimize inputs to the system to minimize the volume during flooding events.

Except for Gloucester City, the rest of the CCMUA customers are from 35 suburban municipalities that have separated sewer systems. The CCMUA has concentrated its LTCP public outreach efforts on informing the public of the combined sewage system issues in Camden and Gloucester Cities. The CCMUA has also worked with local officials from the suburban municipalities to educate them on infiltration and inflow (I&I) issues.

The desired outcome of the Camden City and CCMUA public outreach and education effort is to bring attention to the public health hazard of combined sewage flooding and the detrimental effects of combined sewage overflows on the quality of the receiving water body until the responsible entities can eliminate combined flooding in its entirety and effectively control overflows.

1.6.2 Completed Outreach Activities

A description of outreach activities that have been completed prior to and during the development of this SIAR is provided below. The materials referenced are provided in the Appendix to this document and are labeled as appendix item A-1, etc.

1) Camden SMART and Green Infrastructure Sites

Camden SMART (Stormwater Management And Resource Training) Initiative was founded in 2011 by a coalition of six entities - Cooper's Ferry Partnership (CFP), the City of Camden (City), Camden County Municipal Utilities Authority (CCMUA), Rutgers Cooperative Extension Water Resources Program (RCE), New Jersey Tree Foundation (NJTF), and the NJ Department of Environmental Protection (NJDEP)- the Camden SMART Initiative is a community-driven movement to protect human health, improve conditions for economic development, improve water quality, and enhance the quality of life for Camden City, its residents, and the Delaware River watershed through the broad use of green and grey infrastructure techniques for stormwater management.

Because of Camden's aging and overtaxed combined sewer system, a one-inch rainstorm can leave major roads impassable, turn parking lots into stagnant lakes, and send sewage into parks, homes, and waterways. Not only is this a nuisance, it is a public health crisis that degrades the quality of life of Camden's residents and negatively impacts the City's economic viability and environmental quality. The objective of the Camden SMART is to develop a comprehensive network of green infrastructure programs and projects to solve the combined sewer problem in the City of Camden.

The "Camden SMART Green Infrastructure Sites" (A-1) lists the projects which manage stormwater in Camden City. These sites have signs developed by Rutgers Water Resources Staff that explain the stormwater features to the public. The sites provide a visual reminder of the need to manage storm water in this combined sewer overflow community. The selection and design of these sites involve engaging the community throughout the process. Meetings and site visits are conducted throughout the process. Site 63 is currently in the design phase with The Trust for Public Land whose process involves extensive public outreach. Construction will begin this year on Sites 62, 64, 65 and 66.

2) PowerCorps Camden

PowerCorps Camden is an AmeriCorps direct service program focused on improving Green Infrastructure in the City of Camden. In partnership with Camden County Municipal Utilities Authority (CCMUA) and the City of Camden under the National Governor and Mayor's Initiative, Center for Family Services launched the program in December 2015, with the goals to improve outcomes for opportunity youth and improve green infrastructure in Camden City.

Over the last five years, PowerCorps Camden has aimed to increase economic opportunity through job training and readiness for up to 60 youth each year. Since inception, 171 Camden City residents have served and over 730 acres of land have been treated by PowerCorps members in Camden. Through projects focused on Camden's green infrastructure network, PowerCorps members play a key role in maintaining green infrastructure installations including rain gardens, city and county parks, vacant lots, and stormwater inlets that comprise Camden City's network. The members are all familiar with the issues of combined sewer systems and help to maintain the sites listed in the appendix "Camden SMART Green Infrastructure Sites". Through knowledge and skills training, some which is provided by Camden SMART and Camden Collaborative Initiative partners, PowerCorps Camden develops and nurtures young adults into environmental stewards and strong candidates for the workforce. In addition, at the beginning of each cohort, our Camden SMART partners from Rutgers University provide a day of education to teach each member about the combined sewer issues that Camden faces and the benefits of green infrastructure.

The service projects PowerCorps Camden members take part in are often in collaboration with CCMUA, the Camden SMART partners and many of the Camden Collaborative Initiative partners. In addition to general green infrastructure maintenance, members take part in environmental trainings, group service learning trips and in varied innovative projects, including repurposing concrete/rubble from construction sites to create barriers that protect existing rain gardens within the city. These collaborations allow for members to expand their environmental knowledge while also having a real and lasting impact on the City.

3) *Green Infrastructure Maintenance Activities*

Periodically, environmental stewardship events are held in the city so that all stakeholders including local citizens, local workers, non-profits, and governmental entities can be educated about, and actively participate in, the green infrastructure projects addressing combined sewer flooding and overflows. Since May of 2015, over 600 people have actively participated in such events.

On 5/04/2018 and 5/11/2018 the CCMUA and the Center for Family Services organized an event for 20 Subaru staff that work in Camden City. The staff maintained and planted at five Camden SMART rain gardens. On both days the combined sewer flooding issues were discussed. Rutgers staff and Rutgers Environmental Stewards, New Jersey Tree Foundation, Camden PowerCorps, Coopers Ferry Partnership, New Jersey Conservation Foundation and CCMUA staff all helped at the rain gardens.

On 4/16/2018 the New Jersey Tree Foundation and Coopers Ferry Partnership organized 50 people who planted 20 trees at Gateway Park. Urban Promise students, Camden PowerCorps, Coopers Ferry Partnership, New Jersey Conservation Foundation, Delaware Riverkeeper and CCMUA staff all helped with the planting which was attended by Camden's Mayor Frank Moran.

On 4/11/2018 the Authority staff organized a renovation of the Camden SMART rain garden at the Urban Promise School, 3700 Rudderow Street. The students in the school's environmental program worked with the Camden PowerCorps and installed a new rubble border to protect the rain garden. The CSO flooding issues in the City were discussed with the group. Rutgers Environmental Stewards assisted with the project which involved 35 people.

On 10/12/2017 Camden Public School, Brimm Medical Arts hosted "Imagine a Day Without Water" (A-2). Camden SMART presented to 90 students and faculty. The presentation is attached. It included; Combined sewer system & Green infrastructure, Camden SMART, Camden Reports, Impact of development on local water sources, Water pledge and rain barrel painting, Rain garden re-fresh.

On 9/20/2017, our Authority hosted Camden City's Aramark Building Communities Day. 45 Aramark employees worked at three sites to maintain Camden SMART rain gardens and associated green infrastructure. Rutgers, New Jersey Tree Foundation, New Jersey Conservation Foundation, Coopers Ferry Partnership and CCMUA staff all helped by instructing the volunteers and describing the CSO issues these features work to mitigate.

On 9/17/2017 Jeremiah Bergstrom, LLA, ASLA, Senior Research Project Manager, Rutgers Cooperative Extension Water Resources Program, Rutgers, The State University of New Jersey conducted a site visit for 30 Rutgers Environment Stewards.

On 8/20/17 Camden SMART staff worked with 30 New Jersey American Water employees to maintain the 29th Street Rain Gardens. The gardens were weeded, cleaned up and new plants were added.

On 6/07/2017 Camden SMART held the Camden Environmental Summit and 250 people attended this day-long event held at Rowan University. Panel discussions were held on the following topics: Voices of Camden's Aspiring Green Leaders, Don't Waste Our Open Space, Resilient and Healthy Futures for New Jersey's Environmental Justice Communities, Building Healthy Environments for Food Access and were followed by a CCMUA Facilities Tour. The CCMUA Executive Director, Andrew Kricun, lead 50 people on a tour of the Regional Sewer Treatment plant. The summit was organized by the members of Camden SMART.

On 4/28/2017 the New Jersey Tree Foundation held an Arbor Day celebration. At the Camden Day Nursery volunteers planted street 10 trees. The Arbor Day event was attended by Rutgers University, New Jersey Tree Foundation, New Jersey Department of Environmental Protection, Camden City, Coopers Ferry Partnership and CCMUA staff.

On 9/15/2015, 16 volunteers from Stantec along with the New Jersey Tree Foundation, Rutgers Water Resources, Coopers Ferry Partners, Camden County Soil Conservation District and CCMUA staff planted the Union field rain garden.

On 5/13/2015, 21 Home Depot volunteers along with the New Jersey Tree Foundation, Rutgers Water Resources, Coopers Ferry Partners and CCMUA staff maintained the

Waterfront South Rain Gardens. The gardens were weeded, mulch and plants were added to the rain gardens.

4) *Camden Rain Barrel Installation Program*

This program, modeled after a successful Philadelphia Water Department Program, began in late June 2017. Community Rain Barrel Meetings are set up throughout Camden City. City residents who attend a one-hour meeting are then eligible to have a free rain barrel installed at their home. The one-hour meeting describes how the rain barrel functions and the problem with combined sewer systems. This educational program is presented by the Pennsylvania Horticulture Society. PHS staff make the arrangements with a contractor to install the rain barrels at the homes in Camden City. Camden SMART Partners are responsible for the promotion of the program and make the arrangements for the meetings. Flyers are printed and distributed by the Camden PowerCorps and by the host organization. The "List of CSO Supplemental Information Distributed" (A-3) has the date and number of flyers distributed for each rain barrel meeting. 16 rain barrel meetings have been held in most of the city's neighborhoods. Online or phone registration is accepted for the meeting. 190 people have attended the meetings and 110 rain barrels have been installed since the program began.

In conjunction with the Camden PowerCorps, an informational video promoting rain barrel use and their purpose in a community with a combined sewer system. The video was posted online and an additional 30 city residents participated in the installation program. The link to the video can be found in the "List of CSO Supplemental Information Distributed".

5) *Customer Mailings*

CCMUA has 160,000 customers that are charged every three months for sewer service. Our customers are the properties in Camden County that are connected to the sewer system. The "List of CSO Supplemental Information Distributed" has the date and number of educational flyers distributed to our customers by mail.

6) *Brochures at Public Events*

The CCMUA has several brochures available in the lobby of our administration building designed to inform our rate payers of various stormwater-related issues that affect the county. The Appendix includes a sample of each of these brochures: 7 SMART Steps (A-4a) to reduce neighborhood flooding and improve stormwater management; How to Prevent Stormwater Pollution (A-4b); Camden SMART Initiative; Camden County Conserves - Saving Water, Saving Money (A-4c); Toilets Are Not Trashcans(A-4d). These valuable sources of information are also given out at the various summits, festivals, school and community events, county fairs and public education events that the Authority participates in. At each of these events, a representative of the CCMUA staffs a table to engage with the public, answering questions and providing information about the Authority and its initiatives. These information table events attract and educate hundreds of families each year and include:

- The Camden Environmental Summit – 6/14/17
- Camden Jam: Arts and Music Festival – 9/9/17

- Camden River Days – 9/23/17
- The VietLead Harvest Moon Festival – 10/7/17
- National Community Development Week: Cramer Hill – 4/3/18
- National Community Development Week: Fairview – 4/5/18
- St. Anthony's of Padua School Art Show – 4/19/18
- The Camden Environmental Summit – 6/6/18
- The Camden Environmental Summit – 11/21/19

In addition to Camden City, brochures and information on the broader wastewater system of the County is made available at various annual county events such as:

- Collingswood May Fair
- Mt. Ephraim Night Out
- Blackwood Pumpkin Festival
- Camden County Fair
- Collingwood Green Festival
- International Day
- Gloucester Township Day

7) *Media Outreach*

The LTCP team has conducted extensive outreach through conventional media and the CCMUA web site. Media coverage of the team's actions in reducing combined sewer overflows and activities in promoting public awareness of CSO problems and solutions has been extensive and is listed in "Media Mentions"(A-5). Each press mention was posted on the CCMUA web site. The reported news fell into one or more of the following categories:

- Water conservation efforts, including green infrastructure and rain barrel programs
- Impact of combined sewer overflows on environmental justice communities
- Reduction of combined sewer overflows as a best management practice for wastewater utilities
- Benefits of public investment in infrastructure
- Public and organizational recognition of CCMUA/Camden SMART/Camden Collaborative Initiative efforts
- Contribution of green space and parks to stormwater management
- Impact of climate change on water infrastructure planning
- Wastewater treatment as a resource (e.g., for energy generation and process cooling)
- Publicization of innovative financing for infrastructure and other techniques to support stormwater reduction

8) *CCMUA Website Information*

The CCMUA Web site (http://www.ccmua.org) provides a central resource for relevant information available to the general public, including:

- Home page
    - Brief description of Camden County's regional sewer system and the impact of being connected to combined municipal sewer systems

- News Archive page
    - Links to each of the news items described above and listed in the Appendix
- Green Initiatives page
    - Link to Camden SMART web site (http://www.CamdenSMART.com)
    - Rain Gardens and other green infrastructure projects
    - Climate change information
    - Water Conservation
    - Energy Self-Sufficiency
    - Environmental Management System
    - Camden Collaborative Initiative
    - Living shorelines
- Education page offers informational material on
    - Opportunities for tours
    - Wastewater treatment plants processes
    - Keeping harmful materials out of the system
    - Wastewater industry best practices
    - Strengthening water and wastewater infrastructure
    - Pollution in waterways
    - Other material prepared by partners, distributed as inserts with CCMUA's quarterly bills, including:
        - River and watershed information
        - Stormwater and steps to reduce flooding
        - Water conservation
- Contact information for Authority officials and staff

9) *Green Ambassadors Summer Internship Program*

In 2014 the Green Ambassadors Summer Internship Program began with 10 Camden City high school students. The purpose of the program is to create a group of local young people who can serve as ambassadors of the environment to the people of Camden. The interns participate in hands-on work experience and classroom-style environmental education that introduces them to environmental issues, solutions, and careers. By participating in this program students work to transform the city into a greener, cleaner, safer community while experiencing meaningful employment and environmental education.

The program maintains a special focus on the environmental issues that impact Camden specifically, chief among which is the problems of combined sewer flooding and overflows. Each summer the interns tour our facility and green infrastructure sites and are educated about the causes and effects of the combined sewer issues in the city. To date, 80 youth have completed the program and have gone back to their neighborhoods to spread the word about Camden's environmental issues, as well as the steps being taken to address them. A description of the Green Ambassadors program can be found in the appendix (A-6).

1.6.3 CSO Supplemental Team

Camden City and the CCMUA used the *Forming and Utilizing Your Supplemental CSO Team* guidance document (A-7) and worked with the NJDEP via email correspondence (A-8) in creating the CSO Supplemental Team (CSOST). The result of those efforts is a CSO

Supplemental Team made up of more than 20 individuals representing more than 15 entities and was considered to be representative of the area and its needs (see Appendix A-9 for a complete listing of invitees). Camden City and the CCMUA understand that that there is a likelihood there are other interested parties whom they are not aware of but that should be part of the CSOST. To compensate for this likelihood, all CSOST invitees were asked, and have been continued to be encouraged, to identify and invite people and/or entities they feel should be involved in the LTCP process.

All individuals that were identified as potential CSOST members were sent a letter via email on or around April 7, 2018 (see sample in Appendix A-10) which explained the LTCP, the public participation component of the LTCP and asked them if would join the CSOST. It also conveyed the stated purpose of the CSOST as follows: Through the CSO Supplemental Team, the City and the CCMUA will gain a public perspective on CSOs, local water quality issues and sewer system problems including flooding.

The first convening of the CSOST took place on May 25, 2017. The goal of the meeting was to bring together the team and give an overview of combined sewer systems and the LTCP. The PowerPoint used in that meeting is provided (A-11).

The second convening of the CSOST took place on December 13, 2017. The goal of the meeting was to gain feedback from the team regarding Sensitive Areas in the combined sewer system area, especially primary contact recreation waters. Representatives from the CCMUA, the City of Camden, and the DEP met with community members and local organizations to discuss and determine which sections of the waters affected by CSO overflows require special consideration because of the possibility of direct or indirect contact through recreational activities. A list of the attendees and the organizations they represented can be found in appendix A-12.

A presentation was given by the Executive Director of the CCMUA to explain the combined sewer issue as a whole, the goals of the Long Term Control Plan, and the importance of identifying Sensitive Areas. Slides from the presentation (appendix A-13). Subsequent discussions with the attending members of the CSO Supplemental Team revealed which areas of the Cooper River, Newton Creek and Delaware River back channels are frequently canoed upon. A map of these locations can be found in appendix A-14. The magnitude of the recreational activities was estimated through the Urban Promise Ministries' Urban Trekkers Program representatives; In a given year, over 500 participants canoed these waters through the Urban Trekkers program.

The third Supplemental Team Meeting was held on July 17th, 2018 to examine the findings of the System Characterization Report. The then-current condition of the combined sewer systems of Camden and Gloucester City was discussed as the basis for future green and grey strategies for reducing the volume of overflows into the waterways of the community.

The fourth Supplemental Team meeting took place on June 18th, 2019, the invitee list can be found in appendix A-15. The various partners, stakeholders and community leaders discussed the elements of the DEAR including the CSO control goals for each receiving water segment the types of control alternatives identified as potential solutions to meet the LTCP requirements.

The fifth Supplemental Team meeting was held on January 16th, 2020, the sign in sheet for the meeting can be found in appendix A-16. This meeting focused on the effects of increasing the treatment plant capacity would have on the CSO control goals, and projected effects of 10% DCIA disconnection. The effects on specific sewershed subsystems were discussed, focusing on the probable need for new capital projects at C32 and the C27/Thorndyke Outfalls. The group discussed the various options at each location that would be required, and how each would impact the community in which they were placed. The presentation given to the group at this meeting can be found in appendix A-17.

1.6.4 Additional Municipal Coordination

During the development and finalization of this SIAR, CCMUA held the following coordination meetings (virtual after January) with the City of Camden and Gloucester City:

- Meeting with Camden and Gloucester engineers, attorneys and public works officials (January 29, 2020)
- Distributed draft SIAR to the City of Camden and Gloucester City
- Discussion of draft SIAR with Cities' administrative and technical officials (June 1 and June 8)
- Presentation of the SIAR to the Mayors and executive teams of the Cities (Week of August 9th)
- Presentation of the SIAR to the Cities' Councils (Weeks of August 30th and September 7th).

2

Section 2

Maximizing Flows to WPCF # 1

2.1 CCMUA's Water Pollution Control Facility # 1

CCMUA treats approximately 53 million gallons of sewage per day at its wastewater treatment plant, which is referred to as the Delaware No. 1 Water Pollution Control Facility (WPCF), or simply "the plant." The plant was expanded in the 1980s to a secondary treatment facility with a capacity of 150 MGD. The WPCF operates under NJPDES Permit No. NJ 0026182, with primary year-round permit limits shown below in Table 2-1. The average influent CBOD and TSS concentrations are approximately 187 and 208 mg/L respectively, which is representative of a medium strength wastewater.

Table 2-1 – Delaware WPCF #1 Effluent Limits

Parameter	Monthly Average	Weekly Average
Flow Through Treatment Plant	Monitor & Report	
Total Suspended Solids	30 mg/l	45 mg/l
	85% removal	
Carbonaceous Biochemical Oxygen Demand	25 mg/l	40 mg/l
	85% removal	
Ammonia	35 mg/l	
Fecal Coliform	200 geometric mean #/100 mL	400 geometric mean #/100 mL

The four (4) raw sewage pumps together can provide a firm capacity (largest pump out of service) of 150 mgd, which is the maximum wet weather capacity at the plant. The treatment plant processes train[3-1] include preliminary treatment, primary sedimentation, aeration, final sedimentation, and disinfection. The process train flow is diagramed on Figure 2-1.

In 2017 CCMUA completed a study of alternatives for the upgrading of its WPCF #1. The study recommended a two phase program for the treatment plant. Under phase 1 the plant would be expanded to provide 185 MGD in full secondary treatment capacity. This expansion was completed in 2020. The study also determined that it is feasible to further increase wet weather treatment capacity up to 220 MGD using CSO related bypassing. The potential increase in wet weather treatment capacity up to 220 MGD would provide the equivalent of primary treatment and effluent disinfection prior to discharge into the Delaware River in accordance with CCMUA's NJPDES permit. A schematic process train schematic is shown in Figure 2-1.

[3-1] Excerpted from: Wet Weather Upgrades at the Delaware No. 1 WPCF – Concept Study of Alternatives Draft May 2017 prepared by Greeley & Hansen for CCMUA.

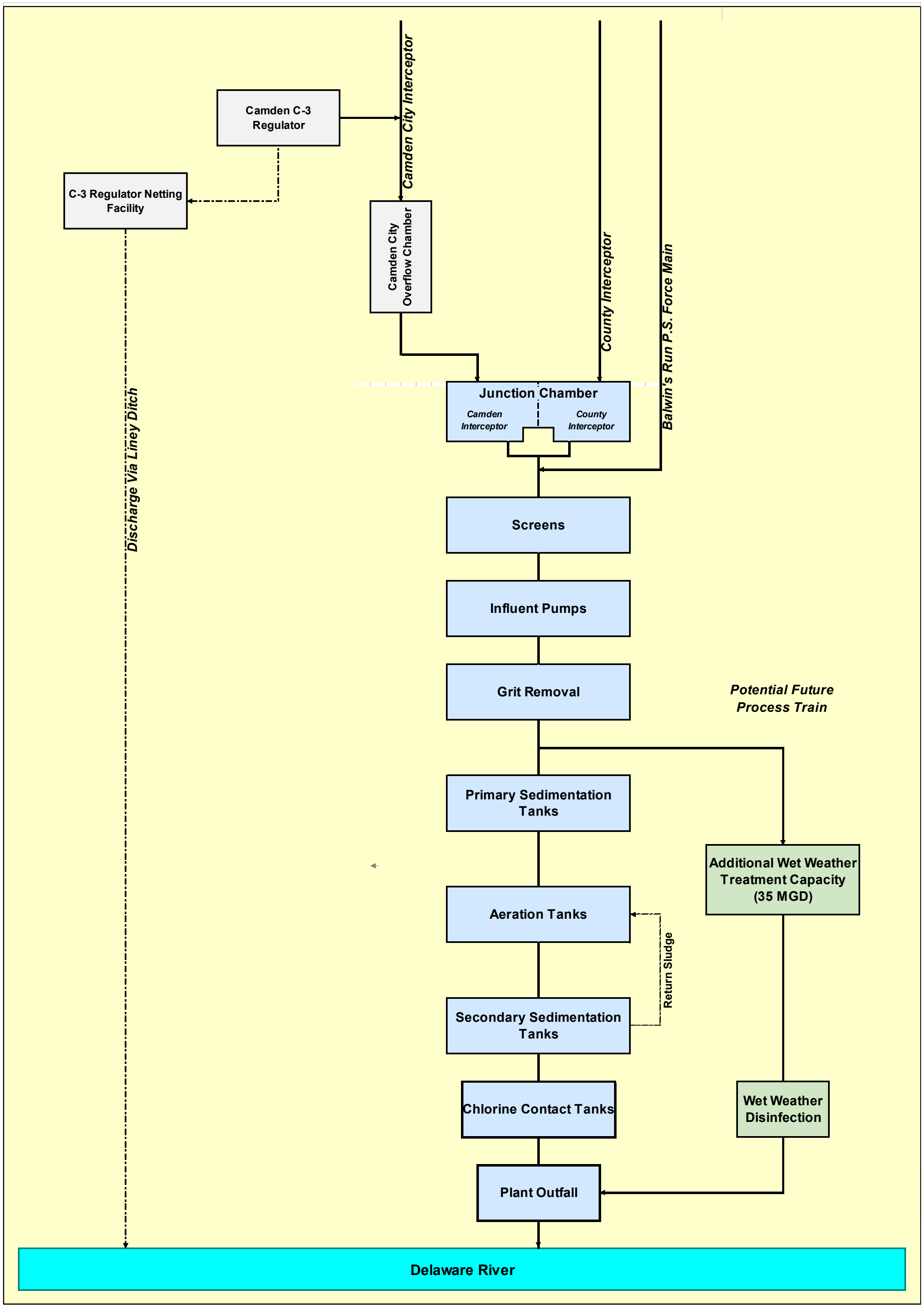


Figure 2-1 – Delaware No. 1 WPCF Treatment Process Flow Diagram

2.2 Regulatory Context

The regulatory basis for CCMUA's potential expansion of wet weather treatment capacity through a CSO related bypass of the secondary treatment process train is based on the 1994 CSO Control Policy:

> "In some communities, POTW treatment plants may have primary treatment capacity in excess of their secondary treatment capacity. One effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the POTW treatment plant for treatment. Delivering these flows can have two significant benefits: first, increasing flows during wet weather to the POTW treatment plant may enable the permittee to eliminate or minimize overflows to sensitive areas; second this would maximize the use of available POTW facilities for wet weather flows and would ensure that combined sewer flows receive at least primary treatment prior to discharge."[2-2]

The utilization of primary treatment capacities at treatment plants that exceed secondary treatment capacities is one of the options that combined sewer system permittees are required to evaluate under their respective NJPDES permits.[3-3] CCMUA's NJPDES permit was modified in July of 2019 to reflect the expansion of full secondary treatment capacity to 185 MGD. In it, NJDEP notes an expectation that CCMUA will consider CSO related bypassing options at WPCF # 1 in the SAIR.[2-4] The expansion of wet weather treatment capacity to up to 220 MGD using a CSO related bypass is one potential component of the CSO control strategy. It was determined to be not necessary or cost effective to meet the 85% system-wide typical year capture target however in the 2020 SIAR. If warranted, this option could be re-examined during the updating of the structural controls analysis anticipated in the 2027-2028 timeframe.

2.3 Wet Weather Capacity Expansion Beyond 220 MGD

It has been determined that additional controls beyond the expansion of WPCF # 1 of up to 220 MGD plus flow reduction through the use of green stormwater infrastructure will not achieve the system-wide control target of 85% wet weather capture during the typical year. To increase the targeted capture rate to 85%, additional controls will be needed for the Gloucester City CSO discharges on the Delaware River, the City of Camden discharges to the Cooper River and to the City of Camden and CCMUA discharges to the backchannel of the Delaware River.

CCMUA has determined that a wet weather treatment facility at or in the vicinity of WPCF #1 is not feasible due to site constraints. Land is not available at WPCF # 1 as evidenced by the already tight configuration of facilities at WPCF # 1 shown on Figure 2-2 on the following page. Moreover, the acquisition of additional land in the vicinity of WPCF # 1 is not realistic. The plant is bounded by the Delaware River, an active railroad, a recently completed

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[2-2] 59 FR 18693

[2-3] Part IV-G.4-e(vii)

[2-4] "Overview of Wet Weather Upgrades of Delaware WPCF # 1" included in the July 18, 2019 Final Surface Water Minor Modification Permit Action for Delaware WPCF #1 NJPDES number NJ0026182.

brownfield to public park, expanding shipping and cargo businesses and a residential neighborhood. Therefore, it is not feasible to provide wet weather treatment beyond 220 MGD at or in the vicinity of WPCF #1.

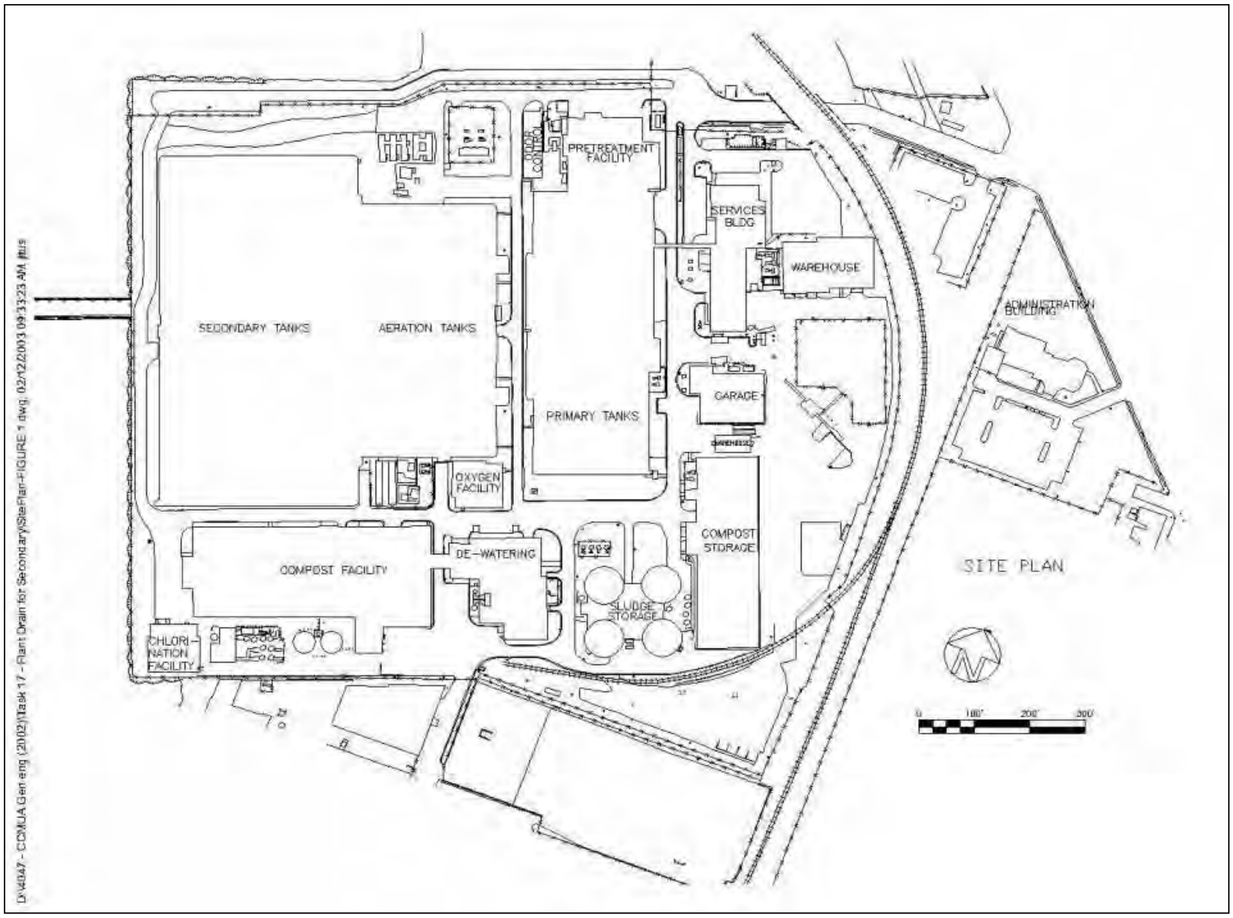

Figure 2-2 – Plan View of CCMUA Delaware Water Pollution Control Facility #1

Source Wet Weather Operating Manual for CCMUA Delaware No. 1 WPCF 2003 WRc/D&B, LLC.

2.4 Impacts of Capacity Expansions to 185 MGD on Wet Weather Capture

2.4.1 CCMUA Water Pollution Control Facility # 1

As noted above, CCMUA completed the expansion of full secondary treatment capacity at its WPCF # 1 to 185 MGD in 2020. The wet weather capture benefits of the plant expansion are shown on Tables 2-2 through 2-4 through the increase in total plant influent flow:

- Table 2-2 – *Overall Comparison of Flow Rates* shows average total daily and peak daily flow rates from January 2016 through April 2020, and from May 1, 2020 through August 30, 2023. It also shows the peak flow rates for these periods.

- Table 2-3 – *Frequency Distribution of Days With Peak Flows* in 25 MGD increments from 100 MGD to 250 MGD.
- Table 2-4 – *Peak Daily Flow Rate by Month* shows the peak daily flow rate for each month from 2016 through August 2023.

Table 2-2 – Overall Comparison of Flow Rates

Time Period	Average		Peak Flow Rate (MGD)
	Total Daily Flow (MGD)	Peak Daily Flow Rate (MGD)	
Jan 2016 - April 2020	54.9	75.7	157.4
Plant Expansion (May 2020 forward)	51.8	84.6	237.8

Table 2-3 – Frequency Distribution of Days With Peak Flows

Days With Peak Rates (MGD) Between:	100	126	151	176	201	226	Number of Days
	125	150	175	200	225	250	
Prior to Plant Capacity Expansion	171	39	13	0	0	0	223
	77%	17%	6%	0%	0%	0%	
cumulative	77%	94%	100%	100%	100%	100%	
Plant Expansion (May 2020 forward)	212	79	45	23	5	1	365
	58%	22%	12%	6%	1%	0%	
cumulative	58%	80%	92%	98%	100%	100%	

Table 2-4 – Peak Daily Flow Rate by Month

Month	2016	2017	2018	2019	2020	2021	2022	2023	Average 2016-2019	2022	% Change (2016 - 2019 .v. 2022)
January	112.2	120.6	109.6	141.1	124.7	166.3	186.3	123.5	120.9	186.3	54%
February	139.8	122.7	154.7	131.1		181.5	177.7	180.3	137.1	177.7	30%
March	146.1	136.1	140.0	140.0		173.6	130.0	166.9	140.6	130.0	-8%
April	113.3	141.0	152.8	134.7	125.4	187.1	177.6	178.2	135.5	177.6	31%
May	145.7	131.4	90.7	155.3	158.2	138.0	237.8	127.1	130.8	237.8	82%
June	115.1	105.6	140.9	157.4		200.1	177.9	179.2	129.8	177.9	37%
July	144.1	130.7	101.3	136.6	176.0	175.3	176.1	160.2	128.2	176.1	37%
August	101.5	127.6	123.9	132.0	174.9	140.1	120.3	168.9	121.3	120.3	-1%
September	110.1	101.4	130.3	104.2	183.0	179.8	174.7		111.5	174.7	57%
October	125.0	151.0	123.0	131.7	176.0	214.0	203.4		132.7	203.4	53%
November	136.8	103.7	156.4	57.2	181.2	156.6	107.5		113.5	107.5	-5%
December	151.8	120.0	154.1	127.9	181.7	126.6	201.8		138.5	201.8	46%
Average	**128.5**	**124.3**	**131.5**	**129.1**	**164.6**	**169.9**	**172.6**	**160.5**	**128.3**	**172.6**	**34%**
Maximum	**151.8**	**151.0**	**156.4**	**157.4**	**183.0**	**214.0**	**237.8**	**180.3**	**140.6**	**237.8**	

🟩 Plant Expansion (May 2020 forward)

2.4.2 City of Camden Arch Street Pump Station

The City of Camden's Arch Street pump station conveys flows from Camden sewersheds C-10 through C-13A via the Camden Interceptor. The City completed upgrades to the Arch Street pump station in 2020 which included increasing the motor horse-power on the three pumps from 75 to 100 each and increasing the size of the pump impellers from 22.25" to 24.25". Prior to the expansion of CCMUA's treatment capacity Camden needed to throttle back the pumping rates at Arch Street during significant storm events to protect the interceptor downstream and the treatment plant. With the expanded treatment plant capacity of 185 MGD and increased pumping capacity at Arch Street, the frequency of the need to temporarily shut down Arch Street pump station has been greatly reduced since 2020 as shown on Table 2-5.

Table 2-5 – Frequency Arch Street Pump Station Shut-Downs During Wet Weather

Year	Rainfall	Arch St. Shut-Downs	C10 CSO Events
2018	69.12	22	112
2019	54.02	28	73
2020	46.60	14	59
2021	43.04	3	54
2022	43.70	2	71
2023 (through July)	19.21	0	29

3

Section 3

Formalized Green Stormwater Infrastructure Program

3.1 GSI Implementation Target

Green stormwater infrastructure is a foundational component of CCCMUA's and the Cities' control strategy due to the many environmental, community, aesthetic, economic and community health benefits intrinsic in green stormwater infrastructure (GSI).

CCMUA and the Cities of Camden and Gloucester are targeting a 10% reduction in impervious areas that are directly connected to the combined sewer system (DCIA) through the installation of GSI. Directly connected impervious areas such as paved streets, parking lots, building roofs, etc. from which stormwater runoff flows into the combined sewer system though a catch basin or other appurtenance.

The 10% target equates to approximately 145 controlled acres as shown in Table 3-1.

Table 3-1 – Calculation of Target Control of Runoff from DCIA

Combined Sewer Area	Acreage
Total	4,499
Directly Connected Impervious Area	1,446
Less 10% Reduction in DCIA	-145
Remaining Uncontrolled DCIA	1,302

The 10% directly connected impervious area reduction target reflects the upper limit of feasible GSI implementation during a twenty to forty-year implementation timeframe typical of CSO control programs. Over a longer timeframe, redevelopment and the renewal and replacement of the currently uncontrolled impervious areas represented by current buildings, roads, etc. will occur and the impervious area would be expected to decline as building and zoning codes and practices integrate GSI.

3.2 Wet Weather Control Benefits of GSI

Reducing stormwater runoff to the combined sewer system from directly connected impervious areas in Camden and Gloucester will have significant CSO control and street flooding reduction benefits. A ten percent decrease in stormwater runoff from impervious areas throughout the combined sewer area would result in a system-wide wet weather capture rate during the Typical Year of 81% coupled with the expansion of WPCF # 1 to 185 MGD and the restoration of the hydraulic capacity of the Camden and Gloucester collection system. This is a 5% improvement compared to 76% for the Control Alternatives Baseline conditions. Volumetrically, removing 10% (145 acres) of the system-wide DCIA would reduce the flow to the combined sewer system by approximately 90 million gallons during the Typical Year .

3.3 GSI Implementation Strategy

By its nature, the ability to implement and the responsibility for the implementation of green stormwater infrastructure is diffuse. The directly connected impervious areas to be addressed using GSI are owned and controlled by all levels of government and private entities ranging from interstate highways and commercial redevelopment to church parking lots. CCMUA and the Cities have limited control over the location, timing and scale of green stormwater projects on private properties or on properties owned by county, state or federal agencies.

Given these institutional constraints, CCMUA and the Cities are proposing the establishment of a framework for the implementation of GSI that would formalize, expand upon and support the current efforts of groups such as the Camden SMART initiative. The intent is to maximize the implementation of GSI whenever feasible in coordination with:

- Development and redevelopment projects;
- Transportation and related public works (e.g. road work);
- Renewal and replacement projects (collection system or other work requiring street openings); and
- Opportunities for neighborhood enhancements (e.g. new or improved neighborhood parks or playgrounds).

CCMUA and the Cities will work with the current neighborhood and economic development groups, neighborhood groups, civic and economic leaders and county and state officials to develop the technical and institutional framework for implementing an aggressive and sustainable GSI program that will be an integral part of the implementation of the LTCP and other public and private projects and programs. The initial deliverable of these efforts will be a GSI Implementation Framework document that will include:

A) Specify technical criteria for identifying potential areas for DCIA reduction:

B) Determination of the potential for DCIA reduction:

  1) Identify technical feasibility criteria, e.g.

    (a) Contributing area runoff characteristics

    (b) Accessible work sites

    (c) Etc.

C) Methodology for identifying and supporting project stakeholders

D) Institutional Opportunities and Impediments

  1) Municipal code issues & opportunities (e.g. GSI requirements for redevelopment over a threshold size);

  2) Existing institutional support structures & organizations; and

  3) County, state and federal regulatory issues or opportunities.

E) Institutional and financial responsibilities for the ongoing maintenance of green stormwater management facilities

- F) Funding mechanisms
  - 1) Current
    - (a) State and federal programs
    - (b) Private sources
  - 2) Potential
    - (a) Stormwater fees
    - (b) Other
- G) Iterative planning, implementation, evaluation processes;
  - 1) Coordinate with municipal
    - (a) Planning and redevelopment plans
    - (b) Public Works capital improvement program cycles
  - 2) Coordinate with NJDOT

The framework would be targeted for completion during 2025, with work to commence upon NJDEP approval of this SIAR. The framework will include specific performance targets for GSI implementation e.g., 30 acres per five year NJPDES permit cycles. An evaluation of GSI implementation and flow reduction efficacy will occur at the end of each permit cycle to inform decisions as to the need for program modifications and to set priorities during the subsequent five year permit cycle. A preliminary outline of the framework is provided on the following pages.

3.4 Draft GSI Implementation Program Framework

I) Framework Details:

- A) Inventory of Potential DCIA Runoff Capture Locations – categorized by:
  - 1) Consolidated Geographic Information System (GIS) data base of areas meeting the technical definition of DCIAs.
    - (a) Using municipal / county block & lot parcel mapping
    - (b) Evaluation / estimation of DCIA area by parcels to an appropriate level of detail necessary for an informed planning level understanding of the DCIA.
  - 2) Land Use
    - (a) Current
      - (i) Actual
      - (ii) Zoned
    - (b) Future Land Use
      - (i) Announced redevelopment;
      - (ii) Land use & redevelopment plans.

3) Land Ownership & Control
    (a) Public Land and Rights of Way (ROW)
        (i) Municipal
            - Streets, roads, mass transit;
            - Parks, etc.;
            - Building & facilities;
            - Parking lots
        (ii) Schools & universities
        (iii) State & Federal
            - Buildings, facilities & structures;
            - Roads, bridges, mass transit, etc.
    (b) Private lands
        (i) Private businesses by zoned usage
        (ii) Non-profits – e.g.
            - Churches
            - Hospitals, clinics;
            - Etc.
4) Categorization of the above data by sewershed.

B) Technical Evaluation Criteria – How will target projects be identified and evaluated in terms of:

1) Spatial Scale
    (a) By parcel
    (b) Sewershed
    (c) Neighborhood
    (d) Etc.
2) DCIA Runoff Capture Potential
    (a) Contributing area
    (b) Site availability & conditions
        (i) Accessibility
        (ii) Conflicts & obstructions (e.g. utility lines)
        (iii) Captured flow discharge opportunities
    (c) Site appropriate controls
        (i) Neighborhood fit

        - (ii) Cost
        - (iii) O&M effort and responsibilities
- C) Institutional Evaluation – impediments and opportunities relating to GSI under the current legal and institutional framework – e.g.:[1]
    - 1) Zoning – in terms of siting GSI facilities
    - 2) Municipal & County codes – e.g. plumbing, building, stormwater management.
        - (a) Encourage GSI
        - (b) Discourage GSI
        - (c) Mandate GSI upon redevelopment or repairs?
    - 3) Road design standards
    - 4) Tax codes
    - 5) Liabilities
- D) Implementation Roles and Responsibilities [who's doing what]
    - 1) Actors
        - (a) Municipalities
            - (i) Current and potential roles & responsibilities
            - (ii) Level of interest
            - (iii) Resource needs (staffing, technical expertise, etc.)
        - (b) County / CCMUA
        - (c) State
        - (d) Current property owners
        - (e) Non-Profit / Civic Organizations and Stakeholders
    - 2) Activities:
        - (a) Project sponsors / champions
            - (i) Identifying potential projects
            - (ii) Identifying project owners
            - (iii) Rallying support
        - (b) Financial support
        - (c) Technical / legal reviews & permitting
        - (d) Technical support
            - (i) Design standards

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[1] All of these have been dealt with in Philadelphia and elsewhere but a local assessment is warranted and may have been undertaken already by / for Camden.

        - (ii) O&M BMPs
        - (iii) "Hands on" technical support
- E) Requirements and Incentives
    - 1) Should GSI be mandatory and under what circumstances? e.g.:
        - (a) Redevelopment supported by public funding
            - (i) Direct funding
            - (ii) Indirect funding (government improvement of off-site infrastructure)
        - (b) Upon redevelopment or significant alternation?
        - (c) How to balance the desire for GSI with need for re-investment and the implicit unequal negotiating positions therein?
    - 2) Responsibilities for ongoing maintenance of GSI facilities
        - (a) Institutional responsibilities
        - (b) Financial responsibilities
    - 3) Funding incentives and resources:
        - (a) Current state or federal programs
        - (b) Tax incentives?
        - (c) Stormwater Utility / Fee
            - (i) As revenue source
            - (ii) As incentive – through fee avoidance by reducing impervious area.
- F) Estimating the likely public / private mix of GSI
    - 1) Based on other cities' experiences
    - 2) Over various timeframes

III) Action Plan for Cycle 1 (NPDES permit cycle 2021 – 2025)

- A) Stakeholder involvement and engagement
    - 1) Stakeholder identification
    - 2) Strategy for developing stakeholder support, buy-in and ownership?
- B) (Strategy for) Identifying Project Priorities
    - 1) CSO control potential
    - 2) Feasibility / resources
    - 3) Community interest
    - 4) Etc.
- C) Project Identification and Operation
    - 1) Identifying and Committing Project Owners & Operators

- (a) Ownership qualifications & responsibilities
- (b) Operator qualifications & responsibilities

2) Implementation Support Structures
   - (a) Planning & design technical supports
   - (b) Construction delivery and management supports
   - (c) O&M supports – including potentials for DBE, training programs, etc.

3) Project Operation & Maintenance
   - (a) Standards of operation & maintenance
   - (b) Performance monitoring

D) Schedule and Performance Metrics
   1) Target implementation schedule
   2) Program evaluation metrics:
      - (a) DCIA acres removed per unit of time
      - (b) Estimated flow reduction
      - (c) Anecdotal information – e.g. flooding events.

3.5 GSI Activities Since September 2020 SIAR Submittal

Green stormwater infrastructure and other wet weather source reduction projects that have been undertaken proactively by CCMUA, Camden and Gloucester City are summarized on Table 3-1. A total of 28.75 acres of drainage area are or will be controlled by GSI projects completed since 2017 or which are currently under planning / design. 2017 is used as the base year since it was base-year for the current conditions documented in the 2018 System Characterization Report.

Table 3-2 – GSI and Source Reduction Project Undertaken Since 2017

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
Development and Implementation of Green Stormwater Infrastructure (GSI) Program Plan – target reduction of 2% (30 acres).	Camden	CCMUA / Camden Co.	Design	Port Road improvements
		CCMUA	Planning / Design	Harrison Avenue / State Street - Complete Streets Project(s)
		CCMUA, Camden SMART	2017 – 2020 Completed	Various Camden SMART GSI projects totaling **2.75 acres**
			2021 – 2023	Various GSI projects totaling **6 acres**.

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
	CCMUA	Camden	Planning / conceptual design	C-32 sewershed green stormwater infrastructure
	Gloucester City		Design / planning	• Conceptual design for 4 acre GSI target area completed in dense older area subject to street flooding bounded by Monmouth, Ellis, ,Mercer and King Streets. • Johnson Blvd. Park improvements to include rain gardens. • Repairs to the rain gardens at the water treatment facility have been completed.

4

Section 4

Revised September 2023

Mitigation of Street Flooding

4.1 Problem Overview

City of Camden

Street flooding during wet weather remains a major public health and environmental concern within the City of Camden There are twenty sewersheds that have been associated with the reported street flooding hot spots identified in Camden's 2016 Flood Mitigation Plan. The number of locations where flooding has been reported Table 4-1 and locations are shown on Figure 4-1.

Table 4-1 – Camden Sewersheds Associated with Street Flooding

Sewershed / Regulator	# of Reported Flooding Locations	Sewershed / Regulator	# of Reported Flooding Locations
Name		Name	
C1	5	C16	1
C3	21	C17	0
C5	5	C22	8
C6	5	C22A	1
C7	4	C23	0
C8	2	C24	1
C9	1	C27	4
C10	2	C28	1
C11	5	CFA	2
C13 / 13A	0	C32	12

The approved LTCP Baseline Model indicates about 90 million gallons of street flooding in the Typical Year as the result of capacity limitations of the combined sewer system within the model extent.[4-1] This is premised on the full capacity of the Camden collection sewer system having been restored and maintained through regular cleaning and required repairs. The contributions of stormwater that can't get into the combined sewer system due to current blockages or capacity limitations have not been calculated as part of this study. It should be noted that the relative roles of structural capacity limitations within the sewer system and of non-structural causes such as blockages is not well understood. Therefore, as outlined in this section of the SIAR, a comprehensive program to understand and address the causes of street flooding is proposed.

[4-1] It should be noted that the hydraulic model is primarily intended to assess the performance of the regulator structures, interceptor sewers and WPCF capacity in relationship to flow rate and volume of combined sewage arriving at the regulator structures. The geographic extent of the model is limited in terms of the upstream collection sewers that send the combined sewage to the regulator structures and cannot simulate the performance of these un-modeled pipes. Therefore, the street flooding volumes shown must be viewed as indicative but imprecise.

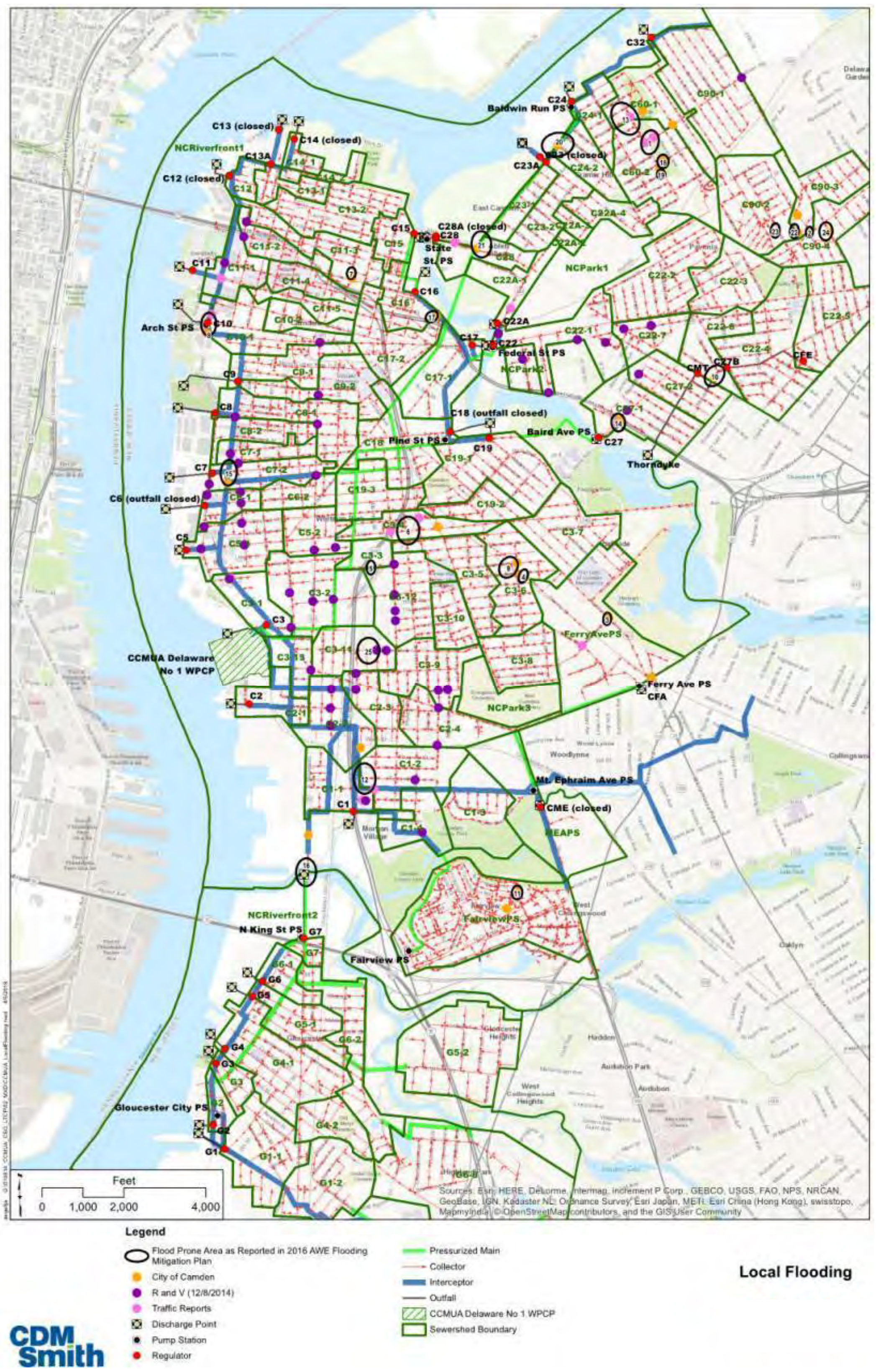


Figure 4-1 – Locations Associated with Street Flooding

The City of Camden and CCMUA have undertaken a number of steps to address street flooding subsequent to the September 2020 SIAR; these are listed in Table 4-2.

Gloucester City

Street flooding can occur in Gloucester City during storm events occurring between two hours before and after high tides. Flooding has occurred near the King Street pumping station which is the low point of the combined system and along Water Street.

Gloucester City has a flood pump installed at the King St. pump station and another portable pump available to pump excess combined sewage when tidal conditions preclude normal drainage by gravity. In addition, Gloucester City and CCMUA coordinate the operation of CCMUA's Gloucester City pump station during high tide storm events to minimize flooding conditions.

Street flooding can have a number of causes, including:

- Stormwater not being able to enter the combined sewer system due to clogged catch basins;
- The hydraulic capacity of collection sewers being reduced by accumulated sediment;
- Clogged CSO outfalls;
- The hydraulic gradient of sewer segments being below that of the receiving stream during high tide; and
- Inherent capacity limitations of existing sewer segments.

The current understanding as to the proximate causes of street flooding at the known flooding locations is limited. Flooding event information such as flooding events dates, events per reported location, flooding duration, approximate sizes and depths of street floods and antecedent weather conditions are not currently available.

Gloucester City and CCMUA have undertaken a number of steps to address street flooding subsequent to the September 2020 SIAR; these are listed in Table 4-2.

4.2 Street Flooding Reduction Benefits of CSO Controls

The CSO controls outlined in this SIAR will reduce the volumes of combined sewer overflow that is discharged through collection sewer backups significantly. Increasing the treatment capacity at CCMUA's WPCF # 1 from 150 MGD to 185 MGD is projected to reduce the simulated volume of street flooding in the Typical Year by around 58% from 90 million gallons per year to 33 million gallons. This remaining street flooding volume is due to capacity limitations within the Camden sewer system. Expanding the plant up to 220 MGD wet weather capacity will enable a significant increase in the capture rate from the large Camden C-3 regulator structure but would not significantly reduce street flooding further upstream in the Camden system.

Given the informational constraints as to the nature and causes of street flooding it is difficult to ascertain the street flooding reduction benefits of the satellite wet weather storage or treatment facilities needed to achieve 85% capture in the Cooper River, Gloucester and (if needed) Delaware Backchannel sub-systems. Regardless, these facilities will be sized to achieve 85% capture of wet weather flows generated in their respective sub-systems.

The analyses performed using the LTCP model indicate that with the WPCF # 1 capacity upgrade to at 185 MGD, capacity limitations within the regulator structures and the interceptor sewers downstream of the regulator structures will not be a significant cause of street flooding. Wet weather flow arriving at the regulator structure that cannot enter the interceptor should be fully discharged through the combined sewer overflow pipe, (assuming that the outfall pipes are maintained and open). Future analysis may reveal the need for the pumping of wet weather flows during high tides at certain locations. If necessary for CSO control purposes, satellite facilities would capture wet weather flows that would otherwise be discharged through the outfall pipes necessary to meet their performance standard (e.g., 85% capture).

A better understanding as to the causes of street flooding within the sewersheds that contribute to the potential satellite facilities is needed. If it were to be determined that street flooding in a sewershed is caused by hydraulic limitations in the collection system, then consideration of increasing the capacity and the implications of the resulting additional flow to the regulator structure and into the satellite facility could then be considered. Street flooding will be better understood and quantifiable after the collection system cleaning program is completed and prior to the design and construction of any satellite facilities.

4.3 Street Flooding Mitigation Program

It is proposed that a Comprehensive Street Flooding Mitigation Program be developed by each city and CCMUA as an early long term CSO control plan implementation action. The objective is to establish a framework for a comprehensive program to mitigate street flooding.

Key program elements could include:

- Establish flood location mitigation priorities and the criteria for prioritization;
- Development of System Performance Goals
- Documenting the implementation of the 2016 Wastewater System Flood Mitigation Plan for Camden;
- Identification and involvement of stakeholders and the identification of an institutional structure for the development and implementation of the mitigation program;
- Coordination with or working within existing green stormwater and sustainable redevelopment groups and programs;
- Establishing a GIS based street flooding event data base. This would involve establishing a flood event spotting and reporting system to track the occurrence, duration, approximate size and depth, preceding weather conditions and tides and integrating these data into a geo-referencing data base;
- Evaluate the principal causes of street flooding by location including but not limited to system hydraulic limitations, situational hydraulic limitations (e.g., pipe or catch basin clogs, not enough inlets), changes in run-off characteristics, etc.;
- Targeted flow monitoring and the extension of the H&H model by Camden in flood prone segments of the Camden collection system within reasonable proximity to a regulator structure. This could be implemented after the restoration of the hydraulic

capacities through cleaning and the observation as to the impacts of this restoration on the occurrences of street flooding;

- Identify design standards and best practices for flooding mitigation for use on public and private redevelopment projects;
- Evaluate and develop a suite of mitigation alternatives;
- Identification and involvement of stakeholders and the identification of an institutional structure for the development and implementation of the mitigation program; and
- The identification and establishment of program funding sources.

4.4 Street Flooding Mitigation Activities Since September 2020 SIAR Submittal

Street flooding and other wet weather source reduction projects that have been undertaken proactively by CCMUA, Camden and Gloucester City are summarized on Table 4-2.

Table 4-2 – Street Flooding Mitigation and Source Reduction Project Undertaken Since 2020

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
Develop and implementation of Camden Street Flooding Mitigation Program	Camden	CCMUA, Camden County	Design	• Harrison Avenue street flooding mitigation project. • Camden County's Port Road Improvement Project includes drainage improvements, sewer separation and where feasible GSI along portions of Second Street, Ferry Avenue, Broadway Street and Atlantic Avenue which will reduce local street flooding in the area. • Flood mitigation under C-32 project. • The ongoing outfall cleaning program has resulted in significant reductions in street flooding based on anecdotal information.
Reduction of wet weather flow from Pennsauken into the Camden combined sewer system in sewershed C-32.	CCMUA	Pennsauken, Camden	Design	C-32 Program Elements: • Implementation of Pennsauken Sewer Separation projects. • Conveyance of separated Pennsauken stormwater to Delaware back channel in new dedicated pipe and/or • Targeted sewer separation in East Camden to synch with Pennsauken separation. • Includes catch basin location and configuration optimization.

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis
G-1 regulator – remedial cleaning May 2023	Gloucester City	CCMUA, Camden County	On-Going	• CCMUA has been evaluating the impact of allowing flow rates greater than 4.5 MGD from Gloucester City into CCMUA's Gloucester City pump station. Flows are being controlled through pump wetwell set-points pending the long term installation of VFD. • Gloucester City and CCMUA are proceeding with the cleaning of CSO outfalls. An inspection of current conditions was completed in August of 2023 and work is proceeding on the design, permitting and implementation of outfall cleaning analogous to the ongoing work on Camden's outfalls. Scheduling is detailed in Section 8 of this Revised SIAR. • Inspection & remedial cleaning of the G-1 regulator which has resulted in a significant reduction in street flooding in the G-1 sewershed. • Gloucester City is one of five small municipalities included in CCMUA's "River Town" street flooding mitigation study.[4-2] Phase 1 is complete and includes short term recommendations e.g., backflow preventors and a proposed Phase 2 for detailed planning and preliminary design of longer term mitigations.

[4-2] Bellmawr Borough, Brooklawn Borough, Gloucester City, Mt. Ephraim Borough and Westville Borough (Gloucester County)

5

Section 5

Additional Structural Controls Revised September 2023

5.1 Additional Control Requirements

The system wide control target of 85% capture cannot be met through the wet weather treatment capacity increase and source reduction alone, therefore sub-system level controls using satellite control facilities was evaluated in the approved 2019 DEAR. The anticipated levels of CSO controls with the expansion of CCMUA's WPCF # 1 to 185 MGD plus a system-wide 10% reduction in DCIA are shown in Table 5-1.

Table 5-1 – Typical Year Capture Impacts of Controlling Runoff from DCIA by 10%

System / Sub-System	WPCF # 1 @ 185 MGD, Camden Hydraulic Capacity Restored	Add 10% Control of Runoff in DCIA
System-Wide	78%	81%
Sub-System		
Delaware R. – Camden	89%	91%
Delaware R. – Gloucester	69%	74%
Delaware R. - Back Channel	69%	72%
Cooper River	70%	75%
Newton Creek	85%	87%

Additional CSO controls were evaluated for three of the five sub-systems to achieve the control objective of 85%system-wide wet weather capture during the Typical Year. It should be noted that the controls evaluated to achieve 85% system-wide wet weather capture will be sized to also achieve 85% capture in each individual sub-systems. Upon completion of the remedial system-wide sewer cleaning efforts by the City of Camden and Gloucester City, CCMUA will undertake a comprehensive flow monitoring program to provide data for the updating of the LTCP model which will provide updated capture rate data and refine the understanding of additional controls necessary to achieve 85% system-wide wet weather capture during the Typical Year. This will enable CCMUA and the Cities to update control alternatives analysis which will lead the final selection of additional controls needed to achieve 85% system-wide typical year wet weather capture.

The 85% capture target for the Delaware River – Camden subsystem will be achieved through the expansion of the wet weather treatment capacity at WPCF # 1 to 185 MGD (completed in 2020) along with modification to the C-3 regulator structure and its operating rules. The expansion of the WPCF#1 will also help the Newton Creek subsystem in achieving 85% capture.

Due to their hydraulic isolation (varies pump stations) from the WPCF #1, the Delaware River – Gloucester City, the Delaware River Back Channel and the Cooper River sub-systems would not achieve increased capture with the expansion of the plant treatment capacity. The hydraulic limitations in the existing Camden and Gloucester interceptor sewers preclude the conveyance of additional wet weather flows to WPCF #1. Moreover, the additional conveyance option is mooted by the infeasibility of expanding the wet weather capacity at the WPCF beyond 220 MGD (see Chapter 5.3.2 of the DEAR report).

There are four broad options for controlling combined sewer overflows:

1. Source reduction – through the removal or reduction of stormwater through green stormwater infrastructure or sewer separation;
2. Conveyance of wet weather flows to a central treatment facility;
3. Satellite storage of wet weather flows until they can be bled back into the combined sewer system for centralized treatment; or
4. Satellite treatment at or near the CSO outfall to provide at least the equivalent of primary treatment and disinfection.

CCMUA proposes to achieve 85% capture in the Delaware River backchannel subsystem through the reduction of wet weather flows from Pennsauken Township and increasing the wet weather flow rates through the Baldwins Run pump station**.** Design work for the separation of combined sewered areas of Pennsauken Township is complete and pending construction permit approval. CCMUA is currently evaluating options for the conveyance of the separated Pennsauken stormwater for discharge to Delaware River back channel through or adjacent to CCMUA's C-32 outfall structure. This conveyance strategy may involve targeted sewer separation in Camden neighborhoods adjacent to Pennsauken or a dedicated stormwater line for the removed Pennsauken stormwater. In either case, CCMUA is studying the optimization of stormwater inlet placement and configuration to mitigate street flooding in East Camden.

Satellite storage or treatment will be required to achieve 85% capture in the Cooper River and Gloucester City sub-systems. The required capacities for these facilities are shown on Table 5-2. Capacity requirements are bracketed based on the achievement of 0% and 10% reductions in DCIA. A ten percent reduction in DCIA is the target established by CCMUA and the Cities as noted in Section 3 of this report. Zero percent reduction reflects the baseline current conditions and is used as a worst-case scenario. After the green stormwater program outlined in Section 3 has been underway for a while, the achievability of the 10% DCIA reduction goal can be re-evaluated.

Table 5-2 – Required Satellite Control Capacities

Sub-System	Locations	With 10% DCIA Reduction		Without 10% DCIA Reduction	
		Storage Volume in Million Gal.	Treatment Capacity in MGD	Storage Volume in Million Gal.	Treatment Capacity in MGD
Delaware River – Gloucester	G-4 / G-5	0.6	4.1	1.2	6.8
	G-1	0.5	2.3	0.7	4.4
Cooper River	C-22 / C-22A	1.3	20	2.6	21
	C-27 / Thorndyke	3	20.4	3.5	38.5
	C17	NA	NA	0.4	4.8

5.2 Overview of Alternative Control Technologies Evaluated

5.2.1 Satellite Treatment

Treatment Process Overview

Enhanced high-rate clarification (EHRC) has been used as the satellite treatment process for planning purposes. The term EHRC is generally used to describe a physical-chemical process in which coagulant and polymer are added to wastewater to remove solids from the stream.

The intent of EHRC treatment is to remove solids from and to disinfect the captured combined sewage. This provides effluent with total suspended solids concentrations that are similar or less than the effluent from the primary clarifiers at the wastewater plant. The removed solids then need to be conveyed to the main treatment plant for treatment.

The coagulant aggregates the suspended solids in the flow into a floc. The resulting floc particles adsorb onto either very fine sand added to the wastewater, or recirculated solids with the aid of a polymer. The fine sand and recirculated solids act as ballast and increases the settling rate of the adsorbed floc, removing the solids from the flow stream. The process is also known as "ballasted flocculation." EHRC systems can be operated intermittently during storm events.

A typical ballasted flocculation system consists of addition of ferric chloride, polymer, and "microsand" (sand approximately 100-microns in diameter) to wastewater. The wastewater and additives are rapidly mixed (flash mixing), then slowly stirred in a maturation tank before settling in a clarifier. The sludge from the settling process is passed through a hydrocyclone, where the microsand is removed from the sludge and recycled.

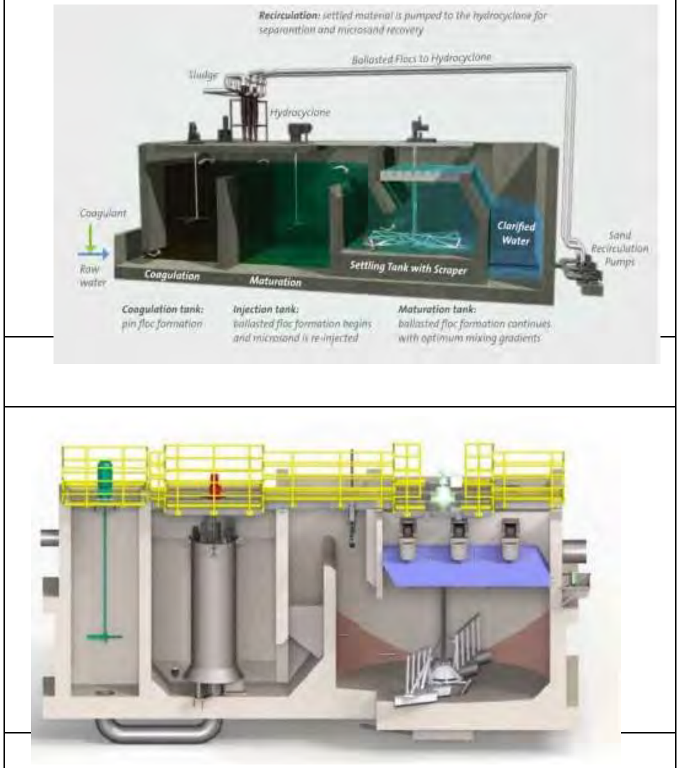


Figure 5-1 – Enhanced High Rate Clarification: Top – ACTIFLO unit, bottom – DensaDeg unit

Several suppliers provide enhanced high-rate clarification systems as proprietary products, including: Kruger's Actiflo® process, which uses microsand as ballast, and Degremont Technologies' DensaDeg® process, which uses recirculated solids as ballast. Cross-sectional diagrams of the two technologies are shown on Figure 5-1

Whichever process is selected, BOD and TSS removal rates associated with high-rate clarification have been shown to be roughly double those of traditional clarification. BOD removal is between

65- and 80-percent and TSS removal is between 70- and 95-percent, according to the USEPA's August 2004 "Report to Congress on the Impacts and Control of CSOs and SSOs". These reductions clearly meet (and even exceed) those of conventional primary treatment processes, and thus satisfy the requirement to provide the "equivalent of primary clarification" per the EPA CSO Policy. Other benefits of this process include:

- Footprint area requirements are only one-tenth of traditional clarification area requirements (5 to 15-percent of the space required for conventional primary treatment);
- Can handle high hydraulic loading rates and treat rapidly varying flows; and
- Able to achieve secondary treatment effluent standards for TSS and approach these standards for BOD.

EHRC also has some disadvantages, including:

- Higher capital costs than less complex processes such as simple settling or screening technologies;
- Higher operating costs relative to conventional clarification due to chemical and floc media requirements;
- 15 – 30 minute start-up time before significant removal occurs;

Solids removed through the satellite treatment process range in concentration from around 0.1% to 1.0% with an average of around 0.3% and are typically discharged to the interceptor sewer for transport and treatment at the wastewater treatment plant. While high in solids concentration (1,000 mg/l to 10,000 mg/l) the volume generated relative to total interceptor sewer flows are typically low enough to not pose operating problems. The feasibility of this being acceptable in Camden or Gloucester would need to be confirmed during a later detailed facilities planning phase of LTCP implementation.

Disinfection

As documented in the System Characterization Report, pathogens pose the primary water quality impact of the CSOs into the Delaware and Cooper Rivers and Newton Creek. Therefore, disinfection of effluent from satellite treatment facilities is assumed. Three disinfection technologies were considered:

- Sodium Hypochlorite;
- Ultraviolet (UV); and
- Peracetic Acid

Detailed descriptions and evaluations of these disinfection technologies were included in Appendix A of the approved Development and Evaluation of Alternatives Report. For purposes of this long term control planning document, disinfection using sodium hypochlorite is assumed. Regulations have required most wastewater treatment plants and CSO facilities to add a dechlorination process that uses sodium bisulfite to remove chlorine before it enters the receiving water. On average, dechlorination will add about $0.30 per gallon of treatment capacity to the cost of chlorination.

5.2.2 Satellite Storage

Off-line surface storage can be used to capture all or part of CSO discharge. When system capacity becomes available, flows are then released for conveyance to the treatment plant. When flow volumes exceed the storage capacity, flow will be discharged to CSO outfalls. Two different approaches can be used to handle these discharges: either (1) flow can be diverted around the storage tank when full, or (2) flow can pass through the tank and overflow at the downstream end of the tank, at which point the storage tank effectively becomes a high-rate settling tank. In either case, the size of a surface storage tank depends upon the capture goals set for each site.

A typical storage tank arrangement includes a regulator, bar screens, pumping facility and piping to and from the collection system. Design details such as flow distribution, tank flushing, and facility activation also are affected by the overall goals for and hydraulics of the specific site. Examples of storage tanks are shown on Figure 5-2.

Figure 5-2 – Examples of Satellite Storage Facilities. Left: below grade facility under construction. Right: retention treatment basin in Inkster Michigan.

Storage tanks are generally fed by gravity and the stored flow is typically pumped back to the interceptor after the storm. This gravity-in / pump-out arrangement minimizes pumping costs (both capital and operating). However, if the existing combined sewers are deep, then the storage tank must be deep and construction becomes more expensive.

5.2.3 Reduction of Inflow & Infiltration (I&I)

Part IV.F.1.h.1.ii of CCMUA's and the Cities' NJPDES permits require that I&I be identified and reduced to non-excessive levels as defined at N.J.A.C. 7:14A-1.2. It was stated in the approved June 2019 joint Development & Evaluation of Alternatives Report that I&I reduction will not play a major role in long term CSO control due to the high volumes of wet weather flow generated in the combined sewered areas relative to the volume of I/I contributed from the hydraulically connected sanitary sewered areas.

A revised baseline level of I&I in and contributing to the CCMUA / Camden / Gloucester combined sewer systems will be determined through the comprehensive flow monitoring and model update to be completed once the Camden and Gloucester sewers and outfall cleaning is completed. The results of this analysis will be integrated into the revised LTCP model and used in the revised control alternatives analysis to be completed in the 2027-2028 time frame.

5.3 Control Alternatives

5.3.1 Summary Assessment of Control Option

Satellite facilities can pose significant siting, financial and operating burdens on the municipalities in which they are located which must be considered in the alternatives selection process. A qualitative summary of the two approaches' pros and cons is provided on Table 5-3.

Table 5-3 – Qualitative Comparison of EHRC and Storage

	Enhanced High Rate Clarification (Ballasted Flocculation)	**Storage Tanks**
Pro	• High levels of treatment and treated effluent quality (meets / exceeds primary treatment). • Proven technology. • Process equipment relatively compact. • Not affected by precursor storm events.	• Relative operating simplicity. • Proven technology • Only discharges to receiving streams during storm events exceeding storage capacities • Captured flow is sent back to the wastewater treatment plant for full treatment
Con	• Operating complexity. • Requires post event cleaning and maintenance. • Requires on-site hypochlorite and other chemical storage • Likely point-source performance standards. • Capital and O&M costs	• Utilizes interceptor and treatment plant capacities during post storm drain downs. • Overflows when storage capacities are exceeded. • Required post event cleaning more difficult than for ballasted flocculation.

5.3.2 Treatment and Storage Cost Estimation (circa 2019)

Generic planning level capital, operation and maintenance (O&M) and life-cycle costs for Enhanced High Rate Clarification and for storage facilities have been developed utilizing process equipment manufacturer data as presented in the January 2018 PVSC Updated Technical Guidance Manual (TGM) that was included as Appendix A in the approved CCMUA / Camden / Gloucester Development and Evaluation of Alternatives Report.[5-1]

5.3.3 Permittee Specific Cost Estimates

Detailed capital and O&M cost estimates have been developed for the Cities of Camden and Gloucester and for the CCMUA. These estimates are premised upon 1) the inclusion of green stormwater infrastructure sufficient to reduce the directly connected impervious areas of Camden and Gloucester by 10%, and 2) that each permittee will be responsible for the future capital and operating costs of CSO controls located within their respective collection systems.

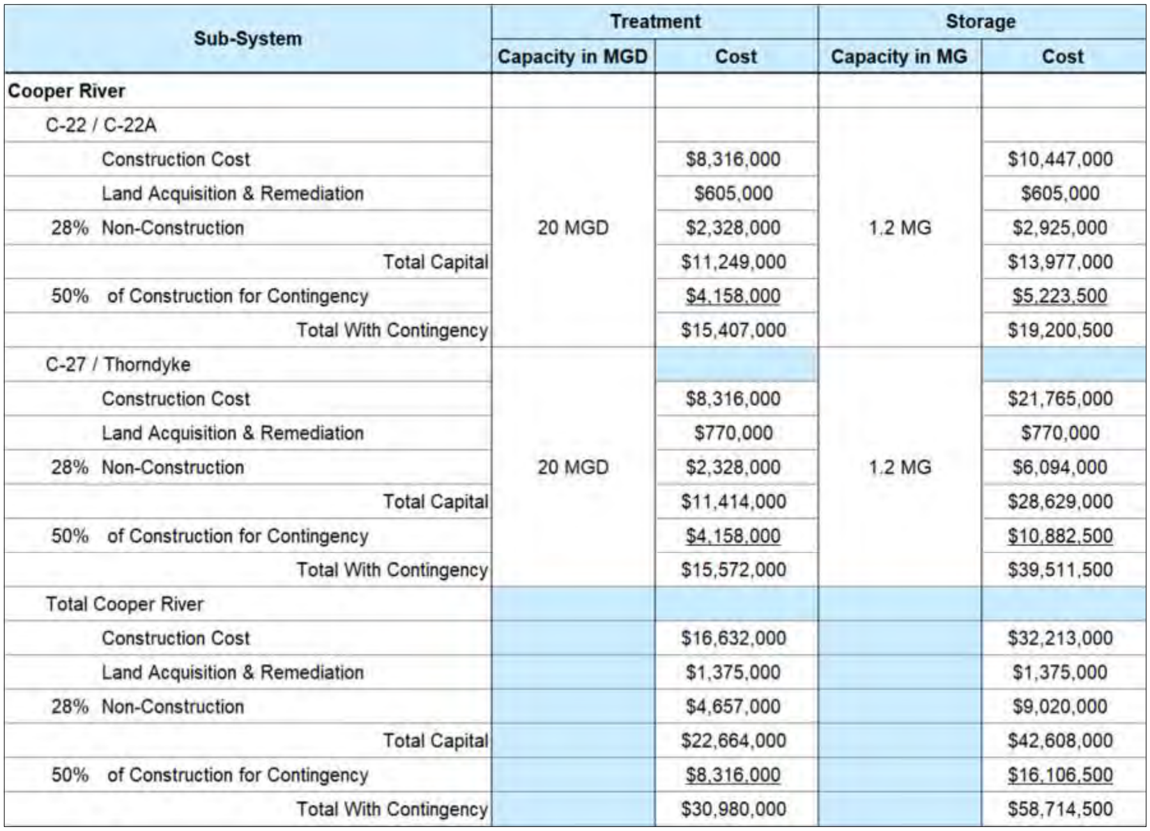
[5-1] Tables 2-18 through 2-22 for ballasted flocculation facilities and Tables 2-29 through 2-31 for disinfection.

City of Camden

The estimated capital costs (in 2020 dollars) and O&M costs for satellite treatment and for satellite storage at Camden regulators C-22 & C-22A (Cooper River) and C-27 & Thorndyke (Cooper River) are shown on Tables 5-4 and 5-5.

As detailed below, the capital cost estimates for Camden range between $102 million for the enhanced high rate clarification treatment option and $130 million for storage tanks. While the estimated capital cost difference of roughly $28 million or a difference of 27%,it should be noted that the construction cost estimates are Class 5 (Conceptual Screening) as defined by the Association for the Advancement of Cost Engineering and therefore have an expected accuracy range of -50% through +100%.

Table 5-4 – Camden CSO 85% Typical Year Wet Weather Capture Control Cost Estimates* (circa 2019)



Sub-System	Treatment		Storage	
	Capacity in MGD	Cost	Capacity in MG	Cost
Cooper River				
C-22 / C-22A				
Construction Cost	20 MGD	$8,316,000	1.2 MG	$10,447,000
Land Acquisition & Remediation		$605,000		$605,000
28% Non-Construction		$2,328,000		$2,925,000
Total Capital		$11,249,000		$13,977,000
50% of Construction for Contingency		$4,158,000		$5,223,500
Total With Contingency		$15,407,000		$19,200,500
C-27 / Thorndyke				
Construction Cost	20 MGD	$8,316,000	1.2 MG	$21,765,000
Land Acquisition & Remediation		$770,000		$770,000
28% Non-Construction		$2,328,000		$6,094,000
Total Capital		$11,414,000		$28,629,000
50% of Construction for Contingency		$4,158,000		$10,882,500
Total With Contingency		$15,572,000		$39,511,500
Total Cooper River				
Construction Cost		$16,632,000		$32,213,000
Land Acquisition & Remediation		$1,375,000		$1,375,000
28% Non-Construction		$4,657,000		$9,020,000
Total Capital		$22,664,000		$42,608,000
50% of Construction for Contingency		$8,316,000		$16,106,500
Total With Contingency		$30,980,000		$58,714,500

Sub-System	Treatment		Storage	
	Capacity in MGD	Cost	Capacity in MG	Cost
10% DCIA Reduction via GSI				
Construction Cost		$39,836,000		$39,836,000
28% Non-Construction		$11,154,000		$11,154,000
Total Capital		$50,990,000		$50,990,000
50% of Construction for Contingency		$19,918,000		$19,918,000
Total With Contingency		$70,908,000		$70,908,000
Total Camden Capital Costs				
Construction Cost		$56,468,000		$72,048,000
		$1,375,000		$1,375,000
28% Non-Construction		$15,811,000		$20,174,000
Total Capital		$73,654,000		$93,597,000
50% of Construction for Contingency		$28,234,000		$36,024,000
Total With Contingency		$101,888,000		$129,621,000

* Excludes future costs for system renewal and replacement necessary to maintain design capacities.

Table 5-5 - City of Camden CSO Controls Estimated Annual O&M and Life Cycle Costs (circa 2019)

Present Worth & Annual Cost Calculations	Treatment & Green	Storage & Green
Annual O&M Cost Estimates		
Non-GSI	$854,000	$424,000
GSI Costs	$329,000	$329,000
Total Annual	$1,183,000	$753,000
Present Worth		
Present Worth of O&M	$18,016,000	$11,467,000
Plus Capital Costs (without contingency)	$73,654,000	$93,597,000
Total Present Worth	$91,670,000	$105,064,000
Estimated Annual Costs		
Debt Service Payments	$6,188,000	$7,864,000
Annual O&M	$1,183,000	$753,000
	$7,371,000	$8,617,000

The control facilities would add between $7.4 to $8.6 million to the annual wastewater management costs of the City of Camden. While the capital costs for tanks is higher, the O&M costs are projected to be lower; with a 20 year present worth O&M cost savings of around $6.6 million. The projected annual costs also include debt service payments of $6.2 to $7.9 million, based on the use of the New Jersey Clean Water State Revolving Fund financing program. Total life cycle costs for the two options are $91.7 million for the EHRC option and $105.1 million for storage. The present worth calculations include a twenty year operating period and a discount rate for the O&M of 2.75%. Note that the capital costs used in the lifecycle cost calculation (Table 5-5) do not include the 50% construction contingency and are therefore lower than the total capital costs shown in Table 5-4 which do include construction contingencies.

Gloucester City Cost Estimates

The estimated capital costs (in 2019 dollars) and O&M costs for satellite treatment and for satellite storage serving Gloucester are shown on Table 5-6. The estimated capital costs for a treatment based approach to achieving 85% wet weather capture in Gloucester is approximately $27 million. Estimated capital costs for storage are $45 million.

Incremental annual costs for Gloucester would range between around $2.0 million for the treatment option and $3.0 million for the storage options as shown on Table 5-7. These figures include financing of the capital costs through the N.J. Clean Water SRF as was the case for Camden.

Table 5-6 – Gloucester CSO Control Cost Estimates (circa 2019)

Sub-System	Treatment		Storage	
	Capacity	Cost	Capacity	Cost
Gloucester City - Delaware River				
Satellite Treatment or Storage	6.4 MGD		1.1 MG	
Construction Cost		$10,943,000		$20,895,000
Land Acquisition & Remediation		$550,000		$550,000
28% Non-Construction		$3,064,000		$5,850,000
Total Capital		$14,557,000		$27,295,000
50% of Construction for Contingency		$5,471,000		$10,447,000
Total With Contingency		$20,028,000		$37,742,000
10% DCIA Reduction via GSI				
Construction Cost		$3,993,000		$3,993,000
28% Non-Construction		$1,118,000		$1,118,000
Total Capital		$5,111,000		$5,111,000
50% of Construction for Contingency		$1,996,500		$1,996,500
Total With Contingency		$7,107,500		$7,107,500
Total Gloucester Capital Costs				
Construction Cost		$14,935,000		$24,887,000
Land Acquisition & Remediation		$550,000		$550,000
28% Non-Construction		$4,182,000		$6,968,000
Total Capital		$19,667,000		$32,405,000
50% of Construction for Contingency		$7,468,000		$12,444,000
Total With Contingency		$27,135,000		$44,849,000

* Excludes future costs for system renewal and replacement necessary to maintain design capacities.

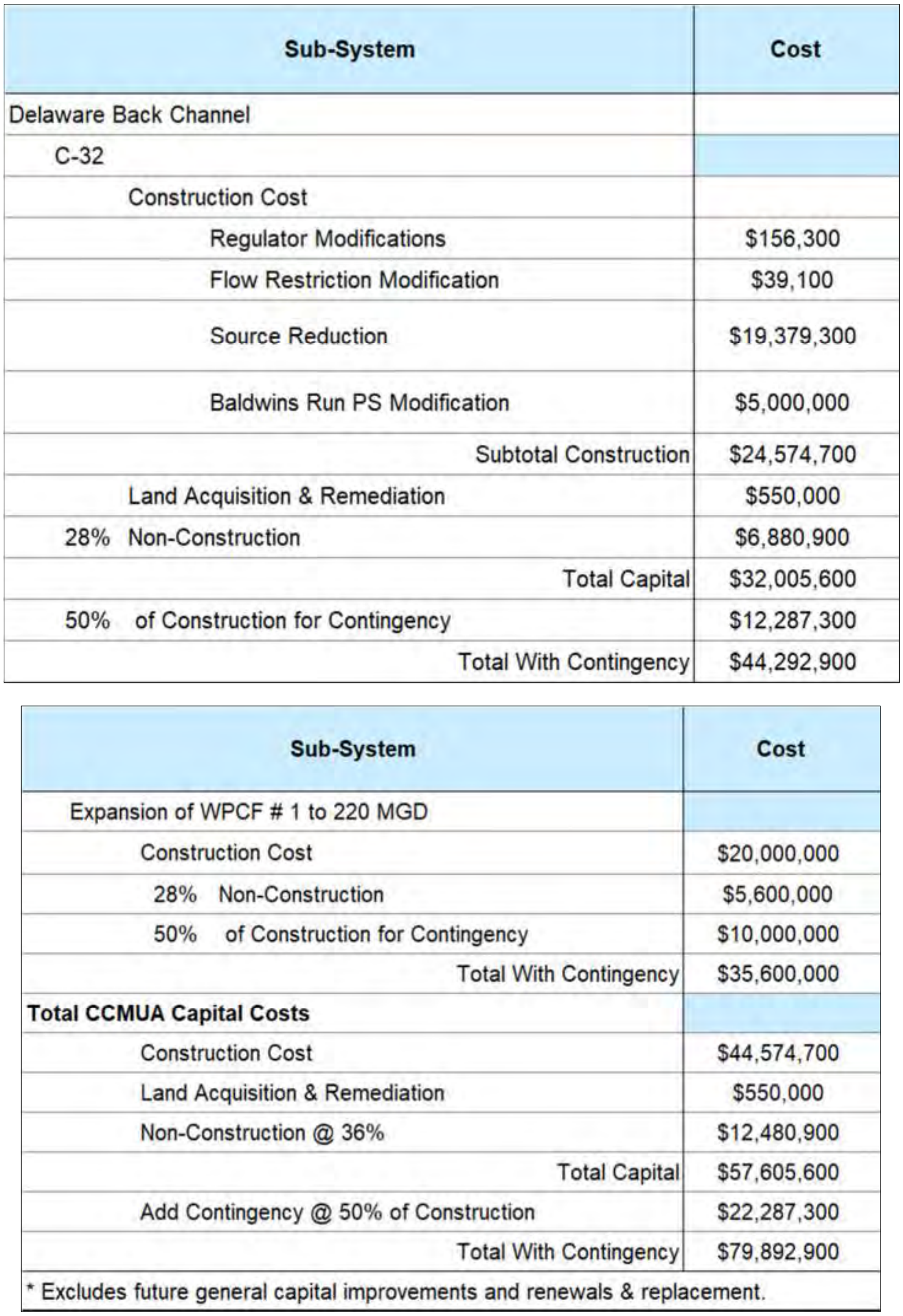
Table 5-7 – Gloucester CSO Control Estimated Annual & Life Cycle Costs (circa 2019)

Present Worth & Annual Cost Calculations	Treatment & Green	Storage & Green
Annual O&M Cost Estimates		
Non-GSI		
	$394,000	$118,000
GSI Costs	$33,000	$33,000
Total Annual	$427,000	$151,000
Present Worth		
Present Worth of O&M	$6,504,000	$2,300,000
Plus Capital Costs (without contingency)	$19,667,000	$32,406,000
Total Present Worth	$26,171,000	$34,706,000
Estimated Annual Costs		
Debt Service Payments	$1,322,000	$2,178,000
Annual O&M	$427,000	$151,000
Total Annual Costs	$1,749,000	$2,329,000

CCMUA Cost Estimates

The estimated capital costs for CSO controls for CCMUA total approximately $80 million as detailed on Table 5-8. This figure includes $36.6 million for the expansion of the wet weather capacity at WPCF # 1 from 185 MGD to 220 MGD and $44.3 to reduce overflows from CCMUA's C-32 regulator sufficiently to achieve 85% capture of wet weather flows during the Typical Year. As noted in Section 2.2, expanding the wet weather treatment capacity to 220 MGD has been determined as neither necessary or cost effective to achieve the 85% system-wide capture goal.

Table 5-8 – CCMUA CSO Control Capital Cost Estimates (circa 2019)



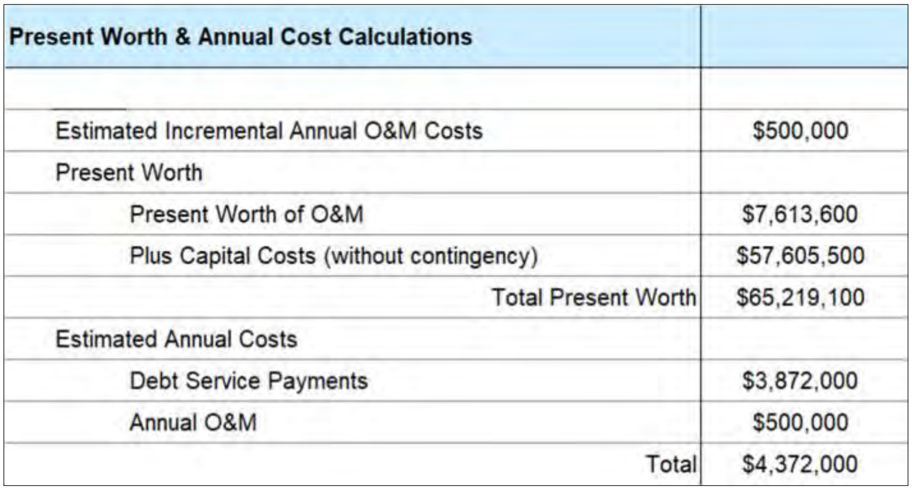
Sub-System	Cost
Delaware Back Channel	
C-32	
Construction Cost	
Regulator Modifications	$156,300
Flow Restriction Modification	$39,100
Source Reduction	$19,379,300
Baldwins Run PS Modification	$5,000,000
Subtotal Construction	$24,574,700
Land Acquisition & Remediation	$550,000
28% Non-Construction	$6,880,900
Total Capital	$32,005,600
50% of Construction for Contingency	$12,287,300
Total With Contingency	$44,292,900

Sub-System	Cost
Expansion of WPCF # 1 to 220 MGD	
Construction Cost	$20,000,000
28% Non-Construction	$5,600,000
50% of Construction for Contingency	$10,000,000
Total With Contingency	$35,600,000
Total CCMUA Capital Costs	
Construction Cost	$44,574,700
Land Acquisition & Remediation	$550,000
Non-Construction @ 36%	$12,480,900
Total Capital	$57,605,600
Add Contingency @ 50% of Construction	$22,287,300
Total With Contingency	$79,892,900

* Excludes future general capital improvements and renewals & replacement.

Projected incremental O&M costs for CCMUA as well as the estimated total lifecycle costs for the CCMUA improvements are shown on Table 5-9.

Table 5-9 – CCMUA CSO Control Incremental O&M and Life Cycle Cost Estimates (circa 2019)



Present Worth & Annual Cost Calculations	
Estimated Incremental Annual O&M Costs	$500,000
Present Worth	
Present Worth of O&M	$7,613,600
Plus Capital Costs (without contingency)	$57,605,500
Total Present Worth	$65,219,100
Estimated Annual Costs	
Debt Service Payments	$3,872,000
Annual O&M	$500,000
Total	$4,372,000

System-Wide Cost Estimate Roll-Up

The respective cost estimates for Camden, Gloucester and CCMUA are aggregated and summarized on Table 5-10. Aggregated capital costs, including construction contingencies total $209 million for the EHRC option and $254 million for the storage option, a difference of about 31%. Combined annual incremental O&M costs are estimated to be $2.4 million for treatment and $1.4 million for storage.

As noted above, CCMUA will undertake a comprehensive flow monitoring and model update upon full completion of the remedial sewer and outfall efforts. The results of the modeling update will be used as a basis for re-evaluating technical control alternatives to reflect revised design flow projections as well as emergent technologies, climate change, economic and inflation trends, and other local conditions that have changed since the initial alternatives evaluation (DEAR) in 2019. Revised cost estimates will be developed through this analysis.

5.4 Cost / Performance Considerations

The Cities of Camden and Gloucester and CCMUA have determined that the Presumption Approach[5-2] should be used as the basis for their CSO control strategies and have established the control of 85% of wet weather flow volume generated during the Typical Year as the CSO control performance target.

Paragraph G-5(a) of the respective NJPDES permits require that permittees utilizing the Presumption Approach to analyze various levels of CSO controls to determine where the

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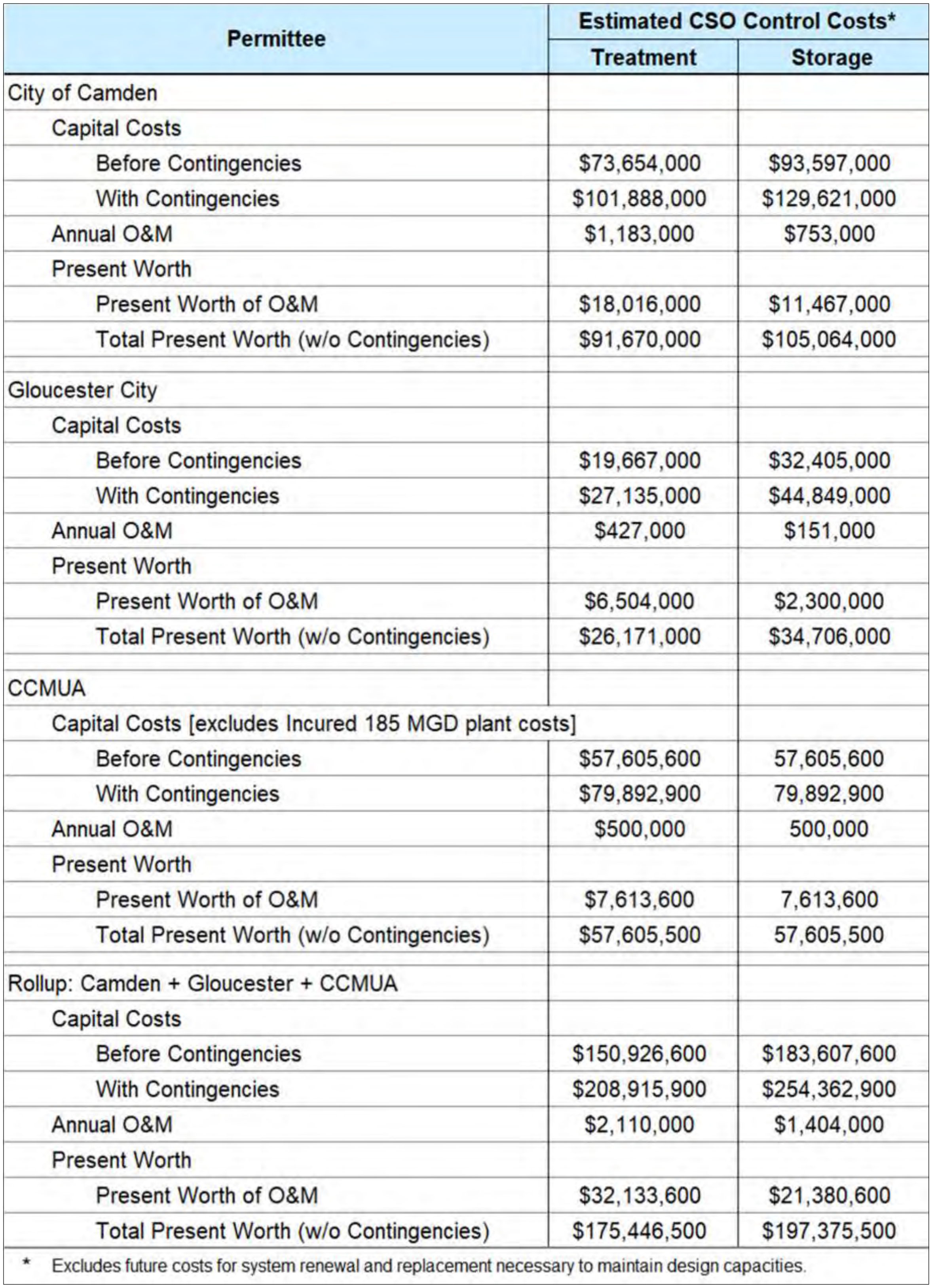
[5-2] Under the USEPA CSO Control Policy (59 FR 18692) a CSO control program that eliminates or captures for treatment no less than 85% of the volume of combined sewage that is collected in the combined sewer system during precipitation events during a Typical Year would be presumed to provide an adequate level of control.

Table 5-10 – System-Wide Roll Up of Cost Estimates (circa 2019)



Permittee	Estimated CSO Control Costs*	
	Treatment	Storage
City of Camden		
Capital Costs		
Before Contingencies	$73,654,000	$93,597,000
With Contingencies	$101,888,000	$129,621,000
Annual O&M	$1,183,000	$753,000
Present Worth		
Present Worth of O&M	$18,016,000	$11,467,000
Total Present Worth (w/o Contingencies)	$91,670,000	$105,064,000
Gloucester City		
Capital Costs		
Before Contingencies	$19,667,000	$32,405,000
With Contingencies	$27,135,000	$44,849,000
Annual O&M	$427,000	$151,000
Present Worth		
Present Worth of O&M	$6,504,000	$2,300,000
Total Present Worth (w/o Contingencies)	$26,171,000	$34,706,000
CCMUA		
Capital Costs [excludes Incured 185 MGD plant costs]		
Before Contingencies	$57,605,600	57,605,600
With Contingencies	$79,892,900	79,892,900
Annual O&M	$500,000	500,000
Present Worth		
Present Worth of O&M	$7,613,600	7,613,600
Total Present Worth (w/o Contingencies)	$57,605,500	57,605,500
Rollup: Camden + Gloucester + CCMUA		
Capital Costs		
Before Contingencies	$150,926,600	$183,607,600
With Contingencies	$208,915,900	$254,362,900
Annual O&M	$2,110,000	$1,404,000
Present Worth		
Present Worth of O&M	$32,133,600	$21,380,600
Total Present Worth (w/o Contingencies)	$175,446,500	$197,375,500

* Excludes future costs for system renewal and replacement necessary to maintain design capacities.

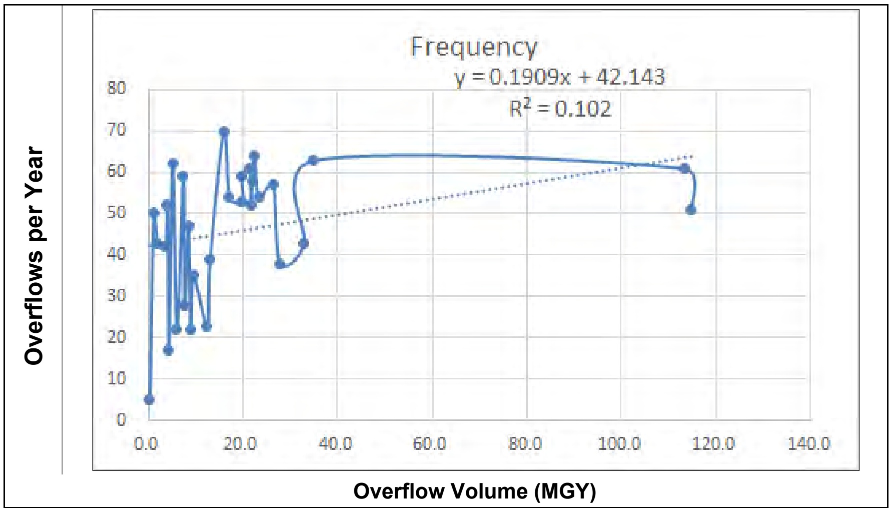


Figure 5-3 – Correlation Between Overflow Frequencies and Annual Discharge Volumes

increment of pollution reduction achieved in the receiving waters diminish compared to the increased costs. Such an evaluation often is referred to as a "knee of the curve" analysis. For this analysis, CCMUA and the Cities initially evaluated the relationship between the frequencies of overflows from the 30 active outfalls during a Typical Year and the volumes of combined sewage discharged from the overflows. As is typical for combined sewer systems with diverse sewershed sizes and land use characteristics, there is little correlation between overflow frequencies and annual overflow volumes from individual out falls. This is shown graphically for the Camden / Gloucester / CCMUA combined sewer system on Figure 5-3.

The variability in overflow volumes between outfalls and the weak relationship between frequency and volume supports the selection of the 85% system-wide capture performance standard. The use of an overflow-event number based performance target, if strictly applied across the 30-outfall system, e.g. 4 to 6 overflows per year, could require that controls be in place at every outfall that exceeds the target frequency under baseline conditions. Therefore, decisions as to where to allocate scarce resources would not be driven by the optimization of overflow reduction benefits, as compared to a more flexible volume-based target applied at the system or sub-system level.

The modeling performed for this cost-performance analysis indicates that achieving 85% capture system-wide will reduce annual CSO volumes by roughly 485 million gallons. This level of CSO reduction approximates (and slightly betters) that which would be accomplished with control levels between eight and twelve overflows per year.

As shown on Table 5-10, the estimated capital costs for system-wide 85% control is around $200 million (excluding construction contingencies). This figure is based on the averaging of the system-wide costs using satellite treatment and those using satellite storage and is net of the 50% construction contingency. The $200 million estimated compares with the approximately $450 million in estimated capital costs for reducing overflows to eight times per Typical Year. A cost-control level curve showing the CSO removal volumes at CSO frequency controls ranging from twenty overflows per year down to zero is presented in Figure 5-4. Included on this graph are the costs and overflow removal volume under an 85% capture strategy. A corollary cost curve showing the Typical Year remaining annual CSO volumes is shown in Figure 5-5.

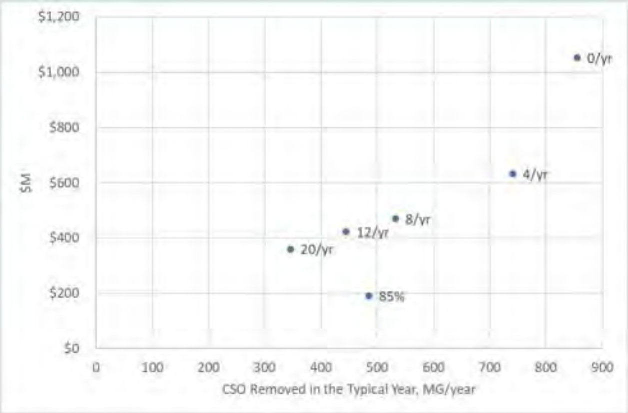


Figure 5-4 – Cost / Performance Relationship of Overflow Frequency Based and 85% System-Wide Capture Control Strategies – Typical Year Overflow Reduction Volumes

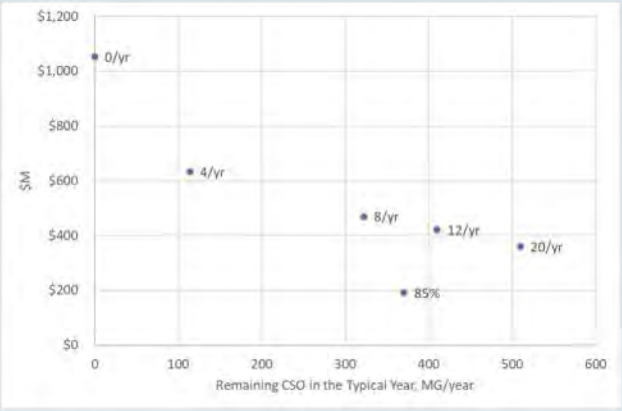


Figure 5-5 – Cost / Performance Relationship of Overflow Frequency Based and 85% System-Wide Capture Control Strategies – Typical Year Remaining Overflow Volumes

5.5 Site Considerations

The preliminary site requirements for the potential satellite treatment or storage facilities described above are shown on Table 5-11. Approximate site vicinity and current land use maps for these potential satellite facilities are shown on Figures 5-9 through 5-13.

Table 5-11 – Potential Satellite Facilities Vicinity Information

Subsystem		Vicinity of Regulators	Approximate Area Required (acres)	Vicinity Notes
1	Delaware River – Gloucester	G1 or the CCMUA Gloucester City Pump Station	~1.5	A facility would be located either in the vicinity of the G-1 regulator or near the Gloucester City Pump Station. A new pipe would convey wet weather flows from regulators G-4 and G-5 as well as G-1 to this facility. Current brownfield site.
2	Cooper River	C22 – C22A	~1.5	Brownfield (status unknown) private bus yard, Federal Street pump station.
		C27 - Thorndyke	~1.5	Grassed area of Gateway Park
		C17	~1.5	Only required if green control targets can't be met in the Cooper River sub-system.

Gloucester City

The hydraulically optimal location for satellite CSO controls within Gloucester City is in the vicinity of Gloucester regulator structures G-4 and G-5 as shown on Figure 5-6. This however would require placement of a satellite facility within or adjacent to Gloucester's Proprietor's Park.

Figure 5-6 – Vicinity of Gloucester City regulators G-4 and G-5 and Adjacent Land Use

To avoid this, an alternative site has been identified in the vicinity of the CCMUA Gloucester City regional pump station and/or around regulator G-1 as shown on Figure 5-7. Consolidation pipes would be needed to convey flow from G-4 and G-5 into the off-site facility.

Figure 5-7 – Gloucester City CSO Control Facility Potential Alternative Site Vicinity

Cooper River – Camden C-22 /22A and C-27 / Thorndyke Regulators

These four regulators discharge to the Cooper River. C-22 and C-22A are adjacent to the Federal Street pump station and the Federal Street bridge over the Cooper River as shown on Figure 5-8.

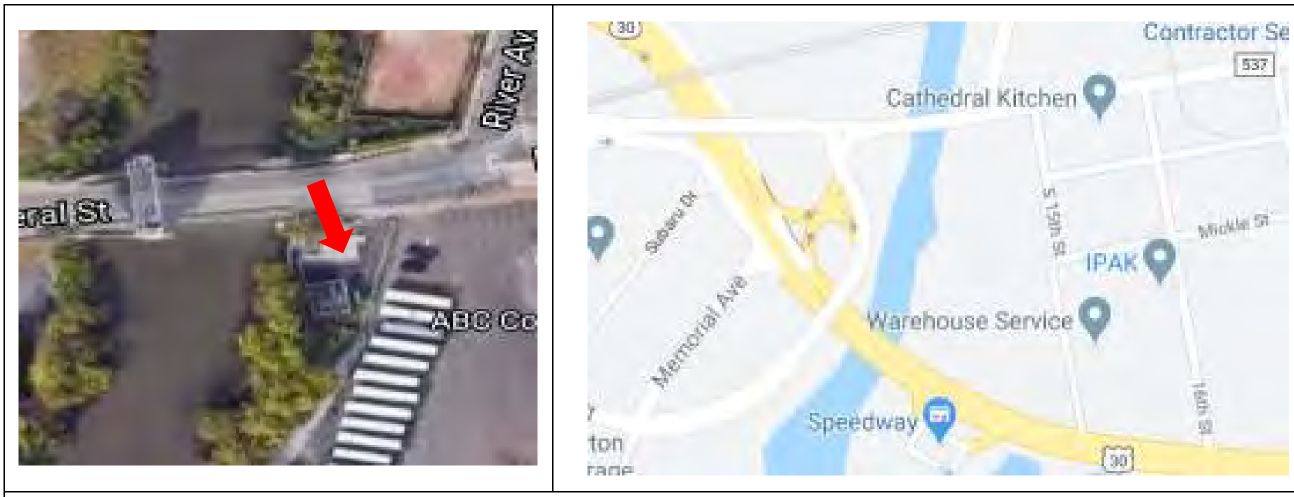


Figure 5-8 – Vicinity of the Camden C-22 / C22-A Outfalls

The outfalls for C-27 and Thorndyke are the most upstream in the Camden combined sewage system that discharge to the Cooper River. The potential location for a satellite facility, adjacent to the existing Thorndyke Street netting facility is shown on Figure 5-9.

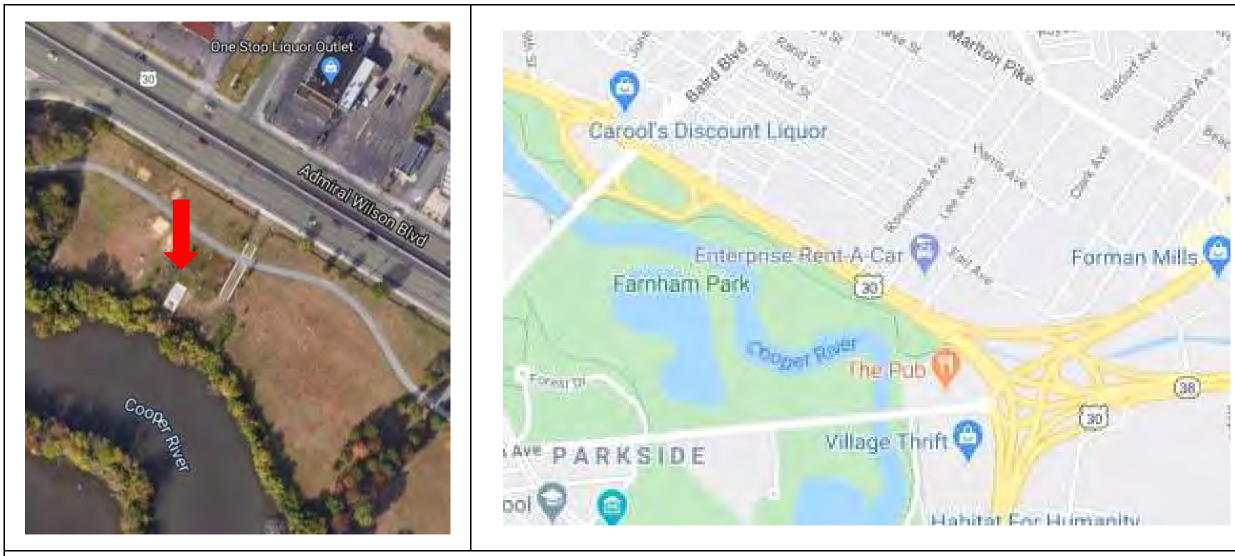


Figure 5-9 – Vicinity of the Camden C-27 and Thorndyke St. Outfalls

Cooper River – Camden C-17 Regulator

If the long term goal of reducing runoff from directly connected impervious in the Cooper River sub-system is not met, an additional satellite treatment facility for the C-17 sewershed will be needed to meet the 85% control objective. The C-17 regulator structure is across the Cooper River and slightly upstream from the C-22 regulator as shown on Figure 5-10. Should additional controls for C-17 prove to be necessary in the long term; the cost-effectiveness of upsizing and consolidating either the C-22 or the C-17 satellite facilities and conveying the wet weather flows across the river for treatment or storage could be evaluated.

Figure 5-10 – Vicinity of the Camden C-17

5.6 Conclusions

In the approved Development and Evaluation of Alternatives Report (DEAR) CCMUA and the Cities of Camden and Gloucester presented a suite of control strategies that would result in the system-wide capture and treatment of 85% of wet weather flows to the combined sewer system during a Typical Year. Through the expansion of CCMUA's WPCF # 1 to 185 MGD, the restoration of the hydraulic capacity of Camden collection system and flow reduction through 10% green infrastructure the capture level is projected to reach 81%and additional controls will be necessary in the Cooper River, Delaware River back channel, and the Delaware River Gloucester City sub-systems.

The technical options for achieving the required additional controls that were outlined in the DEAR have been refined in this section and for purposes of long term control planning now focus on satellite storage through tanks or treatment through enhanced high rate clarification and disinfection. This SIAR is not making a recommendation between storage and treatment. Capacity requirements and cost estimates are provided and it is assumed that the ultimate choice between storage and treatment is best left to future municipal decision makers based on then current conditions.

As noted in the introduction to this section, upon completion of the remedial system-wide sewer cleaning efforts by the City of Camden and Gloucester City and subsequent flow monitoring and model update , CCMUA and the Cities will re-evaluate control alternatives as needed which will lead the final selection of additional controls necessary to achieve 85% system-wide typical year wet weather capture.

6

Section 6.0 Financial & Institutional Capability Assessments Revised September 2023

Note – The financial and institutional capability assessment presented below represents CCMUA's, the City of Camden's and Gloucester City's best understanding of then current conditions and the impacts of implementing the long term control plan as presented in the September 2020 SIAR. This 2020 analysis will be rendered obsolete by the impacts of a number of subsequent developments:

- Potential changes in the use designations and related in-stream water quality standards for Zone 3 of the Delaware River that would result in new treatment plant effluent limits for nutrients (ammonia), currently under development by USEPA and the Delaware River Basin Commission (DRBC);
- The results of the updated CSO control alternatives analyses to be conducted during the forthcoming (2024 – 2028) NJPDES permit cycle upon the completion of system cleaning, flow monitoring, and subsequent revisions to the H&H model;
- USEPA's issuance of revise financial capability guidance in February, 2023;
- Economic changes since 2020 including construction and borrowing cost inflation and an improved potential for federal funding assistance.

CCMUA and the Cities will update the financial and institutional capability assessments as a part of the updated alternatives analyses which is anticipated to occur in the 2027 – 2028 time frame.

6.1 Affordability Assessments

6.1.1 Purpose and Methodology

This section of the SIAR presents a Financial Capability Analysis (FCA) relating to the development of the CSO Long Term Control Plan (LTCP) required under Paragraph G(8)(a) of the Combined Sewer Management section of a permittee's NJPDES discharge permit. The assessment is based upon the EPA document "Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule development," (EPA Guidance Document) published February 1997[6-1], as supplemented by EPA's November 2014 memorandum entitled "Financial Capability Assessment Framework for Municipal Clean Water Act Requirements".[6-2]

[6-1] EPA 832-B-97-004

[6-2] November 24, 2014 memorandum from Ken Kopocis, Deputy Assistant Administrator, Office of Water (OW) and Cynthia Giles, Assistant Administrator, Office of Enforcement and Compliance (OECA) to Regional Administrators

This document supports the twofold purposes of the FCA as envisioned in the 1994 CSO Control Policy[6-3] (Policy). First, this FCA is intended to identify the upper limits of what could constitute an affordable future investment strategy as defined by the Policy and related guidance documents under an assumed LTCP implementation schedule; thereby informing the development of CSO, SSO, MS4, TMDL, and other necessary control alternatives. Second, the assessment will support the development of a workable implementation schedule for the LTCP.[6-4]

The Financial Capability assessment is a two phased process. The residential indicator (RI) is the percentage of a permittee's service area median household income (MHI) expended on wastewater (including stormwater) management. The upper limit of affordability for wastewater services within the Cities and CCMUA will be the point where total wastewater management costs for the typical residential user exceed 2.0% of their respective Median Household Incomes (MHI).

The financial capability indicator is an assessment of the permittee's debt burden, socioeconomic conditions, and financial operations. These two measures are subsequently entered into a *financial capability matrix*, suggested by EPA, to determine the level of financial burden placed on residential customers and the permittee by the existing and projected future expenditures to operate, maintain, and enhance the wastewater management system. The EPA matrix appears in Table 6-12 of this document.

The projected future expenditures driving the RI and imposing demands upon the financial capability of the Cities and CCMUA will include the implementation of CSO controls, stormwater controls, conveyance / collection system rehabilitation, and other operational, maintenance, and capital improvements to the municipal sewer systems. In effect, the future CSO control expenditures will be net of all other expenditures necessary to maintain the appropriate levels of service required to meet public needs, protect public health and the environment and to maintain regulatory compliance under the Clean Water Act, the New Jersey Water Pollution Control Act and the Safe Drinking Water Act.

These analyses are based on information provided by the Cities, CCMUA and external sources such as the on-line fiscal reports available through the New Jersey Department of Community Affairs.[6-5]

6.1.2 Estimated Current Wastewater Costs per Household [6-6]

The Residential Indicator is an approximation of "affordability" which EPA defines as a households' abilities to pay their total wastewater costs and is derived by dividing the total annual wastewater costs for the typical household within the permittees' service areas by the

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[6-3] Combined Sewer Overflow Policy Section II-C(8) 59 FR 18694

[6-4] "Schedules for implementation of the long-term CSO control plan may be phased based on the relative importance of adverse impacts upon water quality standards and designated uses, and on a permittee's financial capability." (59 FR 18688)

[6-5] https://www.nj.gov/dca/divisions/dlgs/resources/fiscal_rpts.shtml

[6-6] Estimates are for 2019 based on latest published rate information from the permittees.

median household income within the service areas. The Residential Indicator is compared to EPA-defined criteria to determine whether total annual wastewater costs impose a low, mid-range, or high impact on residential users. Table 6.-1 shows U.S. EPA's Residential Indicator criteria, which define a "low" impact as a cost per household (CPH) less than 1.0% median household income (MHI), a "mid-range" impact between 1.0 and 2.0%, and "high" impact as greater than 2.0% of MHI.

Table 6 - 1 – EPA Residential Indicator

Residential Indicator	Cost per Household
Low Burden	Less than 1.0 percent of MHI
Mid-Range Burden	1.0-2.0 percent of MHI
High Burden	Greater than 2.0 percent of MHI

The estimated typical annual cost for wastewater services for a typical single family residential wastewater user account in 2019 for Camden was $581 annually. The cost per residential account in Gloucester was $724 and $520 in the CCMUA service area. The derivation of these estimates is shown on Table 6.-2.

For these analyses, the annual costs for a single family residential wastewater accounts are used as proxy for households. User charge rate information combined with an estimate of typical potable water consumption provides an empirically based uniform annual cost estimate.

Table 6 - 2 – Calculated Costs per Typical Residential Wastewater Account in 2019

Metric	Permittee		
	Camden	Gloucester	CCMUA
Wastewater Costs per Typical Residential User Account			
Municipal			
Service Charge	$71.2[a]	$372	$174[c]
Collection System	$158[b]		
Subtotal Municipal	$229		
CCMUA	$219	$352	$352
Total	449	$724	$526
Median Household Income	$26,105[d]	$51,152[d]	$69,283[c]
Current Residential Indicator	1.7%	1.4%	0.76%

a Camden service charge of $17.80 per quarter x 4

b Camden collection system charge of $2.20 per 100 cubic feet of water consumption and an estimated monthly water consumption of 6.02 CCF.

c Average for the 37 CCMUA municipalities weighted by the number of Census households. Municipal costs were calculated based on total costs per household as presented in "Assessing the Affordability of Water and Sewer Utility Costs in New Jersey" by Daniel J. Van Abs (Rutgers University) and Tim Evans (NJ Future) published 2018.

e Source: US Census - American Community Survey (2013 - 2017)

The residential indicator in Camden was at 1.7% of median household income, reflecting the estimated $449 in annual costs and the median household income of $26,105. This places the current wastewater cost burden at the upper end of the mid-range category. While the estimated cost per typical residential user in Gloucester was somewhat higher at $724, Gloucester's median household income of $51,152 resulted in a residential indicator of 1.45%. This is in the middle of EPA's "medium burden" category.

Calculating the typical cost per residential user throughout the CCMUA service area is a bit less direct. CCMUA has thirty-seven customer municipalities ranging in population from 75,500 (Camden) to 4 (Pine Valley and Tavistock Boroughs), number of households ranging from 26,356 (Camden) to 2 each for Pine Valley and Tavistock, and median household incomes ranging from $200,000 (Pine Valley and Tavistock) down to $26,105 (Camden). Annual municipal collection system costs per residential user ranged from $400 (Chesilhurst Borough) down to zero. It should be noted that the municipalities with "zero" collection system user charges recover their system costs through their property tax bases. A detailed analysis of the collection sewer system related portion of the property tax levies in these municipalities is beyond the scope of this SIAR analysis.

In Camden, 37.4% of the population was living below the poverty line. The total Census households are broken out by income brackets on Table 6.-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. As may be noted, the current RI for more than 15,000 households exceed 2.0% and around twelve thousand households have wastewater costs exceeding 3.0%.

Table 6-3 – Analysis of the Current Residential Indicator for Camden

Income Bracket	Households		Bracket Average Income	Bracket RI at Typical Cost per Household
	Number	Cumulative		
Less than $10,000	5,380	5,380	$5,000	11.64%
$10,000 to $14,999	2,538	7,918	$12,500	4.66%
$15,000 to $24,999	4,329	12,247	$20,000	2.91%
$25,000 to $34,999	2,882	15,129	$30,000	1.94%
$35,000 to $49,999	3,368	18,497	$42,500	1.37%
$50,000 to $74,999	3,260	21,757	$62,500	0.93%
$75,000 to $99,999	1,633	23,390	$87,500	0.67%
$100,000 to $149,999	1,217	24,607	$125,000	0.47%
$150,000 to $199,999	380	24,987	$175,000	0.33%
$200,000 or more	208	25,195	$200,000	0.29%
Total	25,195			

In Gloucester, 11.2 percent of the population was living below the poverty line. The total Census households are broken out by income brackets on Table 6.-4 for Gloucester. In Gloucester, around 1,500 households had residential indicators exceeding 2.4% of household income.

Table 6 - 4 – Analysis of the Current Residential Indicator for Gloucester

Income Bracket	Households		Bracket Average Income	Bracket RI at Typical Cost per Household
	Number	Cumulative		
Less than $10,000	165	165	$5,000	14.48%
$10,000 to $14,999	281	446	$12,500	5.79%
$15,000 to $24,999	470	916	$20,000	3.62%
$25,000 to $34,999	554	1,470	$30,000	2.41%
$35,000 to $49,999	497	1,967	$42,500	1.70%
$50,000 to $74,999	815	2,782	$62,500	1.16%
$75,000 to $99,999	575	3,357	$87,500	0.83%
$100,000 to $149,999	500	3,857	$125,000	0.58%
$150,000 to $199,999	175	4,032	$175,000	0.41%
$200,000 or more	43	4,075	$200,000	0.36%
Total	4,075			

6.1.3 Affordability Impacts of CSO Control Alternatives

The estimated capital, incremental debt service and incremental operation and maintenance (O&M) costs of achieving the 85% control target were developed in Section 5 of this SIAR. CCMUA has developed dynamic financial planning and affordability models Camden, Gloucester and CCMUA. These have been used to project the annual costs per typical single family wastewater user upon full implementation of the CSO controls. The projected impacts are shown on Tables 6-5 through 6-7 for Camden Gloucester and CCMUA respectively.

Included in the tables are the residential indicators for 2042 based on an assumed 20 year implementation schedule. The use of a 20 year implementation schedule is intended only to provide a uniform initial basis for analysis; as will be seen from the model outputs a 20 year implementation schedule would result in unacceptable affordability impacts. Also included is a set of hypothetical residential indicators if the CSO controls could be implemented instantaneously this year. This exercise is intended to remove the impacts of inflation.

Table 6 - 5 – Affordability Impacts of the Evaluated CSO Controls: Camden

Metric	≥ 85% Capture	
	Low	High
Capital Costs (millions in 2019 $)		
85% Typical Year Wet Weather Capture Program	$101.9	$129.6
Incremental Costs to Control Cooper River to Zero Overflows per Year	$272.1	
Potential Total Capital Costs (85% Capture Program + Cooper River Zero OPY less 85% capture Cooper River satellite facilities	$374.0	401.7
Projected Residential Indicator in 2042 (Twenty-Year Implementation with inflation)		
For 85% Capture Program	4.8	5.0

Metric	≥ 85% Capture	
	Low	High
Projected Residential Indicator If CSO Control Costs Were Implemented All at Once This Year (to remove inflation impacts)		
For 85% Capture Program	2.5	2.6
With Cooper River Zero Overflow per Year Controls	4.8	5.0
With Cooper River Zero Overflow per Year Controls ***(For documentation of financial infeasibility only – Elimination of Lower Cooper River overflows is not included in the proposed long term control program.)***	8.4	8.1

As noted in Section 5.3.3 and as demonstrated in Section 5.4.2 the elimination of all overflows to the lower Cooper River is financially not achievable and is not included in the proposed long term control program defined in this SIAR.

Table 6 - 6 – Affordability Impacts of the Evaluated CSO Controls: Gloucester City

Metric	≥ 85% Capture	
	Low	High
Capital Costs (millions in 2019 $)	$27.1	$44.8
Projected Residential Indicator in 2042 (Twenty-Year Implementation with inflation)	4.0%	4.7%
Projected Residential Indicator If CSO Control Costs Were Implemented All at Once This Year (to remove inflation impacts)	3.0%	3.7%

Table 6 - 7 – Affordability Impacts of the Evaluated CSO Controls: CCMUA

Metric	≥ 85% Capture
	Low
Capital Costs (millions in 2019 $)	$79.9
Projected Residential Indicator in 2042 (Twenty-Year Implementation with inflation)	0.80%
Projected Residential Indicator If CSO Control Costs Were Implemented All at Once This Year (to remove inflation impacts)	0.75%

Details about the nature and cost breakouts for the control strategies included in these tables are provided in Section 5.3.2 of this document.

Key observations about the data in these table include:

- Owing to its number of outfalls on three receiving streams, the projected least capital cost controls for Camden's CSOs are at $102 million are roughly four times those estimated for Gloucester and 27% more than CCMUA.
- Camden's least cost controls would push the Camden residential indicator to at least 2.5% even if inflation is excluded.
- Gloucester's controls would likewise result in Gloucester's residential indicator being at least 3.0% with or without inflation.

Due to its size, higher median household income and CSO control obligations being limited to the C-32 outfall and the potential further expansion of its WPCF # 1 , the projected RI for the CCMUA service area would appear to remain at the upper limit of what USEPA considers as a low impact. However, due to the income variations between the CCMUA customer municipalities, the use of a regionalized residential indicator is very misleading.

6.1.4 Methodology and Underlying Assumptions

Methodology

CCMUA has developed individual detailed dynamic financial models for each of Camden, Gloucester and CCMUA. These models project current system costs through any reasonable CSO control program implementation period (e.g. 20 through 40 years) based on assumed rates of inflation and any available information as to future system changes or planned capital improvements outside of the CSO controls covered in this SIAR.

Annual revenue requirements for the current municipal systems are calculated by each model based on the projected annual costs along with policy options such as debt service coverage targets, the percentages of capital improvements to be funded by debt or available funds (e.g. from renewal and replacement funds) and the use of retained earnings. The models "start" with the adopted 2019 budgets and 2019 user rates. User rates are adjusted in the model annually based upon changes in revenue requirements. For example, if a hypothetical borough's total wastewater budget is $10 million in 2020 and typical residential costs are $300 annually and the projected budget in 2021 is $11 million, the model would project the cost per residential user to be $330.

Future annual capital costs for CSO controls along with any other new capital programs that have been identified are overlaid to the existing costs in the models. Based upon the financing policy assumptions used, incremental debt service is added one year after a financed capital expenditure. For model simplification purposes, the models "assume" that debt is issued annually during the course of the implementation phase of the capital program(s). Incremental operation and maintenance (O&M) costs are added as applicable in the years following the completion of capital expenditures.

The models can be run with inflation on or off. Running future scenarios without inflation provides a simpler view of the impacts of varying program scopes and schedules. This approach has the advantage of eliminating the need to estimate future rates of inflation and income growth. However, omitting inflation can understate the affordability impact of long-term programs since income growth has not kept pace with and is not projected to keep pace with water utility capital and O&M cost inflation. For example, for the period of 1999 through

2013, the national costs for typical household wastewater services increased at a rate of 4.8%.[6-7] The national Consumer Price Index increased at an annual rate of around 2.4%[6-8] for the period, while the US median household income increased from around $42,000 to $52,250 at an annual rate of 1.6%.[6-9]

On the other hand, running the models with inflation turned on provides an arguably more realistic vision of the future albeit based on some conjecture as to future economic variables such as inflation and interest rates. Including assumptions about inflation rates based upon look-backs at historical rates for time periods approximating the CSO control implementation schedule can provide a reasonable approach to estimating future affordability.

Underlying Assumptions

Key assumptions used in the above analysis are summarized on Table 6 - 8. An annotated complete list of all data and assumptions used in the affordability model is provided as Appendix B to this memorandum.

Table 6- 8 – Affordability Model Key Inputs and Assumptions

Item	Value	Notes
Finance		
Bond Term		
Market Interest Rate	6.0%	NJEIT Financing – Smart Growth program offers 75% funding at 0% interest and 25% funding at market rates for 20 years for CSO control projects.
NJDEP	0.0%	
Blended Interest Rate	1.5%	
Target Coverage	125%	
O&M as % of Capital Cost	2.0%	
Economic		
LTCP O&M Inflation	3.9%	Based on national rates of wastewater system O&M costs in 2017 NACWA study.
LTCP Construction Inflation	3.7%	Based on 1984 – 2015 ENR Construction Cost Index for New York City (80%) and Philadelphia (20%).
Estimate Base Year		
MHI Data Year	2015	
Typical Household Monthly Consumption	4,500	Typical urban water consumption.

6.2 Financial Capability Assessment

The second part of the financial capability assessment is intended to evaluate the financial capabilities of the permittees to finance the required CSO controls. The process is similar to that used by the bond rating agencies and includes six items that fall into three general categories of debt, socioeconomic, and financial management indicators. The six items are:

[6-7] NACWA 2013 Cost of Clean Water Index

[6-8] US Bureau of Labor Statistics

[6-9] US Census

1. Bond rating
2. Total net debt as a percentage of full market real estate value
3. Unemployment rate
4. Median household income
5. Property tax revenues as a percentage of full market property value
6. Property tax revenue collection rate

Items 2, 5 and 6 are applicable to municipalities that have taxing authority and that can fund capital expenditures directly by or backed up through property taxation. Municipal authorities such as CCMUA have no taxing authority and these three property tax related metrics are not applicable.

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). Table 6-9 contains the six criteria and the ratings that categorize the permittee as strong, mid-range, or weak in each category. A discussion of each item follows.

Table 6 - 9 – Permittee Financial Capability Indicator Benchmarks

Indicator	Strong (3)	Mid-Range (2)	Weak (1)
Bond Rating	AAA-A (S&P) or Aaa-A (Moody's)	BBB (S&P) or Baa (Moody's)	BB-D (S&P) of Ba-C (Moody's)
Overall Net Debt as a Percent of Full Market Property Value	Below 2%	2% to 5%	Above 5%
Unemployment Rate	More than 1% below the National Average	+/- 1% of the National Average	More than 1% above the National Average
Median Household Income	More than 25% above National MHI	+/- 25% above National MHI	More than 25% below National MHI
Property Tax as a Percent of Full Market Property Value	Below 2%	2% to 4%	Above 4%
Property Tax Collection Rate	Above 98%	94% to 98%	Below 94%

6.2.1 Bond Rating – Indicator 1

The bond ratings of the three permittees are as follows:

- City of Camden – Standard & Poor's BBB+ which is considered to be mid-range
- Gloucester City – Standard & Poor's AA- which is considered to be strong.
- CCMUA – Moody's Aa2 – which is considered to be strong.

6.2.2 Overall Direct Net Debt as a Percent of Full Market Value – Indicator 2

Debt Burden is measured by overall net debt as a percent of full market property value, which evaluates the ability of local government to issue additional debt. Overall Direct Net Debt is defined as current total liability to be repaid by property taxes divided by the municipality's full market property value. This indicator is relevant as a metric for municipalities issuing general obligation bonds which are substantially repaid through property tax revenues.

Overall direct net debt for Camden for 2019 was $47.1 million.[6-10] The percent of total net debt to the three-year average property valuation of $1.57 billion[10] was 3.03%, which places Camden in the midrange range on this measure.

Overall direct net debt for Gloucester for 2019 was $13.9 million.[6-11] The percent of total net debt to the three-year average property valuation of $543 million[10] was 2.75%, which places Camden in the midrange range on this measure.

This metric is not applicable to CCMUA.

6.2.3 Unemployment Rate – Indicator 3

The unemployment rate is used as an assessment of the economic well-being of residential users in the service area. The dataset for the municipal unemployment rates is taken from the US Census American Community Survey 2013-2017 estimates. The American Community Survey gathers data over a 5-year period.[6-12] The prevailing unemployment rate provided by the ACS for that timeframe more closely represents the actual strength of the economy in a municipality.

The unemployment rate for Camden is 14.0% compared to the national rate of 6.6% for the same time period, resulting in a weak rating. It may be noted that the "weak" rating is triggered in the EPA table when the local unemployment rate is one percent above the national average. Gloucester's unemployment rate was 6.7%, resulting in a mid-range score. The Camden County county-wide unemployment rate of 7.9% can be used as a proxy for CCMUA. This unemployment rate was slightly more than one percent above the national average of 6.6% for the same period, resulting in a weak score.

6.2.4 Median Household Income – Indicator 4

Median Household Income (MHI) divides the relevant incomes of a population into two parts so that half of the incomes are below the median and half of the incomes are above the median. Unlike average income, median income is not skewed by extremely high or extremely low incomes in the dataset. The median household incomes for Camden, Gloucester and the CCMUA service area are shown on Table 6-10.

[6-10] Source: Camden's 2019 NJDCA User Friendly Budget Sheet USB-10

[6-11] Source: Gloucester's 2019 NJDCA User Friendly Budget Sheet USB-10

Table 6-10 – Median Household Income

Permittee	Median Household Income[6-12]	United States	% Difference from US	Categorization
Camden	$26,105	$57,650	-55%	Weak
Gloucester	$51,152		-11%	Mid-Range
CCMUA	$69,283		+20%	Mid-Range

6.2.5 Tax Revenues as a % of Full Market Value – Indicator 5

The three year average property valuations in Camden was $1.7 billion.[6-13] A tax of $28.1 million is levied on the assessed valuation. Therefore, the property tax levy is approximately 1.6%. This value is considered strong in the USEPA metrics.

The three year average property valuations in Gloucester was $543 million.[6-14] A tax of $22 million is levied on the assessed valuation. Therefore, the property tax levy is approximately 4.0%. This value is considered weak in the USEPA metrics.

This metric is not applicable to CCMUA

6.2.6 Property Tax Collection Rate

The EPA criterion for a strong rating in this category is a collection rate of more than 98%. Camden's rate is calculated to be 88.4%, which places it in the weak range for real estate tax collections. Gloucester's collection rate is calculated to be 96.7% which is considered mid-range.

This metric is not applicable to CCMUA.

6.2.7 Financial Indicator Score

As shown on Table 6 -11, 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 all six of the indicators that are applicable to Camden, Gloucester and CCMUA.

Table 6 - 11 – Permittee Financial Capability Indicator Benchmarks

Indicator	Camden		Gloucester		CCMUA	
	Rating	***Numeric Score***	***Rating***	***Numeric Score***	***Rating***	***Numeric Score***
Bond Rating	Mid-Range	2	Strong	3	Strong	3
Overall Net Debt as a Percent of Full Market Property Value	Mid-Range	2	Mid-Range	2	NA	
Unemployment Rate	Weak	1	Mid-Range	2	Weak	1

[6-12] Source: US Census – National Community Survey estimates for 2013 - 2017

[6-13] Source: 2019 User Friendly Budget – sheet USB 10

[6-14] Source: 2019 User Friendly Budget – sheet USB 10

Indicator	Camden		Gloucester		CCMUA	
	Rating	*Numeric Score*	*Rating*	*Numeric Score*	*Rating*	*Numeric Score*
Median Household Income	Weak	1	Mid-Range	2	Mid-Range	2
Property Tax as a Percent of Full Market Property Value	Strong	3	Mid-Range	2	NA	
Property Tax Collection Rate	Weak	1	Mid-Range	2	NA	
Total		10		13		
Overall Indicator Score: (numeric score / number of applicable indicators)		1.67		2.17		6.0
EPA Qualitative Score	Mid-Range		Mid-Range		Mid-Range	

6.3 Financial Capability Matrix

In this section the results of the step 1 affordability analysis which goes towards the residential ratepayers' ability to afford CSO controls within the context of other capital investment needs is integrated with the step 2 (Financial Capability) analysis which goes towards the permittee's ability to finance the implementation of the LTCP.

It was established previously that the least present worth cost CSO control options described in this SIAR would result in the following projected residential indicators in 2042 after a twenty-year implementation period:

- Camden – The residential indicator would be 5.4% of MHI for the least cost approach to controlling wet weather overflows from its Delaware River, Cooper River and Newton Creek overflow structures;
- Gloucester - The residential indicator would be 3.3% of MHI for the least cost approach to control its discharges to the Delaware River and Newton Creek; and
- CCMUA – The residential indicator would be 1.0% after implementing controls for its wet weather discharges to the back channel of the Delaware River from its C-32 outfall.

The overall financial capability ratings for Camden, Gloucester and CCMUA are all considered to be midrange under the EPA framework. The intersection of these two ratings on the EPA financial capability matrix places Camden and Gloucester in the category of high financial burden and CCMUA would be in the mid-range, as shown on Tables 6-12 through 6-14 respectively.

Table 6-12 – The Financial Capability Matrix - (Shaded areas Indicate Camden's Ratings)

Permittee Financial Capability Indicators Score	**Residential Indicator**		
(Socioeconomic, Debt and Financial Indicators)	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

Table 6-13 – The Financial Capability Matrix - (Shaded areas Indicate Gloucester's Ratings)

Permittee Financial Capability Indicators Score	**Residential Indicator**		
(Socioeconomic, Debt and Financial Indicators)	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

Table 6-14 – The Financial Capability Matrix - (Shaded areas Indicate CCMUA's Ratings)

Permittee Financial Capability Indicators Score	**Residential Indicator**		
(Socioeconomic, Debt and Financial Indicators)	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

6.4 Additional Economic Factors

Measuring the household burden imposed by wastewater costs as a percentage of the median household income may underestimate the 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."* [6-15]

Therefore, in addition to following EPA guidelines for completion of the financial capability assessment metric, a discussion of socioeconomic conditions in the City of Camden and Gloucester City is essential to the consideration of scheduling and compliance levels with CSO guidelines.

6.4.1 Cost of Living Index

City of Camden

The overall cost of living within the City of Camden has been calculated at 94% of the US national average.[6-16] Statewide, New Jersey's cost of living is 123% of the national average. The apparent lower cost of living in Camden is driven by the depressed housing market in the City which results in a housing index of 59% of the national average. Other components in the cost of living index are higher than their respective national averages:

- General goods and services – 105%
- Groceries – 117%
- Health care – 103%
- Transportation – 115%
- Utilities – 108%.

Camden's cost of living must be considered in the context of its median household income which is only 45% of the national MHI. Allowing for the 4% lower cost of living, the effective MHI in Camden would still only be about 48% of the national median, or conversely the effective cost of living in Camden is more than twice the national average.[6-17]

Gloucester City

The overall cost of living within Gloucester City has been calculated at 100% of the US national average.[6-15] Statewide, New Jersey's cost of living is 123% of the national average. The cost of living in Gloucester being at the national average and 23% less than the New Jersey average is also driven by a housing index of 80% of the national average. As is the case for Camden, other components in the cost of living index are higher than their respective national averages:

- General goods and services – 105%
- Groceries – 117%
- Health care – 103%
- Transportation – 115%
- Utilities – 108%.

[6-15] 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.

[6-16] Source: Areavibes.com

[6-17] Calculated as follows: cost of living (100%/94%) X Camden MHI @ 45% = 47.9%; or cost of living index of 100% / 47.9% = 2.08.

Gloucester's cost of living also must be considered in the context of its median household income which is 11% lower than the national MHI. This suggests an effective cost of living in Gloucester that is 12% higher than the national average.

6.4.2 Housing Costs

Based upon a 2017 study[6-18] by the National Low Income Housing Coalition, the fair market value of a two bedroom apartment in both Camden County and the Philadelphia / Camden/Wilmington MSA was $1,211 per month or $14, 532 annually. This works out to 58% of the Camden and 28% of the Gloucester median household incomes.

The same study defines affordable monthly apartment rents at around $662 per month. This figure represents 30% of the annual wages at the average hourly wages for renters (around $27,400). At $662 per month, annual rents equal about 32% of the Camden MHI and around 15% of the MHI in Gloucester.

6.4.3 Local Tax Burdens

City of Camden

The property tax burdens within Camden and Gloucester are substantial. The average residential tax for 2019 in Camden was $________]. This includes Camden's taxes of $________ along with Camden County and school district taxes.[6-19]

Gloucester City

The average residential tax for 2019 in Gloucester was $4,665 for a property with the average assessed valuation of 108,000. This includes Gloucester's taxes of $2,397 along with Camden County and school district taxes.[20] This compares with a national average local property tax levy of $3,500 for a similarly priced home.

6.4.4 Poverty Rate[6-21]

Per the US Census' 2013-2017 American Community Survey the poverty rates in Camden and Gloucester were 37.4 and 11.2 respectively. These compares to the national average poverty rate of 14.6%.

6.4.5 Income Growth Trends

The MHI growth rates between 2000 and 2015 were about 0.69% annually for Camden and 1.95% annually for Gloucester. This growth rate compares with the growth rates for New Jersey (2.20%) and for the U.S. (2.14%).

[6-18] Out of Reach 2017 – The High Cost of Housing National Low Income Housing Coalition.

[6-19] Source: 2017 NJDCA User Friendly Budget sheet UFB-1

[6-20] Source: 2017 NJDCA User Friendly Budget sheet UFB-1

[6-21] Source: US Census – National Community Survey 2013 - 2017

6.4.6 NJDCA Municipal Revitalization Index (MRI)

The Municipal Distress Index[6-22] 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 thirty-seven municipalities within Camden County are shown on Table 6-15. The City of Camden has a ranking of 1 as the most distressed municipality. Gloucester City is ranked 51 state-wide, placing it in the top 10th percentile ranking. A synthesized ranking for all 37 CCMUA municipalities was calculated using the numbers of households per municipality as a weighting factor. The calculated MRI distress score is 40.6 which would give it a ranking of about 79th, or within the top 15th percentile.

Table 6-15 – Municipal Renewal Index for the CCMUA Customer Municipalities

Municipality		2017 Municipal Revitalization Index			Population	Households
		MRI Score	MRI Distress Score	MRI Rank		
1	**Camden City**	**-26.05**	**100.0**	**1**	**75,550**	**25,195**
2	Woodlynne Borough	-14.69	68.4	15	2,950	805
3	Lindenwold Borough	-8.96	52.4	32	17,418	7,096
4	Clemonton Borough	-7.70	49.0	42	4,933	1,898
5	Lawnside Borough	-7.21	47.6	46	2,917	1,148
6	Chesilhurst Borough	-6.64	46.0	49	1,647	584
7	**Gloucester City**	**-6.42**	**45.4**	**51**	**11,333**	**4,075**

[6-22] Measuring Distress in New Jersey: the 2017 Municipal Revitalization Index Office of Policy and Regulatory Affairs, New Jersey Department of Community Affairs.

Municipality		2017 Municipal Revitalization Index			Population	Households
		MRI Score	MRI Distress Score	MRI Rank		
8	Pine Hill Borough	-6.21	44.8	55	10,517	5,232
9	Brooklawn Borough	-6.14	44.6	57	2,006	713
10	Pennsauken Township	-5.11	41.7	71	35,863	12,163
11	Audubon Park Borough	-5.02	41.5	76	1,023	479
12	Bellmawr Borough	-4.54	40.2	83	11,583	4,357
13	Hi-Nella Borough	-4.54	40.1	84	861	366
14	Berlin Township	-4.22	39.3	94	5,453	2,058
15	Mount Ephraim Borough	-3.36	36.9	116	4,641	1,779
16	Magnolia Borough	-3.14	36.3	118	4,310	1,643
17	Somerdale Borough	-3.06	36.0	121	5,417	2,164
18	Runnemede Borough	-3.06	36.0	122	8,391	3,191
19	Merchantville Borough	-2.71	35.1	129	3,769	1,421
20	Waterford Township	-1.69	32.2	165	10,749	3,521
21	Barrington Borough	-1.47	31.6	172	6,811	2,770
22	Laurel Springs Borough	-1.34	31.2	177	1,917	707
23	Stratford Borough	-1.31	31.2	179	7,019	2,576
24	Winslow Township	-0.90	30.0	192	39,317	13,645
25	Oaklyn Borough	-0.88	30.0	193	4,009	1,751
26	Gloucester Township	-0.83	29.8	195	64,034	23,422
27	Berlin Borough	-0.58	29.1	206	7,612	2,750
28	Collingswood Borough	-0.54	29.0	210	13,969	6,023
29	Gibbsborro Borough	0.55	26.0	247	2,183	774
30	Audubon Borough	0.69	25.6	255	8,736	3,500
31	Vorhees Township	1.21	24.2	286	29,386	10,929
32	Cherry Hill Township	2.06	21.8	341	71,204	26,356
33	Haddon Township	2.25	21.3	350	14,612	5,820
34	Haddon Heights Borough	2.65	20.1	373	7,530	2,921
35	Pine Valley Borough	4.51	15.0	472	4	2
36	Haddonfield Borough	5.72	11.6	519	11,428	4,195
37	Tavistock Borough	9.89	0.0	565	4	2
CCMUA Service Area-Wide Weighted by # of Households		**(4.71)**	**40.6**	**79**	**511,106**	**188,031**

6.5 Institutional Context

6.5.1 System Ownership, Operation and Maintenance Responsibilities

The Cities of Camden and Gloucester own their respective municipal sewerage consisting of primarily combined collection systems and sanitary collection systems and stormwater collection and conveyance systems in limited areas of each municipality. The combined sewer portions of their collection systems are operated under permits NJ0108812 (Camden) and NJ0108847 (Gloucester). The Camden County Municipal Utilities Authority (CCMUA) provides wastewater conveyance (via the Baldwins Run pump station and force main) and treatment services for Camden and Gloucester along with thirty-five suburban municipalities within Gloucester County. CCMUA's one CSO associated with the C-32 regulator structure upstream of the Baldwin's Run pump station operates under permit number NJ0026182. The two combined sewered municipalities are responsible for the operation and maintenance of their respective systems.

6.5.2 Legal Framework

The Camden and Gloucester combined sewer systems are owned and operated by the cities pursuant to Title 40A of New Jersey Statutes (Municipalities and Counties). New Jersey municipalities are authorized and empowered to:

- "…acquire, construct, improve, extend, enlarge or reconstruct and finance sewerage facilities and to operate, manage and control all or part of these facilities and all properties relating thereto…"
- "To issue bonds of the local unit or units to pay all or part of the costs of the purchase, construction, improvement, extension, enlargement or reconstruction of sewerage facilities";
- "To make and enter into all contracts and agreements necessary or incidental to the performance…";
- "To fix and collect rates, fees, rents and other charges…"
- "To prevent toxic pollutants from entering the sewerage system.";
- "To exercise any other powers necessary or incidental to the effectuation of the general purpose of N.J.S.40A:26A-1 et seq."[6-23]

The financial management of the cities' combined sewer systems are regulated under Chapter 4 of Title 40A. Municipalities are required to establish public utility funds to isolate sewer system costs and revenues from the municipal general funds:

> "All moneys derived from the operation of publicly owned or operated utility or enterprise and any other moneys applicable to its support, shall be segregated by the local unit and kept in a separate fund which shall be known as "utility fund" and shall bear a further designation identifying the utility or enterprise and, except as provided

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[6-23] N.J.S.40A:26A-1 et seq. Municipal and County Sewerage Act.

> in section 40A:4-35, shall be applied only to the payment of the operating and upkeep costs, and the interest and debt redemption charges upon the indebtedness incurred for the creation of such utility or enterprise."[6-24]

The annual budgets for municipal sewerage systems are controlled through the Local Budget Law, codified at N.J.A.40A:4-1 et seq. Annual operating, debt service, revenue and five-year capital improvement budgets are developed using forms and excel templates specified by the New Jersey Department of Community Affairs. The draft budgets are reviewed and approved by the Department prior to final adaption of the budget by the municipalities prior to the start of the fiscal year.

CCMUA owns and operates its regional conveyance interceptor system and the Water Pollution Control Facility # 1 under the New Jersey Municipal and County Utilities Authorities Law.[6-25] Municipal Utility Authorities are empowered to provide water, wastewater, solid waste and hydroelectric power generation and distribution services in a defined service area (district). These services may be provided directly to end-user properties (retail services) or indirectly through service contracts with the municipalities.

CCMUA provides wholesale wastewater conveyance and treatment to Camden, Gloucester and the other municipalities within its service area under the terms of the Service Agreement of December 1986 with its participant municipalities. Under the terms of the Service Agreement the participant municipalities are individually responsible for the operation, maintenance, expansion and replacement of their local collection systems.[6-26] However, CCMUA has the option at its sole discretion but not the obligation to address inflow and infiltration on a regional basis where cost-effective.[6-27] Taken together, these provisions appear to preclude CCMUA from assuming the costs of combined sewer control in Camden or Gloucester beyond those relating to facilities that may provide incidental or equivalent reductions in inflow and infiltration.

Municipal utility authorities have broad powers to acquire, build, own, be the lessor or lessee, operate and maintain wastewater and other public works systems.[8-28] They can finance capital improvements through revenue bonds. With the exception of retail services provided outside of their geographic districts, municipal authorities can set wholesale and retail rates (as applicable) without review by the New Jersey Board of Public Utility Commissioners. The annual budget process for municipal utility authorities is proscribed in the Local Authorities Fiscal Control Law[6-29] and closely parallels that used by municipal governments under the Local Budget Law.

[6-24] N.J.S.40A:4-62

[6-25] N.J.S.40:14B-1 et seq.

[6-26] Section 502 – Operation and Maintenance of the Local Sewerage System

[6-27] Section 503 – Authority's Option to Correct Infiltration and Inflow.

[6-28] N.J.S.40:14B-20 (Powers)

[6-29] N.J.S.40A:5A-1 et seq.

6.6 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 CCMUA, the City of Camden and Gloucester City and their respective financial capabilities to finance the CSO control program are premised on the baseline financial conditions of the three permittees as well as the economic conditions in New Jersey and the United States generally at the time that work on this SIAR commenced. While the impacts of the COVID-19 pandemic on the long-term affordability of the CSO LTCP are obviously still unknown, it is reasonable to expect that there will be potentially significant impacts. There are several dimensions to these potential impacts, including reduced utility revenues and household incomes.

6.6.1 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 CCMUA, the two Cities and municipal wastewater utilities in general across the United States will face significant and potentially permanent declines in revenues from households unable to pay their water and sewer bills and the sudden decline in industrial and commercial demands for potable water and wastewater treatment.

On March 20, 2020 the National Association of Clean Water Agencies (NACWA) issued a press release stating that:

> **"NACWA conservatively estimates the impact to clean water utilities nationwide of lost revenues due to coronavirus at $12.5 Billion.** This isa low-end estimate, assuming an average loss of revenue of 20% which is well within the range of what individual utilities are already projecting. Some utilities are anticipating closer to a 30% or 40% loss in revenue. This estimate is based on the substantial historical utility financial data NACWA has on file through its Financial Survey and recent reports from NACWA members on the decrease in usage they are observing in their systems over the last few weeks."[6-30]

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 the 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

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[6-30] NACWA press release: Coronavirus Impacting Clean Water Agencies; Local Utilities and Ratepayers Need Assistance March 20, 2020

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 potentially erode the financial capabilities to fund the CSO LTCP.

6.6.2 Potential Median Household Income Impacts

The impacts of the pandemic on median household incomes in Camden, Gloucester and the entire CCMUA service area 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.[31]
- The U.S. unemployment rates rose from 5.0% in December of 2007 to 9.9% in December of 2009.[32]
- 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%.[33]

While a quantifiable assessment of the impact of the pandemic on median household income is not feasible at this time, reduction in base year MHI can be expected. This will further exacerbate the impacts of the revenue reductions described above on LTCP affordability, as higher base user charge rates will absorb an increased portion of lower MHI.

6.2.3 Implications for the Long Term CSO Control Program

CCMUA, Camden and Gloucester anticipate that the financial implications of the COVID-19 pandemic will be discussed with NJDEP during the review of the SIAR and as the 2021 – 2025 NJPDES permit is developed.

Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, Permittees will be reticent to commit to long term capital expenditures for CSO controls without the incorporation of adaptive management provisions, including provisions to revise and reschedule the long term CSO controls proposed in this SIAR based on emergent economic conditions beyond the permittees' control. As detailed in Section 8 of this SIAR, these provisions could include scheduling the implementation of specific CSO control measures to occur during the five year NJPDES permit cycles. A revised affordability

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

[32] Source: Bureau of Labor Statistics data series LNS1400000

[33] Source: Federal Reserve Economic Data (FRED) data series: A792RC0A052NBEA

assessment should be performed during review of the next NJPDES permit to identify controls that are financially feasible during that next permit period.

6.7 USEPA Proposed Revisions to the Financial Capability Assessment Process

CCMUA, Camden and Gloucester are aware of these pending changes to EPA's guidance on Financial Capability Assessment (FCA) announced on September 15, 2020. This new guidance is still under review and not yet final, but it is recognized that it may impact the FCA and in turn the LTCP implementation schedule presented in this report. If the final guidance prompts changes to the FCA and the implementation schedule, these elements of this LTCP may be modified and resubmitted to NJDEP for review and approval.

7

Section 7 Revised September 2023

Selected Long Term Control Program

7.1 Selected Long Term Control Program Overview

The selected long term control program consists of six program elements that will have phased and overlapping implementation schedules (detailed in Section 8). These six elements are:

1. ***Completion of Projects to Optimize Current Assets* -** Since the submittal of the SIAR in September of 2020 CCMUA completed the capacity expansion of its Delaware Water Pollution Control Facility (WPCF) # 1 to 185 MGD in 2020. The City of Camden has completed the rehabilitation of 28 regulator structures and the upgrading of the Arch Street pump station and is working towards the restoration of the hydraulic capacity of Camden's combined collection sewer system through a comprehensive sewer and outfall cleaning and rehabilitation program. Gloucester City has also been progressing with system-wide collection system and outfall cleaning and as-needed spot repairs.

Additional details as to the status of LTCP related projects identified in the 2020 SIAR are described in the previous sections of this revised SIAR as well as in the joint CCMUA / City of Camden / Gloucester City response to NJDEP's request for information letter of June 12, 2023 provided as Appendix C.

2. *Efficacy Evaluation* - The evaluation of the efficacy of these current improvements through comprehensive flow monitoring which will inform the refinement and recalibration of the existing hydrologic / hydraulic model to then current conditions. This will establish a new baseline of overflow statistics informed by the wet weather operating history with these capacity improvements in place. The proposed scheduling for the flow monitoring and model recalibration is provided in Section 8 of this document. Similar evaluations may occur after other improvement project milestones such as the implementation of the formalized green stormwater infrastructure and the street flooding mitigation program elements.

3. *Formalized Green Stormwater Infrastructure Program* – Accelerating green stormwater infrastructure through a coordinated, formalized and expanded GSI Implementation Program with the goal of achieving a ten percent reduction in the directly connected impervious areas contributing stormwater runoff to the combined sewer system. GSI efforts since September 2020 are listed in Section 3.5 of this revised SIAR and in Attachment 1 to Appendix C.

4. *Street Flooding Mitigation Program* – The development and rapid implementation of a comprehensive Street Flooding Mitigation Program will be developed within the City of Camden to provide an empirical understanding of the frequency, location and extent of street flooding remaining after the Camden sewer system is cleaned. This will serve as the basis for short and long term operational and capital improvements. Subsequent to the submittal of the SIAR, CCMUA and the City of Camden have been

working with the Drexel University School of Engineering on flood sensors and reporting technologies in East Camden areas currently prone to street flooding. Moreover, through the paralleling efforts of sewer and outfall cleaning and the expansion of treatment capacity at CCMUA's WPCF #1, reductions in incidences of street flooding have been noted along the Delaware River. Street flooding mitigation efforts since September 2020 are listed in Section 4.4 of this revised SIAR and in Attachment 1 to Appendix C.

5. ***Cooper River Water Quality Optimization Program*** – The Cooper River is an important environmental, recreational and economic asset for the City of Camden's economic redevelopment. Eliminating Camden's CSOs from the Cooper River is not financially feasible and would not result in water quality compliance. CCMUA and the City of Camden are committing to work with the other Cooper River municipalities, stakeholders and NJDEP to develop a **Cooper River Water Quality Optimization Strategy** during the first NJPDES permit cycle after this SIAR is approved. As detailed in Section 7.6, the CCMUA has developed an initial sampling program for the summer of 2023 to evaluate sampling access sites and to start developing contemporary data. Results for Cooper River sampling conducted during the summer of 2023 are provided in Section 7.6.

6. ***Additional Structural Controls*** – Within the limitations imposed by affordability constraints, structural controls in each of the five sub-systems that will raise the level of CSO capture in each sub-system and system-wide to no less than 85% of wet weather flows during the Typical Year.

Due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated in Section 6, these controls will require significant external funding and will likely need to be implemented over the course of several NJPDES permit cycles.

Each of these program elements are described in further detail in Sub-section 7.2 – 7.7. The anticipated cumulative CSO control performance as the program is implemented is shown on Table 7-1.

Table 7-1 – Project Cumulative CSO Control Levels as the Program is Implemented

Program Element		System Wide	Delaware River - Camden	Delaware River-Gloucester	Delaware River – Back Channel	Cooper River	Newton Creek
Baseline	**Baseline Conditions**						
	Percent Capture	69%	71%	69%	69%	69%	79%
	Overflow Volume (MGY)	822.9	404.7	75.8	140.2	170.5	31.7
	Modeled Street Flooding (MGY)	79.7	52.3	6.5	1.9	8.7	10.4

Program Element		**System Wide**	**Delaware River - Camden**	**Delaware River-Gloucester**	**Delaware River – Back Channel**	**Cooper River**	**Newton Creek**
Program Element 1	**System Optimization - Completion of Current Projects**						
	Percent Capture	78%	89%	69%	69%	70%	85%
	Overflow Volume (MGY)	579.9	167.3	75.3	142.0	170.4	24.8
	Modeled Street Flooding	33.0	13.8	6.4	0.6	6.9	5.2
Program Element 2	**Efficacy Evaluation**	This program element will evaluate the levels of control achieved after the completion program elements 1 and may also be conducted as needed after program elements 3 and 5.					
Program Element 3	***Formalized Green Stormwater Infrastructure Program (results of 10% DCIA reduction)***						
	Percent Capture	81%	91%	74%	72%	75%	87%
	Overflow Volume (MGY)	487.0	135.3	63.9	125.3	141.5	20.9
	Modeled Street Flooding	24.4	10.3	4.7	0.3	4.9	4.2
Program Element 4	***Street Flooding Mitigation Program***	The CSO control impacts of the street flooding mitigation cannot be quantified prior to its development and implementation.					
Program Element 5	***Cooper River Regional Water Quality Optimization Strategy***	This program element will not directly impact CSO overflow levels. It will identify steps that CCMUA, Camden, NJDEP and the other Cooper River municipalities can take to improve water quality and enhance safe recreational use of the Cooper River.					
Program Element 6	***Additional Structural Controls*** (statistics are for satellite storage for Del-GL and Cooper)						
	Percent Capture	86%	91%	85%	85%	85%	87%
	Overflow Volume (MGY)	341.5	135.3	35.2	68.0	82.2	20.9
	Modeled Street Flooding	<24.4	<10.3	<4.7	<0.3	<4.9	<4.2

7.2 Program Element 1 – Completion of Current Projects

7.2.1 Treatment Plant Capacity Expansion

In 2016 CCMUA proactively undertook the expansion of treatment capacity at its Delaware Water Pollution Control Facility No. 1 from 150 MGD to 185 MGD and completed the project in 2020. Improvements included:

- *Influent Pump Upgrades* – CCMUA has completed a major capacity expansion of its influent pumping capacities including upgrading two of the four pumps from 45 MGD to 60 MGD, resulting in a firm pumping capacity of 180 MGD with one pump out of service and a total pumping capacity of 240 MGD. Improvements also include new high efficiency variable frequency drive motors and related upgrades to the power distribution equipment.
- *Process Train Hydraulic Improvements* – CCMUA has reduced hydraulic bottlenecks in the primary sedimentation tankage piping and channels to enable full treatment of up to 185 MGD.

Statistics documenting the benefits of these plant capacity improvements on peak flow rates into the plant are detailed in Section 2.4 of this revised SIAR.

7.2.2 Hydraulic Capacity Restoration

City of Camden

The City of Camden is currently undertaking a number of projects intended to restore and optimize the use of the design hydraulic capacities of its collection system:

- *Collection System Cleaning and Spot* Repairs – Through its collection system contract operator, American Water Operations & Maintenance LLC, Camden has embarked on a multi-year project to address deferred cleaning and to make spot repairs within its collection system. It is anticipated that this remedial system-wide cleaning will be completed in 2024. Statistics related to Camden's cleaning activities are provided in Appendix C of this revised SIAR. Maps showing areas cleaned are provided in Appendix D.
- *Regulator Rehabilitation* – The City of Camden undertook a comprehensive system-wide inspection of its regulator structures which determined that the regulator mechanisms required extensive repairs. Repairs have been prioritized for the regulator mechanisms for Camden regulators C-1 through C-9, thereby enabling the control of flows into the Camden interceptors. Flows from the other Camden regulators can be controlled through the Arch Street, Pine Street and Baldwin's Run pump stations and through a control gate immediately upstream of the treatment plant, eliminating the need for the regulator controls. To maintain maximum flexibility should the need arise in the future to re-use these regulators as a part of flood prevention, the deteriorated mechanisms will be removed, and their anchor systems replaced with stainless steel plates. Camden completed the rehabilitation of its 28 regulators in 2022.
- *Overflow Outfall Cleaning* - Concurrent with its regulator rehabilitation project, Camden is addressing blockages that it has identified at some of the CSO outfalls. Dredging is required to remove and clear these blockages. The City of Camden has been working closely with CCMUA and NJDEP to complete this program as expeditiously as possible. Two projects were developed with CCMUA currently working on the most critical nine of these outfalls and a second project by the City to

clear the remainder of the outfalls. As of September, 2023 the outfall cleaning was estimated to be approximately 90% complete with completion anticipated in 2023.

- *Arch Street Lift Station Upgrades* – Camden and CCMUA have upgraded the capacity of the Arch Street Lift Station by replacing the three existing 75 horsepower motors with new 100 horsepower motors and replacing the three existing 22.25" impellers with 24.25" impellers.
- *Institutionalization of Green Stormwater Practices for Redevelopment* – the stormwater control ordinance Article III (725-12 through 725-22) is applicable to any site plan or subdivision that requires preliminary or final site plan approval. Section 725-14 of Camden's stormwater control ordinance requires that "to the maximum extent practicable, the (stormwater quantity and quality) standards … shall be met by incorporating nonstructural stormwater management strategies…into the design of the project" (725-14.E).

Gloucester City

Approximately 18 miles of sewer were cleaned and jetted between 2021 and May of 2023 out of a total of 39 miles of sewers. Gloucester City anticipates that the system-wide cleaning will be completed within 2023. A map showing the extent of the system cleaning is provided as Attachment D to Appendix D of this revised SIAR. As a result of regular inspections of Gloucester's seven regulator structures the need for remedial cleaning of regulator G-1 was identified and completed in May of 2023, resulting in a significant reduction in street flooding. In August of 2023 CCMUA conducted an inspection of the Gloucester regulator and outfall structures and identified outfall structures with obstructions. These are expected to be cleaned in 2025 and into 2026 based on planning, design and permitting work to be completed in 2024. A copy of the 2023 outfall and regulator inspection report is provided as Attachment E to Appendix D.

As shown in Table 7-1, with the expansion of CCMUA's treatment capacity to 185 MGD and the restoration of the Camden and Gloucester collection systems' hydraulic capacity, the annual overflow volumes are projected to decrease from 823 to 582 MGY and the system-wide capture rate increase from 69% to 78%. In addition, the volume of modeled surface flooding would be reduced by roughly 50% from 80 million gallons to 33 million gallons in the Typical Year. The projected capital costs for these current wet weather control related projects total roughly $47 million as shown on Table 7-2. These figures do not include the investments by the Cities and CCMUA for green infrastructure to date.

Table 7-2 – Ongoing Wet Weather Control Capital Investments (as of the 2020 SIAR)n

Current Control Project	Capital Costs ($ millions)
CCMUA – Expansion of WPCF # 1 to 185 MGD	
Influent Pump Upgrades	$10.1
Wet Weather Improvements	$3.8

Current Control Project	Capital Costs ($ millions)
Influent Junction Separation	$8.0
Subtotal CCMUA	$21.9
City of Camden	
Collection System Cleaning (estimated, ongoing)	$12.0
Regulator Improvements	$5.4
Outfall Dredging	$5.2
Arch Street Lift Station Upgrade	$2.1
Subtotal Camden	$24.7
Grand Total	$46.6

7.3 Program Element 2 – Iterative Efficacy Evaluation

The second element of the long term control program will be iterative flow monitoring and recalibration of the hydrologic / hydraulic model to reflect changing conditions. The first round of flow monitoring will occur after the completion of the initial cleaning of the Camden and Gloucester collection system and outfalls. This flow monitoring will occur in 2025 and as needed into 2026. By that time, CCMUA will have accumulated operating experience with the WPCF capacity at 185 MGD which will enable the model to be updated in 2026 to reflect CCMUA's system control rules and understanding of the wet weather behavior of the three trunk lines going into the plant. It is anticipated that an efficacy evaluation will be repeated after other milestones such as the formalized GSI, and the street flooding mitigation efforts once these programs have been implemented for a period sufficient to determine how much GSI is likely to be accomplished over a reasonable planning horizon.

7.4 Program Element 3 – Formalized Green Stormwater Infrastructure Program

As detailed in Section 3, CCMUA and the Cities of Camden and Gloucester are targeting a 10% or around a 145 acre reduction in impervious areas that are directly connected to the combined sewer system (DCIA) through the installation of GSI. CCMUA and the Cities are proposing the establishment of a framework for the implementation of GSI that would formalize, expand upon and support the current efforts of groups such as the Camden SMART initiative. The framework is targeted for completion during the first permit cycle, with work to commence upon NJDEP approval of this SIAR. The framework will include specific performance targets for GSI implementation, e.g., 30 acres per five year NJPDES permit cycles.

Since 2017, projects capturing stormwater flows from approximately 29 acres have been constructed or are in planning or design phases. The project locations and sizes are described in Section 3.5 and in Attachment 1 to Appendix C of this revised SIAR.

7.5 Program Element 4 – Street Flooding Mitigation Program

The fourth Long Term Control Program element will be the implementation of a Comprehensive Street Flooding Mitigation Program as detailed in Section 4 of this document. The objective is to establish a framework for a comprehensive program to understand, reduce the occurrences of, and mitigate the impacts of street flooding. The program will establish the empirical basis for street flooding mitigation and assign responsibilities for the prevention of and response to street flooding events. It is anticipated that a detailed program plan will be completed early in the initial (2021 – 2026) NJPDES permit cycle following the approval of this SIAR. Steps taken to mitigate street flooding since the September 2020 submission of the SIAR to NJDEP were described in Section 4.4 of this revised SIAR.

7.6 Program Element 5 – Cooper River Regional Water Quality Optimization Strategy

The fifth Long Term Control element will be the development of a regional strategy to optimize water quality in the Cooper River. This strategy will take a watershed-based approach to reducing the discharge of pathogens and other pollutants into the Cooper River that degrade it's recreational and economic redevelopment usage as well as its aquatic habitat. Pending refinement by stakeholders, two preliminary goals are identified:

- Achieving water quality standards for pathogens during dry weather; and
- Reducing wet weather impacts, including recovery time.

The intent of the strategy is to identify *what, how, and who* – is needed to achieve these goals. It will be developed during the first NJPDE permit cycle following the approval of this SIAR (2024-2028). A stakeholders' working group (may be derived from existing groups and interested parties). Anticipated initial activities could include:

1. Compilation and review of existing data and planning efforts such as the Tri-County Water Quality Management Plan, the circa 2003 TMDL for fecal coliform in Watershed Management Area 18, the most recent NJDEP Section 303 Integrated WQ Report, current NJPDES MS4 stormwater permits, development and land use plans for the 40 square mile Cooper River watershed.
2. Development of Cooper River recreational usage policies and best practices e.g.:
    - Determine the need for and implementation as warranted a post-wet weather sampling program to determine when pathogen levels in the river meet state standards for recreational secondary (e.g., boating) or primary (e.g., swimming) contact.
    - Develop and implement a public notification program using the internet, call-in and/or visual notification (e.g., orange "CSO" flags flown at marina's in Pittsburgh during and after CSO events).

3. Identify opportunities to support and expand recreational usage of the Cooper River and stewardship of its aquatic habitat as a critical local environmental resource and as a catalyst for economic growth and community revitalization.
4. Identify and support opportunities for funding and cooperation with other groups and agencies for riparian improvements, e.g., multi-purpose stream bank stabilization with recreational trails, invasive species control and habitat enhancement and restoration, etc.
5. Identify and support feasible and implementable green stormwater management, other source reduction and modifications as appropriate of municipal and county land use and redevelopment regulations and policies that enhance compliance with MS-4 requirements and reduce the impacts of non-point source runoff.

As a proactive step in developing a Cooper River water quality optimization strategy CCMUA developed an initial sampling program for the summer of 2023 to evaluate sampling access sites and to start developing contemporary data. Six sampling locations were selected for 2023 with five along Cooper River and one on the back channel of the Delaware River:

- USGS 01467190 (Rt 130 bridge) – just upstream of tidal boundary
- USGS 01467150 (Kings Highway, Haddonfield) – HUC boundary of South Branch
- NJDEP_BFBM-ANO188 (Park Blvd, Cherry Hill) – HUC boundary of North Branch
- 31DELRBC_WQX-CooperRiver at Cuthbert Blvd (Cherry Hill) – nontidal, upstream of Rt 130
- 31DELRBC_WQX-CooperRiver near mouth (State St, Camden) – CSO area
- DRBC-DRLE-9904 - back channel

The approximate locations of the sampling sites are shown on Figure 7-1.

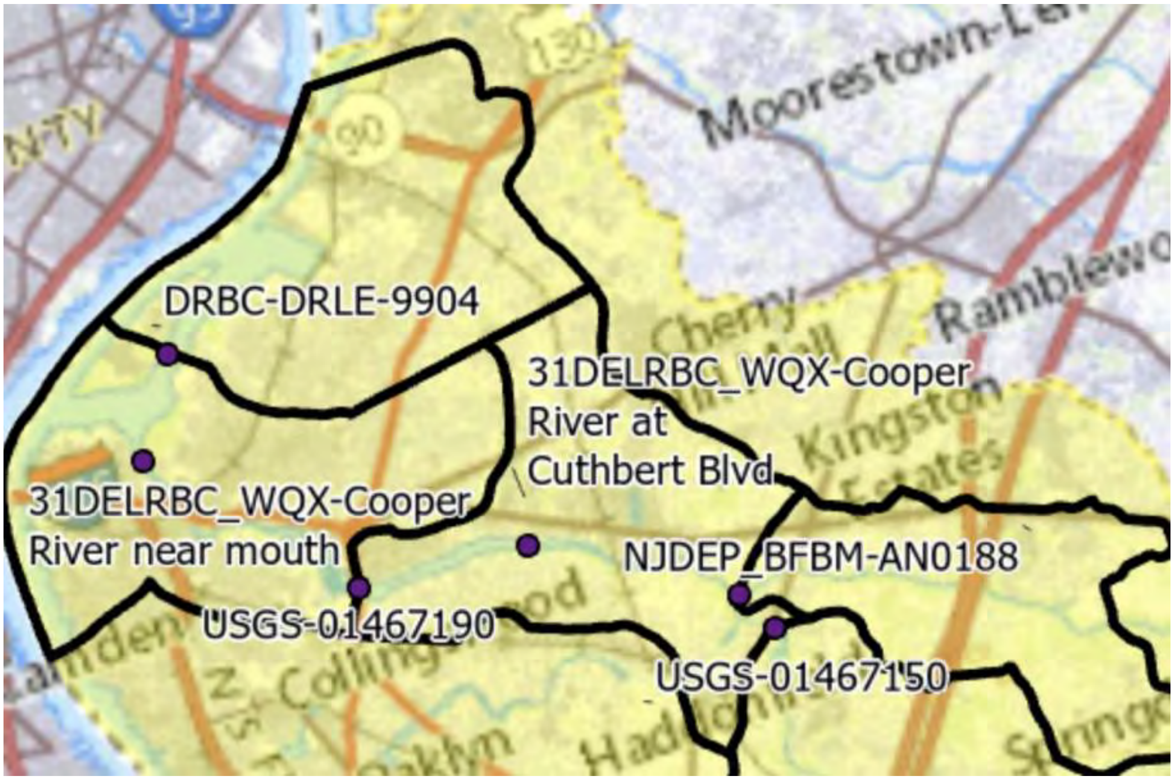


Figure 7-1 – 2023 Cooper River Water Quality Sampling Locations

The sample location in the back channel of the Delaware River proved inaccessible and not sampled in 2023. Of the five Cooper River sampling locations, one is subject to influence from combined sewer overflows. The remaining sites are located upstream of the CSO outfalls and isolated from CSO discharge by the dam just upstream of Kaighn Avenue forming Cooper River Lake. An example of the data for E. coli from early summer of 2023 is provided on Table 7-3.

Table 7-3 – Initial 2023 Cooper River Sampling Data

Sampling Location	CSO Influence ?	E Coli WQS Violated?			Sampling Dates							
		Single Sample > 235 colonies / 100 ml	Geometric Means		5/3/23	5/18/23	5/25/23	6/1/23	6/7/23	6/15/23	6/20/23	6/29/23
			Value	Exceed 126 col./ml?								
State Street Bridge	Yes	5	513	yes		162	214	115	2,420	866	387	613
Route 130 Bridge	No	4	210	yes		125	236	20	167	345	133	345
Cuthbert Blvd. Bridge	No	8	1,742	yes		1,050	2,420	1,550	980	1,550	2,420	2,420
Park Blvd.	No	4	314	yes		199	308	153	326	613	1,410	173
King's Highway	No	8	1,076	yes	517	517	2,420		727	1,120	816	1,300

As shown on Table 7-3, the E.-coli water quality standard of 235 CFU/ 100 ml for single samples and of 126 CFU/100 ml for the geometric means were exceeded in all of the locations upstream of CSO influence during dry weather sampling events. More detailed data analysis will be performed and documented in later reports as more data is collected during future permit cycles.

7.7 Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture

Based on the results of the post-cleaning flow monitoring and modeling, CCMUA and the Cities will update the structural controls alternatives analysis to determine additional controls needed to achieve 85% typical year wet weather capture. This is anticipated to occur in the 2027 – 2028 time frame. The updated alternatives analysis will also provide a more accurate projection of long term implementation scheduling. CCMUA's and the Cities' best projections and commitments based on understandings as of 2023 are detailed in Section 8.

Subject to changing conditions and understanding, e.g., as a result of flow monitoring and model updates under program element 2, as of September 2020 CCMUA and the Cities of Camden and Gloucester propose the following suite of structural controls that along with the 10% GSI will achieve the 85% wet weather capture during the Typical Year control performance goal.

- ***Delaware River – Camden***: CCMUA will undertake modifications to the C-3 regulator structure and implement revised wet weather operating procedures. These, coupled with the completion of the capacity expansion at WPCF # 1 to 185 MGD will enable 85% capture from the Delaware River – Camden sub-system.
- ***Delaware River – Gloucester***: A satellite control facility will be installed to capture overflows from the G-4, G-5, and G-1 regulators. This could be either a 1.1 million gallon storage tank or a 6.4 MGD high rate wet weather treatment facility that would provide at least the equivalent of primary treatment as well as for disinfection and dechlorination (as necessary depending on the disinfection approach selected).
- ***Cooper River***: Satellite control facilities will be installed in two locations. One facility will capture flows from Camden regulators C-22 and C-22A and have either a storage capacity of 1.3 million gallons or a 20 MGD treatment capacity. It is anticipated that the location will be adjacent to or in the vicinity of Camden's Federal Street pump station. The second facility will capture flows from Camden's C-27 regulator and from the Thorndyke Street outfall, which receives flows from several upstream regulators. This facility would have a storage capacity of 3.0 million gallons or a treatment capacity of 20.4 MGD located near the Thorndyke outfall.
- ***Delaware River Back Channel***: The 85% control target will be achieved in the Delaware River Back Channel through two projects. First, the combined sewer flows that are currently discharged from the Pennsauken Township sewer system into the Camden combined system will be re-routed for discharge to the Delaware River back channel after treatment and disinfection. The second component of the Delaware Back Channel controls will be the modification and reconfigurations of regulator structures and power supplies associated with the Baldwins Run pump station to enable full utilization of its 25 MGD capacity.

Design work for the separation of combined sewered areas of Pennsauken Township is complete and pending construction permit approval. CCMUA is currently evaluating options for the conveyance of the separated Pennsauken stormwater for discharge to Delaware River back channel through or adjacent to CCMUA's C-32 outfall structure. This conveyance strategy may involve targeted sewer separation in Camden neighborhoods adjacent to Pennsauken or a dedicated stormwater line for the removed Pennsauken stormwater. In either case, CCMUA is studying the optimization of stormwater inlet placement and configuration to mitigate street flooding in East Camden.

- ***Potential Further Expansion of CCMUA's WPCF #1 Wet Weather Treatment Capacity:*** As detailed in Section 2 of this SIAR; CCMUA has evaluated the potential to expand the wet weather treatment capacity of its WPCF up to 220 MGD as determined necessary in the future. Expansion of the plant wet weather capacity to 220 MGD was determined to be not necessary or cost effective to meet the 85% system-wide typical year capture target however in the 2020 SIAR. If warranted, this option could be re-examined during the updating of the structural controls analysis anticipated in the 2027-2028 timeframe.

CCMUA and the Cities recommend against the selection between satellite storage and treatment at this time. As will be detailed in Section 8 (Implementation), the proposed structural controls outlined above are proposed not to occur until after the results of program elements one through four are mostly implemented and their impacts on CSO evaluated though flow monitoring and modeling. Moreover, additional advancements in wet weather treatment and storage technologies are likely to occur. In addition, water quality standards or other regulatory requirements may change, e.g., as a result of DRBC's current water quality monitoring efforts.

Another reason to defer a decision on the satellite control technology is uncertainty as to the feasibility of reaching the 10% DCIA reduction target. The targeted 10% reduction in DCIA is aggressive and unlike structural controls such as satellite storage or treatment, the implementation of green infrastructure, the timing and scope of green stormwater projects are not completely under the control of the Cities.

Should the 10% DCIA goal prove to be unachievable in a regulatorily acceptable time-frame, the capacities of the satellite treatment facilities described in Section 5 that are anticipated to be necessary to achieve 85% system-wide wet weather capture would be upsized. The estimated revised facility sizes required with a zero percent reduction in DCIA are shown on Table 7-4to bracket the sizes needed.

Table 7-4 – Control Facility Sizing Implications of Zero DCIA Reduction

Sub-System	Locations	Required Capacities			
		Storage (MGY)		Treatment (MGD)	
		0% DCIA Reduction	10% DCIA Reduction	0% DCIA Reduction	10% DCIA Reduction
Delaware River – Gloucester	G-4 / G-5	0.6	1.2	4.1	6.8
	G-1	0.5	0.7	2.3	4.4
Cooper River	C-22 / C-22A	1.3	2.6	20	21

Sub-System	Locations	Required Capacities			
		Storage (MGY)		Treatment (MGD)	
		0% DCIA Reduction	10% DCIA Reduction	0% DCIA Reduction	10% DCIA Reduction
Newton Creek	C-27 / Thorndyke	3	3.5	20.4	38.5
	C-17	NA	0.4	NA	4.8

The final size requirements of satellite facilities will be finalized after the GSI Implementation Program has been implemented long enough to determine the level of GSI that is achievable and the system performance with the green and other improvements has been quantified through future flow monitoring and modeling.

7.8 Implications of the Financial Capability Assessment

7.8.1 Problem Statement

NOTE: CCMUA and the Cities will update the financial and institutional capability assessments detailed in Section 6 of this SIAR Update as a part of the updated alternatives analyses.

The long term CSO control planning process set forth in the NJPDES permits is based on the logical progression from system characterization to a broad evaluation of control alternatives to the selection of the optimal control strategy for a given permittee. Included in this process is a consideration of the impacts of the long term controls on ratepayer affordability and on the permittee's financial capability to finance the controls. Per the USEPA CSO Control Policy, these financial factors serve to inform the setting of the implementation schedule for the long term controls.

The logic of the long term control planning process is challenged when as documented in Section 6, the affordability of CSO controls for Camden and Gloucester is extremely limited. As shown on Table 7-5, there is a huge gap between the estimated costs of the selected long term control program and the economic and financial resources of the residents and municipal governments of Camden and Gloucester.

Table 7- 5 – Financial Capability and Control Program Capital Costs

Item	Permittee	
	Camden	Gloucester
Future Capital Costs Triggering a 2.0% Residential Indicator in 2042 ($ millions)		
With Inflation	$0.0	$1.7
Without Inflation	$30.0	$12.5
Estimated Total Capital Costs of 85% Capture Long Term Program by Permittee (in 2019 dollars)		
Least Cost	$101.9	$27.1
Most Cost	$129.6	$44.8

Item	**Permittee**	
	Camden	**Gloucester**
Projected Residential Indicator After Full Implementation in 2042[a]		
	With Inflation	
Least Cost	4.8%	4.0%
Most Cost	5.0%	4.7%
	Without Inflation	
Least Cost	2.5%	3.0%
Most Cost	2.6%	3.7%

[a] 2042 is used for example only. It is based on the approval of the SIAR in 2021 and implementation of the long term control program through 2041. These dates may not be appropriate for Camden and Gloucester.

As shown on Table 7-5 the least capital cost option for Camden is $101.9 million while the amount of future capital costs causing the residential indicator to exceed the USEPA 2.0% high burden trigger is $30 million assuming no inflation while the figures for Gloucester are $12.5 million in current dollars.

7.8.2 Impacts of Inflation

The 1997 USEPA guidance document on affordability and financial capability assessment does not account for inflation beyond bringing older cost or income data to the current year. This simplification eliminates the need to project economic trends such as household income or construction costs. However, if the potential effects of inflation are not considered, the affordability of long term CSO controls can be overstated. Nationally, the growth in the cost of wastewater services have outpaced the growth in household incomes. A comparison of national cost trends and the growth in household incomes for Camden and Gloucester for the period of 1999 through 2013 is shown on Figure 7-2.

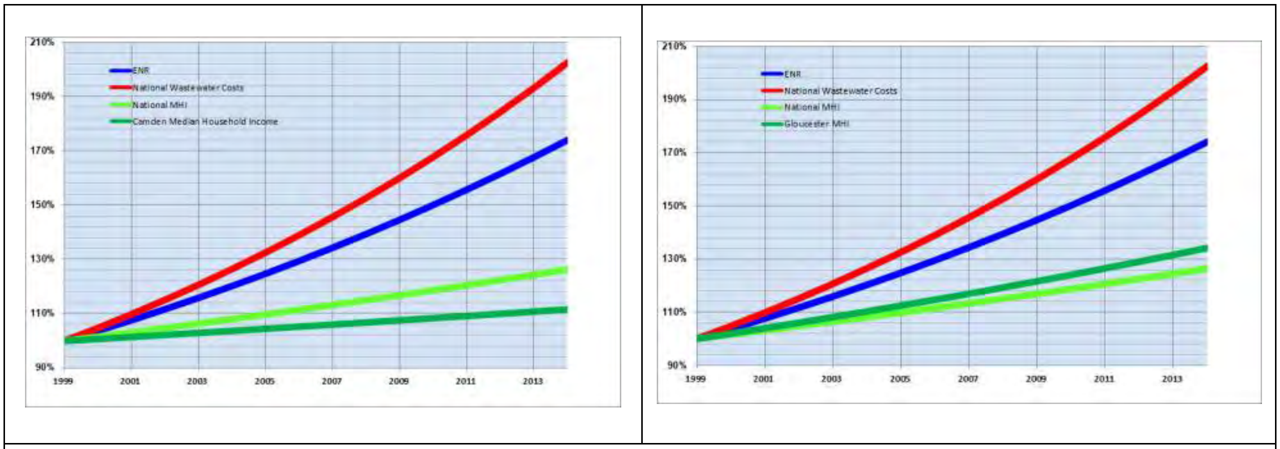


Figure 7-~~1~~2– Comparison of Rates of Growth of Wastewater System Costs Nationally with Growth in Camden's (left) and Gloucester's (right) Median Household Income. [sources: NACWA, US Census]

The graphs demonstrate the potential erosion in affordability if the growth of costs is greater than the growth in household incomes. If inflation is considered in projecting affordability, the $30 million new capital expenditure figure that causes Camden's residential indicator to cross the 2.0% high burden threshold disappears. Based on the historically based inflation rates used in the affordability model, Camden's residential indicator is projected to rise to 3.55% with no new capital expenditures through 2041. Projected inflation erodes the $12 million new capital trigger for Gloucester down to $1.7 million.

Obviously, the future rates of inflation cannot be known. Therefore, the scope and schedule for implementing the long term control program outlined above will need to be based on iterative re-evaluations of affordability and financial capability under the adaptive management process detailed in Section 8 of this document. This adaptive management strategy will include empirical triggers for reconsidering the type, scale and scheduling of control elements within the context of interim targets to be established in future NJPDES permits.

7.8.3 Alternative Implementation Schedules

The base case affordability / financial capability assessment assumes a 22 year implementation schedule based on the durations for facilities planning, design and construction shown in Table 7-6.

Table 7-6 – Base Case Implementation Schedule for Affordability and Financial Capability

Start Date	2021
Facilities Planning	1
Design & Permitting	3
Construction	17
Total Years to Implement LTCP (inclusive)	21

The assumed start date is based on the submittal and approval of the SIAR in 2020 and coincides with the effective date of the next NJPDES permit. The impacts of extending this implementation period has been evaluated. The impacts of extending the implementation schedule on the residential indicators depend on whether or not inflation is considered as shown in Table 7-7.

Table 7-7 – Impacts of Implementation Scheduling on the Residential Indicators

Implementation Duration in Years	Camden Residential Indicator		Gloucester Residential Indicator	
	With Inflation	Without Inflation	With Inflation	Without Inflation
22	4.8%	2.5%	4.0%	3.0%
32	6.0%	2.7%	4.2%	2.2%
42	7.2%	2.2%	4.1%	2.1%

If as is assumed in the base-case affordability model that costs will continue to outpace income growth, affordability decreases as the implementation period is extended. If inflation is not included in the analysis, extending the implementation period does improve affordability, however even with an implementation period extending more than forty years, the residential indicators for both Camden and Gloucester are projected to remain well over the 2.0% high burden threshold.

7.8.4 Annual Pay-as-You-Go Funding

The amounts that each city could spend on an annual basis without causing their respective residential indicators to exceed 2.0% have also been calculated and are shown on Table 7-8.

Table 7-8 – Maximum Annual Expenditures Without Trigger a 2.0% Residential Indicator

Implementation Duration in Years	Camden		Gloucester Residential Indicator	
	With Inflation	Without Inflation	With Inflation	Without Inflation
22	None	~$1.0 million	$80,000	$530,000
32	None		None	
42	None		None	

7.8.5 External Funding Needs

As documented above, the least capital cost of 85% wet weather flow capture control options would result in residential indicators of well over the 2.0% high burden threshold with or without factoring in inflation. Conversely, put on an annual expenditure basis, Camden and Gloucester could only afford around $1.0 million and $530,000 respectively before triggering the high burden. Moreover, increasing the implementation schedule out past 2060 would not resolve the affordability problem even at zero inflation. In addition, the amounts of capital expenditures that could be incurred by the two cities include necessary renewal, replacement and other non-CSO control project costs.

A meaningful CSO control program is not feasible for Camden or for Gloucester without either a significant reduction in capital costs through the reduction in the targeted level of controls or through external funding that would effectively reduce the capital expenditures by the two cities. It has been demonstrated in Section 5.4 (cost and performance considerations) that a Presumption based control strategy targeting 85% control of Typical Year wet weather is the lest-cost path towards compliance with the performance metrics in the CSO Policy and in the NJPDES permits. Therefore, the path forward must include significant external funding through the State of New Jersey or through a yet to be promulgated federal funding program. Shown on Table 7-9 are the impacts of various levels of external capital funding and/or capital cost reduction on the residential indicators over a twenty-two and thirty-two year implementation schedule.

Table 7- 9 – External Funding and/or Capital Cost Reduction Impacts on Residential Indicators

Grant / Capital Cost Reduction	Camden Residential Indicator				Gloucester Residential Indicator			
	With Inflation		Without Inflation		With Inflation		Without Inflation	
	22 Years	32 Years	22 Years	32 Years	22 Years	32 Years	22 Years	32 Years
0%	4.9	6.0	2.5	2.3	4.0	4.2	3.0	2.2
25%	3.8	5.8	2.3	2.2	3.6	3.9	2.5	2.0
50%	4.2	5.4	2.2	2.0	3.2	3.6	2.2	1.8
75%	3.8	5.1	2.0	1.9	2.8	3.3	1.8	1.7
100%	3.6	4.9	1.9	1.9	2.4	3.0	1.6	1.6

The combinations of implementation schedule and external funding or cost reductions that would result in a projected residential indicator of 2.0% or less are highlighted in green.

No combinations of schedule and funding work if inflation is included. Camden's program could be workable from an affordability standpoint with either a 22 year or 32 year implementation schedule and funding of 75% or more of the capital costs. For Gloucester's program to be considered as affordable over a 22 year schedule, funding of around 60% would be required. If the Gloucester implementation period were extended to 32 years, 25% or greater funding would result in the residential indicator not exceeding 2.0%

The examples shown in this section and in the entire SIAR are the results of the myriad assumptions and estimations used in the development of control program costs and future economic conditions. These will change and be refined as the long term control program moves into implementation; but as presented are sufficiently accurate to form the basis for the development of a regulatory compliance strategy moving forward.

7.9 Construction and Financing Schedule

Paragraph G-8(a) of the NJPDES permits requires the submittal of a Construction and Financing Schedule as an early long term control program deliverable to NJDEP. Due to the financial constraints facing Camden and Gloucester the scope of this document will need to be broadened into a comprehensive program financing and funding strategy that addresses from a financial perspective ***what is doable and when?*** While Section 8 of this revised SIAR includes a general design and construction schedule for structural controls, **CCMUA and the Cities will prepare a detailed construction and design schedule as a part of the updated evaluation of structural alternatives for submission to NJDEP no later than six months before the end of the forthcoming five year (2024 – 2028) NJPDES permit cycle.**

Developing a workable funding strategy will require a partnership between the two Cities, CCMUA, NJDEP and likely other state and regional agencies such as the New Jersey Department of Community Affairs and Department of Transportations. Allied and related agencies such as Camden County will likely also play a role; the former in leveraging County road and highway projects to support green stormwater infrastructure or sewer line renewal and replacement coincident with road work.

State Programs beyond the New Jersey Clean Water Revolving Loan Program that target low income areas, transportation or economic redevelopment potentially could be leveraged with specific CSO projects, e.g., coordinating local sewer separation with the water and sewerage needs of a redevelopment or roadwork project. In addition, new state legislation and appropriations actions may be required by the State Legislature. These could be pursued with and through NJDEP and the other New Jersey combined sewered municipalities and authorities.

Current federal funding for public water and wastewater systems is limited pending new Congressional action on infrastructure programs. Existing programs such as the Water Infrastructure Finance and Innovations Act (WIFIA) – which provides loans from the US Treasury Department (Administered by USEPA) are likely of limited applicability to Camden and Gloucester. In the past Congressional appropriations to the US Army Corps of Engineers Civil Works funding through Sections 219 and 206 of the Water Resources Development Act have been used successfully in other regions towards CSO control funding.

While current federal funding is not robust, long term consideration could be given towards crafting new pushes for federal assistances if conditions appear to be propitious. Previous successful examples include Rouge River Program in the Detroit area and the 3 Rivers Wet Weather Program (Pittsburgh) which together channeled more than $300 million in federal funding towards municipal wet weather and CSO control projects.

The Construction and Financing Schedule and all aspects of the long term control program implementation will incorporate adaptive management as described more fully in Section 8 of this document. As detailed in Section 8, CCMUA and the Cities propose that the implementation schedule for the CSO control program be synchronized with the five year NJPDES permit cycles. Specific enforceable CSO control program targets will be negotiated during the NJPDES renewal process. These targets will be subject to revision due to forces beyond the control of CCMUA and the Cities including but not limited to natural disasters (e.g., hurricane), pandemics or other disasters along with resultant sever economic downturns which disrupt the revenues available to the three permittees or the abilities of the rate payers to pay their sewer bills. It is proposed that the Construction and Financing Schedule include specific metrics defining triggering events.

A key component of adaptive management will be the inclusion of an affordability and financial capability trigger in the Construction and Financing Schedule. The projects and activities to be included in each five-year permit cycle would be selected and scheduled such that the residential indicator in either City and in the CCMUA service area not exceed the 2.0% of median household income triggering the USEPA high burden definition. Should economic or other conditions occur such that the residential indicators exceed 2.0% during a permit cycle or lead to reasonable expectations that the 2.0% value be exceeded in subsequent permit cycles the projects and activities in subsequent permit cycles will be modified in cooperation with NJDEP.

8

Section 8 Implementation Schedule & Adaptive Management Revised September 2023

8.1 Implementation Scheduling Context

The implementation of CSO controls by CCMUA, the City of Camden and Gloucester City will require a long term commitment of scarce financial resources. The reduction of CSOs also presents an intergenerational opportunity to serve as a catalyst for sustainable redevelopment and growth in Camden and Gloucester.

The implementation scheduling strategy proposed in this SIAR has been informed by the following:

- CCMUA and the Cities already completed key projects focusing on projects that will provide significant near-term overflow and street flooding benefits such as the expansion of the WPCF # 1, upgrading the capacity of the Arch Street pump station and regulator rehabilitation by the City of Camden and substantial progress towards the cleaning of the Camden and Gloucester City collection systems and outfalls.
- Upon the completion of remedial system cleaning by the City of Camden and Gloucester City; CCMUA will undertake a comprehensive flow monitoring program and recalibration of the hydrologic / hydraulic model to establish a contemporary baseline of system performance (2025 – 2026).
- During the 2024 – 2028 NJPDES cycle, the recalibrated model will then be used for an updated evaluation of alternatives to define the types, locations, and design standards for additional CSO controls needed to achieve 85% system-wide capture for the Typical Year. This evaluation will include an updated financial capability assessment and the proposed Construction and Financing Schedule for NJDEP approval and implementation in subsequent five-year permit cycles.
- The projected costs to fully implement the CSO control strategy are far greater than the financial resources currently available to the Cities of Camden and Gloucester ; and
- The complete implementation of the CSO control strategy presented in this SIAR will span multiple five-year NPDES permit cycles; and will be implemented in the midst of climate and other changes and uncertainties. Therefore, ongoing performance monitoring and adaptive management will be required to adjust the control program to match changing conditions.

8.2 Proposed Implementation Schedule

The implementation schedule will synchronize projects, milestones and activities to coincide with the five year NJPDES permit cycles. In brief it includes:

First Five Year Permit Cycle (2024 – 2028)

1. Gloucester sewer cleaning completion by 12/31/23
2. Camden sewer cleaning completion in 2024

3. Gloucester outfall cleaning completion in 2025 or early 2026 (dependent on aquatic species protection requirements)
4. Flow monitoring of entire CCMUA, Camden Gloucester system (dependent on cleaning and weather conditions, anticipate spring and fall of 2025 or spring of 2026 as needed for adequate data).
5. Formalize Green Stormwater Infrastructure Program by 12/31/25 – implementation ongoing thereafter.
6. Formalize Street Flooding Mitigation Program by 12/31/25 – implementation ongoing thereafter.
7. Continue Cooper River water quality monitoring and develop a Cooper River Water Quality Strategy - through June 2028.
8. Update the hydrologic/hydraulic model – 2026.
9. Updated evaluation of structural control alternatives along with the proposed Construction and Financial Schedule and the updated FCA to be completed and submitted to NJDEP no later than June 30, 2028.

Second and Third Permit Cycles (2029 – 2033 and 2034 – 2038)

10. Planning, design, permitting, land acquisition, etc. – (NJPDES Cycle 2: 2029 – 2033)
11. Construction of additional structural controls – (NJPDES Cycle 3: 2034 – 2038)
12. Ongoing implementation of GSI and flood mitigation programs as well as periodic system performance and efficacy evaluation through flow monitoring and modeling.

The proposed implementation schedule synchronized with NJPDES permit cycles is shown by category of activity in Gantt chart form (Figure 8-1) on the following page. It should be noted that the dates specified above are contingent on reasonable and timely regulatory approvals and other variables beyond the control of CCMUA and the Cities.

8.3 Adaptive Management

The implementation schedule outlined in Table 8-1 above includes an evaluation at the completion of each five year NJPDES permit cycle. Based on these evaluations, CCMUA and the Cities will revise the LTCP as necessary with NJDEP's coordination and approval. This process exemplifies the concept of adaptive management.

Adaptive Management, as defined by the EPA, is "the process by which new information about the health of a watershed is incorporated into the watershed management plan."[8-1] In the context of the SIAR adaptive management assumes that while the CSO control goals will remain constant, the tactical approaches to achieving the goals must be adjustable.

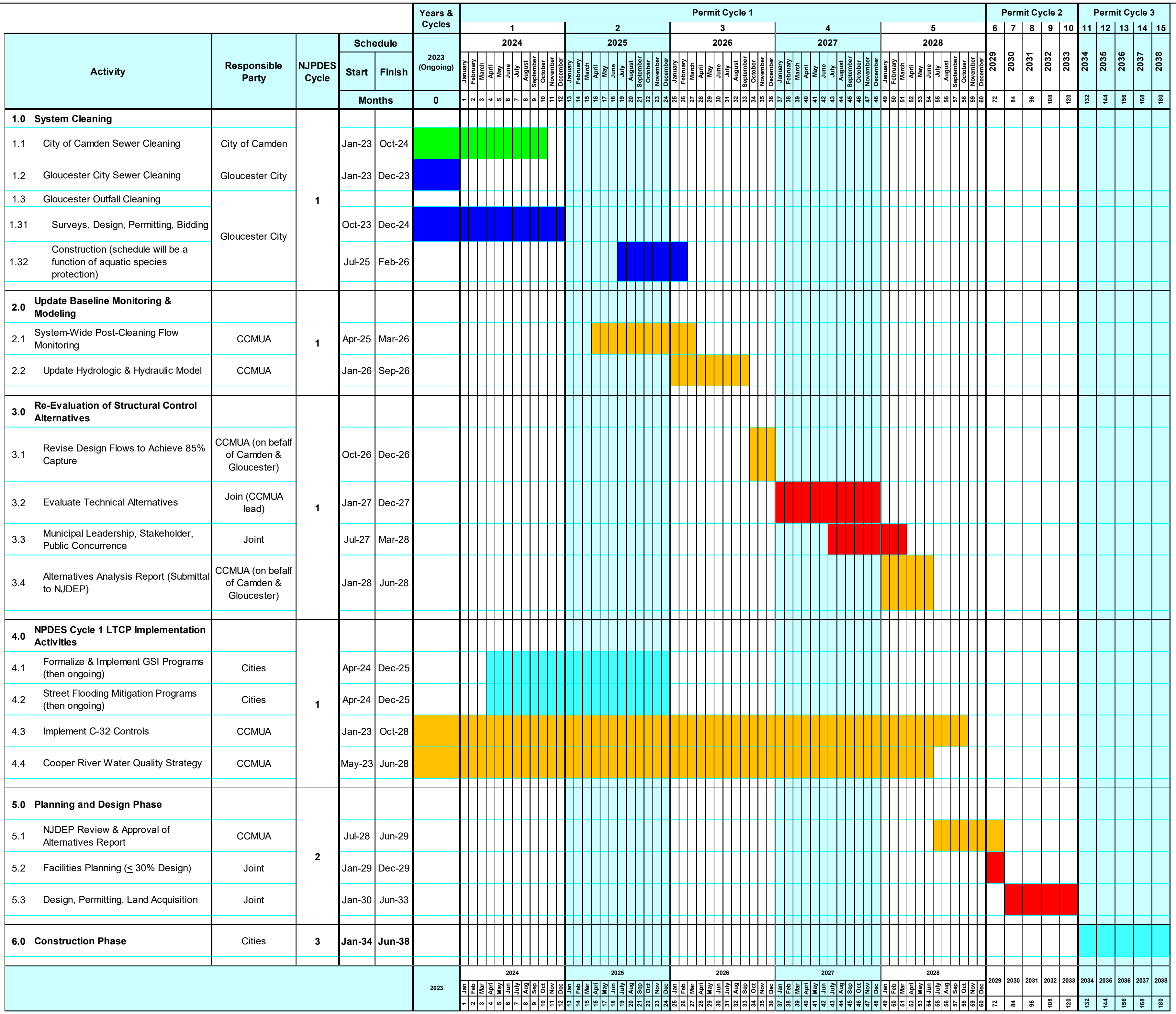
CCMUA and the Cities will also be subject to a variety of future conditions beyond their controls which may materially affect the benefits, feasibility and scheduling of the CSO controls described in this SIAR, thereby triggering a need to revise the LTCP. Examples of such triggering conditions include:

[8-1] Watershed Analysis and Management Guide for Tribes (2000) EPA Watershed Analysis and Management Project. Step 5 page 1.

- External changes requiring modifications to the fundamental planning and design bases used in the development of the LTCP or in subsequent design due to changing demographics, municipal collection system conditions, climate change and other external changes, etc.;
- Emergent regulatory requirements specific to the receiving streams (e.g. TMDLs) or in general (e.g. the promulgation of a National SSO Policy);
- Emergent economic and other developments and trends that could materially affect the affordability and CCMUA's and the Cities' abilities to finance the CSO controls that would be expected to cause the residential indicator for any of the permittees to exceed 2.0% of median household income.
- Changes to water quality standards and guidance that could affect the types and levels of wet weather controls necessary to meet the program objectives;
- Innovative and alternative technologies that could enhance water quality and/or reduce costs thereby enabling expanded control efforts.
- The unavailability of supplies, materials, contractors or labor necessary to implement the LTCP as scheduled in the LTCP due to conditions beyond CCMUA's and the Cities control such as a natural disaster or other emergency; and
- Local, state or federal legal impediments to the timely or orderly implementation of the LTCP e.g. lengthy litigation over land acquisition or inability to obtain required permits.

CCMUA and the Cities will inform NJDEP upon becoming aware of circumstances such as those listed above as to:

- An analysis of the issues and implications posed by the condition;
- An analysis of the impacts on the implementation of the LTCP or the efficacy of the controls; and
- A proposed plan of action to address the adverse conditions that will preserve CCMUA's and the Cities' compliance with their NJPDES permits and the requirements of the CSO Control Policy.



Activity	Responsible Party	NJPDES Cycle	Start	Finish
1.0 System Cleaning		1		
1.1 City of Camden Sewer Cleaning	City of Camden		Jan-23	Oct-24
1.2 Gloucester City Sewer Cleaning	Gloucester City		Jan-23	Dec-23
1.3 Gloucester Outfall Cleaning	Gloucester City			
1.31 Surveys, Design, Permitting, Bidding			Oct-23	Dec-24
1.32 Construction (schedule will be a function of aquatic species protection)			Jul-25	Feb-26
2.0 Update Baseline Monitoring & Modeling		1		
2.1 System-Wide Post-Cleaning Flow Monitoring	CCMUA		Apr-25	Mar-26
2.2 Update Hydrologic & Hydraulic Model	CCMUA		Jan-26	Sep-26
3.0 Re-Evaluation of Structural Control Alternatives		1		
3.1 Revise Design Flows to Achieve 85% Capture	CCMUA (on befall of Camden & Gloucester)		Oct-26	Dec-26
3.2 Evaluate Technical Alternatives	Join (CCMUA lead)		Jan-27	Dec-27
3.3 Municipal Leadership, Stakeholder, Public Concurrence	Joint		Jul-27	Mar-28
3.4 Alternatives Analysis Report (Submittal to NJDEP)	CCMUA (on befall of Camden & Gloucester)		Jan-28	Jun-28
4.0 NPDES Cycle 1 LTCP Implementation Activities		1		
4.1 Formalize & Implement GSI Programs (then ongoing)	Cities		Apr-24	Dec-25
4.2 Street Flooding Mitigation Programs (then ongoing)	Cities		Apr-24	Dec-25
4.3 Implement C-32 Controls	CCMUA		Jan-23	Oct-28
4.4 Cooper River Water Quality Strategy	CCMUA		May-23	Jun-28
5.0 Planning and Design Phase		2		
5.1 NJDEP Review & Approval of Alternatives Report	CCMUA		Jul-28	Jun-29
5.2 Facilities Planning (≤ 30% Design)	Joint		Jan-29	Dec-29
5.3 Design, Permitting, Land Acquisition	Joint		Jan-30	Jun-33
6.0 Construction Phase	Cities	3	**Jan-34**	**Jun-38**

Figure 8-1 – Proposed LTCP Implementation Schedule

Appendices to Revised SIAR

SELECTION AND IMPLEMENTATION OF ALTERNATIVES REPORT

Camden County Municipal Utilities Authority

City of Camden

Gloucester City

NJPDES Permit Nos.

NJ0026182

NJ01O8812

NJ01O8847

September 2020

Revised September 2023

cdmsmith.com

APPENDIX - A

Camden SMART Green Infrastructure Sites

Project Name - Features	GI #	Street Address	Neighborhood	Completion Date	Gallons of Stormwater Captured per Year
Michael Doyle Fishing Pier	1	200 Jackson Street	Waterfront South	4/1/2003	-
20th St Community Garden, Rain Garden	2	N 20th at River Ave	Cramer Hill	6/1/2010	63,000
Sumner Elementary School, Rain Garden	3	1600 S 8th St	Centerville	6/1/2010	110,000
Ferry Avenue Rain Garden	4	1656 Ferry Avenue	Waterfront South	3/1/2011	75,000
Waterfront South, Rain Gardens, Wildflower Meadow	5	S Broadway @ Chelton Ave	Waterfront South	7/1/2011	470,000
Ferry Avenue Library, Rain Garden	6	852 Ferry Avenue	Centerville	4/1/2012	62,500
Brimm School, Rain Garden	7	1626 Copewood Street	Whitman Park	5/1/2012	81,000
PRUP, Rain Garden and Rainwater Harvesting	8	818 S. Broadway	Bergen Square	6/1/2012	31,250
RT Cream School Rain Garden	9	1875 Leon Huff Street	Centerville	6/1/2012	25,000
29th St., Rain Gardens	10	29th St @ Pierce St & Tyler St	Cramer Hill	7/1/2012	296,000
Woodrow Wilson High School, Rain Garden	11	3100 Federal Street	Stockton	7/1/2012	30,000
Waterfront South Native Plant Nursery	12	1645 Ferry Avenue	Waterfront South	7/11/2012	-
Park Blvd, Rain Garden #1	13	Park Blvd @ Magnolia Ave	Parkside	8/1/2012	60,000
Park Blvd, Rain Garden #2	14	Park Blvd @ Vesper Blvd	Parkside	8/1/2012	40,000
304 State St., Rainwater Harvesting	15	304 State Street	North Camden	9/1/2012	3,000
Neighborhood Center Rain Garden, Rainwater Harvesting	16	278 Kaighns Ave	Central Waterfront	9/1/2012	119,000
Front St. Community Garden, Rainwater Harvesting	17	N Front St at Penn Street	Cooper Grant	3/1/2013	5,000
Pyne Poynt School, Rain Garden	18	N 7th Street @ Erie Street	North Camden	4/1/2013	47,700
Urban Promise Academy, Rain Garden	19	27 N 36th Street	Rosedale	5/1/2013	22,500
Yorkship Elementary School, Rain Garden	20	1251 Collings Ave	Fairview	5/1/2013	22,500
St. Anthony's, Rain Garden	21	29th St @ River Ave	Cramer Hill	7/1/2013	175,000
Liney Ditch Park,Shelterbelt Tree Planting	22	Jasper Street	Waterfront South	10/15/2013	117,000
Baird Blvd, Rain Garden	23	Baird Blvd & Cooper River	Marlton	6/1/2014	122,000
Gateway Park, Rain Garden	24	Route 30 & Thorndyke	Marlton	6/1/2014	221,000
Jackson St, Rain Garden	25	200 Jackson Street	Waterfront South	6/1/2014	258,000
Trenton Ave, Rain Garden	26	Trenton & Newton Ave	Cooper Grant	6/1/2014	32,000
Parkside Learning Garden, Cistern	27	1219 Haddon Ave	Parkside	10/1/2014	12,000
Mt. Zion Highway of Holiness, Porous Pavement	28	295 Chestnut Street	Central Waterfront	11/1/2014	51,541
Neighborhood Center, Porous Pavement	29	278 Kaighns Ave	Central Waterfront	11/1/2014	17,306
Phoenix Park Phase #1, Wildflower Meadow, Depaving, Porous Pavement, Trees	30	227 Jefferson St	Waterfront South	8/1/2015	5,000,000
Acelero Learning Center, Downspout Planters	31	311 Grand Ave	Marlton	9/15/2015	29,687

Adventure Aquarium, Rain Gardens	32	1 Riverside Drive	Central Waterfront	9/15/2015	158,854
Brimm School, Porous Pavement, Stormwater Planter	33	1626 Copewood Street	Whitman Park	9/15/2015	121,774
Cooper Sprouts Community Garden Rain Garden, Rainwater Harvesting, Porous Sidewalk, Trees	34	7th & Newton Avenue	Cooper Grant	9/15/2015	221,415
Dudley Grange Park, Rain Garden, Trees	35	3100 Federal Street	Dudley	9/15/2015	27,488
Ferry Avenue Library Rain Garden, Stormwater Planter, Downspout Planter, Tree	36	852 Ferry Avenue	Centerville	9/15/2015	282,508
Henry H Davis School, Downspout Planters	37	3425 Cramer St	Rosedale	9/15/2015	79,716
Octavius V. Catto School, Rain Garden, Trees	38	3100 Westfield Ave	Dudley	9/15/2015	207,031
Respond Day Care, Rainwater Harvesting, Trees	39	309 Vine St	North Camden	9/15/2015	35,735
St. Bartholomew's Church, Rain Garden, Rainwater Harvesting	40	749-751 Kaighns Ave	Bergen Square	9/15/2015	7,500
St. Joan of Arc Church, Rainwater Harvesting	41	3107 Alabama Rd	Fairview	9/15/2015	2,500
US Wiggins Elementary School, Porous Pavement, Tree Pit	42	400 Mt. Vernon St	Bergen Square	9/15/2015	79,716
Vietnamese Community Garden Rain Garden, Rainwater Harvesting, Porous Sidewalk	43	29th & Cramer St	Dudley	9/15/2015	114,279
Yorkship Elementary School Porous Pavement, Landscape Planters, Trees	44	1251 Collings Rd	Fairview	9/15/2015	145,414
Union Field/ Malandra Hall, Rain Garden	45	1244 S Merrimac Rd	Fairview	9/15/2015	340,000
Von Nieda Park/ Baldwin's Run	46	29th & Harrison St	Cramer Hill	10/1/2015	50,000,000
Von Nieda Park, Rain Garden	47	29th & Harrison St	Cramer Hill	4/1/2017	10,614
4th & Washington, Stormwater Planters	48	4th & Berkley St	Lanning Square	5/1/2017	192,800
Admin Parking Lot, Porous Pavement, Rain Garden	49	1645 Ferry Avenue	Waterfront South	5/1/2017	738,400
Bonsall School, Stormwater Planters, Porous Pavement	50	1575 Mt. Ephraim Ave	Liberty Park	5/1/2017	736,300
Broadway Triangle, Rain Garden	51	Walnut St & Broadway	Bergen Square	5/1/2017	104,300
Coopers Poynt School, Porous Pavement	52	3rd & York Sts,	North Camden	5/1/2017	495,200
Cramer School, Tree Pits	53	2800 Mickle Street	Stockton	5/1/2017	960,360
Elijah Perry Park, Porous Pavment	54	Ferry Ave & Phillips St	Centerville	5/1/2017	294,400
Westfield Ave, Porous Pavement	55	3706 Westfield Ave	Rosedale	5/1/2017	176,700

Phoenix Park Phase #2, Wildflower Meadow, Depaving, Porous Pavement, Trees	56	227 Jefferson St	Waterfront South	11/1/2017	1,000,000
Cramer Hill Nature Preserve, Nature Trail	57	32nd & Farragut Ave	Cramer Hill	12/1/2017	-
9th and Woodland Ave, Infiltration Trench, Trees	58	9th & Woodland Ave	Morgan Village	12/1/2018	35,298
Dudley School, Rain Garden	59	2250 Berwick St	Marlton	12/1/2018	108,807
Early Childhood Development Center, Planter Boxes	60	1602 Pine St	Parkside	12/1/2018	107,301
Princess Ave, Infiltration Trench, Porous Pavement, Trees	61	Princess & Walnut St	Parkside	12/1/2018	191,301
Coopers Poynt School	62	3rd & York St	North Camden	In Progress	-
Domenic Andjuar Park	63	Erie & Point St	North Camden	In Progress	-
Molina School	64	7th & Elm St	North Camden	In Progress	-
Gateway Park Bioswale	65	Route 30 & Thorndyke	Marlton	In Progress	-
Historical Society Rain Garden	66	1900 Park Blvd.	Parkside	In Progress	37,100
				TOTAL:	**64,611,795**

Camden

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Initiative

Stormwater Management and Resource Training

Appendix A-2

Imagine A Day Without Water 2017

October 12, 2017

1 of 21

The SMART Team

CITY OF CAMDEN
NEW JERSEY

COOPER'S FERRY
PARTNERSHIP
LIVE | WORK | INVEST | CAMDEN

CAMDEN COUNTY
MUNICIPAL UTILITIES AUTHORITY

DEPARTMENT OF ENVIRONMENTAL PROTECTION
NEW JERSEY

RUTGERS
New Jersey Agricultural
Experiment Station

New Jersey TREE
FOUNDATION

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Types of Water

- Drinking water
- Sewage
- Stormwater Runoff

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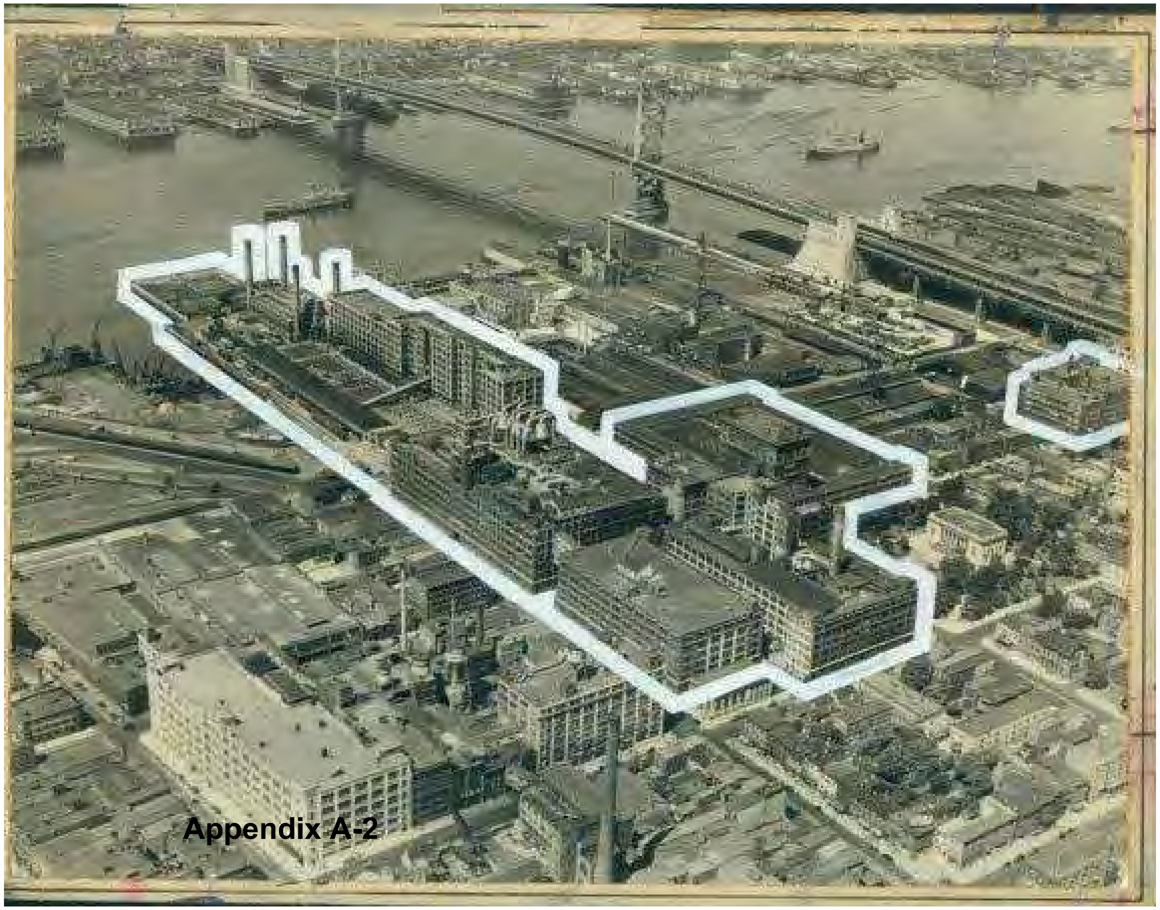
Where do we get our Drinking Water?



Camden's water history:

1845: Camden Water Works

Takes water directly from Delaware River (Cooper St)

(1854: Pavonia station)

1898: Morris-Delair System

Water pumped to surface from PRM Aquifer

1909: Phila Water Dept

Pumps from PRM Aquifer

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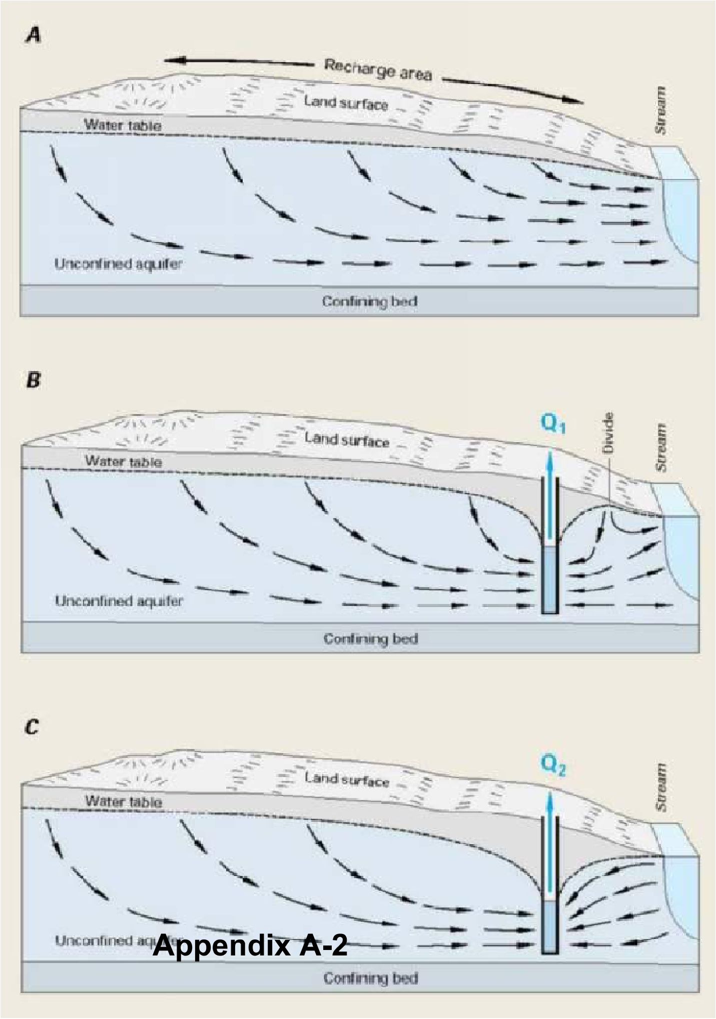


What is an aquifer?

A geological formation that is pumped for water supply.

In Camden city, the Potomac-Raritan-Magothy (PRM) Aquifer is our most important source of drinking water.

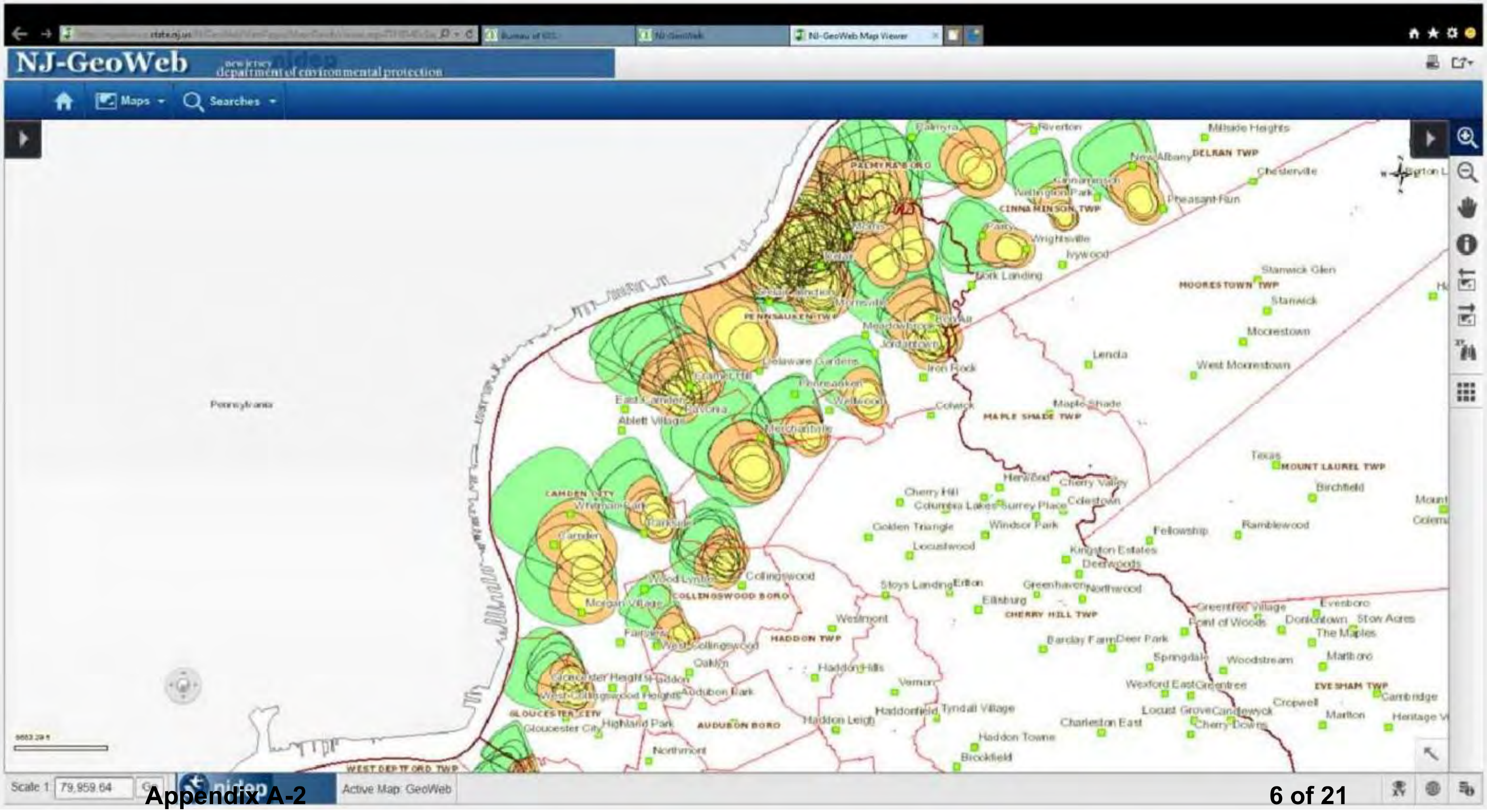
…The PRM Aquifer sits directly below us…

…and, it is vulnerable to pollution

Camden SMART Initiative

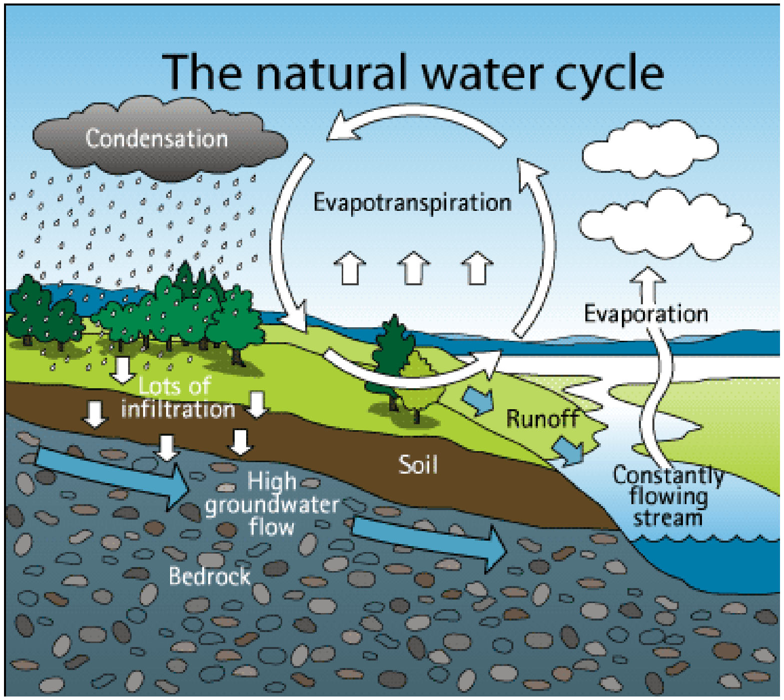
Stormwater Management and Resource Training

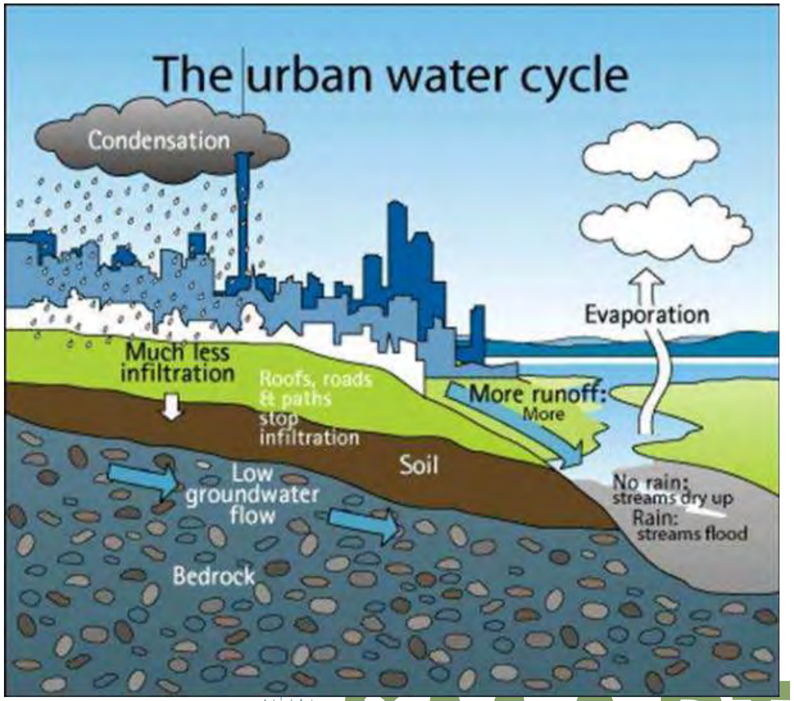
Where do we get our Drinking Water in Camden?



NJDEP Wellhead protection area maps for Camden area water supply wells

Where do we get our Drinking Water?





How rainwater behaves effect our drinking water supply & water quality

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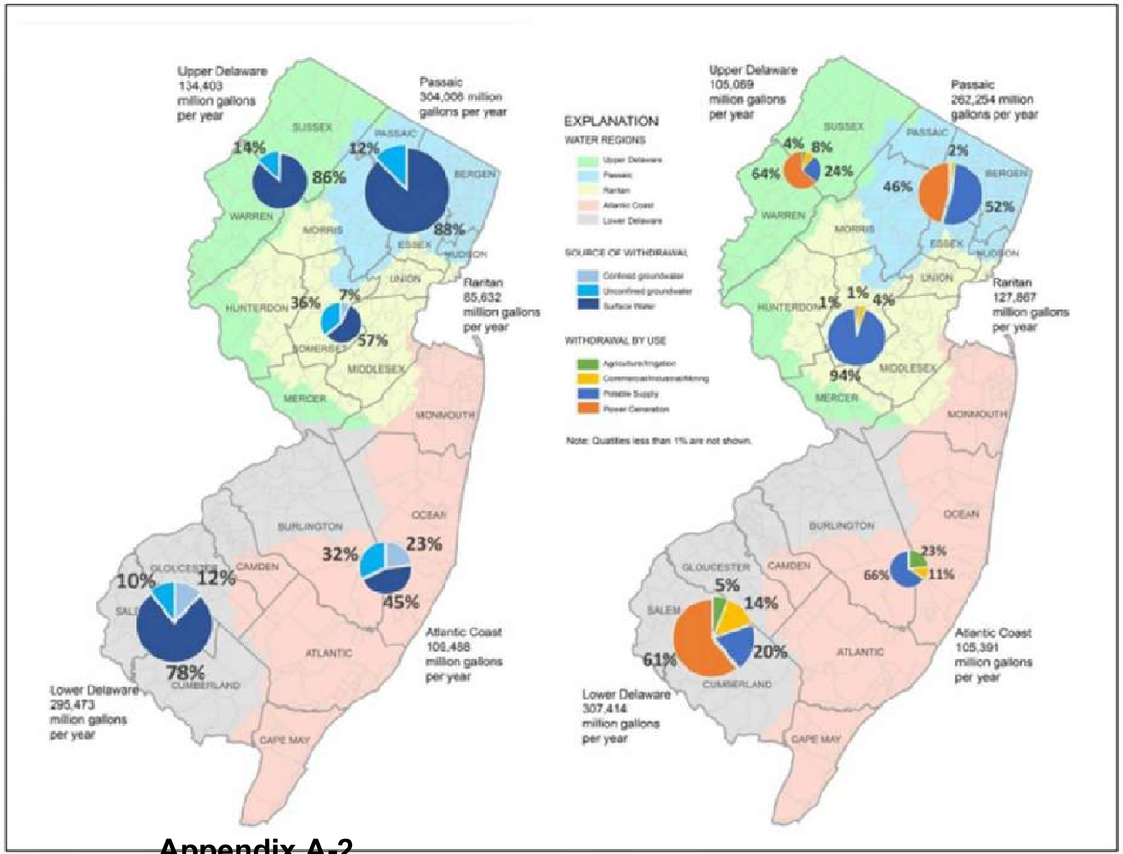
How do we use our water resources in NJ?



Appendix A-2

Figure 2.4 (a) Average annual source of water withdrawal by water region, 1990-2015 (millions of gallons).

Figure 2.4 (b) Average annual use of water by water region, 1990-2015 (millions of gallons).

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8 of 21

Lead Awareness

Appendix A-2

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Sewage and Stormwater Runoff

- What is sewage?
- What is stormwater runoff?
  - Pervious vs impervious surfaces
    - Pervious: Football field
    - Impervious: Parking lot
- Combined sewer system

Camden SMART Initiative

Stormwater Management and Resource Training

Formation of Camden SMART Initiative

- What is the Camden SMART (Stormwater Management and Resource Training) Initiative?
  - Combined sewer system
  - Combined sewer overflows
  - Green vs grey infrastructure

Green Infrastructure – Rain Barrel


Appendix A-2

- Rain water harvesting
- 50-gallon barrel
- Uses: watering plants, washing car, etc.
- Reducing water uses for outdoor chores

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Stormwater Management and Resource Training

Green Infrastructure – Rain Garden

Appendix A-2

- Waterfront South Rain Garden
- Captures stormwater runoff from the street

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13 of 21

Green Infrastructure – Trees

Appendix A-2

- Trees help with stormwater management!
- Absorb extra water during rain events
- Filter pollutants
- Increase rain infiltration into ground water
- Works well with rain gardens and barrels

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Stormwater Management and Resource Training

Green Infrastructure – Park Creation

Appendix A-2

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Stormwater Management and Resource Training

Completed Projects

- ○ 53 completed green infrastructure projects citywide
- ○ 1,700+ trees planted
- ○ 63+ million gallons

Camden SMART Initiative

Stormwater Management and Resource Training

Appendix A-2

16 of 21

Cramer Hill

https://www.youtube.com/watch?v=rULgne7stg4

Appendix A-2

- History of Cramer Hill
  - How Von Nieda Park became a Park
- What problems do we see in Cramer Hill?
- What are the resident's top priorities?
- Von Nieda Park – Baldwin's Run 50 million gallons of stormwater annually

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Stormwater Management and Resource Training

Green Infrastructure – Daylighting Stream

Appendix A-2

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18 of 21

Stormwater Management and Resource Training

What types of green infrastructure do we have at Brimm?

Rain Garden	81,000 gallons managed annually
Stormwater Planter Box and Porous Pavement	121,774 gallons managed annually
Rain Barrel	50 gallons managed per rainfall event
Total gallons of stormwater captured annually	**202,824**

How can YOU help?

CAMDEN REPORTS

- Report instances of flooding and illegal dumping to Camden SMART Partners by visiting www.CamdenReports.com

https://www.youtube.com/watch?v=Qrie7lyNR8k&t=28s

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Stormwater Management and Resource Training

What’s Next?

- Today, you will help Camden SMART Partners:
    - Plant Brimm’s stormwater planter box
    - Re-fresh Brimm’s rain garden (weeding, mulching, and planting)
    - Pledge to report instances of flooding via the Camden Reports application

Camden SMART Initiative

Stormwater Management and Resource Training

List of CSO Supplemental Information Distributed

Link to 2020 Rain Barrel Virtual Workshop Program: https://youtu.be/yHXXfHLDRKk

Rain Barrel Meeting 6/20/18, English & Spanish, 1,000 copies distributed

Rain Barrel Meeting 5/31/18, English & Spanish, 800 copies distributed

Rain Barrel Meeting for National Community Development Week 4/3/18, 4/4/18 and 4/5/18, 1,200 copies distributed.

Rain Barrel Meeting 4/24/18, English & Spanish, 1,000 copies distributed

Rain Barrel Meeting 4/7/18, English & Spanish, 900 copies distributed

Rain Barrel Meeting 3/20/18, English & Spanish, 1,100 copies distributed

Lead Exposure Information, 20,000 mailed with bill 4/1/18, English & Spanish

Listing of Treatment Plant tours, 11/20/15 through 3/15/18

Audit Report on Environmental Communication 1/20/17

Environmental Policy 1/10/18, 160 copies distributed

Rain Barrel Meeting 2/21/18, English & Spanish, 240 copies distributed

Rain Barrel Meeting 12/12/17, English & Spanish, 1,000 copies distributed

Rain Barrel Meeting 10/17/17, English & Spanish, 1,200 copies distributed

Rain Barrel Meeting 10/07/17, Vietnamese, 500 copies distributed

Rain Barrel Meeting 9/26/17, English & Spanish, 1,400 copies distributed

Rain Barrel Meeting 8/22/17, English & Spanish, 1,100 copies distributed

Rain Barrel Meeting 8/01/17, English & Spanish, 1,100 copies distributed

Rain Barrel Meeting 6/28/17, English & Spanish, 1,200 copies distributed

Circuit Trails 160,000 mailed with bill 3/1/18 & 4/1/18

Gloucester City CSO insert 4,000 mailed with bill 3/1/17

Hidden Treasures Delaware River, 160,000 mailed with bill 12/1/16 & 1/1/17

Fishing Day South Camden flyer 800 distributed 9/1/17

Toilets Are Not Trash Cans, 160,000 mailed with bill 6/1/16 & 7/1/16

EPA Safe Drinking Water Tips, 20,000 mailed with bill 4/1/16

Circuit Trails, 160,000 mailed with bill 3/1/16 & 4/1/16

Camden County Conserves, 160,000 mailed with bill 12/1/15 & 1/1/16

Wonders of the Watershed, 160,000 mailed with bill 3/1/15 & 4/1/15

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Stormwater Management and Resource Training

What is the Camden SMART Initiative?

The objective of the Camden SMART (Stormwater Management and Resource Training) Initiative is to develop a comprehensive network of green infrastructure programs and projects for the City of Camden.

The Initiative is a collaboration between the City of Camden, Camden County Municipal Utilities Authority, Cooper's Ferry Partnership, Rutgers Cooperative Extension Water Resources Program, New Jersey Tree Foundation, NJ Department of Environmental Protection, our public-private partners, community organizations, and most importantly, Camden residents to restore and revitalize our neighborhoods.

The Initiative includes neighborhood green and grey infrastructure projects, stormwater management policy development, and green infrastructure training programs.

Camden SMART Initiative:

- Reduce neighborhood flooding
- Reduce combined sewer overflows
- Improve air, water and climate quality
- Develop sustainable environmental policy
- Enhance economic development opportunities
- Add recreational amenities and open space
- Beautify neighborhoods

A former gas station is now home to four rain gardens at Broadway and Chelton Ave.

Visit Us at www.camdensmart.com

7 SMART steps

To reduce neighborhood flooding and improve stormwater management

www.camdensmart.com

Did you know?

- Camden has a combined sewer system which makes it more susceptible to backups and flooding. A combined sewer system collects sewage and rainwater in a single pipe system.
- Trash and debris block storm drainage systems, which can lead to flooding. Trash and debris also pollute our local streams and waterways, which can harm the habitat for many species of plants and animals.

Think SMART!
Everyone must do their part!

Rain garden on Park Blvd., Parkside neighborhood

Be SMART! Take Action!

1. Keep Camden Clean

Keep the street clean. Don't throw litter into the street. Take an active role by reporting illegal dumping.

To report dumping call:
PUBLIC WORKS HOTLINE 856-757-7034

2. Clean Your Yard Regularly

Bag, compost or recycle grass, tree limbs, leaves and other yard waste. Uncollected yard waste can clog storm drains when carried by rainwater.

3. Adopt a Drain

Keep your nearest storm drain clear of any debris or trash (including yard waste). Debris blocking the storm drain can easily result in flooding.

4. Collect and Reuse Rainwater

Take an active role in recycling rainwater and install a rain barrel at your home. By collecting rainwater, homeowners can help reduce flooding and pollution in local waterways.

For more information, visit:
www.water.rutgers.edu

5. Plant a Rain Garden

A rain garden allows about 30% more water to soak into the ground than a patch of lawn! Rain gardens also help to remove pollutants from stormwater runoff, protecting local waterways.

For more information, visit:
www.water.rutgers.edu

6. Flood Proof Your Home

Install rain gutters and direct downspouts away from the house. Keep rain gutters clear to prevent blockage. Also grade soil away from your home to prevent basement flooding.

7. Plant Trees and Shrubs

Trees, shrubs, and perennial plants absorb up to fourteen times more rainwater than a typical lawn, and they help to reduce rainwater flow into the sewer system by 35% or more.

Trees available for Camden residents.
For more information, visit:
www.newjerseytreefoundation.org
or call 856-287-4488

7 SMART steps to Reduce Neighborhood Flooding

How To Prevent Stormwater Pollution

What is stormwater?

Stormwater is water from rain or melting snow that does not soak into the ground. It flows from rooftops, over paved areas, bare soil, and sloped lawns. As it flows, stormwater runoff collects and transports soil, animal waste, salt, pesticides, fertilizers, toxic metals, oil and grease, debris and other potential pollutants. In general, untreated stormwater is unsafe.

What is the problem?

Rain and snowmelt wash pollutants from streets, construction sites, and land into storm sewers. Eventually, the storm sewers empty the polluted stormwater directly into streams and rivers without prior purification or treatment. In Camden and Gloucester City, the sewage and stormwater are combined in the same pipe. During a storm when the flow exceeds the sewers' capacity the untreated sewage and stormwater overflow into the city's waterways and streets.

Polluted stormwater degrades our lakes, rivers, wetlands and other waterways. Untreated stormwater discharging to the ground can contaminate aquifers that are used for drinking water. Nutrients such as phosphorous and nitrogen can cause the overgrowth of algae, resulting in oxygen depletion in waterways. Toxic substances from motor vehicles and careless application of pesticides and fertilizers threaten water quality and can kill fish and other aquatic life. Bacteria from animal wastes and improper connections to storm sewer systems can make lakes and waterways unsafe for wading, swimming and fish consumption. Eroded soil is a pollutant as well. It clouds the waterway and interferes with the habitat of fish and plant life.

People really can make a difference when it comes to reducing stormwater runoff and the problems and costs that go with it. Because we all contribute to the problem, we all can be a part of the solution. It starts with paying attention to stormwater; at home, at work and in our communities.

Tips to prevent stormwater pollution:

- Pick up animal waste.
- Look for ways to keep runoff out of the stormwater system so it can soak into the ground.
- Compost or mulch leaves and yard debris.
- Plant rain gardens, use rain barrels.
- Remove litter from streets, sidewalks, and storm drains adjacent to your property.
- Sweep debris from driveways and parking lots rather than hosing debris into storm drains.
- Water the lawn, not the sidewalk and driveway.
- Reduce paved surfaces.
- Do not drain swimming pools into storm drains or road ditches.
- Reduce winter salt application.
- Triple rinse and recycle empty pesticide and fertilizer containers.
- Reconsider using toxic asphalt sealers, seal cracks only.
- Avoid using chemicals near waterways or storm drains.
- Dispose of automotive fluids appropriately. Fix vehicle fluid leaks immediately.
- Clean up spills immediately and properly dispose of cleanup materials.
- Avoid spraying pesticides/fertilizers in windy conditions or when rain is in the forecast.
- Cover and contain topsoil and mulch during installation.
- Reduce fertilizers, turf builders and pesticides on your lawn and garden. Use small amounts of slow-release fertilizer and environment-friendly products.

Water Conservation Ordinance Adopted by Camden City

Camden City Council recently approved a water conservation ordinance to help alleviate problems with reduced water pressure in times of drought. With the increasing effects of climate change and global warming felt throughout the world, long-term droughts are more likely to occur in the near future. It is critical to have a plan in place to deal with these conditions as they arise.

In addition, conserving water makes financial sense. Not only can you reduce your water bill, but the less water you use means the less water that needs to be treated at the wastewater treatment plant, thus keeping sewer rates in check.

Camden's water conservation ordinance states that, during a drought situation:

- Lawns may be watered two days per week. Properties with even number addresses may only water on Mondays and Thursdays. Properties with odd number addresses may only water on Tuesdays and Fridays.
- Watering may only be conducted between the hours of 6:00am and 9:00am or between 5:00pm and 8:00pm.
- No single area shall be watered more than 30 minutes per day.
- Flowers and shrubs may be watered as needed with a hand-held hose equipped with an automatic shut-off nozzle.
- No hose or hose-end watering shall be permitted when it is raining.
- Irrigation systems must only run between midnight and 10:00am.

We are asking for your support in adhering to these guidelines. The City is committed to water conservation and encourages residents to get on board. Start saving water and money now! And help us make Camden a sustainable community!

For more information on water conservation, visit www.epa.gov/watersense and www.cleanwaternj.org

For more information on sustainability in Camden, visit www.camdensmart.com

USING LESS WATER IS THE RIGHT THING TO DO!

- It's the right thing to do environmentally as water is a rare and precious resource. When we conserve water, we are saving the planet for our children and for future generations.
- Saving water reduces the potential for flooding of raw sewage during rain events in your town and for your neighbors upstream and downstream because you are using less of the sewer system's finite capacity.
- Saving water reduces sewage pumping costs for your town, which helps keep costs down.
- Saving water reduces pumping and treatment costs for the CCMUA, which helps us keep our rates down.
- Saving water helps save money for you, and keeps money in your pocket.

Flooding in the City of Camden after a typical rain event.

FOR MORE INFORMATION AND WATER SAVING TIPS, VISIT:

www.epa.gov/watersense

www.njwatersavers.rutgers.edu

Camden County Municipal Utilities Authority
1645 Ferry Ave.
Camden, NJ 08104
(856) 541-3700

www.ccmua.org

CAMDEN COUNTY CONSERVES

Saving Water, Saving Money

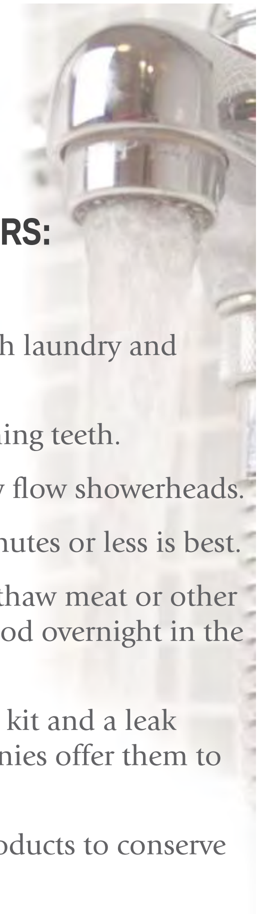
How much can you save?

Approximately 70 percent of water used in a household is used inside the home, with the bathroom utilizing more water than any other room. By replacing older, inefficient bathroom fixtures with WaterSense® labeled fixtures, your household can save in numerous ways.

WATER:
7,000 gallons annually
(enough to wash 6 months worth of laundry)

ELECTRICITY:
200 kilowatt hours annually
(enough to run a refrigerator for 2 months)

MONEY:
$80 in utility bills annually
(fixtures pay for themselves in as little as 2 years)



SAVING WATER INDOORS:

- Fix household leaks.
- Always wash full loads for both laundry and dishes.
- Turn the water off while brushing teeth.
- Replace showerheads with low flow showerheads.
- Take shorter showers - five minutes or less is best.
- Avoid using running water to thaw meat or other frozen foods. Instead, defrost food overnight in the refrigerator.
- Purchase a water conservation kit and a leak detector kit. Many water companies offer them to customers at reduced prices.
- Install WaterSense® labeled products to conserve water.
- For commercial properties, refer to the best management practices for buildings that the Environmental Protection Agency (EPA) recommends for federal buildings.
- Refer to the Alliance for Water Efficiency Resource Library for more information regarding specific residential, commercial, and institutional water efficiency (www.allianceforwaterefficiency.org and www.home-water-works.org).

SAVING WATER OUTDOORS:

- Water only when needed; Camden County landscapes need approximately one inch of water per week.
- Water landscapes early or late in the day to reduce evaporation.
- Plant native plants; they are adapted to the region's conditions and require less water.
- Use a shut-off nozzle on your hose.
- Install a rain barrel to water flowers with rainwater collected from rooftops.
- Use fixed spray irrigation on turfgrass only. For all other plants, use drip or micro irrigation.
- Limit turfgrass to 40 percent or less of the total landscaped area.
- Wash vehicles at a car wash that recycles water.

Install a rain barrel at your house!

The more you conserve, the more you save!

What is:

“Flushable?”

TOILETS ARE NOT TRASHCANS™

When you flush your toilet or pour something down the drain of your sink or tub, what you send away disappears from sight and mind. But it’s only begun its journey to the CCMUA’s wastewater treatment plant in Camden, and beyond. If it’s a harmful chemical, it may disrupt the treatment process, or some of it may not be removed, and will pass through into the Delaware River. If it’s a solid, greasy, or sticky material that isn’t designed to pass through the sewer system, it may not even make it to the plant. That can result in a clog somewhere along the line, and back sewage up into the streets, into your house, or into streets and homes in neighborhoods miles away elsewhere in the county as it travels toward the treatment plant. Clogs from these materials can also happen at the plant itself, creating problems for the whole system.

By giving a little thought to what goes down the toilet and drain, and by disposing of materials properly, you can save yourself from some repair bills; save the environment from unnecessary pollutants; and reduce potential damage to the public wastewater treatment system whose costs end up being charged back to the users—including you.

Just because you can do something doesn’t mean that you should do it. You could claim that anything that fits through the hole at the bottom of the toilet bowl is “flushable,” technically. Parents of young children may have experienced keys, golf balls, toys, or clothing go down. But that doesn’t mean they’re going to be carried through the complicated network of pipes (potentially many miles) until they reach the wastewater treatment plant at the end of the line. Toilet paper is manufactured to disintegrate quickly in water. Paper tissues and towels, sanitary products, and diapers are not. Material can get caught at a sharp turn, or snag on the pipe lining, or tangle with other debris and make a bigger mess that impedes the flow in the pipe and cause partial or complete blockage and backups. The problems can be even bigger as material tries to pass through pumps or other machinery in its travels, and it stops or even damages equipment. Even material that starts out as liquid fats, oils, and greases (“FOG” in the industry lingo) can solidify and clog up the system.

So just because something can disappear down the toilet with a flush, that doesn’t mean you should put it there.

These days, the biggest offender is personal hygiene materials advertised as **“flushable” baby or adult wipes.** Sure, it’s physically possible to flush them down and out of sight, but once sent on their way through the sewers, “flushable” wipes can do a tremendous amount of damage! Rather than disintegrate, they manage to attach to other material and grow into agglomerations that the sewer systems are not designed to handle. You may have seen the headlines from London over the last few years, where what they call “fatbergs” of fat, wipes, waste, and other items were cleaned out of the London sewer system. The separate instances were described as “the size of a bus,” “the size of a 747,” and “40-metre long fatberg.” The problem has been covered by the New York Times, Washington Post, the major media networks, and the major national wastewater treatment organizations have instituted campaigns to raise awareness of this real problem. The general rule to follow is **“don’t flush any personal hygiene products other than toilet paper.”**

Drugs and Medications

The US Food and Drug Administration states that disposal by flushing down the toilet is not advised for most drugs because of concerns that trace amounts of drugs can end up in the water supply and in rivers and lakes. That means potentially into the food chain, and ultimately into you and me. Not only humans can be affected. For example, a recent study found that fish whose brains held trace amounts of human anti-anxiety drugs were less effective at seeking shelter from predators. Antibiotic waste, which is associated with antibiotic-resistant bacteria, is also a problem in the wild. The best solution is to bring unwanted pharmaceuticals to a designated drug collection drop off point. Alternatively, you may discard some drugs in household trash after first making them difficult to recover by children, pets, or others seeking drugs. You can do this by first mixing pills or tablets with coffee grounds, kitty litter, dirt, or sawdust, then placing them in a non-leaking container such as a sealable plastic bag before placing them in the regular trash. But they may eventually land up in a landfill and return to the environment anyway. So it’s best to bring them to bring the unwanted drugs to an approved collection point.

New Jersey’s **Project Medicine Drop Program (800-242-5846)** has placed secured drop boxes in the headquarters of local police departments. Consumers from anywhere in New Jersey can visit these boxes seven days a week, to drop off unneeded and expired medications and keep them away from those at risk of abusing them. **www.njconsumeraffairs.gov/meddrop**

The Camden County Board of Freeholders’ **Addiction Awareness Task Force** aims to provide a safe, convenient, and responsible means of disposing of prescription drugs. No longer needed or outdated prescription drugs in homes are the same drugs that have unfortunately become the target of theft and misuse, oftentimes by people who have access to the residence. America’s 12 to 17 year olds have made prescription drugs the number one substance of abuse for their age group, and much of that supply is coming from the medicine cabinets of their parents, grandparents, and friends. Help us end medicine abuse by disposing of unneeded prescription drugs at a drug drop box near you. The web site list local police departments that provide drop boxes for unneeded or expired drugs:
www.addictions.camdencounty.com

More information

To learn more about the problem, visit the CCMUA’s education web page: www.CCMUA.org

(0516) Toilets Are Not Trash Cans logo courtesy of NACWA

Appendix A-5: Media Mentions

Publication	Source	Web URL (to online source)
Fix a Leak Week 2015, March 16–22, 2015 (3/1/2015)	CCMUA	http://www.ccmua.org/?page_id=1759
Executive Director Andy Kricun to discuss "Promoting Environmental Justice as an Essential Best Management Practice for Utilities in Economically Distressed Communities" (3/11/2015)	AWRA	http://awra-pmas.memberlodge.org/event-1867270
CCMUA joins Value of Water Coalition (3/16/2015)	Value of Water Coalition	http://www.ccmua.org/wp-content/uploads/2015/03/VOW-Relaunch-Press-Release-FINAL.pdf
CCMUA Receives WAVE award from Association of Environmental Authorities of NJ for forward thinking and innovation (3/25/2015)	Camden County	http://sustainable.camdencounty.com/ccmua-wins-aea-wave-award-for-innovation/
Camden SMART partnership to receive NJ Future's 2015 Smart Growth Award for green and gray stormwater infrastructure program (4/15/2015)	NJ Future	http://www.njfuture.org/smart-growth-101/smart-growth-awards/2015-smart-growth-award-winners/grassroots-collaboration-on-green-infrastructure/
Camden SMART projects highlighted in Earth Week celebration (KYW, 4/21/2015)	KYW	http://philadelphia.cbslocal.com/video/category/latest-videos/11412412-earth-week-celebrations-underway-in-camden-nj/
US EPA recognizes Camden SMART stormwater management program with Environmental Champion Award (4/23/2015)	EPA	https://19january2017snapshot.epa.gov/newsreleases/epa-honors-new-jersey-environmental-champions_.html
Phoenix Park opens on South Camden waterfront (Courier Post, 6/2/2015)	Courier Post	http://www.courierpostonline.com/story/news/local/south-jersey/2015/06/02/phoenix-park-opens-south-camden-waterfront/28371393/
Phoenix Park rises from crumbling industry to create oasis for Camden residents (NJ.com, 6/3/2015)	NJ.com	http://www.nj.com/camden/index.ssf/2015/06/phoenix_park_rises_from_crumbling_industry_to_crea.html

Freeholders Open Park in Camden City (6/4/2015)	Camden County	http://www.camdencounty.com/county-news/freeholders-open-phoenix-park-camden-city
US EPA releases video on CCMUA adaptation for climate change (Courier Post, 8/4/2015)	Courier Post	http://www.courierpostonline.com/story/news/local/south-jersey/2015/08/04/ccmua-featured-climate-change-video-series/31101889/
CCMUA Net Zero Energy program featured in US EPA video (8/10/2015)	EPA	https://youtu.be/_no2kKYyt6w
CCMUA completes project funded by NJ Environmental Infrastructure Trust to capture 30 tons of solids per year that used to go to Delaware River, Cooper River, and Newton Creek (8/29/2015)	CCMUA	http://www.ccmua.org/?p=165
Rutgers professor highlights CCMUA as a model utility, using capital investment to reduce costs (NJ Spotlight, 9/6/2015)	NJ Spotlight	http://www.njspotlight.com/stories/15/09/02/opinion-nj-should-require-water-utilities-to-spend-more-now-so-they-will-cost-less-later/
National Association of Clean Water Agencies (NACWA) awards CCMUA third consecutive Gold Peak Performance Award for outstanding effluent/water quality performance (9/25/2015)	NACWA	http://www.nacwa.org/about-us/awards/peak-performance-awards/peak-past-honorees
NJ Section of American Water Resources Association presents Excellence in Water Resources Protection and Planning Award to Phoenix Park Project (10/1/2015)	NJAWRA	http://www.ccmua.org/wp-content/uploads/2015/10/NJAWRA-CCMUA-Web-site-display-package.pdf
Association of NJ Environmental Commissions awards CCMUA 2015 Environmental Achievement Award for Phoenix Park project (10/9/2015)	ANJEC	http://anjec.org/pdfs/Congress2015-AchievementAwardWinnersProjects.pdf
"Promoting Environmental and Community Service Leadership as an Essential Best Practice for the Clean Water Utility of the Future," presented by CCMUA Executive Director Andy Kricun to The Funders Network (11/11/2015)	CCMUA	http://www.ccmua.org/wp-content/uploads/2015/11/Environmental-Community-Service-Leadership-11-11-2015-Funders-Network.pdf

CCMUA Honored by Federal Environmental Council for one of most innovative uses of the US EPA's Federal State Revolving Fund in the history of the program (1/13/2016)	Camden County	http://sustainable.camdencounty.com/ccmua-honored-federal-environmental-council/
National Association of Clean Water Agencies (NACWA) Features CCMUA Role Shown In New EPA Video On Sustainable Communities (2/22/2016)	NACWA	http://www.nacwa.org/news-publications/clean-water-current-archives/clean-water-current---february-19
New EPA Video highlights Camden Collaborative Initiative sustainability efforts (2/22/2016)	EPA	https://www.youtube.com/watch?v=vzlJmHhSC3M&feature=youtu.be
CCMUA featured as example in NACWA call for federal action to institute measures to help water utilities transition into 'Utility of the Future' (3/15/2016)		http://www.ccmua.org/wp-content/uploads/2016/03/Trifold.pdf
NJ DEP Water Resource Management quarterly highlights CCMUA's innovative use of state revolving fund for green and grey infrastructure projects (5/2/2016)	NJ DEP	http://www.ccmua.org/wp-content/uploads/2016/05/wrm-quarterly-update-spring2016c.pdf
CCMUA begins upgrade of biosolids treatment with cogeneration technology (Water Online, 5/2/2016)	Water Online	http://www.wateronline.com/doc/new-jerseys-camden-county-municipal-its-wastewater-facility-0001
Article draws sharp contrast between Camden's forward-looking water infrastructure policies and Flint, Michigan's water supply disaster (Water Online, 5/9/2016)	Water Online	http://www.wateronline.com/doc/wwema-window-a-tale-of-two-cities-flint-mi-and-camden-nj-0001
CCMUA Executive Director Andy Kricun comments to WHYY's Newsworks on importance of rehabilitating Camden's infrastructure (WHYY, 5/13/2016)	WHYY	http://www.newsworks.org/index.php/local/healthscience/93664-renewed-attention-to-water-supply-infrastructure-starting-to-impact-cities-like-camden-nj
Camden Collaborative Initiative awarded EPA's 2016 Environmental Champion Award (5/13/2016)	EPA	https://19january2017snapshot.epa.gov/newsreleases/epa-honors-new-jersey-environmental-champions-0_.html

"Clean water a priority at the CCMUA" (article; must scroll down to page 10) (Cherry Hill Sun, 5/18/2016)	Cherry Hill Sun (scroll down to page 10)	https://www.scribd.com/doc/312524040/CherryHill-0518
NJTV broadcast discusses green infrastructure approach with CCMUA Executive Director Andy Kricun (NJTV, 5/25/2016)	NJTV	http://www.njtvonline.org/news/video/group-eyes-ways-rebuild-preserve-states-old-brittle-water-infrastructure/
CCMUA featured in US EPA blog highlighting successful efforts of utilities to become climate-ready (6/15/2016)	EPA	https://blog.epa.gov/blog/2016/06/protecting-drinking-water-by-becoming-climate-ready/
CCMUA is awarded grant by National Fish and Wildlife Foundation and William Penn Foundation to implement rain barrel program (7/21/2016)	NFWF	http://www.nfwf.org/whoweare/mediacenter/pr/Pages/delaware_16-0720.aspx
WPVI (Philadelphia Channel 6) coverage of NFWF and William Penn Foundation grant to CCMUA for rain barrel program (WPVI, 7/21/2016)	WPVI	http://6abc.com/society/delaware-river-restoration-fund/1435474/
KYW (Philadelphia Channel 3) coverage of NFWF and William Penn Foundation grant to CCMUA for rain barrel program (KYW, 7/21/2016)	KYW	http://philadelphia.cbslocal.com/video/category/spoken-word-kywtv/3434416-grant-will-fund-conservation-projects-in-2017/
CCMUA Executive Director speaks in Washington on infrastructure funding strategies (7/25/2016)	NACWA	http://www.nacwa.org/news-publications/clean-water-current-archives/clean-water-current---july-25
CCMUA awarded with recognition as a Utility of the Future Today (8/2/2016)	Water Resources Utility of the Future Today	http://www.ccmua.org/wp-content/uploads/2016/08/Utility-of-the-Future-Today-Recognitions-Press-Release-8-9-16-with-Recipients-list.pdf
CBS 3 News report on CCMUA's Cramer Hill Nature Preserve (KYW, 8/15/2016)	KYW	http://philadelphia.cbslocal.com/2016/08/15/camden-sewerage-nature/
35-Acre Cramer Hill Nature Preserve to be created in Camden by CCMUA (Courier Post, 8/16/2016)	Courier Post	http://www.courierpostonline.com/story/news/local/2016/08/12/camden-waterfront-access-preserve/88626726/

New Waterfront Park Coming to Camden City (8/23/2016)	Camden County	https://web.archive.org/web/20160831161501/http:/www.camdencounty.com:80/county-news/new-waterfront-park-coming-camden-city
From wastewater treatment plant to nature preserve (Philly.com, 8/25/2016)	Philadelphia Inquirer	http://www.philly.com/philly/news/new_jersey/20160824_From_wastewater_treatment_plant_to_nature_preserve.html?mc_cid=6c15a851e6&mc_eid=e8a2df0487
National water industry magazine highlights Camden green stormwater infrastructure program as example for other economically stressed cities (Water World, 8/29/2016)	Water World	http://www.waterworld.com/articles/print/volume-32/issue-8/features/aren-t-you-swale.html
CCMUA featured in Government Technology magazine article on planning for climate change consequences (Government Technology, 9/2/2016)	Government Technology	http://www.govtech.com/fs/Predicting-the-Unpredictable-How-Data-Based-Forecasting-Helped-One-Town.html
Cramer Hill Camden property to become nature preserve (Philadelphia Inquirer, 9/26/2016)	Philadelphia Inquirer	http://www.philly.com/philly/columnists/kevin_riordan/20160925_Where_the_bald_eagle_and_owl_dwell_in_Camden.html
CCMUA noted as EPA CREAT case study (10/3/2016)		http://www.nacwa.org/news-publications/clean-water-current-archives/clean-water-current---october-3
CCMUA's Phoenix Park Phase 1 project featured in Delaware Valley Green Building Council Green Stormwater Infrastructure precedent library (dvgbc.org, 1/8/2017)	Delaware Valley Green Building Council	https://dvgbc.org/sites/default/files/images/policyflipbook/index.html?page=52
Camden SMART Stormwater Management Projects featured in New Jersey League of Municipalities conference session (1/8/2017)	Sustainable Jersey	http://www.sustainablejersey.com/fileadmin/media/Events_and_Trainings/Awards_Ceremony/NJLM_Sessions/2016/FINAL_SW_Mgmt_Role_in_Comm_Health.pdf

CCMUA implementation of CSO Long Term Control Plan is listed among top commitments in statewide water infrastructure effort (JerseyWaterWorks.org, 1/8/2017)	Jersey Water Works	http://www.jerseywaterworks.org/our-work/2017-commitments/
NJ Department of Environnmental Protection recognizes CCMUA for Environmental Stewardship (2/7/2017)	NJ DEP	http://www.ccmua.org/wp-content/uploads/2017/02/NJDEP-Envir-Stewardship-Recognition.pdf
CCMUA and Rutgers Cooperative Extension Water Resources Program collaborate on Camden green infrastructure projects (2/7/2017)	Rutgers Cooperative Extension Water Resources Program	http://www.water.rutgers.edu/Water_Pages/Enewsletters/E-Newsletter_V38_20170119.pdf
CCMUA Executive Director Andy Kricun to receive 2017 Leadership in GSI (Green Stormwater Infrastructure) award from Sustainable Business Network of Philadelphia (4/19/2017; updated 1/23/2018)	Sustainable Business Network of Philadelphia	http://gsipartners.sbnphiladelphia.org/leadership-in-gsi-2017-excellence-in-gsi-awards-ceremony/
Water Utility of the Future Today compendium highlights CCMUA achievements (4/19/2017)	WEF	http://www.wef.org/globalassets/assets-wef/3---resources/for-the-public/utility-of-the-future/2016-summary-uotf-today-honorees-final.pdf
Water Resources Association of the Delaware River Basin awards 2017 Achievement Award to Camden SMART Initiative (4/19/2017)	Water Resources Association of the Delaware River Basin	http://www.wradrb.org/calendar_dtl.php?id=23&d=2017-04-19
Board of Public Utilities funds CCMUA community microgrid feasibility study (7/10/2017)	**Military-Technologies.net (NO LONGER AVAILABLE)**	http://www.military-technologies.net/2017/07/05/n-j-board-of-public-utilities-highlights-development-of-town-center-distributed-energy-resource-microgrids-with-tour-of-proposed-downtown-trenton-microgrid/

Clean water industry group releases report on environmental justice and community service featuring CCMUA efforts (7/24/2017)	NACWA	http://www.nacwa.org/news-publications/clean-water-current-archives/clean-water-current/2017/07/18/nacwa-releases-environmental-justice-community-service-compendium
US Senate Hears Testimony from CCMUA Executive Director Andy Kricun on need to fund improvements to nation's aging water infrastructure (7/24/2017)	Camden County	http://www.camdencounty.com/us-senate-hears-testimony-ccmua/
CCMUA receives 2016 NACWA Gold Peak Performance award (7/25/2017)	NACWA	http://www.nacwa.org/about-us/awards/peak-performance-awards/peak-2017-honorees
State announces study of microgrid to connect CCMUA with other facilities for energy resiliency (9/8/2017)	SNJ Today	http://www.snjtoday.com/story/36315005/state-officials-announce-start-of-camden-microgrid-study
CCMUA Executive Director Andy Kricun stresses critical need for independent power source in planning for microgrid (9/12/2017)	Daily Energy Insider	https://dailyenergyinsider.com/news/7752-new-jersey-board-public-utilities-approves-feasibility-study-camden-county-microgrid/
Camden Sewage Treatment Plant To Go Off Power Grid By 2019 (9/28/2017)	KYW	http://philadelphia.cbslocal.com/2017/09/28/camden-sewage-treatment-plant-to-go-off-power-grid-by-2019/
US Water Alliance spotlights CCMUA commitment to local revitalization through partnerships (9/30/2017)	US Water Alliance	http://uswateralliance.org/resources/one-water-spotlight-camden-county-municipal-utilities-authority-september-2017
CCMUA keeping rates stable and building the local workforce (in new EPA Report "Water Infrastructure Financial Leadership: Successful Financial Tools for Local Decision Makers," p. 32) (10/2/2017)	EPA	https://www.epa.gov/sites/production/files/2017-09/documents/financial_leadership_practices_document_final_draft_9-25-17_0.pdf
CCMUA Becomes First Authority in State to be Energy Independent (CamdenCounty.com) (10/3/2017)	Camden County	http://www.camdencounty.com/ccmua-becomes-first-authority-state-energy-independent/
Camden County Utilities Authority Goes Off-Grid with $40M Sustainability Loop (NJ Pen) (10/3/2017)	NJ Pen	http://www.njpen.com/camden-county-utilities-authority-goes-off-grid-with-40m-sustainability-loop/

Camden County Takes Steps to Get Off the Grid (SNJ Today) (10/3/2017)	SNJ Today	http://www.snjtoday.com/story/36477983/camden-county-takes-steps-to-get-off-the-grid
Camden Sewage Treatment Plant To Go Off Power Grid By 2019 (CBSPhilly.com) (10/3/2017)	KYW	http://philadelphia.cbslocal.com/2017/09/28/camden-sewage-treatment-plant-to-go-off-power-grid-by-2019/
Camden County MUA Moves To Be Energy Independent by 2019 (10/3/2017)	NACWA	http://www.nacwa.org/news-publications/news-detail/2017/10/03/camden-county
Camden County MUA says energy independent in 2019 (Courier Post) (10/3/2017)	Courier Post	http://www.courierpostonline.com/story/news/2017/09/28/camden-county-utilities-authority-savings/711842001/
Wastewater for electricity: South Jersey utility in swap deal with trash-to-energy plant (Philly.com) (10/3/2017)	Philadelphia Inquirer	http://www.philly.com/philly/business/energy/wastewater-for-electricity-south-jersey-utility-in-swap-deal-with-trash-to-energy-plant-20170928.html
Article on Green Infrastructure Investment Analysis for Camden (Urban Planning) (10/12/2017)	Urban Planning	https://www.cogitatiopress.com/urbanplanning/article/view/1038
CCMUA mentioned in NAPA report on Community Affordability of Clean Water Services (11/15/2017)	NACWA	http://www.nacwa.org/docs/default-source/conferences-events/Hot-Topics-in-Clean-Water-Law-Webinar/2017-11-15napa_report.pdf?sfvrsn=2
CCMUA addresses Camden City sewer overflow problem (12/11/2017)	NJ Pen	http://www.njpen.com/a-plan-to-end-sewer-overflow-in-camden/
Phoenix Park ‘Rises from the Ashes,’ Opens in Camden (12/12/2017)	SNJ Today	http://www.snjtoday.com/story/37051571/phoenix-park-rises-from-the-ashes-opens-in-camden
In the shadow of a Camden waste treatment plant, a park opens (12/12/2017)	Courier Post	http://www.courierpostonline.com/story/news/local/south-jersey/2017/12/12/shadow-camden-waste-treatment-plant-park-opens/941599001/

Final phase of Phoenix Park in Camden opens (12/12/2017)	Camden County	http://www.camdencounty.com/freeholders-open-final-phase-phoenix-park-camden/
Access Opened Up to Riverfront and Parks (12/29/2017)	Camden County	http://www.ccmua.org/wp-content/uploads/2018/01/Nash-Retrospect-Riverfront-Access-Column-2017-12-29.pdf
Study shows that optimal maintenance of Camden City's sewer system would reduce 90% of community and street flooding (1/10/2018)	Jersey Water Works	http://www.jerseywaterworks.org/resource/impact-proper-maintenance-combined-sewer-overflow-system-flooding-city-camden/
CCMUA projects highlighted in "New Report Analyzes the Financial Benefits of Investing in Water Infrastructure" (New Jersey Municipalities) (2/21/2018)	Jersey Water Works	http://www.jerseywaterworks.org/wp-content/uploads/2018/02/NJ-Municipalities-Magazine-February-2018-David-Zimmer.pdf
US EPA report highlights CCMUA in A Wet Weather Case Study of Incorporating Community Interests into Effective Infrastructure Decision-Making (3/2/2018)	EPA	https://www.epa.gov/sites/production/files/2018-01/documents/camden_case_study-1-16-18.pdf
Camden SMART Initiative Revitalizes, Extends City's Open Spaces (3/19/2018)	NJ Spotlight	http://www.njspotlight.com/stories/18/03/18/camden-smart-initiative-revitalizes-extends-city-s-open-spaces/?mc_cid=b755c9fe6d&mc_eid=e8a2df0487
Park Projects Connect Camden to Delaware River (3/23/2018)	Camden County	http://www.ccmua.org/wp-content/uploads/2018/04/Retrospect-article-2018-03-23.pdf
Camden Finds Strength in Its Partners (4/2/2018)	NJ Spotlight	http://www.njspotlight.com/stories/18/04/01/camden-finds-strength-in-its-partners/
Camden's Vision for a Sustainable Future (4/9/2018)	NJ Spotlight	http://www.njspotlight.com/stories/18/04/08/camden-s-vision-for-a-sustainable-future/

National study on affordability of utility rates highlights CCMUA (4/25/2018)	Univ. of NC Environmental Finance Center	https://efc.sog.unc.edu/project/navigating-legal-pathways-rate-funded-customer-assistance-programs
US Water Alliance designates CCMUA to lead Camden Taskforce (one of only six in the nation for this initial year) to develop and promote equitable water management (5/11/2018)	US Water Alliance	http://uswateralliance.org/initiatives/water-equity/taskforce
Brookings Institution recognizes CCMUA's lead role in Camden Collaborative Initiative to strengthen the city's infrastructure and economy (5/14/2018)	Camden County	https://www.brookings.edu/blog/the-avenue/2018/05/14/the-water-workforce-opportunity-how-camden-is-driving-collaborative-solutions-around-its-infrastructure-and-economy/
Camden SMART Initiative to hold free rain barrel workshop	TAPintoCamden	https://www.tapinto.net/towns/camden/articles/camden-smart-initiative-to-hold-free-rain-barrel
Camden's Free Rain Barrel Program Will Help You Conserve Water	SJ Magazine	https://sjmagazine.net/news-features/camdens-free-rain-barrel-program-will-help-conserve-water

Compendium of Successful Water Workforce Practices

Green Ambassadors Program

Name of Utility: Camden County Municipal Utilities Authority

Municipality/State: Camden, New Jersey

Contact Person/Information: Timothy Feeney tfeeney@ccmua.org Camden County Municipal Utilities Authority

Year of Inception of Program: 2014

Purpose and Goals of Workforce Program:

To introduce Camden City high school students to environmental issues, solutions and careers through a summer internship program consisting of educational tours, classroom-style learning and community service projects.

Case Study Summary

The Green Ambassadors is an environmentally focused youth internship program offered at the Camden County Municipal Utilities Authority since 2014. Over the six cohorts of the program so far, 84 youths have participated. The participants are aged 14-18 and are drawn from all the high schools in the treatment plant's host city of Camden New Jersey.

The interns are exposed to the most critical environmental topics by some of the leading government agencies and nonprofit organizations in the field including NJ Department of Environmental Protection, US Environmental Protection Agency, New Jersey Audubon, South Jersey Land and Water Trust, the Partnership for the Delaware Estuary, and the Delaware Valley Regional Planning Commission. Through both classroom-style education and site tours, these high school students are taught by true experts and leaders in environmental protection. In addition, the Green Ambassadors tour the facilities of permittees such as a water treatment plant, trash-to-steam facility and the CCMUA's own wastewater treatment plant to see technologies and processes required to meet environmental permits and protect public health.

The program is typically five weeks long, three days per week paying 10 dollars an hour. Early cohorts consisted of 10 participants and a single counselor. In 2017 the program was expanded, with two counselors and 20 participants. It was found that a seven-hour workday, three days per week is the optimal schedule for this type of program.

The Green Ambassadors also benefit from a creative variety of teaching experiences such as canoe tours and ecology hikes conducted by local environmental nonprofits. They also use their own creativity to accomplish projects that beautify and strengthen their own community, while being advocates for a clean and healthy environment to their friends and neighbors. Typical examples of community service projects include riverbank cleanups, recycling promotion and outreach, community garden or park cleanup and beautification, and tree plantings.

Personal Story/Anecdote from Workforce Program Employee

In order to continually improve the program, year after year, a great effort is made to collect detailed feedback from the participants through surveys and exit interviews. The input and insights of each cohort is used to craft the program of the following summer.

Tahee Purnell was 15 years old, a rising sophomore at Camden County Technical School in the summer of 2017 when he participated in the Green Ambassadors Program. He was enrolled in the Technical School's Academy of Law and Public Safety, and his career goal at the time was to become a law enforcement officer.

In his exit interview, he discussed how his view of the environment and personal decisions changed as a result of the program.

"I used to litter every day 'cause at the end of the day, it didn't affect me. Before the program I would be like everyone else and just throw trash on the ground not knowing. But after the program I realized there's parts of Camden that's beautiful, but it's not open to people because there's so much trash there. So really, what we do, it does affect us."

Year after year, UrbanPromise Ministries' Cooper River Ecology History Paddle is voted a top favorite activity by the Green Ambassadors. While out on the water, every summer without fail, at least one Green Ambassador will say something very close to "I can't believe we're in Camden right now." Of that day, Tahee said:

"My favorite part? There was a lot of good things going on, but I have to say the canoe ride, because you would never get to do that. Not unless you were in this program. It was really nice just to paddle through. It was calm too, like peaceful. There's not bad stuff out there."

When asked how the program affected his academic and/or career goals, Tahee said:

"I do school for law and public safety, so I didn't really ever look into environmental science. But after the program, I realized there's like, people in the DEP that solve environmental cases, they carry a gun and a badge. Really they do the same thing as a cop, it's just a different perspective."

Benefits of Workforce program

The principal benefit of the program is to introduce high school students to the myriad careers dedicated to protecting the environment as well as the health and safety of the public. Especially because these students reside in Camden New Jersey, a heavily industrial city with a large number of brownfield sites and many environmental justice concerns. They learn how various government agencies, scientific institutions, environmental advocacy groups and industries interact, sometimes amicably and sometimes with conflict, and the ways in which that interaction improves or degrades the natural resources upon which we all rely.

A person cannot aspire to nor pursue a career path they are unaware of, and cannot work to rectify environmental injustices they do not understand. The Green Ambassador program gives students an in-depth look, through both learning and experience, at environmentally based careers at a formative time in their lives when critical career and academic choices are being made.

Outside Financial Support and/or program partners

The Green Ambassadors Program is self-funded by the Camden County Municipal Utilities Authority, with enormous help and cooperation from our partners:

-Camden Collaborative Initiative
-New Jersey Department of Environmental Protection
-Environmental Protection Agency
-UrbanPromise Ministries, Inc.
-Partnership for the Delaware Estuary
-The Salvation Army Kroc Center in Camden
-PowerCorps Camden
-Forest Resource Education Center
-New Jersey American Water
-South Jersey Land & Water Trust
-Rutgers University-Camden
-Camden Lutheran Housing, Inc.
-Camden Block Supporter Initiative
-Covanta Camden Energy Recovery Center
-After-School All-Stars
-New Jersey Audubon Society
-New Jersey Tree Foundation
-Delaware Valley Regional Planning Commission

Greatest Obstacles Encountered

Finding enough students to sign up for the program and follow through with the full process of obtaining the employment certificate to be employed as a minor is a challenge every year. Proper “marketing” strategies must be used to attract students in the first place. Students taking a cursory glance at the job application, or doing a brief internet search, might be turned off at the prospect of working at a waste treatment facility. A good relationship with, and outreach to the local schools and educators is essential for success.

After they have expressed interest and signed up, the onerous and convoluted process of obtaining a physician’s certification, personal documents, bouncing back and forth between their prospective employer, the school, the doctor, and the school board issuing officer can be daunting. Especially for families with limited resources and transportation options. Luckily, Camden high schools are often staffed with extraordinary guidance counselors and teachers that go the extra mile to help guide students through the process.

Links to Additional Information on Workforce Program

https://bit.ly/cairns-ga

New Jersey Department of Environmental Protection
Division of Water Quality
CSO Program

Forming and Utilizing Your Supplemental CSO Team

For New Jersey's Combined Sewer Overflow (CSO) Permits and Long Term Control Plans

The Supplemental CSO Team is a resource to you. The Supplemental CSO Team will be beneficial in soliciting input from the public throughout the Long Term Control Plan (LTCP) process, and will enable you to better develop an outreach program that reaches a broad base of citizens. Through the Supplemental CSO Team, you, as the permittee will gain a public perspective on CSOs, local water quality issues and sewer system problems, and the public's willingness to participate in efforts to eliminate CSOs.

The members of the Supplemental CSO Team are not expected to be experts on CSOs or have extensive engineering backgrounds to participate. Members should be representative of the permitted communities or areas served by the sewage treatment plant. The Supplemental CSO Team can provide local information on flooding issues, neighborhood priorities, and community willingness to accept or participate in CSO alternatives (such as building or maintaining green infrastructure).

The Supplemental CSO Team, as part of your public participation process, is a two way dialogue and an opportunity for you to share information about your work and an opportunity for the team to provide input.

The Supplemental CSO Team should be provided with information to help it better understand the issues, costs, and operation of the collection and treatment systems. The Supplemental CSO Team should be aware of the various permit milestones and due dates. These milestones include installation of signs, public participation plan, the characterization of the combined sewer system, evaluation of alternatives analysis to reduce or eliminate CSOs, selecting alternatives, and implementation schedule, for example.

Excerpt from Section G.2.c of the NJPDES CSO Permit (see http://www.nj.gov/dep/dwq/cso.htm)
describing the Supplemental CSO Team

The permittee shall invite members of the affected/interested public to establish a Supplemental CSO Team to work with the permittee's assigned staff from Section F.1 and to work as an informal work group as a liaison between the general public and the decision makers for the permittee. The goals of the Supplemental CSO Team could consist of the following elements:

i. Meet periodically to assist in the sharing of information, and to provide input to the planning process;
ii. Review the proposed nature and extent of data and information to be collected during LTCP development;
iii. Provide input for consideration in the evaluation of CSO control alternatives; and
iv. Provide input for consideration in the selection of those CSO controls that will cost

Should a regional Supplemental CSO Team be formed that incorporates several hydraulically connected communities or would multiple supplemental teams be more effective?

It is up to you. Regional teams, if created, should be reflective of the various communities, populations, and social and environmental needs of the areas served by the sewage treatment plant.

Community-based Supplemental CSO Teams, as opposed to a regional Supplemental CSO Team, may be more effective if the communities in the hydraulically connected region:

- are unique;
- are geographically distant;
- are large in size or population;
- have widely diverse or various priorities; and/or
- have many active groups.

Both community-based and regional Supplemental CSO Teams may be needed in some cases. Community-based teams can be utilized to reach a more localized population, while a representative from the community-based team can participate in the regional Supplemental CSO Team as well.

Justification regarding the composition of the Supplemental CSO Team or Teams should be articulated in the public participation plan, as well as a discussion of the goals of the Supplemental CSO Team, feedback received so far from the Supplemental CSO Team, and frequency and type of team interaction.

Who should be involved in the Supplemental CSO Team?

The Supplemental CSO Team should be customized to meet your needs and the needs of your community. Consider inviting individuals or group representatives to participate in the Supplement CSO Team who have been involved in your past public participation efforts or who are currently involved with or concerned about CSOs and related issues (such as redevelopment, environmental improvement, waterfront access, community engagement, stormwater, or economic development).

The structure, organization and responsibilities of the Supplemental CSO Team should be representative of the issues and possible alternatives. The Supplemental CSO Team should represent the community's diverse perspectives and address the needs of the affected public. When considering the makeup of your Supplemental CSO Team you should keep in mind that pursuant to Section II.C.2 of the National CSO Policy, the affected public includes rate payers, industrial users of the sewer system, persons who reside downstream from the CSOs, persons who use and enjoy these downstream waters, and any other interested person.

Consider including representatives from the following interest groups:

Community/neighborhood groups
Environmental groups
Recreational Water Users
Business, Industry, and Redevelopment community
Local Institutions (ex: academic, business, healthcare)
Representatives of Local Government
Faith based and social service based organizations

The optimum size of the Supplemental CSO Team can be determined by you but each team should be diverse and representative of the population served while still small enough to have effective meetings and dialog among the team members.

When inviting the public to participate on the Supplemental CSO Team, share with them what they should expect by participating and how much time they should plan to dedicate to this effort. Keep in mind that the public participation process will involve more than the Supplemental CSO Team. Therefore, if there are members of the public that are unable to commit to the Supplemental CSO Team, they should be invited to participate in the broader public participation effort.

Several CSO communities may have teams formed around issues related to CSOs, such as a community based green infrastructure team, municipal action team, or green team. These teams may or may not include the diversity of representatives that are needed for the Supplemental CSO Team. Evaluate how best to utilize and build off of these existing teams.

What frequency should my Supplemental CSO Team meet?

The role of the Supplemental CSO Team may differ among permittees and their participation in the LTCP development process should correlate with the area impacted; the number of people impacted; and resources needed to implement the LTCP. The Supplemental CSO Team should meet as often as needed for the team to ultimately be able to meaningfully provide input on the evaluation of CSO alternatives. However, the Department would expect the Supplemental CSO Team to meet in person no less than when important milestones and reports are completed throughout the LTCP development process. The Supplemental CSO Team may need to meet frequently in the beginning of the LTCP development process in order to establish goals and learn about the LTCP and less frequently while studies and reports are being conducted and developed. As the time approaches to evaluate and provide input on alternatives, the Supplemental Team may need to again meet more frequently. Meeting types and locations may differ from one permittee to another as well as from one task to another throughout the LTCP process. In person meetings might be the primary way for the Supplemental CSO Team to operate. There are other methods that may be helpful to share information and gain feedback from the Supplemental CSO Team, such as conference calls, emails, online surveys and website updates, among others.

Meetings held on a consistent schedule and at a convenient location enable continued participation. Weekend and evening meetings may work best for your team members. When selecting a meeting location think about if the location is accessible via public transportation, has free parking, and does not require extensive security checks.

Who should facilitate the Supplemental CSO Team?

It is ultimately your responsibility to ensure that the Supplemental CSO Team is conducted and facilitated so that all permit requirements are met. The Supplemental CSO Team could be led by staff within your organization or municipality or by hired professionals. Whomever you choose to lead your Supplemental CSO Team, you should seek individuals that have the following facilitation skills:

- experience engaging with the public;
- ability to translate complex issues;
- facilitate and encourage active listening and;
- accepting of different perspectives and ideas.

What's the Supplemental CSO Team's role in public participation?

The Supplemental CSO Team will be a great asset for developing and implementing parts of the public participation process. Members of your Supplemental CSO Teams are likely to be members of other networks and can be conduits for sharing information with their peers and neighbors. Providing feedback on community reaction, effective ways to share information, and input on your public participation strategy are great ways to utilize the Supplemental CSO Team. You may find that your Supplemental CSO Team will assist you in public participation activities.

The Supplemental CSO Team will be beneficial in soliciting input from the public throughout the planning process, and will enable you to better develop an outreach program through public meetings and public hearings that reaches a broad base of citizens. By using the Supplemental CSO Team to develop and implement a larger public engagement process, you will gain a public perspective on local water quality issues and sewer system problems, the amount of public concern about CSOs in particular, and the public's willingness to participate in efforts to eliminate CSOs.

Supplemental Team Examples

CSO communities in other states have implemented networks similar to Supplemental CSO Teams. The following two examples can provide helpful information on how to organize and utilize these teams. Links are provided for additional information on Philadelphia and Nashville's public participation process for developing their Long Term Control Plans and engaging the public.

Philadelphia, PA

Business
- Building Industry Association

Citizen Groups
- Northern Liberties Neighborhood Association
- Passyunk Square Neighbors Association
- Washington West Civic Association

Interest Groups
- Community Legal Services, Inc.
- Delaware River City Corporation
- Impact Services Corporation
- PennFuture (Next Great City)
- Pennsylvania Environmental Council
- Tookany/Tacony-Frankford WatershedPartnership
- Schuylkill River Development Corporation
- Sierra Club

Regulatory Agencies
- Pennsylvania Department of Environmental Protection (PADEP)

Local Government Agencies
- Fairmount Park Commission
- Mayor's Office of Sustainability
- Philadelphia Water Department

See table 2-1 at the following link for the advisory committee membership:
http://www.phillywatersheds.org/ltcpu/LTCPU_Section02_Public%20Participation.pdf

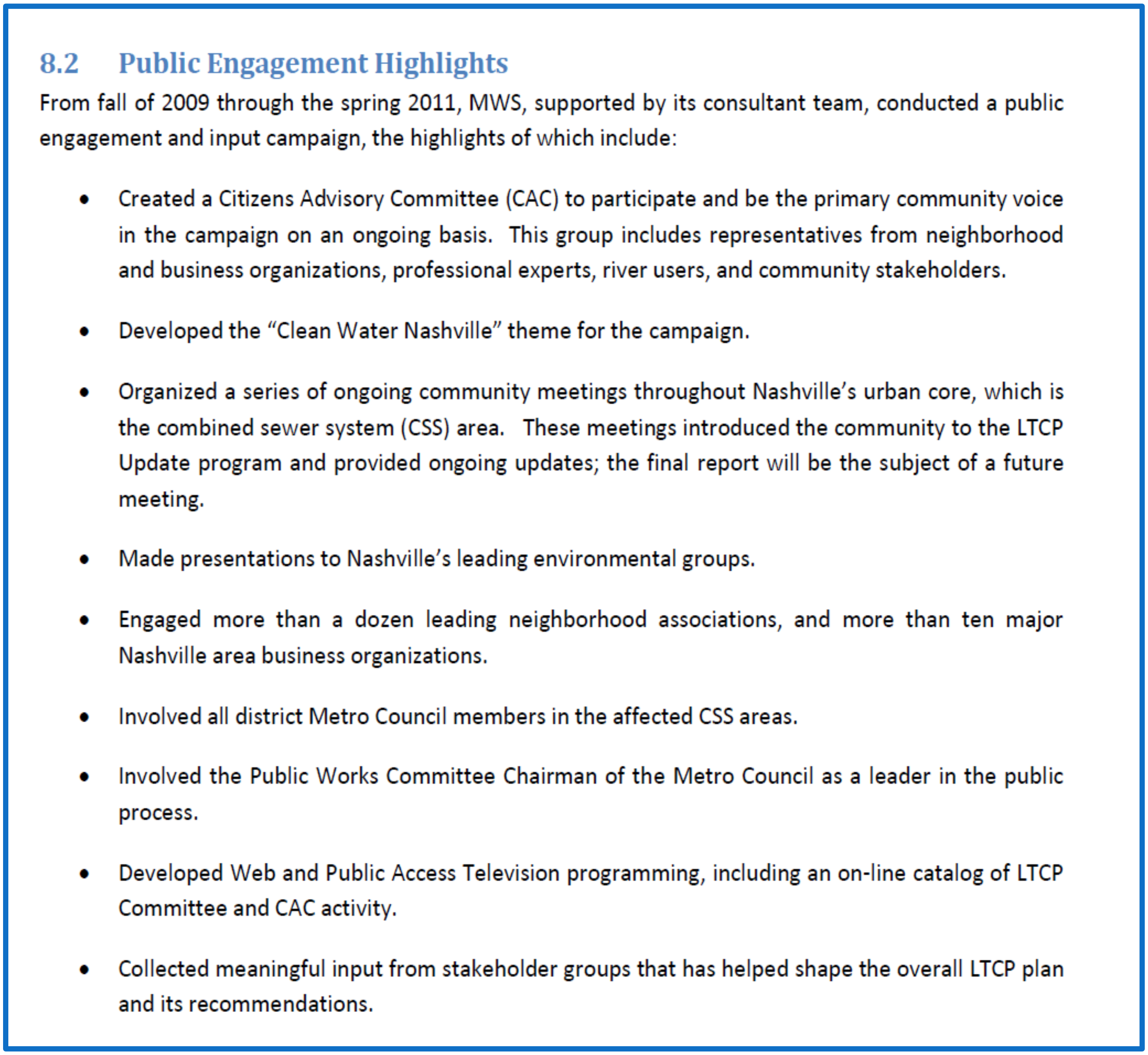
The Public Participation Program Team assembled a diverse group of stakeholders to comprise the *Green City, Clean Waters* Advisory Committee. The committee consists of key city, state and community representatives (including civic organizations in neighborhoods affected by sewage backups during intense rainstorms), as well as leaders of local, regional and national environmentally -minded organizations. Targeted efforts were made to invite civic leaders of the impacted neighborhoods (and who represent ratepayers), industrial users, and organizations that represent people that live near and use the impacted areas. A majority of the representatives who actively participate on the advisory committee belong to organizations whose missions concentrate on civic and environmental issues. (Section 2.2.1, page 2-4)

This is an example of an advisory committee or local stakeholder team. Your Supplemental CSO Team is likely to include many of these sub-groups and it is important for local decision makers (City Council, Planning Boards, Zoning Boards, Redevelopment Committees, to name a few) to either be a part of this group or ensure its involvement in the LTCP development through other methods.

Nashville, TN

Nashville developed a Citizens Advisory Committee along with many other public engagement activities. Their Citizen Advisory Committee was designed "to extend the public engagement initiative far into communities, and to generate the most thorough input from residents, businesses, neighborhood associations, and other organizations. These were individuals who were recognized as leaders and experienced conveners in their respective neighborhoods. In this case, these leaders and their respective organizations were located throughout the urban core, the most affected areas of the LTCP Update." (Section 8.3) Members included representatives from faith based organizations, academia, historic committee, metropolitan council, neighborhood and park organizations, transit authority, health department, and business groups to name a few.

http://www.cleanwaternashville.org/content/resources/pdfs/pdr/LongTermControlPlan.pdf



8.2 Public Engagement Highlights

From fall of 2009 through the spring 2011, MWS, supported by its consultant team, conducted a public engagement and input campaign, the highlights of which include:

- Created a Citizens Advisory Committee (CAC) to participate and be the primary community voice in the campaign on an ongoing basis. This group includes representatives from neighborhood and business organizations, professional experts, river users, and community stakeholders.
- Developed the "Clean Water Nashville" theme for the campaign.
- Organized a series of ongoing community meetings throughout Nashville's urban core, which is the combined sewer system (CSS) area. These meetings introduced the community to the LTCP Update program and provided ongoing updates; the final report will be the subject of a future meeting.
- Made presentations to Nashville's leading environmental groups.
- Engaged more than a dozen leading neighborhood associations, and more than ten major Nashville area business organizations.
- Involved all district Metro Council members in the affected CSS areas.
- Involved the Public Works Committee Chairman of the Metro Council as a leader in the public process.
- Developed Web and Public Access Television programming, including an on-line catalog of LTCP Committee and CAC activity.
- Collected meaningful input from stakeholder groups that has helped shape the overall LTCP plan and its recommendations.

Scott Schreiber

From: Caldarelli, Adriana <Adriana.Caldarelli@dep.nj.gov>
Sent: Monday, March 20, 2017 2:58 PM
To: Scott Schreiber
Cc: Andy Kricun; Doug Burns; Pepe, Rachael; Feltis, Jennifer
Subject: RE: CSO Supplemental Team

Scott,

The revisions look great. I ran it by our experts and they agree that the supplemental team can and should evolve as the process does, so I think you should go ahead and schedule a kickoff meeting to get the process started. We could throw out as a discussion point during the kickoff meeting whether the invitee list is inclusive enough and take suggestions. For instance, Jennifer Feltis suggested that we may want to engage large property owners near outfalls, like marinas, etc., so perhaps the group could provide suggestions and feedback.

Let me know if you need anything else.

Sincerely,

Adriana Caldarelli
NJDEP Division of Water Quality
Office of the Assistant Director, Water Pollution Management Element
401 E. State St
PO Box 420, Mail Code 401-2B
Trenton, NJ 08625
609-422-7671
609-777-0432 (fax)

From: Scott Schreiber [mailto:sschreiber@ccmua.org]
Sent: Monday, March 20, 2017 11:59 AM
To: Caldarelli, Adriana <Adriana.Caldarelli@dep.nj.gov>
Cc: Andy Kricun <andy@ccmua.org>; Doug Burns <doug@ccmua.org>
Subject: CSO Supplemental Team

Adriana,

Andy, Doug and I wanted to follow up on the previous comments offered by you and the public participation experts at the NJDEP by submitting a revised roster of potential Camden City CSO Supplemental Team participants (below). Our goal is to be responsive to the NJDEP guidance document *Forming and Utilizing Your Supplemental CSO Team* and the aforementioned NJDEP comments offered after our initial submission of potential participants. We made every effort to be more inclusive of the types of individuals and entities that are represented while creating this revised potential roster. Further, it is our intention to have an initial meeting with this group of community leaders and ask them to reach out to colleagues and/or residents who live in the City of Camden and invite them to all future meetings. In other words, we do not view the CSO Supplemental Team as a static group of individuals or entities but rather an evolving one which aims to address the concerns of residents and rate payers of the City. We very much look forward to receiving your comments. Thank you.

Best Regards,
Scott Schreiber

Entity	**Individual(s)/Organizations**
Camden City	Uzo Ahiarakwe, Patrick Keating, Joe Thomas
American Water	James Cowley
Camden City Public Schools	Brendan Lowe
Camden SMART	Camden City, CCMUA, Cooper's Ferry, Rutgers, NJ Tree Foundation, NJDEP
NJ Conservation Foundation	Olivia Glenn
Camden Redevelopment Agency	James Harveson
Center for Aquatic Sciences	Brian DuVall and/or Angela Wenger
Urban Trekkers/Urban Boat Works	Jim Cummings
Camden Block Supporter Initiative	Pino Rodriguez
Kroc Center – Camden	Demetrius Marlowe
Center for Environmental Transformation	Teresa Niedda
The Neighborhood Center	Christa Galvin
Rutgers University	Student Recommended from Faculty/Staff

Scott Schreiber
Director of Adminsistrative Operations
Camden County MUA
1645 Ferry Avenue
Camden, NJ 08104
P - 856-583-1261
F - 856-964-1829

Supplemental CSO Team Invitees

Entity	Individuals
American Water	James Cowley
Camden City	Uzo Ahiarakwe, Patrick Keating, Joe Thomas
Camden City Public Schools	Brendan Lowe
Camden Kroc Center	Demetrius Marlowe
Camden Redevelopment Agency	James Harveson
Center for Aquatic Sciences	Brian DuVall
Center for Environmental Transformation	Teresa Niedda
Cooper's Ferry Partnership	Meishka Mitchell, Sarah Bryant, Caroline Gray
New Jersey Conservation Foundation	Olivia Glenn
NJ Tree Foundation	Lisa Simms
NJDEP	Franklin McLaughlin, Adriana Caldarelli, Armando Alfonso
Rutgers University	Larry Gaines
Rutgers Water Resource Program	Jeremiah Bergstrom
The Neighborhood Center	Amelia Kaselaan
Urban Promise	Jim Cummings

THE CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
1645 Ferry Avenue ● Camden, NJ 08104
Phone (856) 541-3700 ● Fax (856) 964-1829
www.ccmua.org

April 7, 2017

Delivered via Email
Olivia Glenn
Regional Manager, South Jersey Metro
New Jersey Conservation Foundation
170 Longview Road
Far Hills, NJ 07931

Re: Combined Sewer Overflow Supplemental Team

Dear ~~Ms. Glenn~~: Olivia

The New Jersey Department of Environmental Protection has issued new permits to all entities which own combined sewer outfalls. One of the goals of these new permits is to significantly reduce the frequency and volume of combined sewage overflows (CSO) that enter receiving streams and rivers during wet weather. The City of Camden and the Camden County MUA (CCMUA) are working together on a Long Term Control Plan which, when completed, will provide a blueprint that will allow the City and the CCMUA to be in compliance with the permit, reduce or eliminate CSO events, improve the water quality of the receiving streams and, most importantly, eliminate combined sewage street flooding.

An integral part of the Long Term Control Plan is to solicit public participation via a CSO Supplemental Team. Through the CSO Supplemental Team, the City and the CCMUA will gain a public perspective on CSOs, local water quality issues and sewer system problems including flooding. Members of the CSO Supplemental Team are not expected to be experts or engineers but will be expected to provide information on neighborhood priorities and input on possible CSO alternatives like green infrastructure.

Are you willing to be a CSO Supplemental Team Member?

If so, the City of Camden and the CCMUA will invite you to several meetings over the next year and will also ask you to invite other members of the community you feel should be included in the process of creating the Long Term Control Plan. It is my hope that upon completing this voluntary service all CSO Supplemental Team members will have a better understanding of the combined sewer system, the permitting process, the goals of the Long Term Control Plan and, most importantly, will help guide the City and the CCMUA on selecting ways that meet both the local needs and desires and that effectively control CSOs and flooding.

Please let me know if you would like to join by emailing me at andy@ccmua.org. Thank you very much for considering this important community service.

Best Regards,

Andrew Kricun, P.E., BCEE
Executive Director/Chief Engineer
Camden County Municipal Utilities Authority

Camden City - CCMUA CSO Supplemental Team

Kick Off Meeting

May 25, 2017

CCMUA Administration Building

Agenda

- -Combined Sewer Systems
- -Combined Sewer Overflows
- -Combined Sewage Flooding
- -The Long Term Control Plan
- -The Role of the CSO Supplemental Team
- -Topics for Future Meetings
- -Inviting Community Members to Future Meetings

What is a Combined Sewer System (CSS)?

The Environmental Protection Agency Defines a CSS as:

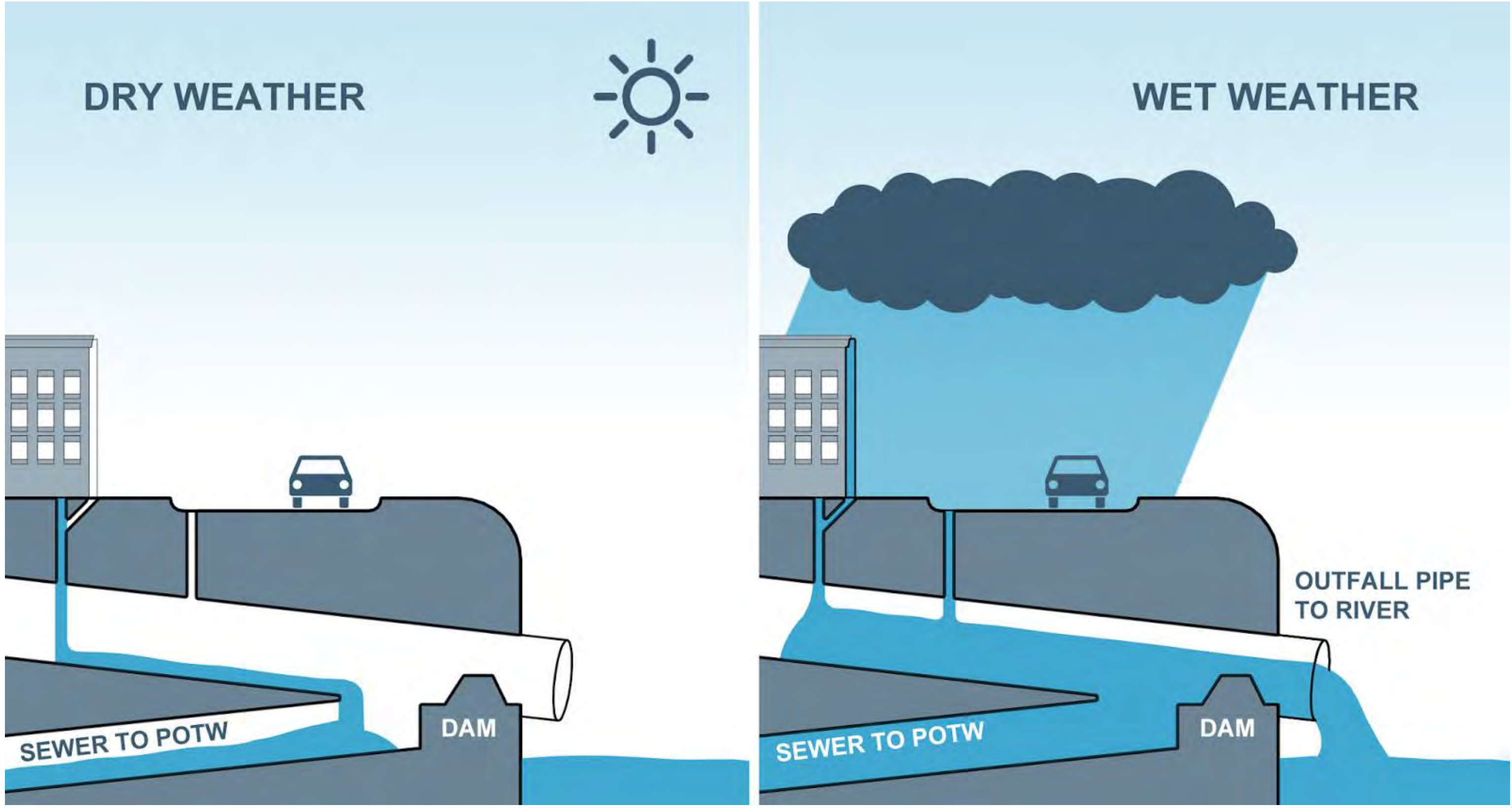
- A combined sewer system (CSS) collects rainwater runoff, domestic sewage, and industrial wastewater into one pipe. Under normal conditions, it transports all of the wastewater it collects to a sewage treatment plant for treatment, then discharges to a water body. The volume of wastewater can sometimes exceed the capacity of the CSS or treatment plant (e.g., during heavy rainfall events or snowmelt). When this occurs, untreated stormwater and wastewater, discharges directly to nearby streams, rivers, and other water bodies.
- Combined sewer overflows (CSOs) contain untreated or partially treated human and industrial waste, toxic materials, and debris as well as stormwater. They are a priority water pollution concern for the nearly 860 municipalities across the U.S. that have CSSs.

CSSs Used to be State of the Art

www.alamy.com - D97W2K

But Not Anymore

Combined Sewer Overflows



Total Overflow - Camden City & CCMUA

- 833 Millions of Gallons per Year Overflow into Cooper River, Delaware River and Newton Creek

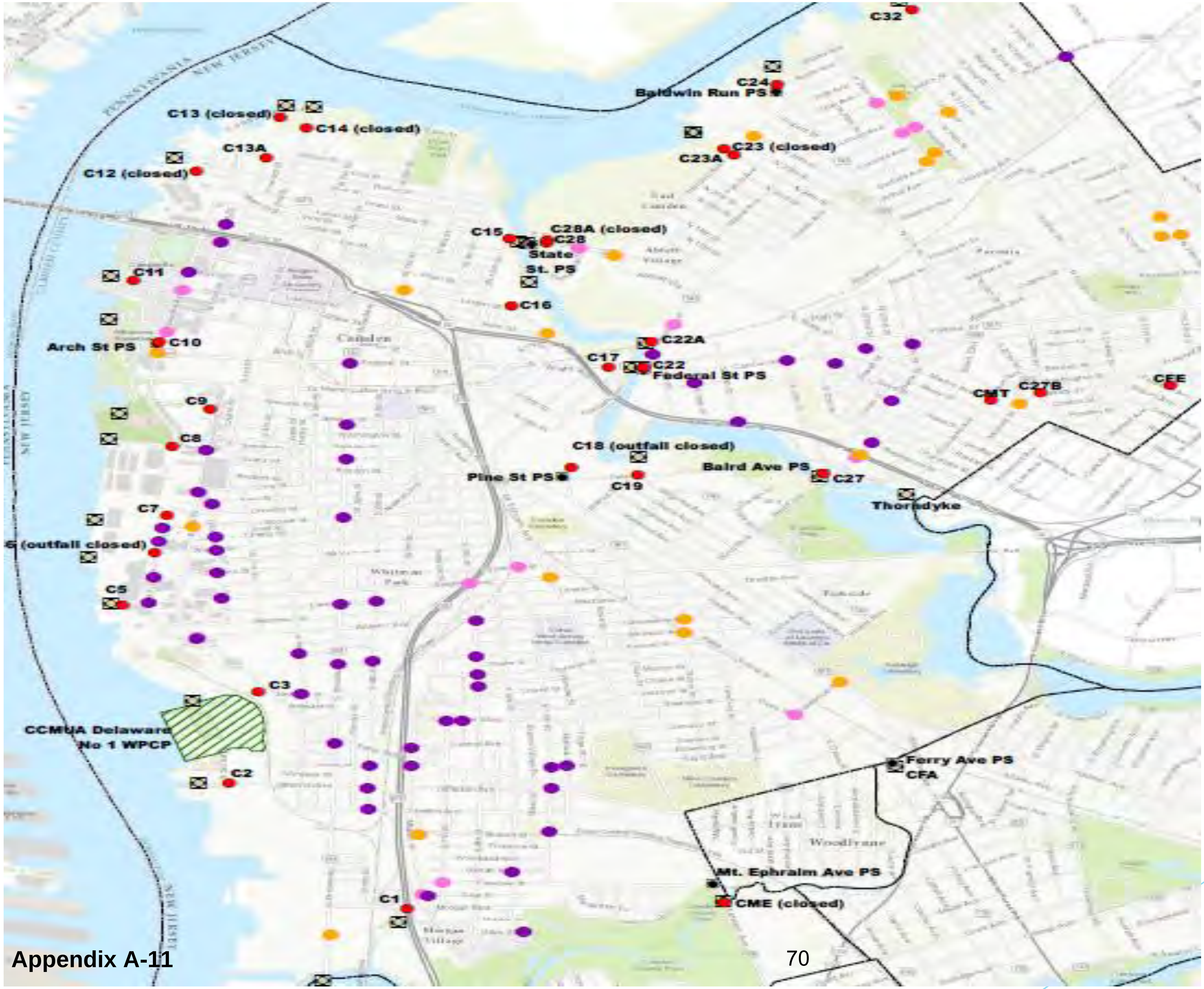
- 23 Outfalls Overflow on Average 37 Times Per Year

Overflows by Receiving Stream

- Cooper River
    - 9 CSO Outfalls
    - 274 MGY
    - Average of 46 Events per Outfall
- Delaware River
    - 12 CSO Outfalls (11 Camden City, 1 CCMUA)
    - 509 MGY
    - Average of 36 Events per Outfall
- Newton Creek
    - 2 CSO Outfalls
    - 50 MGY
    - Average of 30 Events per Outfall

Combined Sewage Flooding

- https://youtu.be/m2j8UGGZqGY


C32
C24
Baldwin Run PS
C13 (closed)
C14 (closed)
C13A
C12 (closed)
C23 (closed)
C23A
C15
C28A (closed)
C28
State St. PS
C11
C16
Arch St PS
C10
C22A
C17
C22
Federal St PS
C9
C8
CMT
C27B
CEE
C18 (outfall closed)
Pine St PS
C19
Baird Ave PS
C27
Thorndyke
C7
6 (outfall closed)
C5
C3
CCMUA Delaware No 1 WPCP
C2
Ferry Ave PS
CFA
Mt. Ephraim Ave PS
CME (closed)
C1
Camden
PENNSYLVANIA
NEW JERSEY

The Long Term Control Plan

Characterization, monitoring, and modeling of the combined sewer system

Public participation

Consideration of sensitive areas

Evaluation of alternatives to meet CWA requirements

Cost/performance considerations

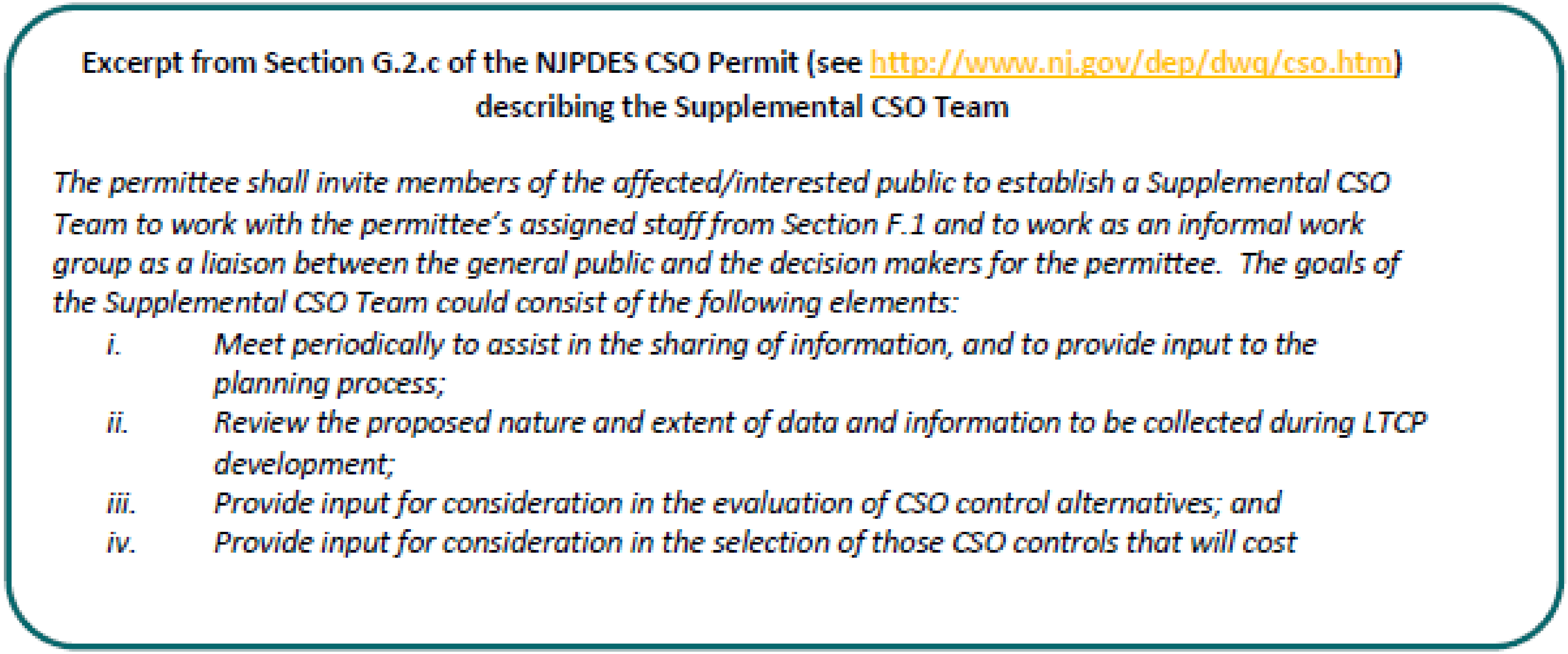
Operational Plan

Maximizing treatment at the existing wastewater treatment plant

Implementation schedule

Post-construction compliance monitoring program

Public Participation
The CSO Supplemental Team

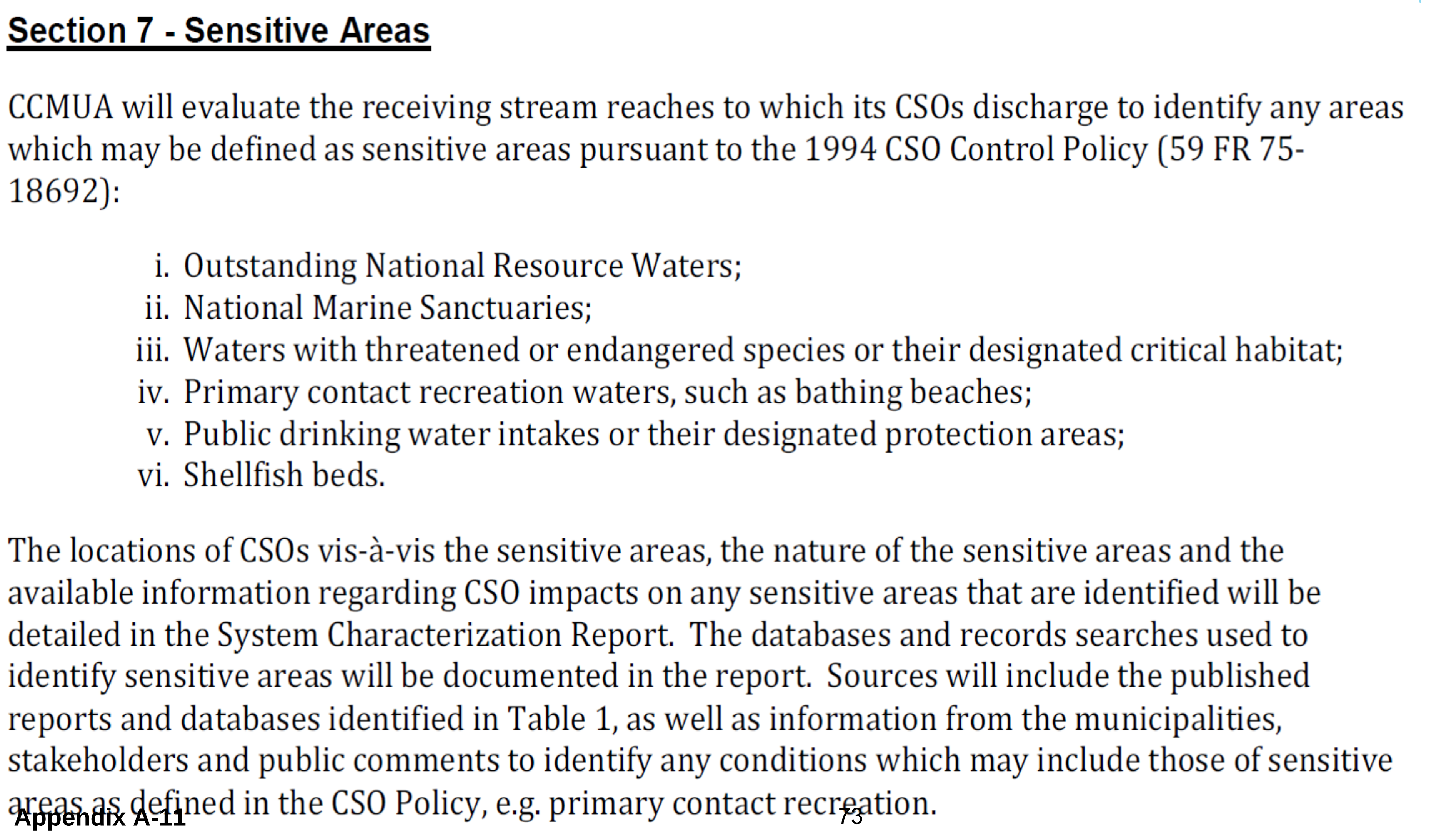


Excerpt from Section G.2.c of the NJPDES CSO Permit (see http://www.nj.gov/dep/dwq/cso.htm) describing the Supplemental CSO Team

The permittee shall invite members of the affected/interested public to establish a Supplemental CSO Team to work with the permittee's assigned staff from Section F.1 and to work as an informal work group as a liaison between the general public and the decision makers for the permittee. The goals of the Supplemental CSO Team could consist of the following elements:

- *i. Meet periodically to assist in the sharing of information, and to provide input to the planning process;*
- *ii. Review the proposed nature and extent of data and information to be collected during LTCP development;*
- *iii. Provide input for consideration in the evaluation of CSO control alternatives; and*
- *iv. Provide input for consideration in the selection of those CSO controls that will cost*

Topic for Next Meeting:



Section 7 - Sensitive Areas

CCMUA will evaluate the receiving stream reaches to which its CSOs discharge to identify any areas which may be defined as sensitive areas pursuant to the 1994 CSO Control Policy (59 FR 75-18692):

i. Outstanding National Resource Waters;
ii. National Marine Sanctuaries;
iii. Waters with threatened or endangered species or their designated critical habitat;
iv. Primary contact recreation waters, such as bathing beaches;
v. Public drinking water intakes or their designated protection areas;
vi. Shellfish beds.

The locations of CSOs vis-à-vis the sensitive areas, the nature of the sensitive areas and the available information regarding CSO impacts on any sensitive areas that are identified will be detailed in the System Characterization Report. The databases and records searches used to identify sensitive areas will be documented in the report. Sources will include the published reports and databases identified in Table 1, as well as information from the municipalities, stakeholders and public comments to identify any conditions which may include those of sensitive areas as defined in the CSO Policy, e.g. primary contact recreation.

Please Invite Community Members to Future Meetings

Thank you!

List of Supplemental CSO Team Meeting #2 Attendees

Sensitive Areas Meeting: 12/13/17

Name	Organization
Jose Santiago	Block Supporters Initiative
Destiny Wilson	Urban Promise Academy
Hope Lugo	Urban Promise Academy
Jeremiah Bean	Urban Promise OEL
Jim Cummings	Urban Promise OEL
Meredith Brown	NJ Tree Foundation
Jessica Franzini	Camden Lutheran Housing
Jeremiah Bergstrom	Rutgers Camden
Carlos Morales	Heart of Camden
Teresa Nieda	Center for Environmental Transformation
Demetrius Marlowe	Salvation Army Kroc Center
Olivia Glenn	NJ Conservation Foundation
Pat Keating	Camden City
Armando Alfonso	NJDEP
Shaza Qizvi	NJDEP
Susan Rosenwinkel	NJDEP
Josie Horowitz	NJDEP
Tim Feeney	CCMUA
Doug Burns	CCMUA
Scott Schreiber	CCMUA
Andy Kricun	CCMUA

Appendix A-12

List of Supplemental CSO Team Meeting #2 Attendees Sensitive Areas Meeting: 12/13/17	
Name	Organization
Jose Santiago	Block Supporters Initiative
Destiny Wilson	Urban Promise Academy
Hope Lugo	Urban Promise Academy
Jeremiah Bean	Urban Promise OEL
Jim Cummings	Urban Promise OEL
Meredith Brown	NJ Tree Foundation
Jessica Franzini	Camden Lutheran Housing
Jeremiah Bergstrom	Rutgers Camden
Carlos Morales	Heart of Camden
Teresa Nieda	Center for Environmental Transformation
Demetrius Marlowe	Salvation Army Kroc Center
Olivia Glenn	NJ Conservation Foundation
Pat Keating	Camden City
Armando Alfonso	NJDEP
Shaza Qizvi	NJDEP
Susan Rosenwinkel	NJDEP
Josie Horowitz	NJDEP
Tim Feeney	CCMUA
Doug Burns	CCMUA
Scott Schreiber	CCMUA
Andy Kricun	CCMUA

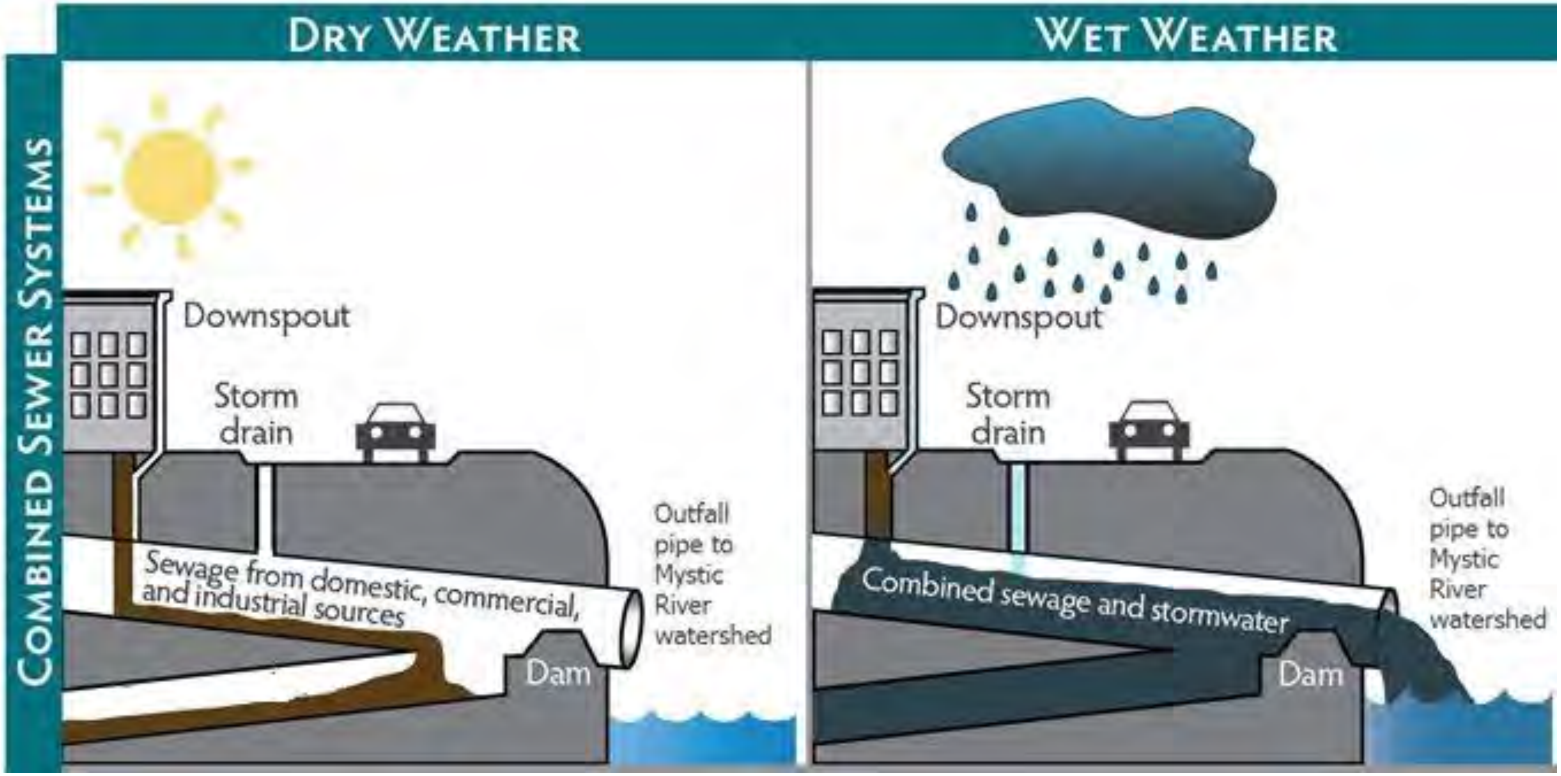
Appendix A-12

CSO Supplemental Team

Sensitive Areas Identification

12/13/17 Meeting

Combined Sewer Overflows



Long Term Control Plan

Characterization, monitoring, and modeling of the combined sewer system

Public participation

Consideration of sensitive areas

Evaluation of alternatives to meet CWA requirements

Cost/performance considerations

Operational Plan

Maximizing treatment at the existing wastewater treatment plant

Implementation schedule

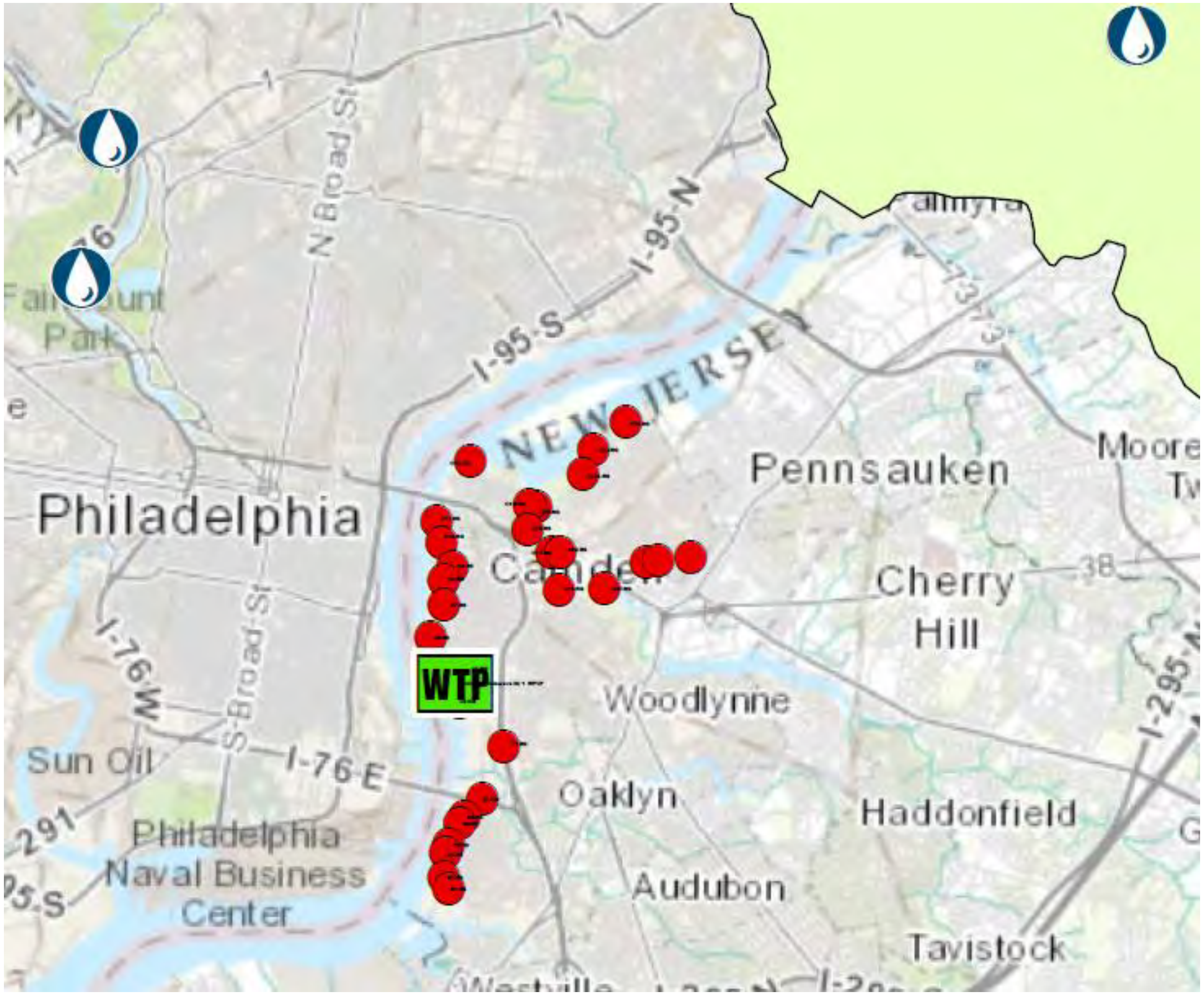
Post-construction compliance monitoring program

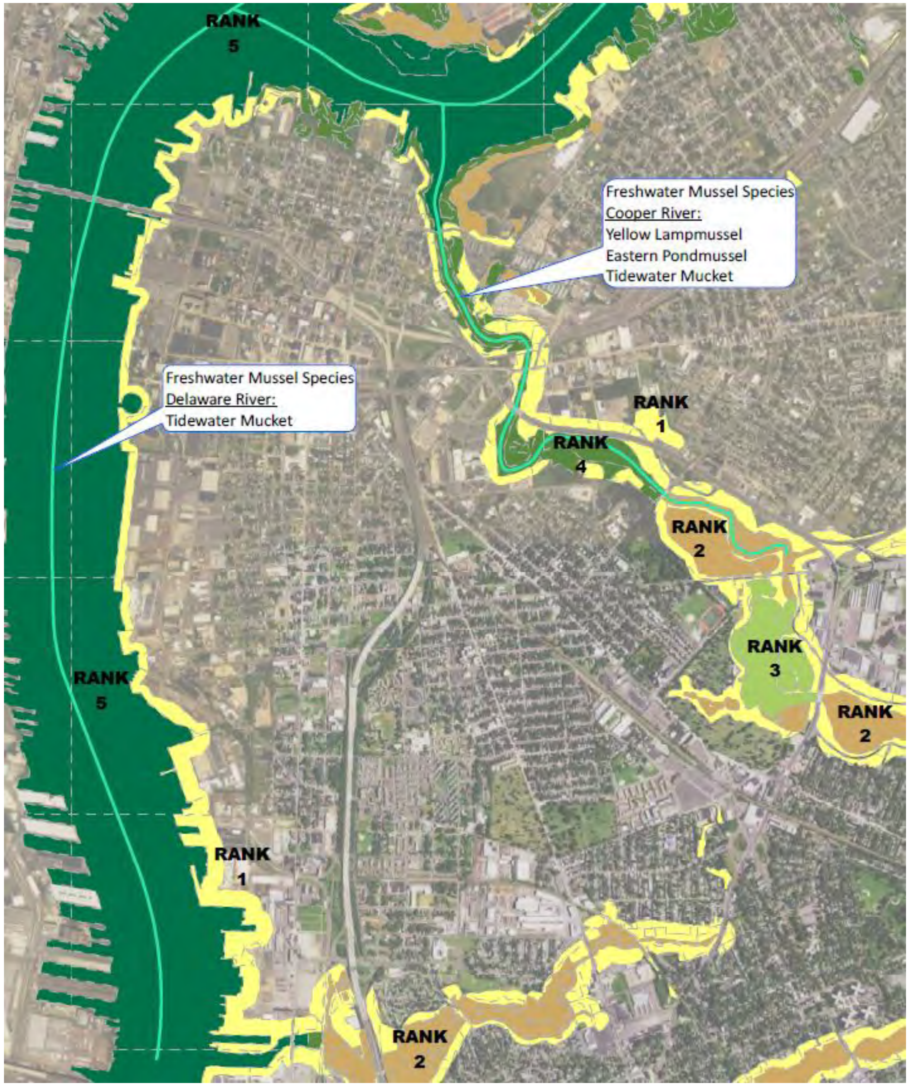
Supplemental CSO Team

- "Members should be representative of the permitted communities or areas served by the sewage treatment plant. The Supplemental CSO Team can provide local information on flooding issues, neighborhood priorities, and community willingness to accept or participate in CSO alternatives (such as building or maintaining green infrastructure)."

Sensitive Areas

- 1) Outstanding National Resource Waters
- 2) National Marine Sanctuaries
- 3) Threatened or Endangered Species Habitat
- 4) Public Drinking Water Intakes
- 5) Shellfish Beds
- 6) Primary Contact Recreation

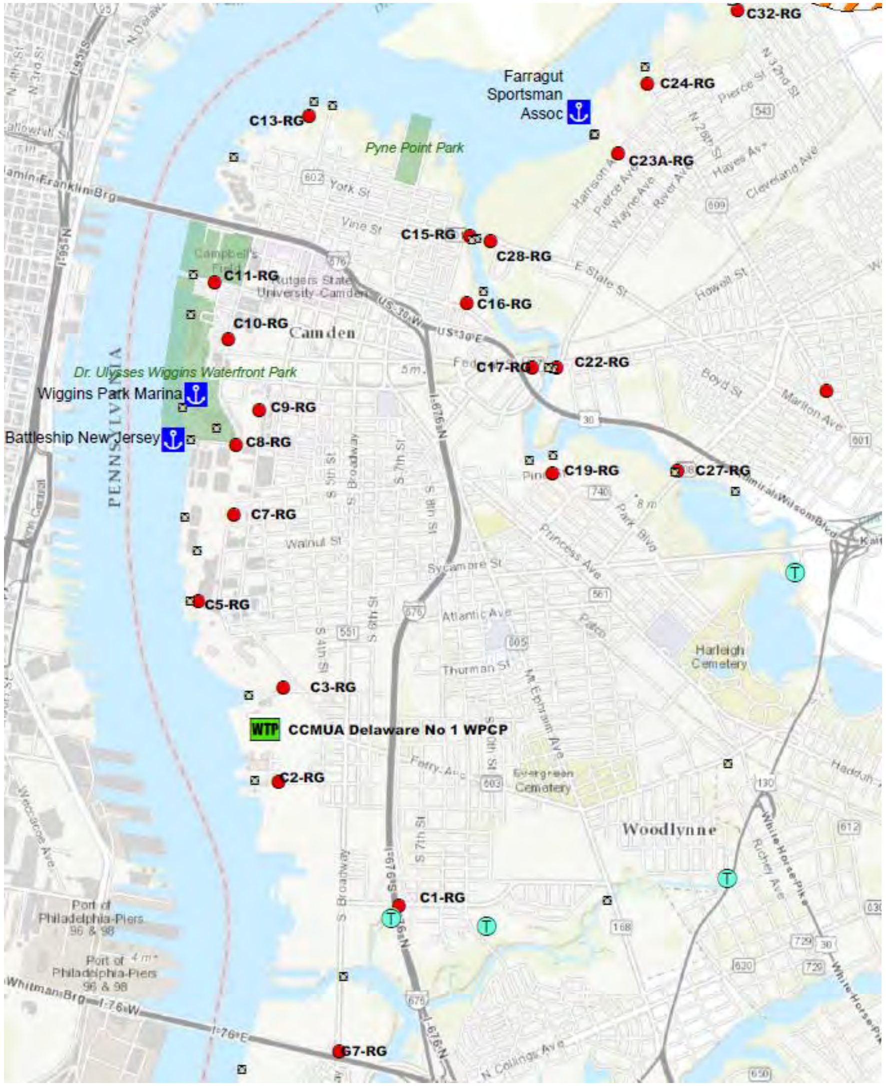

Philadelphia
NEW JERSEY
Pennsauken
Camden
Cherry Hill
Woodlynne
Oaklyn
Haddonfield
Audubon
Tavistock
Fairmount Park
Sun Oil
Philadelphia Naval Business Center
WTP
N Broad St
S Broad St
I-95 N
I-95 S
I-76 W
I-76 E
I-295 N
291
38
73


RANK 5
Freshwater Mussel Species
Cooper River:
Yellow Lampmussel
Eastern Pondmussel
Tidewater Mucket
Freshwater Mussel Species
Delaware River:
Tidewater Mucket
RANK 1
RANK 4
RANK 2
RANK 3
RANK 5
RANK 2
RANK 1
RANK 2

Primary Contact Recreation

- Swimming, Boating, Fishing etc.

- Philadelphia Control Plan Example:
    - "An annual triathlon is held in the Schuylkill River above Fairmount Dam. This area is upstream of PWD's CSO outfalls on the Schuylkill River. Occasional primary contact recreation occurs in Cobbs Creek and Tacony-Frankford Creek. These activities are unsafe in addition to exposing recreators to potentially unsafe levels of pathogens in wet weather. The City is addressing these concerns through education, signage, and enforcement."



Questions for us:

- Where do people canoe/kayak?
- Where do people fish?
- Where do people swim?
  - Official/Annual Events? Informally?

WTP	Treatment Plant	🟩	Park, Recreation Area
●	Regulator Structure	▨	Natural Heritage Priority Site
☒	Discharge Point		
⚓	Marinas		
Ⓣ	Head of Tide		

Map of Primary Contact Recreation Areas

☑ **Newton Creek Access Points**

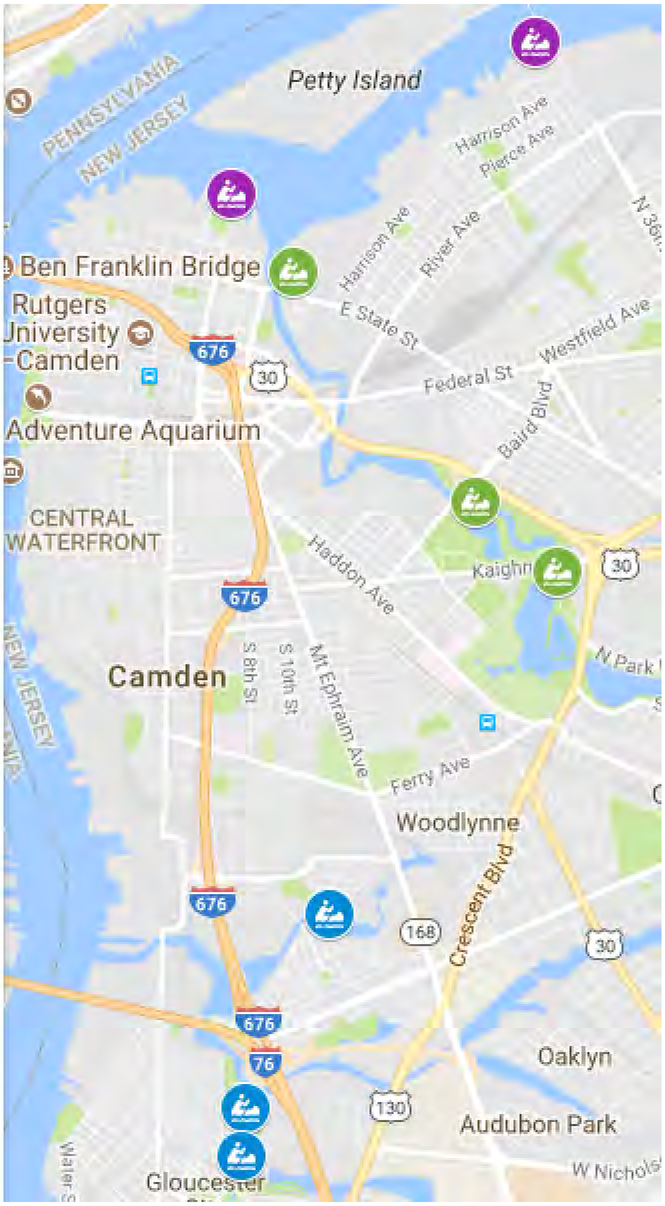
- 🔵 Johnson Blvd Recreation Dev Canoe Access
- 🔵 Reverend Evers Park Access Point
- 🔵 Gloucester City Little League Majors Field

☑ **Cooper River Access Points**

- 🟢 Cramer Hill Waterfront Park
- 🟢 Kaighn Ave Dam Access
- 🟢 Gateway Park Proposed Access

☑ **Back Channel Access Points**

- 🟣 Pyne Poynt Park
- 🟣 36th St



Invitee List of Camden CSO Supplemental Team – June 20th 2019

Vince Quarles	American Water	vincent.quarles@amwater.com
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Scott Schreiber	CCMUA	sschreiber@ccmua.org
Tim Feeney	CCMUA	tfeeney@ccmua.org
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Angela Wenger	Center for Aquatic Sciences	AWenger@aquaticsciences.org
Teresa Niedda	Center for Environmental Transformation	director@cfet.org
Jon Compton	Center for Environmental Transformation	farmer@cfet.org
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Terrence Thompson	CFS - PowerCorps	terrance.thompson@centerffs.org
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Jahtieh Postell	CFS - PowerCorps	jahtieh.postell@centerffs.org
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Sarah Bryant	Cooper's Ferry Partnership	bryant@coopersferry.com
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Lisa Simms	NJ Tree Foundation	lsimms@njtreefoundation.org
Meredith Brown	NJ Tree Foundation	mbrown@njtreefoundation.org
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Josie Horowitz	NJDEP	Josie.Horowitz@dep.nj.gov
Shaza Qizvi	NJDEP	
Susan Rosenwinkel	NJDEP	susan.rosenwinkel@dep.nj.gov
Franklin McLaughlin	NJDEP	frank.mclaughlin@dep.nj.gov
Monique Phillips	NV5	monique.phillips@nv5.com

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Larry Gaines	Rutgers	gaines@camden.rutgers.edu
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Betsy Clifford		bclifford@clhi.org
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Gregory Gamble		gambleg@camden.rutgers.edu
Keith Walker		kewalker@ci.camden.nj.us
Rachel Abbott		rabbott@urbanpromiseusa.org
Joanne Higgins		jhiggins@urbanpromiseusa.org
Enrique Rivera	St. Joseph Carpenter	erivera@sjcscamden.org
Pilar Closkey	St. Joseph Carpenter	phogan@sjcscamden.org

LTCP Supplemental Team - 1/16/20 Sign-In Sheet

NAME	ORGANIZATION	EMAIL
Alyssa ward	PowerCorps Camden Center For Family Services	alyssa.ward@centerffs.org
Eric G. Fowler	Gloucester City Dept of Utilities	ericfowler@cityofgloucester.org
Monique Phillips	NV5 inc	monique.phillips@NV5.com
Michael English	Powercorps Camden	mike.english0420@gmail.com
Peter Kroll	CCMUA	PKROLL@CCMUA.ORG
S. Rosenwinkel	NJDEP	susan.rosenwinkel@dep.nj.gov
Molly Jacoby	NJDEP	molly.jacoby@dep.nj.gov
Sherry Preisig	NJDEP	sherry.preisig@dep.nj.gov
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Gary A Brooks	AM water	gary.brooks@amwater.com
Jim Hopkins	BH - City of Camden	jhopkins@bucharthorn.com
Matthew Leconey	Rutgers WRP	matthew.leconey@rutgers.edu
Sarah Bryant	CFP	bryant@coopersferry.com
Veronica Sanchez	Powercorps Camden	v.sanchez8201@icloud.com
DOUGLAS BURNS	CCMUA	DAB@CCMUA.ORG
Shaila Martinez	PowerCorps Camden	
Kiey Hunley	PowerCorps Camden	
Terrance Thompson	PowerCorps Camden	Terrance.Thompson@Centerffs.org
Lew Bivona	PRCIP	lew@parksideftm.com
Tim Feeney	CCMUA	tfeeney@ccmua.org

Public Participation Meeting for Controlling Combined Sewer Overflows in Camden and Gloucester City

LONG TERM CONTROL PLAN

DEVELOPMENT AND EVALUATION OF ALTERNATIVES

SUPPLEMENTAL TEAM MEETING
JANUARY 16TH 2020

WHERE WE ARE NOW

- CDM Smith prepared the System Characterization Report in 2018
  - 68% Stormwater Capture
  - CCMUA 150 MGD, Single City and County Junction Chamber
  - Severely Clogged Sewer System and CSO Outfalls
  - 54% Impervious Land Surface (DCIA)

COMBINED SEWER OVERFLOWS

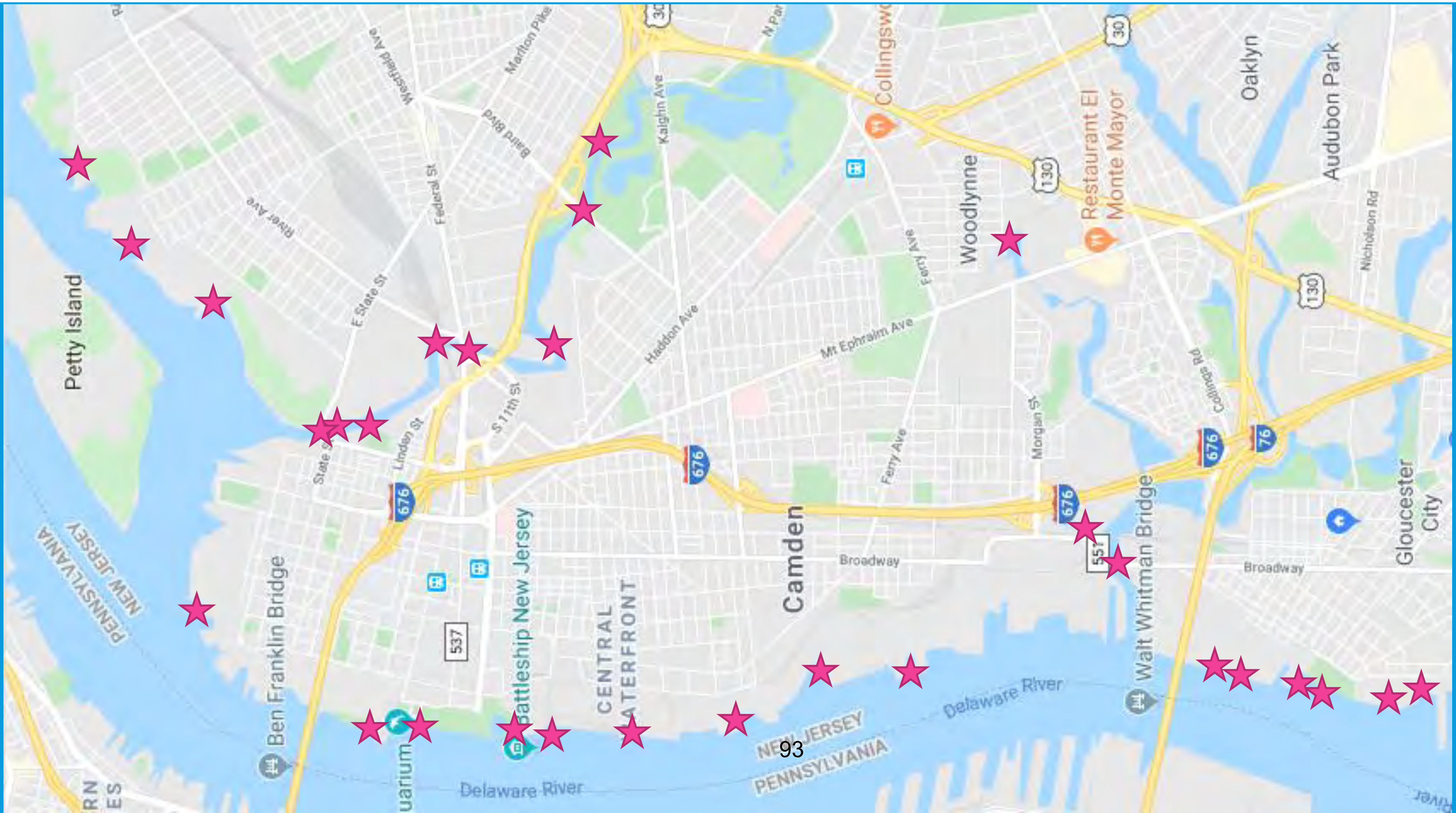
DURING DRY WEATHER

Normal sewage flow is contained within the system and flows to the Wastewater Treatment Plant.

DURING STORMY WEATHER

The combination of stormwater and sewage can exceed normal capacity and overflows into area waterways.

COMBINED SEWER OVERFLOWS



GOALS AND OUTCOMES

- 85% Capture of Wet Weather Flows Entering the System
- As a result of LTCP implementation, street flooding is projected to decrease from 90 MGY to 35 MGY

WHAT WE ARE DOING NOW

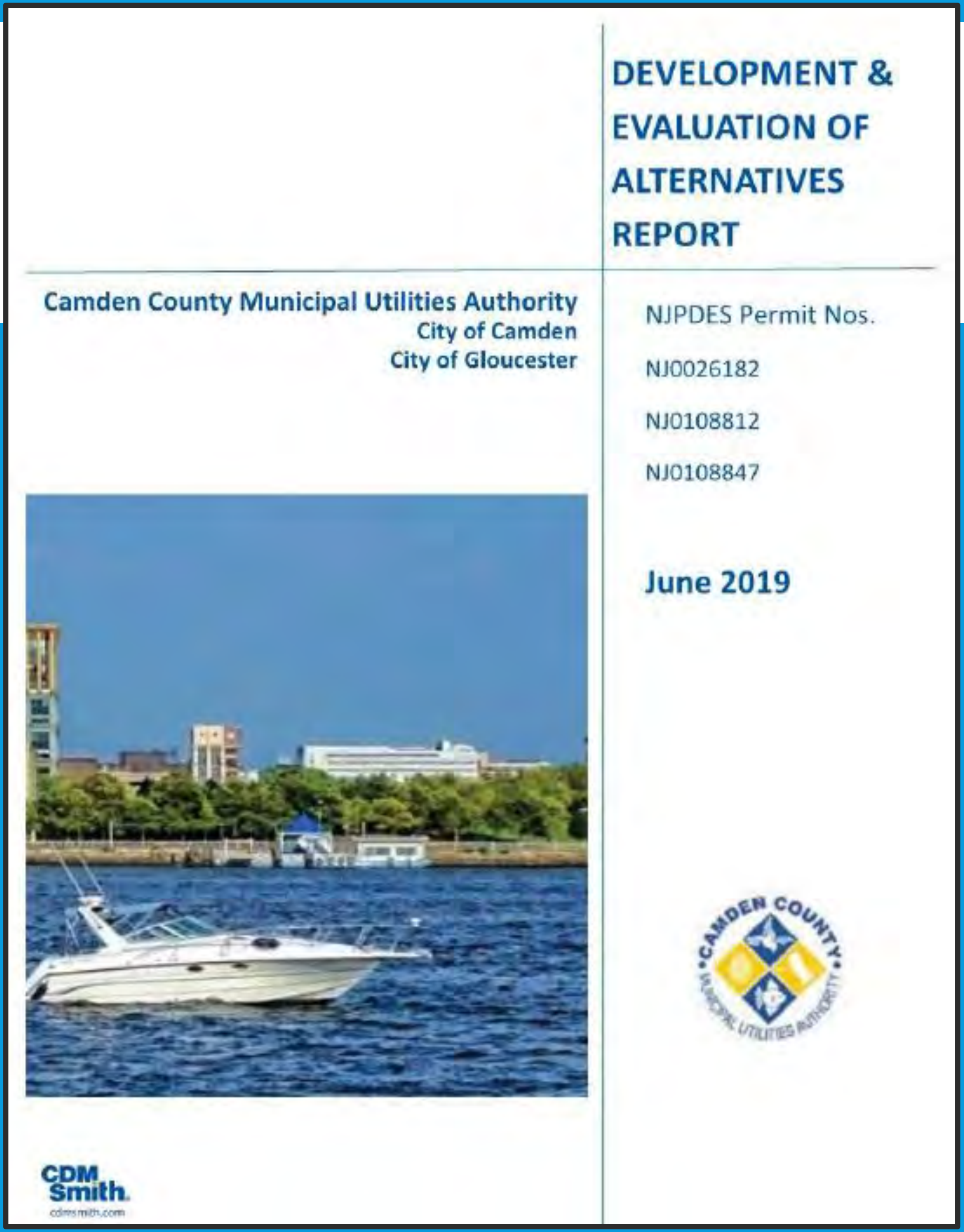
- Separating City and County Sewage Flows
- Increasing Wet Weather Plant Capacity to 185 MGD
- Arch St Pump Station Improvements
- City and American Water Cleaning Combined Sewer System
- CCMUA Dredging and Cleaning 9 CSO Outfalls
- CamdenSMART & Partners Constructing Green Stormwater Infrastructure

PHASE I

- Further Upgrades to Plant Capacity, Green Infrastructure, and System Maintenance
  - 220 MGD Wet Weather Capacity through Secondary Bypass
  - 10% Control of Directly Connected Impervious Area through Green Infrastructure
  - Triennial Sewer System Cleaning and Maintenance
  - 12 CSO Outfalls Require Further Attention

PHASE II

- New Grey Infrastructure / System Modifications
  - Plant Upgrades and 10% Greening alone may not achieve LTCP Goals
  - DEAR evaluated a range of technologies to bridge the gap



DEVELOPMENT & EVALUATION OF ALTERNATIVES REPORT

Camden County Municipal Utilities Authority
City of Camden
City of Gloucester

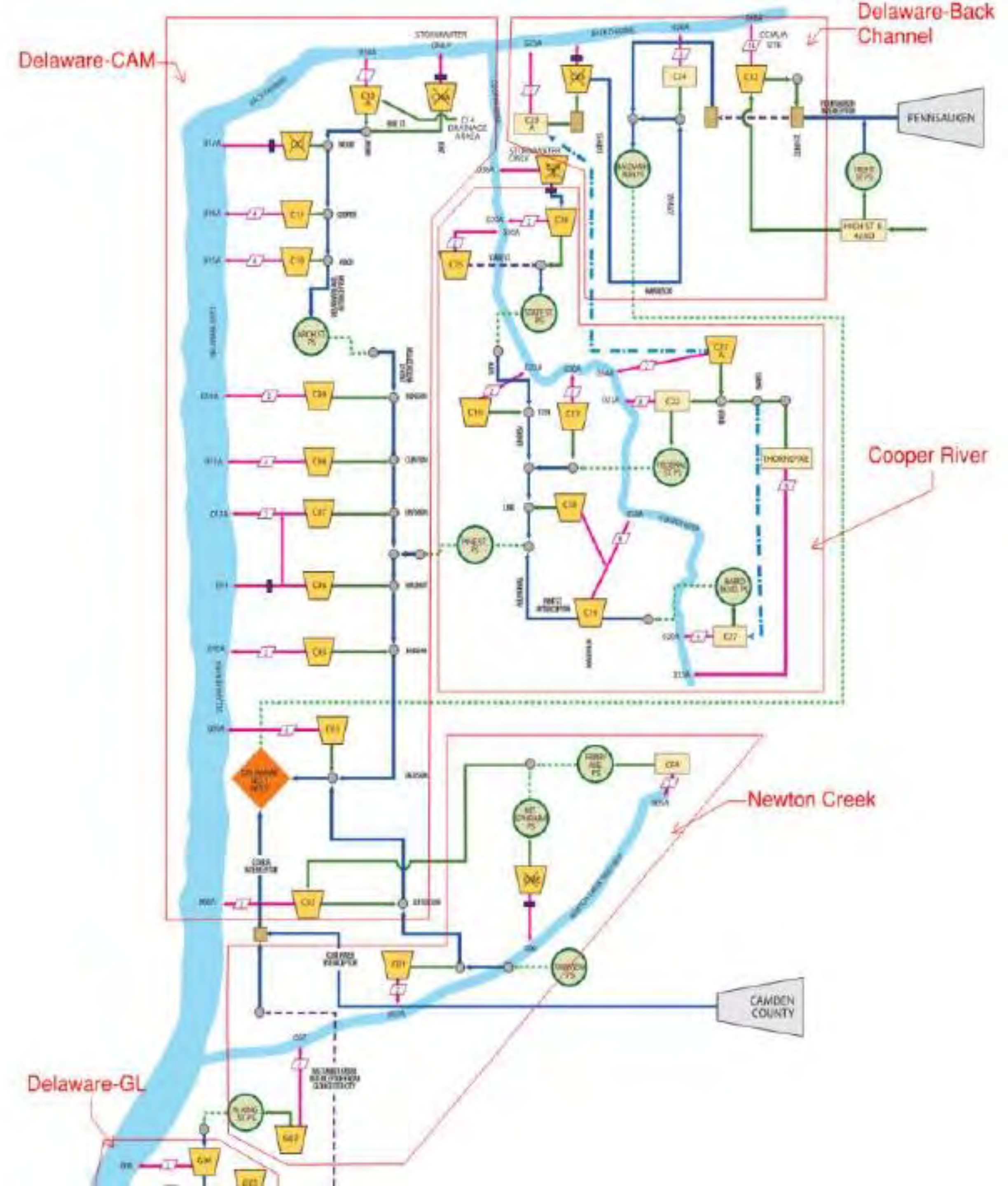
NJPDES Permit Nos.
NJ0026182
NJ0108812
NJ0108847

June 2019

CDM Smith
cdmsmith.com

SUBSYSTEMS

- Delaware River – Camden
- Delaware River – Gloucester
- Newton Creek
- Delaware River – Back Channel
- Cooper River

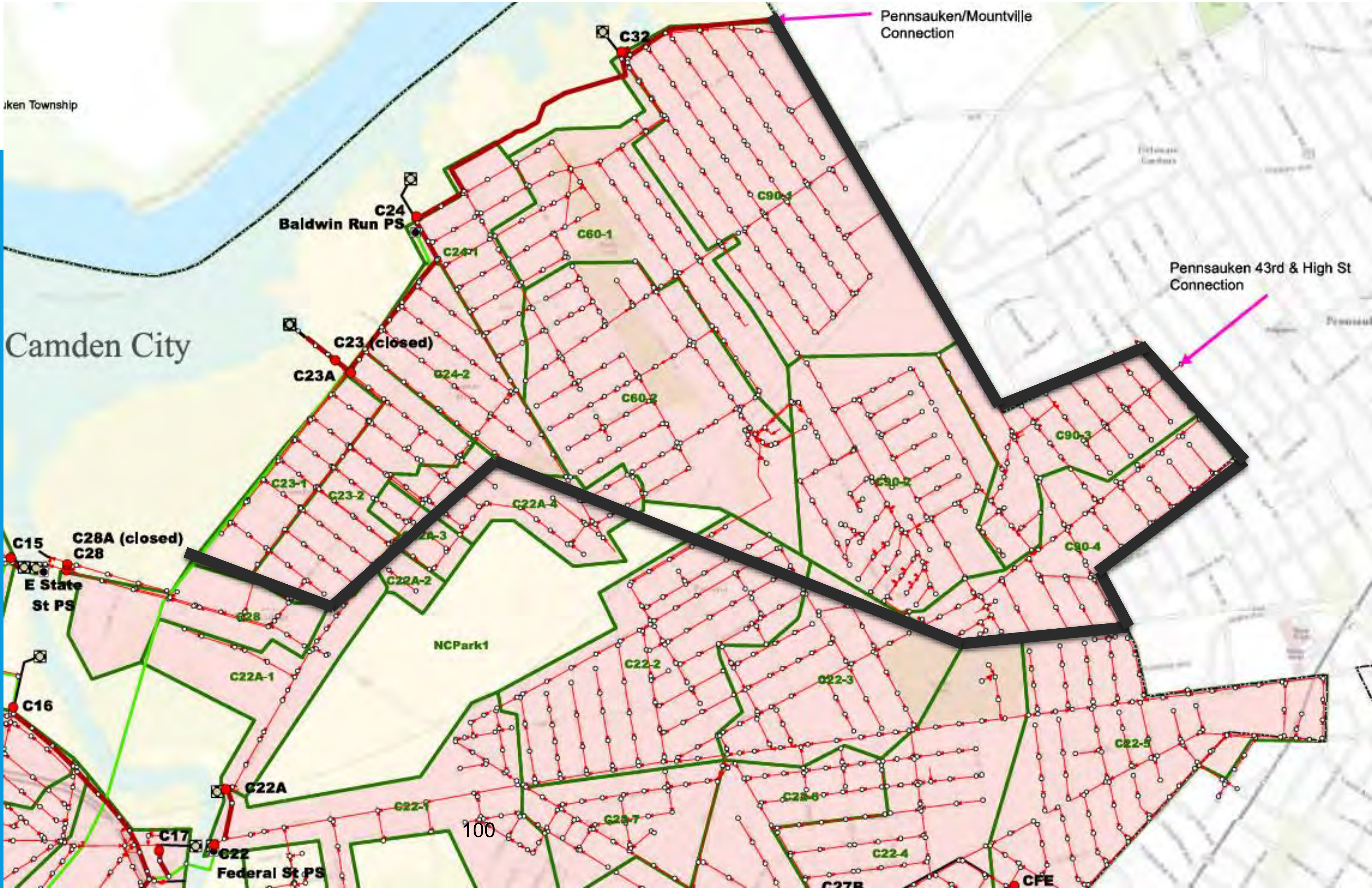


PHASE II - ALTERNATIVES

- 5 Hydraulically Connected Subsystems
  - ✓ Delaware River – Camden: 10% GSI and Plant Upgrades Achieves 85% Capture
  - ✓ Delaware River – Gloucester: 10% GSI and Plant Upgrades Achieves 85% Capture
  - ✓ Newton Creek: 10% GSI and Plant Upgrade to 185 MGD Achieves 85% Capture
  - Delaware River – Backchannel: Isolated by Conveyance, Unaffected by Plant Upgrades
  - Cooper River: Isolated by Conveyance, Unaffected by Plant Upgrades

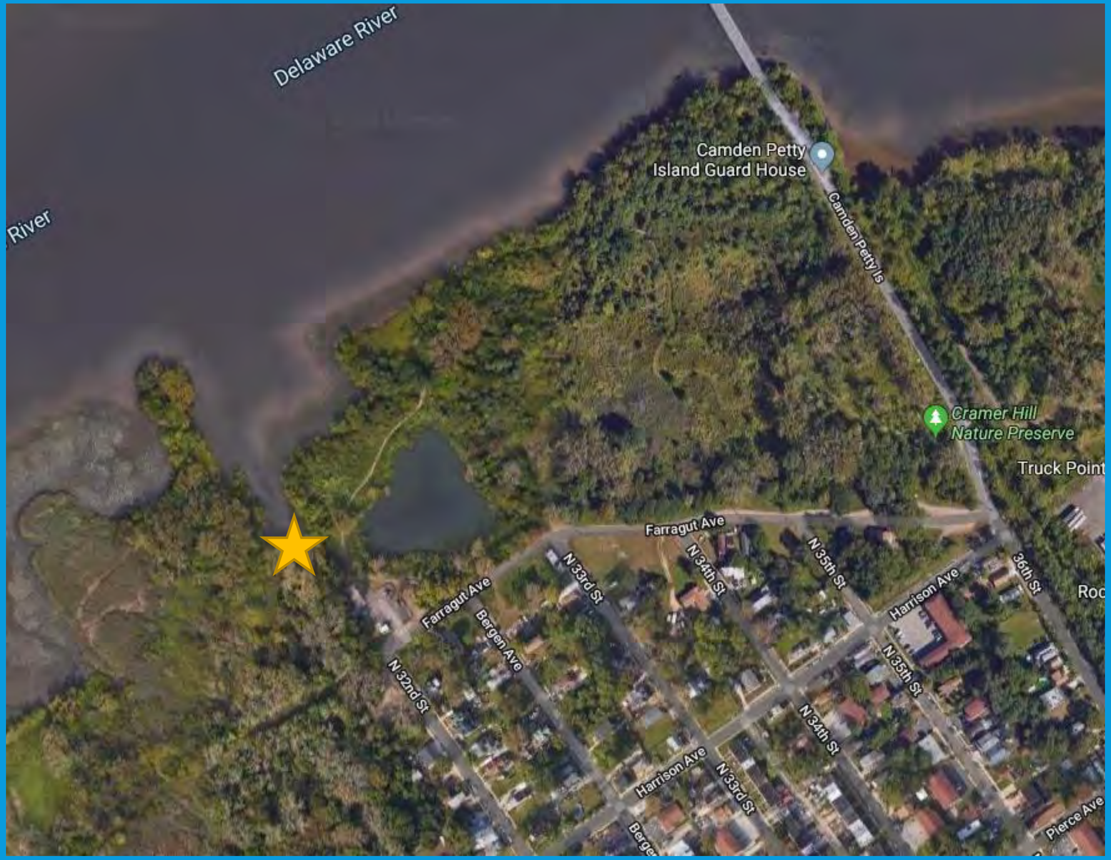
DELAWARE RIVER – BACKCHANNEL

- Isolated from effects of Plant Upgrades
- Bottleneck is the Baldwin's Run Pump Station and Force Main



DELAWARE RIVER – BACKCHANNEL

- 1) Satellite Treatment or Storage for C32 Outfall
- 2) Control Wet Weather Flows to and Upgrade of Baldwin's Run Pump Station to 25 MGD
- Outfall C32 Environmentally Sensitive Area



COOPER RIVER

- Isolated from effects of Plant Upgrades
- Bottleneck is the Pine St Pump Station

COOPER RIVER

- 1) Satellite Treatment or Storage at C-27 and/or Thorndyke Outfalls

- 2) Combination of Satellite/Storage <u>and</u> Conveyance Upgrades all the way to CCMUA

WE NEED GREEN!

- 10% Reduction in impervious area = 145 acres → Green
  - (Von Nieda = 19 acres; Gateway Park = 25 acres)
- 64 Million Gallons per year from CamdenSMART Sites
- We need to build on that; 10% MORE disconnected/greened DCIA
- 5 Year Parks Plan Survey - Flooding + GSI Feedback / Maps
- Green+Healthy Camden mapping tool

GSI IMPLEMENTATION PROGRAM PLAN

1) Institutional Framework

    -SMART, a new committee?, new partners?

2) Timeframe

    -Permit cycles, Periodic assessment

3) Funding

4) Identifying potential projects <u>early</u>

<u>GSI Opportunities</u>

-Development and redevelopment projects

-Roadwork and transportation projects

-Renewal and replacement projects

-Neighborhood enhancements (e.g. parks and playgrounds)

OVERVIEW

- Where We Are Now
  - 68% Stormwater Capture
  - CCMUA 150 MGD, Single City and County Junction Chamber
  - Severely Clogged Sewer System and CSO Outfalls
  - 54% Impervious Land Surface (DCIA)
- Current Improvements
- Separating City and County Sewage Flows
- Increasing Wet Weather Plant Capacity to 185 MGD
- Arch St Pump Station Improvements
- City and American Water Cleaning Combined Sewer System
- CCMUA Dredging and Cleaning 9 CSO Outfalls
- CamdenSMART & Partners Constructing Green Stormwater Infrastructure

- Phase I
  - 220 MGD Wet Weather Capacity through Secondary Bypass
  - 10% Reduction of Directly Connected Impervious Area through Green Infrastructure
  - Triennial Sewer System Cleaning and Maintenance
  - 12 CSO Outfalls remain unrepaired / dredged
- Phase II
  - Cooper River: Satellite Treatment Facility and/or Conveyance Upgrades
  - Cramer Hill: Satellite Treatment Facility *or* Control of Wet Weather Flow to Baldwin PS + 25 MGD PS Upgrade

NJDEP Comment Letter of 5/7/21 & CCMUA / Camden / Gloucester City Responses of 7/2/21

Appendix B

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

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

SHAWN M. LATOURETTE
Acting Commissioner

May 7, 2021
Via E-mail

Scott Schreiber, Executive Director
Camden County Municipal Utilities Authority
1645 Ferry Avenue
Camden, NJ 08104

Orion Joyner
Department of Planning and Development
City of Camden
520 Market Street, Suite 325
Camden, NJ 08101

Donna Domico
Department of Utilities
City of Gloucester
512 Monmouth Street
Gloucester City, NJ 08030

Re: Review of Selection and Implementation of Alternatives Report (SIAR)
City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847
Camden County Municipal Utilities Authority (CCMUA), NJPDES Permit No. NJ0026182

Dear Permittees:

Thank you for your submission dated September 2020 entitled "Selection and Implementation of Alternatives Report" for CCMUA, the City of Camden and the City of Gloucester as submitted to the New Jersey Department of Environmental Protection (the Department). This SIAR report (also referred to as the Long Term Control Plan or LTCP) was submitted in a timely manner as required by the above referenced New Jersey Pollutant Discharge Elimination System (NJPDES) permit. This submission was issued in response to the LTCP submittal requirements as due on October 1, 2020.

The overall objective of the LTCP is to identify and select CSO control alternatives that meet the requirements of the Federal CSO Control Policy Section II.C.4, N.J.A.C. 7:14A-11, Appendix C, and the USEPA Combined Sewer Overflows Guidance for Long-Term Control Plan (EPA 832-B-95-002). The Federal CSO Policy establishes a framework for the coordination, planning, selection, and implementation of CSO controls required for permittee compliance with the Clean Water Act. This subject report builds on other previously submitted LTCP reports referenced in Part IV.D.3.b of the NJPDES permit, which includes an approved hydrologic, hydraulic and water quality model and other information in the June 2018 "System Characterization Report" (approved by the Department on January 24, 2019); the June 2018 "Public Participation Report" (approved by the Department on October 7, 2019); the June 2018 "Baseline Consideration of Sensitive Areas" (approved by the Department on December 17, 2018); the June 2018 "Baseline Compliance Monitoring Report" (approved by the Department on February 7, 2019) and the June

2019 Development & Evaluation of Alternatives (DEAR) (approved by the Department on January 30, 2020).

As currently written the LTCP does not conform to the above stated objectives as it does not provide a clear plan for attaining 85% wet weather capture as per the selected Presumption Approach. Section E.1, Introduction of the LTCP states:

> "…This SIAR documents the selection of a long term strategy, schedule and institutional framework for implementation of CSO controls. This SIAR maintains the CSO control target of capturing for treatment 85% of the combined sewage generated during precipitation events occurring over the Typical Year…"

While the above referenced statement is accurate, the LTCP does not conform to this goal as it does not contain a strategy to attain the minimum 85% wet weather capture and instead specifies a system-wide capture rate of 81% as stated in Section 1.4, Overview of Control Alternatives in the DEAR. This is inconsistent with the Federal CSO Control Policy and the NJPDES permit. Rather, the LTCP states that the baseline will be reassessed as part of an Efficacy Evaluation subsequent to the Completion of Current Projects and projects will then be determined at that time subject to financial considerations. Note that the June 2019 DEAR did contain projects to attain 85% capture as shown in Tables 5-2 through 5-6 of that report. Please amend the LTCP by selecting specific CSO projects that attain 85% capture as well as any deleting any statements that claim that a targeted goal of 81% is acceptable.

In addition to the above, expansion of the plant to 220 million gallons per day (MGD) as a CSO related bypass and disconnection of the Pennsauken flows from the combined sewer system must be prioritized in the short term given the significant reductions in CSO volumes that will be realized from these projects. Also, this LTCP must give priority to the elimination of the ongoing flooding that is occurring in the Cities of Camden and Gloucester as flooding is a public health issue. Finally, the LTCP is lacking information regarding the City of Gloucester and any strategy and commitment for reducing CSOs.

The objective of the LTCP is to select CSO control alternatives to demonstrate compliance with the Federal CSO Control Policy where the resultant schedule length is determined based on the financial capability of the affected municipality. The LTCP must be revised in its selection of alternatives for compliance with the Federal CSO Control Policy and must structure the schedule for those projects based on affordability. In addition, detailed assumptions must be provided that were used to reach the overall conclusions on affordability. A review of the financial capability can not be conducted until this information has been provided.

The below represents the Department's initial comments. The Department reserves the right to further comment on these issues. Comments are as follows.

N.J.A.C. 7:14A-4.9, Certifications

Comment 1: Part IV.D.1.b of your existing CSO permit states the following:

"b. All reports submitted to the Department pursuant to the requirements of this permit shall comply with the signatory requirements of N.J.A.C. 7:14A-4.9, and contain the following certification:

i. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or

> persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information”.

The Department acknowledges that a modified version of the above referenced certification statement is included in the report and has been signed by representatives of CCMUA, the City of Camden and the City of Gloucester. In addition, the report also includes intermunicipal agreements in the form of resolutions that are also signed by representatives of CCMUA, the City of Camden and the City of Gloucester. These certification statements are acceptable to the Department. This comment is included for informational purposes and does not necessitate a response.

Executive Summary

Comment 2: The Executive Summary serves to provide a summary of the overall report. Any changes as part of a revised LTCP should include revisions to the Executive Summary as appropriate. In addition, please note that the information within the Executive Summary is not always consistent with other sections of the LTCP such as baseline percent capture values as included in various tables. Please address.

Section 1.0, SIAR Introduction

Comment 3: Section 1.2, Overview of the Combined Sewer System states the following:

> “Improvements currently underway by CCMUA and the City of Camden will result in the expansion of CCMUA’s Delaware No. 1 WPCF [Water Pollution Control Facility] wet weather treatment capacity from 150 (wet weather) to 185 MGD and the restoration of the hydraulic capacities of the Camden sewer system, including stormwater inlets and CSO outfalls to current design capacities through comprehensive cleaning. The restoration of the hydraulic capacities is critical to Camden’s efforts to reduce street flooding which can occur during wet weather.
>
> The results of these ongoing improvements are summarized on Table 1-2 below. The projected reduction in CSO volume, increased capture rates and reduction in surface flooding resulting from these early implementation steps may be noted.

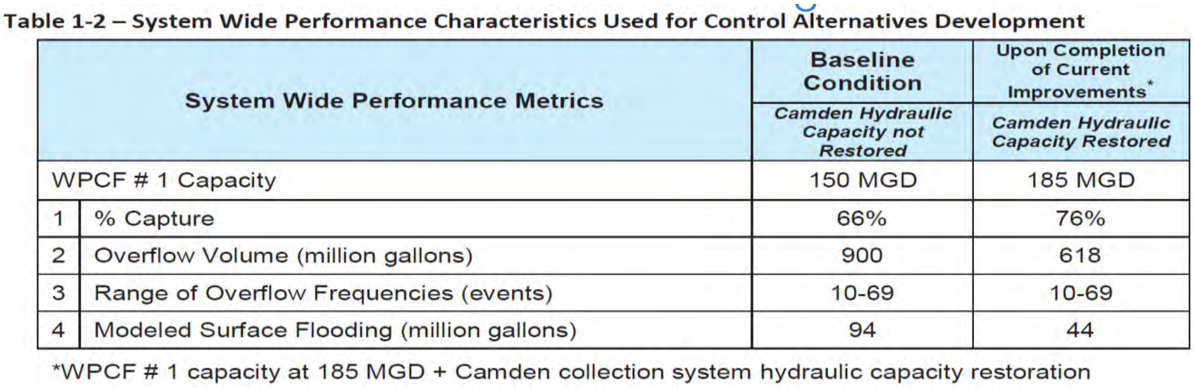


Table 1-2 – System Wide Performance Characteristics Used for Control Alternatives Development

System Wide Performance Metrics		Baseline Condition	Upon Completion of Current Improvements*
		Camden Hydraulic Capacity not Restored	Camden Hydraulic Capacity Restored
WPCF # 1 Capacity		150 MGD	185 MGD
1	% Capture	66%	76%
2	Overflow Volume (million gallons)	900	618
3	Range of Overflow Frequencies (events)	10-69	10-69
4	Modeled Surface Flooding (million gallons)	94	44

*WPCF # 1 capacity at 185 MGD + Camden collection system hydraulic capacity restoration

”

Given that Table 1-2 is intended to provide a baseline after completion of ongoing improvements, please provide a detailed update on the schedule for ongoing projects as identified in Table E-13 including continued cleaning of Camden collection system, continued cleaning of Camden CSO outfalls, rehabilitation of Camden regulator mechanisms, and the completion of the Arch Street Pump Station capacity expansion (replacement of 3 existing 75 horsepower motors with new 100 horsepower motors and replacement of 3 existing 22.25" impellers with 24.25" impellers.). In addition, please describe why the range of overflow events in Table 1-2 is so significant.

As noted throughout the LTCP, collection system cleaning and outfall dredging projects are still ongoing as part of Program Element 1 and the Department is concerned that these projects have not yet been completed given that the proper operation and maintenance of the system is a required Nine Minimum Control. As such, the Department is evaluating the most appropriate regulatory instrument to ensure completion of these projects on schedule.

Comment 4: Section 1.4, Overview of Control Alternatives in the DEAR states that the SIAR builds upon and incorporates a number of findings of the DEAR including the following:

- "The control performance target will be system-wide 85% capture of wet weather combined sewer flow during the typical year;"

The Federal CSO Control Policy and the NJPDES permit at Part IV.G.4.f.ii specify that wet weather capture is a means of compliance under the Presumption Approach as follows:

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

The 2015 NJPDES CSO permit requires selection of either the Presumption Approach or the Demonstration Approach. The Department acknowledges that the permittees have selected the Presumption Approach in the DEAR as well as in the LTCP where the minimum percent capture value of 85% must be attained to ensure compliance. As previously stated, the selected CSO projects must be reevaluated and revisited, as well as any statements within the LTCP that include a targeted goal of 81%, since the Presumption Approach requires a minimum of 85% wet weather capture.

Comment 5: Section 1.4, Overview of Control Alternatives in the DEAR includes Figure 1-2 – Combined Sewer System – Five Subsystems. Additional clarification needs to be provided as part of this figure regarding the grouping of Delaware-GL, Newton Creek, and 007A. Specifically, it is the Department's understanding that captured flows from the G-7 sewershed are conveyed into the Gloucester interceptor sewer via the King Street pump station yet the overflows from the G-7 regulator discharge to Newton Creek. In addition, the flow capture rate from G-7 was included in the Newton Creek subsystem statistics and was treated as inflow for the Delaware River-Gloucester subsystem statistics. Please supplement this figure with this information to clarify these points and confirm that percent capture was appropriately calculated and confirm that certain flows were not double counted.

Comment 6: Section 1.6, Stakeholder Involvement in the SIAR Development includes a detailed description as to how the City of Camden and CCMUA actively worked together to engage, inform and educate the public and CSO Supplemental Team on CSOs, CSO related flooding and the development of the LTCP as required by the existing NJPDES permit. This is described at length in Section 1.6.2 and includes the Completed Outreach Activities along with the names of groups that participated in those events. Most notably, the City of Camden and CCMUA have a clear plan for the ongoing operation and maintenance of existing green infrastructure in Camden through the utilization of PowerCorps Camden which is an AmeriCorps direct service program. Appendix A also includes materials relevant to the public participation process.

However, while it is clear that the required public participation requirements of the 2015 NJPDES permit have been attained in a robust and holistic manner for the City of Camden and CCMUA, there is limited discussion on public participation activities for the City of Gloucester. The LTCP must be supplemented with an update of public participation activities that have occurred for the City of Gloucester since submission of the June 2018 Gloucester City Public Participation Process Report as shown here: https://www.nj.gov/dep/dwq/pdf/CSO_PublicParticipation_GloucesterCity_20180626_1.pdf. Please revise.

Section 2.0, Maximizing Flows to WPCF #1

Comment 7: Section 2.1, CCMUA's Water Pollution Control Facility # 1 states the following:

> "In 2017 CCMUA completed a study of alternatives for the upgrading of its WPCF #1. The study recommended a two phase program for the treatment plant. Under phase 1 the plant would be expanded to provide 185 MGD in full secondary treatment capacity. This expansion is underway and is scheduled for completion in 2020. The study also determined that it is feasible to further increase wet weather treatment capacity up to 220 MGD using CSO related bypassing. The potential increase in wet weather treatment capacity up to 220 MGD would provide the equivalent of primary treatment and effluent disinfection prior to discharge into the Delaware River in accordance with CCMUA's NJPDES permit…"

Upgrades to the treatment plant under Phase 1, which will allow the acceptance of additional wet weather combined sewage flows from 150 to 185 MGD, are almost fully completed and the Department acknowledges the proactive manner in which the implementation of increased wet weather capacity is occurring. This project is a component of Program Element 1 and will contribute towards percent capture reductions for the Delaware River – Camden subsystem (including C-3 which is the largest outfall accounting for 16% of the total system flow). As stated in Section 5.1, Additional Control Requirements "The expansion of the WPCF#1 will also help the Newton Creek subsystem in achieving 85% capture." Phase 1 of this project is authorized in a July 18, 2019 NJPDES permit modification and was approved in a November 8, 2018 Treatment Works Approval 18-0290. Please provide a status update on this project.

Phase 2 of this project would entail a wet weather expansion to 220 MGD. This CSO related bypass has already been approved in the final NJPDES permit action dated May 1, 2020 where any CSO related bypass as a future phase is conditioned on TWA approval where there has been no relaxation in effluent limits. A cost value of $36.3 million is provided in Table 5-8 (CCMUA CSO Control Capital Cost Estimates) for this wet weather expansion. Section 4.2 of the LTCP states that "Expanding the plant up to 220 MGD wet weather capacity will enable a significant increase in the capture rate from the large Camden C-3 regulator structure." Note that C-3 comprises 16% of total CSO flow from the system as per Figure 7-1 of the June 2018 System Characterization Report as shown in Comment 12. Despite these projected reductions in percent capture, the LTCP does not include any commitment to this project or any implementation schedule. A CSO related bypass would have benefits to percent capture on a system wide basis with significant benefits to directly connected sub-watersheds. Given the flooding occurring in the City of Camden, provide an estimate on reduced flooding within the City as a result of the CSO related bypass. Please revisit the inclusion of CSO related bypass to 220 MGD as part of the overall selected CSO control strategy.

Section 3.0, Green Stormwater Infrastructure Implementation

Comment 8: Program Element 3 entails a framework for a Formalized Green Stormwater Infrastructure Program where it is stated that removing 10% (145 acres) of the directly connected impervious area (DCIA) would reduce the flow to the combined sewer system by approximately 100 million gallons per year. The

Department acknowledges that green infrastructure can mitigate CSO discharges particularly for smaller rain events yet also has ancillary benefits such as aesthetic improvements and reducing heat island effects.

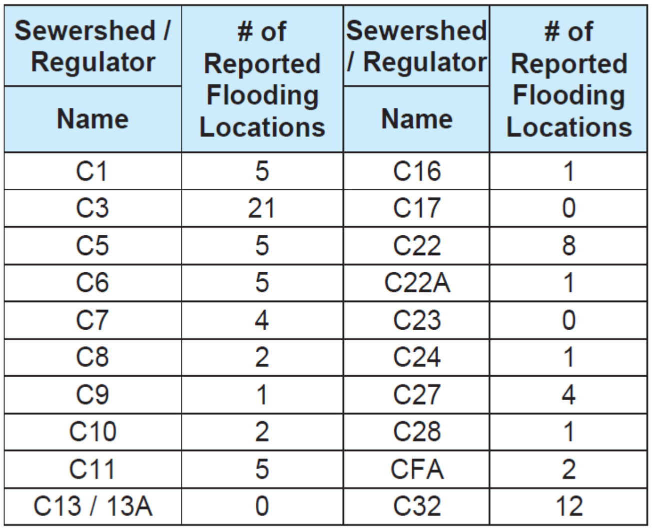
However, there is limited information as to the potential locations for 145 acres of green infrastructure, information as to whether or not 145 acres is available in the City of Camden, and whether or not this program is also intended for the City of Gloucester. This information must be provided in order for the Department to consider this to be a viable LTCP option. In addition, please provide the basis as to how 145 acres equates to a reduction in flow to the combined sewer system by 100 million gallons per typical year and if this value was confirmed through modeling.

Section 4.0, Mitigation of Street Flooding

Comment 9: Section 4.1, Problem Overview states the following regarding flooding in the City of Camden:

> "Street flooding during wet weather remains a major public health and environmental concern within the City of Camden… It should be noted that the relative roles of structural capacity limitations within the sewer system and of non-structural causes such as blockages is not well understood. Therefore, as outlined in this section of the SIAR, a comprehensive program to understand and address the causes of street flooding is proposed.
>
> There are twenty sewersheds that have been associated with the reported street flooding hot spots identified in Camden's 2016 Flood Mitigation Plan. The number of locations where flooding has been reported [are shown in] Table 4-1...

Table 4-1 – Camden Sewersheds Associated with Street Flooding



Sewershed / Regulator	# of Reported Flooding Locations	Sewershed / Regulator	# of Reported Flooding Locations
Name		Name	
C1	5	C16	1
C3	21	C17	0
C5	5	C22	8
C6	5	C22A	1
C7	4	C23	0
C8	2	C24	1
C9	1	C27	4
C10	2	C28	1
C11	5	CFA	2
C13 / 13A	0	C32	12

"

Flooding of combined sewage in streets is a public health concern and is not acceptable. The LTCP must address the elimination of street flooding where this should be the utmost priority in the selection of alternatives. Table E-1 shows that after the implementation of a wet weather expansion to 185 MGD, restoration of the Camden collection system, and 10% reduction in directly connected impervious area (DCIA) (145 acres for Camden over a timeframe of 22 years), an estimated 24 million gallons of flooding would remain in the City of Camden during the typical year. In fact, Section 1.6.2, states that "Because of Camden's aging and overtaxed combined sewer system, a one-inch rainstorm can leave major roads impassable, turn parking lots into stagnant lakes, and send sewage into parks, homes, and waterways."

In addition to the above, it appears that street flooding in the City of Camden has already been identified and studied through the preparation of the "2016 Flood Mitigation Plan" which should be provided as part of any amended LTCP. Please provide information regarding any measures that have already been taken based on this report. Also, given this report objective, it is unclear why an additional step has been added within the LTCP to further study street flooding in the City of Camden as Program Element 4 as part of a "Street Flooding Mitigation Program." Since the most significant flooding occurs near C3 and C32, it is unclear why the CSO related bypass to 220 MGD and the reduction of wet weather flow from Pennsauken into the Camden combined sewer system (sewershed C-32) are not given a higher priority within the LTCP. These projects in and of themselves could significantly mitigate street flooding. Please clarify.

Comment 10: Section 4.1, Problem Overview also states the following regarding flooding in the City of Gloucester:

> "Street flooding can occur in Gloucester City during storm events occurring between two hours before and after high tides. Flooding has occurred near the King Street pumping station which is the low point of the combined system and along Water Street.
>
> Gloucester City has a flood pump installed at the King St. pump station and another portable pump available to pump excess combined sewage when tidal conditions preclude normal drainage by gravity. In addition, Gloucester City and CCMUA coordinate the operation of CCMUA's Gloucester City pump station during high tide storm events to minimize flooding conditions.
>
> …
>
> The current understanding as to the proximate causes of street flooding at the known flooding locations is limited. Flooding event information such as flooding events dates, events per reported location, flooding duration, approximate sizes and depths of street floods and antecedent weather conditions are not currently available."

Based on the above, the LTCP contains limited information regarding street flooding in the City of Gloucester and whether this flooding is related to combined sewage or stormwater. Additional information must be provided as well as any CSO control strategies to remedy street flooding.

Section 5.0, Additional Control Requirements

Comment 11: As stated in Section E.6, Cost / Performance Considerations:

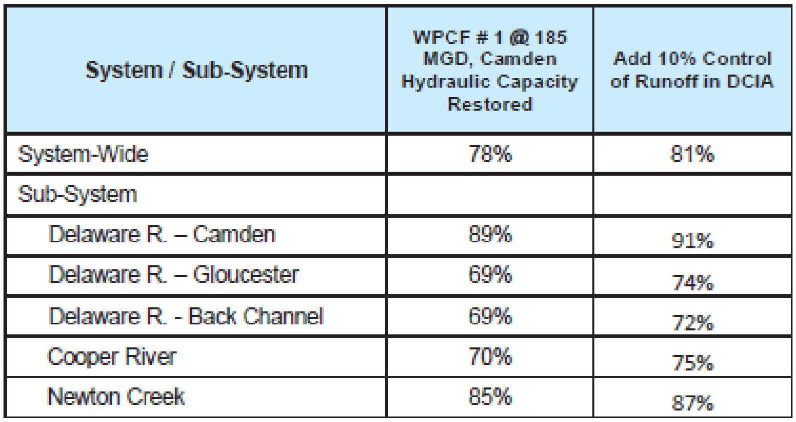
> "The Cities of Camden and Gloucester and CCMUA have determined to use the Presumption Approach as the regulatory basis for their CSO control strategies and have established the control of 85% of wet weather flows generated during the Typical Year as the CSO control performance target…"

The percent capture equation was provided in the June 2018 System Characterization Report and the June 2019 DEAR as follows:

$$\begin{aligned}&\mathit{Percentage\ Capture}\\&= 1 - \frac{(\mathit{Total\ CSO\ Volume} + \mathit{Total\ Flooding\ Volume})}{(\text{Total System WW Inflow} - \text{Total WW Flow from Separate Sanitary Communities})}\end{aligned}$$

Given the selection of the Presumption Approach, the derivation of percent capture is central to a review of this report. Table 5-1 is provided as follows to show the percent capture values that will be attained upon completion of upgrades to the WPCF to 185 MGD, restoration of the City of Camden combined sewer system and green infrastructure:

Table 5-1 – Typical Year Capture Impacts of Controlling Runoff from DCIA by 10%



System / Sub-System	WPCF # 1 @ 185 MGD, Camden Hydraulic Capacity Restored	Add 10% Control of Runoff in DCIA
System-Wide	78%	81%
Sub-System		
Delaware R. – Camden	89%	91%
Delaware R. – Gloucester	69%	74%
Delaware R. - Back Channel	69%	72%
Cooper River	70%	75%
Newton Creek	85%	87%

It is then further stated:

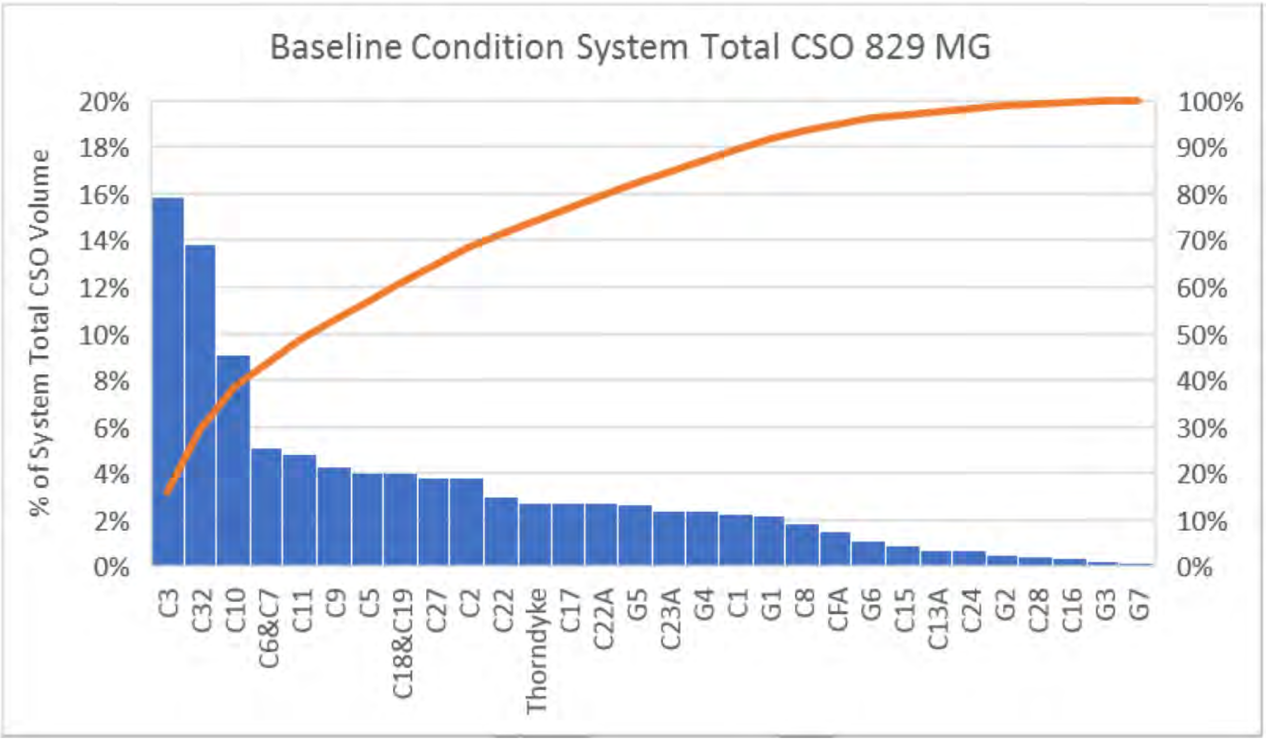
> "Additional CSO controls will be evaluated for three of the five sub-systems to achieve the control objective of 85%system-wide wet weather capture during the Typical Year. It should be noted that the controls evaluated to achieve 85% system-wide wet weather capture will be sized to also achieve 85% capture in each individual sub-systems."

In comparing Table 5-1 to Table 1-2 (as provided above in Comment 3), the system-wide percent capture values do not match (i.e., 78% versus 76%) as well as in other sections of the report (i.e., Table 1-2 (76%) versus Table 7-1 (69%)). Please provide one comprehensive table for percent capture including the various inputs to the equation that were used to derive the values above by subsystem as well as on a system-wide basis. In addition, please confirm that the system-wide values include a summation of the inputs across all the subsystems and are not simply an average of the five systems. Approval of this report hinges in part on the inputs and results of this equation being clearly demonstrated and reproducible.

Comment 12: Section 5.1, Additional Control Requirements states the following regarding the Delaware River backchannel subsystem:

> "CCMUA proposes to achieve 85% capture in the Delaware River backchannel subsystem through the reduction of wet weather flows from Pennsauken Township and increasing the wet weather flow rates through the Baldwins Run pump station."
>
> …
>
> Due to their hydraulic isolation (varies pump stations) from the WPCF #1, the Delaware River – Gloucester City, the Delaware River Back Channel and the Cooper River sub-systems would not achieve increased capture with the potential expansion of the plant treatment capacity. The hydraulic limitations in the existing Camden and Gloucester interceptor sewers preclude the conveyance of additional wet weather flows to WPCF #1…"

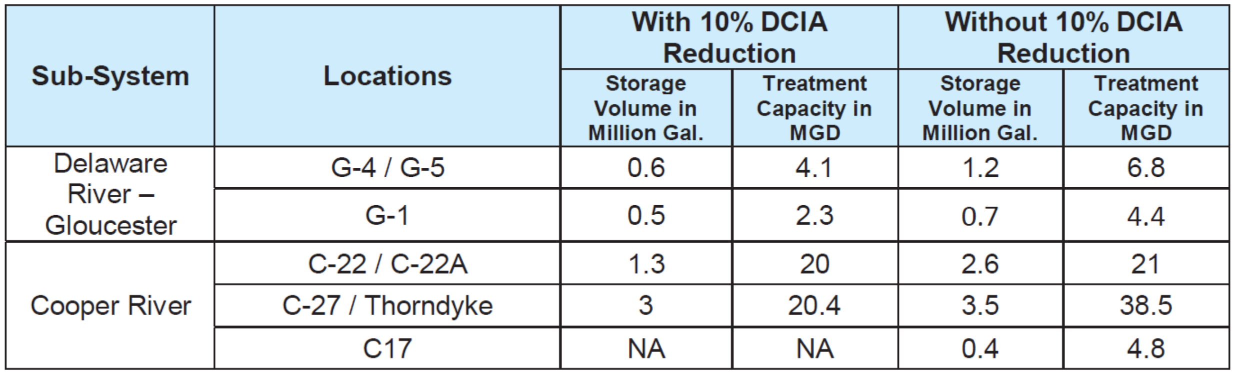
Currently, the overflow from the combined sewer system from the C-32 sewershed is discharged through this CCMUA outfall into the Delaware Back Channel which is an important ecosystem that would benefit from protection through a reduction in CSO flow. In addition, the Department is aware that these combined stormwater and sanitary flows that come from Pennsauken take up needed capacity within the Camden combined sewer system. The cost of this project is estimated at $43.3 million as per Section 5.3.3, Permittee Specific Cost Estimates. The location and hydraulic connection of this project within the system mean that it could occur independently from projects related to the restoration of the Camden combined sewer system and it is stated elsewhere in the report that this project would significantly reduce flooding in the Cramer Hill neighborhood. In addition, C-32 comprises a significant portion of the system-wide CSO flow in the CCMUA/Camden/Gloucester system, as per Figure 7-1, Percentage of System Total CSO for Each Outfall and Cumulative Distribution (Baseline Condition) of the June 2018 System Characterization Report:



Based on the above, please supplement this section with additional detail regarding the Camden-Pennsauken disconnect project including an explanation of which flows (i.e., stormwater, combined sewage) would be separated out and diverted to a direct outfall. In addition, please describe any stormwater or satellite treatment (i.e., disinfection) that would be incorporated. Finally, please provide a detailed schedule so that this project is prioritized to take place in the next five year permit cycle.

Comment 13: Section 5.1, Additional Control Requirements includes an analysis of satellite storage and treatment in order to achieve 85% capture in the Cooper River and Gloucester City subsystems. As stated within this section, these subsystems are hydraulically isolated from the WPCF #1 and therefore do not achieve increased capture by the potential expansion of the plant treatment capacity. It is further stated that the hydraulic limitations in the existing Camden and Gloucester interceptor sewers also preclude the conveyance of additional wet weather flows to WPCF #1. The required capacities for storage and satellite are shown in Table 5-2:

Table 5-2 – Required Satellite Control Capacities



Sub-System	Locations	With 10% DCIA Reduction		Without 10% DCIA Reduction	
		Storage Volume in Million Gal.	Treatment Capacity in MGD	Storage Volume in Million Gal.	Treatment Capacity in MGD
Delaware River – Gloucester	G-4 / G-5	0.6	4.1	1.2	6.8
	G-1	0.5	2.3	0.7	4.4
Cooper River	C-22 / C-22A	1.3	20	2.6	21
	C-27 / Thorndyke	3	20.4	3.5	38.5
	C17	NA	NA	0.4	4.8

Section 5.2.1, Satellite Treatment includes a treatment process overview regarding enhanced high rate clarification and includes the following statement:

> "Solids removed through the satellite treatment process range in concentration from around 0.1% to 1.0% with an average of around 0.3% and are typically discharged to the interceptor sewer for transport and treatment at the wastewater treatment plant."

This statement seems misplaced within this section as these estimates do not seem appropriate for enhanced high rate clarification. In addition, while there are cost estimates included in Section 5.0, there is no commitment or schedule for satellite treatment or storage where these technologies are necessary in order to attain 85% capture.

Comment 14: Section 5.4.2, Potential Impacts of Cooper River Designated Use Reclassification describes amendments to the New Jersey Surface Water Quality Standards at N.J.A.C. 7:9B where the Cooper River is now classified as a Category One waterway from the U.S. Route 30 crossing to the confluence with the Delaware River. Based on this reclassification, the report concludes:

> "The CSO Policy states that overflows to sensitive areas should be eliminated or relocated wherever physically possible and financially achievable. A conveyance and treatment alternative that would eliminate untreated overflows to the Cooper River was evaluated. To effectively eliminate the CSO discharges to this area, the wet weather conveyance interceptor and high rate treatment facility could be sized to capture 100% of wet weather flow not entering the existing interceptor during the Typical Year..."

The Department acknowledges that there has been a recent regulatory change in the receiving waterbody classification for Cooper River in that it has been reclassified as a FW2-NT(C1) waterbody as described above. See https://www.nj.gov/dep/rules/rules/njac7_9b.pdf . The Department also acknowledges that N.J.A.C. 7:9B-1.5(d)2iii states the following:

> "iii. Category One Waters shall be protected from any measurable changes (including calculable or predicted changes) to the existing water quality. Water quality characteristics that are generally worse than the water quality criteria, except as due to natural conditions, shall be improved to maintain or provide for the designated uses where this can be accomplished without adverse impacts on organisms, communities, or ecosystems of concern."

The classification of "sensitive areas" should not be confused with the C1 designation since these are separate and distinct regulatory requirements. Consistent with the intent of the Federal CSO Control Policy Part IV.G.3.a of the NJPDES CSO permit states the following:

> "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."

In its December 17, 2018 findings on the permittees' June 2018 "Baseline Consideration of Sensitive Areas" report the Department agreed with the permittee's contention that all of the outfalls (with the exception of the outfalls that discharge to Newton Creek) are considered sensitive areas thereby minimizing the utility of a prioritization scheme. Because the Federal CSO Control Policy and existing NJPDES permit require that CSOs be addressed in the Cooper River subsystem within the LTCP it is not acceptable to dismiss addressing these outfalls because it is cost prohibitive.

Section 6.0, Financial and Institutional Capability

Comment 15: As previously described, the LTCP lacks specificity regarding CSO control projects and compliance with 85% wet weather capture consistent with the Presumption Approach. Despite this lack of strategy, the LTCP does include an analysis of Financial and Institutional Capability in Section 6.0 where this information is also referenced in other sections of the LTCP. In fact, the Executive Summary E.8.4 and Section 7.8.3 state that the "base case affordability/financial capability assessment assumes a 22-year implementation schedule based on the durations, planning, design and construction." This assessment ultimately results in a "high burden" for the cities of Camden and Gloucester and "mid-range" burden to CCMUA as per Table 6-12 – The Financial Capability Matrix. However, these costs do not match the proposed and/or possible projects. For example, costs are provided for satellite treatment and storage in determining that this LTCP will result in a "high burden" as part of the Financial Capability Assessment yet there is no commitment for satellite and storage for the cities of Camden and Gloucester so the information provided does not conform to the conclusions for Financial Capability.

Since the LTCP does not contain a long term strategy, schedule and implementation framework for implementation of CSO controls in compliance with the Presumption Approach the Department is not commenting on cost and financial analysis at this time. The Department will comment on those the financial capability components as revisions to the LTCP are made and the alternatives are selected.

Section 7.0, Selected Long Term Control Plan

Comment 16: Section 7.1 also states the following:

> "Due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated in Section 6, these controls will require significant external funding and will likely need to be implemented over an extended period of time as resources permit."

The objective of the LTCP is to select CSO control alternatives to demonstrate compliance with the Federal CSO Control Policy where the resultant schedule length is determined based on the financial capability of the affected municipality. The above statement which essentially states that a plan is not being provided is not acceptable.

Comment 17: Section 7.1, Selected Long Term Control Program Overview and Sections 7.2 through 7.8 includes detail regarding the various LTCP program elements, that are proposed to be implemented in an iterative manner, and are listed as follows:

1. Completion of Current Projects
2. Efficacy Evaluation
3. Formalized Green Stormwater Infrastructure Program
4. Street Flooding Mitigation Program
5. Cooper River Water Quality Optimization Program
6. Additional Structural Controls

Comments 17a through 17e apply to these steps above.

> Comment 17a: Under Program Element 1 – Completion of Current Projects, Section 7.2.2 describes the City of Camden Hydraulic Capacity Restoration where two of the five elements are as follows:
>
> "
>
> - ***Regulator Rehabilitation*** – Camden undertook a comprehensive system-wide inspection of its regulator structures which determined that the regulator mechanisms required extensive repairs. Repairs have been prioritized for the regulator mechanisms for Camden regulators C-1 through C-9, thereby enabling the control of flows into the Camden interceptors. Flows to the other Camden regulators can be controlled through the Arch Street, Pine Street and Baldwin's Run pump stations and through a control gate immediately upstream of the treatment plant, eliminating the need for the regulator controls. To maintain maximum flexibility should the need arise in the future to re-use these regulators as a part of flood prevention, the deteriorated mechanisms will be removed and their anchor systems replaced with stainless steel plates.
>
> - ***Overflow Outfall Cleaning*** - Concurrent with its regulator rehabilitation project, Camden is addressing blockages that it has identified blockages at some of the CSO outfalls. Dredging is required to remove to clear these blockages. The City of Camden has been working closely with CCMUA and NJDEP to complete this program as expeditiously as possible. Two projects were developed with CCMUA currently working on the most critical nine of these outfalls and a second project by City for the clearing the remainder will commence in parallel with regulator project."
>
> It is the Department's understanding that CCMUA has completed 9 of the 18 outfall dredging projects yet the City of Camden has not yet commenced dredging of the remaining 9 outfall pipes. Please verify. It is also the Department's understanding that the regulator replacement project to be completed by the City of Camden has not yet begun. Please provide a status update on both these projects.
>
> Given that these projects relate to Nine Minimum Controls as required by the City of Camden's NJPDES permit, the ongoing failure to progress on these projects could result in enforcement action. These outfall blockages also contribute to street flooding in the City of Camden which is a public health concern.
>
> Comment 17b: Under Section 7.4, Program Element 3 – Formalized Green Stormwater Infrastructure Program the following is stated:

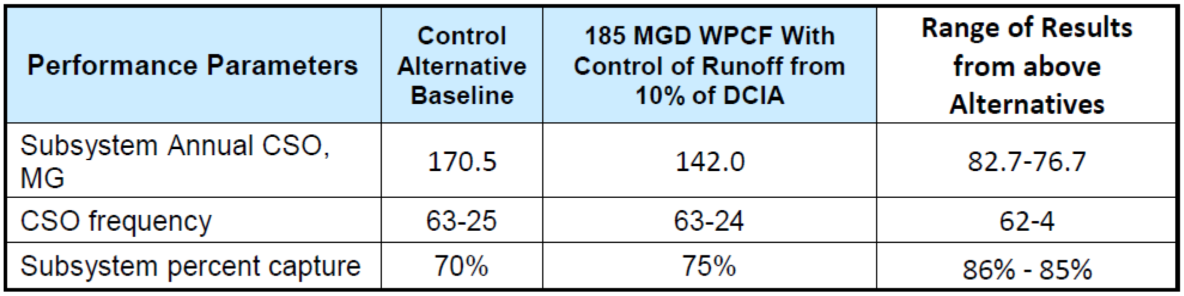
> "…CCMUA and the Cities of Camden and Gloucester are targeting a 10% or around a 145 acre reduction in impervious areas that are directly connected to the combined sewer system (DCIA) through the installation of GSI. CCMUA and the Cities are proposing the establishment of a framework for the implementation of GSI that would formalize, expand upon and support the current efforts of groups such as the Camden SMART initiative…The framework will include specific performance targets for GSI implementation, e.g. 30 acres per five year NJPDES permit cycles."

It is then stated later in Section 7.7, Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture that "CCMUA has evaluated the potential to expand the wet weather treatment capacity of its WPCF up to 220 MGD." It is then further stated that "the proposed structural controls outlined above are proposed not to occur until after the results of program elements one through four are fully implemented and their impacts on CSO evaluated though flow monitoring and modeling." This language conflicts with the implementation schedule included in Table E-13 as well as in Table 8-1 where the CSO related bypass is scheduled to occur in years 2031 through 2035. It is not acceptable to delay the effects from a CSO related bypass since they can be realized in the short term, until after "program elements one through four are fully implemented" as described later in Section 7.1. Given the uncertainty and lack of specifics for the locations for green infrastructure sites at the scale described in the LTCP, the CSO related bypass should not be delayed until that step is completed. It is not acceptable to wait for green infrastructure to be implemented.

Comment 17c: Section 7.4, Program Element 5 – Cooper River Regional Water Quality Optimization Strategy describes a strategy that would take a watershed-based approach to reducing the discharge of pathogens and other pollutants into the Cooper River that degrade it's recreational and economic redevelopment usage as well as its aquatic habitat. As noted within this section, the "intent of the strategy is to identify *what, how, and who* – is needed to achieve these goals."

A Water Quality Optimization Strategy is not a CSO control alternative but rather a framework to study and develop a strategy. Such a strategy is more appropriate for an evaluation of alternatives as opposed to the LTCP which requires a selection of a strategy to minimize or eliminate CSOs is required to be included. Note that the DEAR included three 85% capture alternatives in Section 5.3.4 namely Cooper River 1 – Satellite Treatment or Storage Only; Cooper River 2 – Satellite Treatment / Storage + Conveyance Upgrades; and Cooper River 3 – Conveyance Only with a summary table from the DEAR is provided as follows:

Table 5-5 Summary of Performances for Sub-System Cooper River



Performance Parameters	Control Alternative Baseline	185 MGD WPCF With Control of Runoff from 10% of DCIA	Range of Results from above Alternatives
Subsystem Annual CSO, MG	170.5	142.0	82.7-76.7
CSO frequency	63-25	63-24	62-4
Subsystem percent capture	70%	75%	86% - 85%

Please revisit and select CSO control strategies for the Cooper River.

Comment 17d: Under Section 7.7 Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture, the following is stated:

> ***“Delaware River Back Channel***: The 85% control target will be achieved in the Delaware River Back Channel through two projects. First, the stormwater (?) wet weather/ combined sewer flows that are currently discharged from the Pennsauken Township sanitary [storm] sewer system into the Camden combined system via Pennsauken’s High Street regulator structure will be re-routed for discharge to the Delaware River back channel after treatment and disinfection. The second component of the Delaware Back Channel controls will be the modification and reconfigurations of regulator structures and power supplies associated with the Baldwins Run pump station to enable full utilization of its 25 MGD capacity.”

Despite the clear benefits in the reduction of CSOs by reducing wet weather flows from Pennsauken Township by increasing the wet weather flow rates through the Baldwins Run pump station as described in Section 5.1, this project is designated to take place between 2026 through 2030 as per Table E-13 – Implementation Schedule (Based on five-year NJPDES permit cycles). Please provide a detailed implementation schedule for this project and reschedule it so that it takes place in the first NJPDES five year permit cycle. In addition, please clarify the wastewater components of any remaining CSO discharge and additional details regarding disinfection.

Comment 17e: Section 7.7, Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture describes a suite of controls to attain 85% capture. This section also states:

> “CCMUA and the Cities recommend against the selection between satellite storage and treatment at this time. As will be detailed in Section 8 (Implementation), the proposed structural controls outlined above are proposed not to occur until after the results of program elements one through four are fully implemented and their impacts on CSO evaluated though flow monitoring and modeling. Moreover, additional advancements in wet weather treatment and storage technologies and in are likely to occur. In addition, water quality standards or other regulatory requirements may change, e.g. as a result of DRBC’s current water quality monitoring efforts.”

As stated previously, the LTCP is required to include a clear plan to attain compliance and it is unacceptable to not include a plan pending treatment technologies, water quality standards or other regulatory requirements which are always changing.

In addition to the above, there are no specific projects or implementation schedule within Program Element 6 to address CSOs in the City of Gloucester to mitigate CSO issues. This is in contradiction to the approved DEAR which includes three alternatives to attain 85% capture for the Delaware River – Gloucester subgroup as shown in Section 5.3.2 of the June 2019 DEAR. Below is a summary of these projects from the DEAR:

- Delaware River – Gloucester 1 – Satellite Treatment or Storage Only (control of runoff from 10% of the directly connected impervious area (DCIA) reduction using GSI; expansion of WPCF #1 to 185 MGD; 32 MGD high rate treatment or 2.4 MG storage facility serving G-4 and G-5)

- Delaware River – Gloucester 2 – Satellite Treatment/Storage + Increased Conveyance (control of runoff from 10% of the DCIA reduction using GSI; expansion of WPCF #1 to 185 or 220 MGD; operate CCMUA’s Gloucester City PS at 35 MGD; 11.7 MGD high rate treatment or 0.9 MG storage serving G-4 and G-5)

- Delaware River – Gloucester 3 – Conveyance (control of runoff from 10% of the DCIA reduction using GSI; potentially adding additional wet weather treatment capacity beyond 220 MGD at the WPCF #1; upgrades to Gloucester City regulators G-3, G-4 and G-5; increased capacity of Gloucester City interceptor between regulators G-3 through G-5 and to CCMUA's Gloucester City PS; increased CCMUA's Gloucester City PS at 45 MGD)

- 130 MGD wet weather capacity to WPCF #1; upgrades to Gloucester City regulators G-3, G-4, and G-5; increased capacity of Gloucester City interceptor between regulators G-3 through G-5 and to CCMUA's Gloucester City PS; Increased CCMUA's Gloucester City PS at 45 MGD)

The objective of the LTCP is to select alternatives from the DEAR. Please provide a strategy to attain a minimum of 85% wet weather capture for the Delaware River - Gloucester subsystem.

Comment 18: Section 7.7 Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture includes a list of projects including satellite and storage. The State of New Jersey and the Department are working to address and mitigate the impacts of climate change where additional information is available here: https://www.nj.gov/dep/climatechange/. Climate change can have an impact on the design for resiliency for CSO storage and high rate treatment and resiliency requirements must be considered in the design of any infrastructure. Specifically, in accordance with the provisions of Executive Order 11988, the USEPA and the New Jersey Water Bank require that funded infrastructure be located outside of floodplains or elevated above the 500-year flood elevation. Where such avoidance is not possible, the following hierarchy of protective measures has been established:

1. Elevation of critical infrastructure above the 500-year floodplain;
2. Flood-proofing of structures and critical infrastructure;
3. Flood-proofing of system components.

Please address how the selected CSO control alternatives address climate change and sea level rise.

Section 8.0, Implementation Schedule and Adaptive Management

Comment 19: Adaptive Management is referenced throughout the LTCP where Section 8.3, Adaptive Management states the following:

> "The implementation schedule outlined in Table 8-1 above includes an evaluation at the completion of each five year NJPDES permit cycle. Based on these evaluations, CCMUA and the Cities will revise the LTCP as necessary with NJDEP's coordination and approval. This process exemplifies the concept of adaptive management.
>
> Adaptive Management, as defined by the EPA, is "the process by which new information about the health of a watershed is incorporated into the watershed management plan."[8-1] In the context of the SIAR adaptive management assumes that while the CSO control goals will remain constant, the tactical approaches to achieving the goals must be adjustable.
>
> [8-1] Watershed Analysis and Management Guide for Tribes (2000) EPA Watershed Analysis and Management Project. Step 5 page 1."

As noted in this section, an Adaptive Management approach could serve as a compliance "check in" as the projects proceed and an Adaptive Management requirement could be a component of the next NJPDES permit renewal to allow flexibility from the perspective of treatment technology advancements. However, the permittee is obligated to set forth a path for compliance with the 85% wet weather capture requirement under the Presumption Approach through measures set forth in the LTCP to ensure that compliance is attained. Note that any changes to projects set forth in the NJPDES permit as part of the LTCP will require a NJPDES permit modification or renewal. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.

Comment 20: Section 8.3, Adaptive Management also states the following:

> "CCMUA and the Cities will also be subject to a variety of future conditions beyond their controls which may materially affect the benefits, feasibility and scheduling of the CSO controls described in this SIAR, thereby triggering a need to revise the LTCP…"

The LTCP then lists a number of triggering conditions including, but not limited to, changing demographics, municipal collection system conditions, emergent regulatory requirements, emergent economic conditions and trends, changing water quality standards and guidance, changes in technologies, unavailability of supplies, materials, contractors or labor necessary to implement the LTCP etc. While the Department acknowledges that there are factors that can impact the schedule, any changes to the LTCP must be provided as an amended document with a certification statement as required by the NJPDES permit. Changes to the LTCP could also result in the need for a modification to the NJPDES permit provided the implementation schedule for those projects is included in the permit.

Please incorporate these changes to the report and submit a revised version of the report to the Department no later than 60 days from the date of this letter. Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water and Pretreatment Permitting

C: Marzooq Alebus, Bureau of Surface Water and Pretreatment Permitting
Dianne Crilly, Office of Economic Analysis
Teresa Guloy, Bureau of Surface Water and Pretreatment Permitting
Molly Jacoby, Bureau of Surface Water and Pretreatment Permitting
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Re: Review of Selection and Implementation of Alternatives Report
(SIAR) City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847
Camden County Municipal Utilities Authority (CCMUA), NJPDES Permit No.

NJ0026182 Dear Permittees:

Thank you for your submission dated September 2020 entitled “Selection and Implementation of Alternatives Report” for CCMUA, the City of Camden and the City of Gloucester as submitted to the New Jersey Department of Environmental Protection (the Department). This SIAR report (also referred to as the Long Term Control Plan or LTCP) was submitted in a timely manner as required by the above referenced New Jersey Pollutant Discharge Elimination System (NJPDES) permit. This submission was issued in response to the LTCP submittal requirements as due on October 1, 2020.

The overall objective of the LTCP is to identify and select CSO control alternatives that meet the requirements of the Federal CSO Control Policy Section II.C.4, N.J.A.C. 7:14A-11, Appendix C, and the USEPA Combined Sewer Overflows Guidance for Long-Term Control Plan (EPA 832-B-95-002). The Federal CSO Policy establishes a framework for the coordination, planning, selection, and implementation of CSO controls required for permittee compliance with the Clean Water Act. This subject report builds on other previously submitted LTCP reports referenced in Part IV.D.3.b of the NJPDES permit, which includes an approved hydrologic, hydraulic and water quality model and other information in the June 2018 “System Characterization Report” (approved by the Department on January 24, 2019); the June 2018 “Public Participation Report” (approved by the Department on October 7, 2019); the June 2018 “Baseline Consideration of Sensitive Areas” (approved by the Department on December 17, 2018); the June 2018 “Baseline Compliance Monitoring Report” (approved by the Department on February 7, 2019) and the June

Note: This document provides the initial responses of CCMUA and the Cities of Camden and Gloucester City to NJDEP’s comment letter of May 7, 2021 concerning the joint Selection and Implementation of Alternatives Report (SIAR) submitted to NJDEP in September of 2020.

The text of NJDEP’s letter is reproduced verbatim in the left side of each page and the CCMUA / Camden / Gloucester responses are provided on the right sides. There are also references in the responses to Attachments A through E which contain additional backup information.

2019 Development & Evaluation of Alternatives (DEAR) (approved by the Department on January 30, 2020). As currently written the LTCP does not conform to the above stated objectives as it does not provide a clear plan for attaining 85% wet weather capture as per the selected Presumption Approach. Section E.1, Introduction of the LTCP states: "…This SIAR documents the selection of a long term strategy, schedule and institutional framework for implementation of CSO controls. This SIAR maintains the CSO control target of capturing for treatment 85% of the combined sewage generated during precipitation events occurring over the Typical Year…" While the above referenced statement is accurate, the LTCP does not conform to this goal as it does not contain a strategy to attain the minimum 85% wet weather capture and instead specifies a system-wide capture rate of 81% as stated in Section 1.4, Overview of Control Alternatives in the DEAR. This is inconsistent with the Federal CSO Control Policy and the NJPDES permit. Rather, the LTCP states that the baseline will be reassessed as part of an Efficacy Evaluation subsequent to the Completion of Current Projects and projects will then be determined at that time subject to financial considerations. Note that the June 2019 DEAR did contain projects to attain 85% capture as shown in Tables 5-2 through 5-6 of that report. Please amend the LTCP by selecting specific CSO projects that attain 85% capture as well as any deleting any statements that claim that a targeted goal of 81% is acceptable. In addition to the above, expansion of the plant to 220 million gallons per day (MGD) as a CSO related bypass and disconnection of the Pennsauken flows from the combined sewer system must be prioritized in the short term given the significant reductions in CSO volumes that will be realized from these projects. Also, this LTCP must give priority to the elimination of the ongoing flooding that is occurring in the Cities of Camden and Gloucester as flooding is a public health issue. Finally, the LTCP is lacking information regarding the City of Gloucester and any strategy and commitment for reducing CSOs. The objective of the LTCP is to select CSO control alternatives to demonstrate compliance with the Federal CSO Control Policy where the resultant schedule length is determined based on the financial capability of the affected municipality. The LTCP must be revised in its selection of alternatives for compliance with the Federal CSO Control Policy and must structure the schedule for those projects based on affordability. In addition, detailed assumptions must be provided that were used to reach the overall conclusions on affordability. A review of the financial capability cannot be conducted until this information has been provided. The below represents the Department's initial comments. The Department reserves the right to further comment on these issues. Comments are as follows. . **7:14A-4.9, Certifications** <u>Comment 1</u>: Part IV.D.1.b of your existing CSO permit states the following: All reports submitted to the Department pursuant to the requirements of this permit shall comply with the signatory requirements of N.J.A.C. 7:14A-4.9, and contain the following certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for purposely, knowingly, recklessly, or negligently submitting false information".	The 81% capture rate does not apply to full implementation of the proposed LTCP, and instead is associated with the projected capture rate upon the 1) expansion of the CCMUA WPCF # 1 to 185 MGD, 2) the restoration of the hydraulic capacity of the Camden collection system and CSO outfalls and 3) a 10% reduction in directly connected impervious areas through green stormwater infrastructure or other source removal steps. Additional controls as detailed in the SIAR will be required to achieve an 85% system-wide typical year capture rate. The SIAR documents the joint commitments of CCMUA, the City of Camden and Gloucester City to implement a CSO long term control plan that will result in the capture of no less than 85% of wet weather flow generated during the typical year. These commitments are highlighted in Attachment A to this initial response letter which is comprised of pages excerpted from the joint SIAR. Note particularly pages 2, 10,11,24 and 26. The revised report will clarify the 85% capture target to be achieved with full implementation of the LTCP. Gloucester's control strategy is reference throughout the SIAR, e.g. pages E-7, 5-2 and 5-8. Various excerpts of the SIAR referencing the 85% capture control strategy have been collected in Attachment A to this letter for ready reference. The pages cited above are pages 4, 16,and 18 of this attachment. This strategy includes storage or enhance high rate clarification and disinfection for outfalls G-4/ G-5 and G-1. The revised report will include more prominently featured descriptions of this strategy.

The Department acknowledges that a modified version of the above referenced certification statement is included in the report and has been signed by representatives of CCMUA, the City of Camden and the City of Gloucester. In addition, the report also includes intermunicipal agreements in the form of resolutions that are also signed by representatives of CCMUA, the City of Camden and the City of Gloucester. These certification statements are acceptable to the Department. This comment is included for informational purposes and does not necessitate a response.

Executive Summary

Comment 2: The Executive Summary serves to provide a summary of the overall report. Any changes as part of a revised LTCP should include revisions to the Executive Summary as appropriate. In addition, please note that the information within the Executive Summary is not always consistent with other sections of the LTCP such as baseline percent capture values as included in various tables. Please address.

Response to comment 2:

Some refinements to the modeled system configuration and performance were made during the development of the SIAR which were not accurately reflected in Table 1-2. As a result, Table 1-2 did not include the correct final values and the revised report will be corrected to include the figures in red below. Also Table E-1 will be revised to reflect a minor adjustment in the estimated future CSO volume and system wide percent capture values. The system wide percent capture values for Baseline and Program Element 3 will also be updated to 68% and 82% respectively in the revised SIAR report.

Table 1-2 – System Wide Performance Characteristics Used for Control Alternatives Development

System Wide Performance Metrics		Baseline Condition	Upon Completion of Current Improvements*
		Camden Hydraulic Capacity not Restored	*Camden Hydraulic Capacity Restored*
WPCF # 1 Capacity		150 MGD	185 MGD
1	% Capture	66% 68%	76% 78%
2	Overflow Volume (million gallons)	900 823	618 580
3	Range of Overflow Frequencies (events)	10-69 11-70	10-69 8 -71
4	Modeled Surface Flooding (million gallons)	94 80	44 33

*WPCF # 1 capacity at 185 MGD + Camden collection system hydraulic capacity restoration

Table E-1 – Benefits of the CSO Control Elements Before Satellite Control Facilities

System Performance Metric	Baseline Condition	With System Optimized	Optimized + 10% Reduction in DCIA
WPCF Capacity (Millions of Gallons per Day)	150	185	185
Overflow Volume (Millions of Gallons per Year)	823	582 580	487
% Wet Weather Capture	69%68%	78%	81% 82%
Range of Overflow Event Frequencies (min – max (median))	11-70 (47)	8 -71 (45)	6 - 67 (43)
Modeled Street Flooding (Millions of Gallons per Year)	80	33	24

Section 1.0, SIAR Introduction

Comment 3: Section 1.2, Overview of the Combined Sewer System states the following:

> "Improvements currently underway by CCMUA and the City of Camden will result in the expansion of CCMUA's Delaware No. 1 WPCF [Water Pollution Control Facility] wet weather treatment capacity from 150 (wet weather) to 185 MGD and the restoration of the hydraulic capacities of the Camden sewer system, including stormwater inlets and CSO outfalls to current design capacities through comprehensive cleaning. The restoration of the hydraulic capacities is critical to Camden's efforts to reduce street flooding which can occur during wet weather.
>
> The results of these ongoing improvements are summarized on Table 1-2 below. The projected reduction in CSO volume, increased capture rates and reduction in surface flooding resulting from these early implementation steps may be noted.

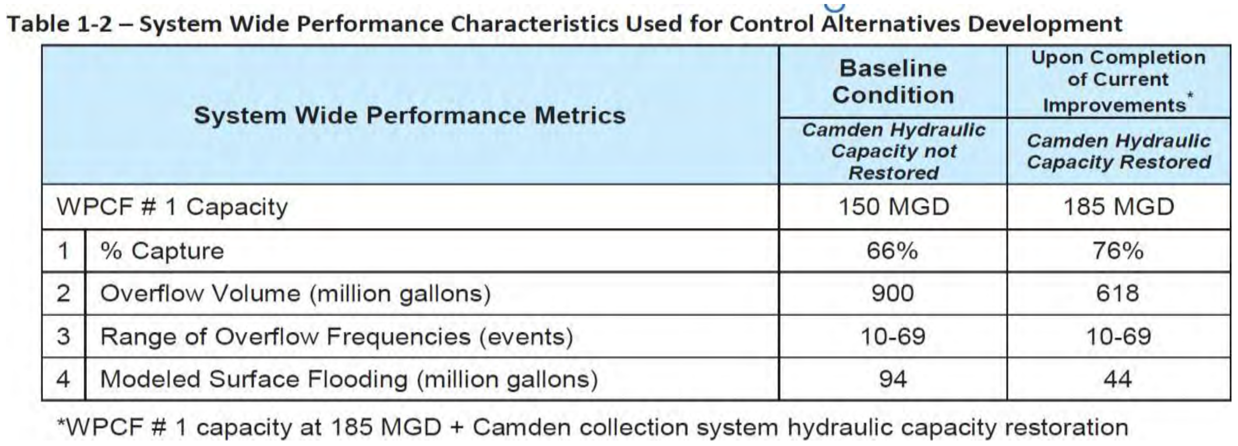


Table 1-2 – System Wide Performance Characteristics Used for Control Alternatives Development

System Wide Performance Metrics		Baseline Condition	Upon Completion of Current Improvements*
		Camden Hydraulic Capacity not Restored	*Camden Hydraulic Capacity Restored*
WPCF # 1 Capacity		150 MGD	185 MGD
1	% Capture	66%	76%
2	Overflow Volume (million gallons)	900	618
3	Range of Overflow Frequencies (events)	10-69	10-69
4	Modeled Surface Flooding (million gallons)	94	44

*WPCF # 1 capacity at 185 MGD + Camden collection system hydraulic capacity restoration

"

Given that Table 1-2 is intended to provide a baseline after completion of ongoing improvements, please provide a detailed update on the schedule for ongoing projects as identified in Table E-13 including continued cleaning of Camden collection system, continued cleaning of Camden CSO outfalls, rehabilitation of Camden regulator mechanisms, and the completion of the Arch Street Pump Station capacity expansion (replacement of 3 existing 75 horsepower motors with new 100 horsepower motors and replacement of 3 existing 22.25" impellers with 24.25" impellers.). In addition, please describe why the range of overflow events in Table 1-2 is so significant.

As noted throughout the LTCP, collection system cleaning and outfall dredging projects are still ongoing as part of Program Element 1 and the Department is concerned that these projects have not yet been completed given that the proper operation and maintenance of the system is a required Nine Minimum Control. As such, the Department is evaluating the most appropriate regulatory instrument to ensure completion of these projects on schedule.

Response to comment 3:

The status of Camden's ongoing projects referenced in Comment 3 are as follow and as detailed in Attachment B to this correspondence:

1. Collection Sewer Cleaning: The City projects that the initial cleaning pass of the entire combined and sanitary sewer systems will be complete as of June 30, 2023.
2. Outfall Cleaning: The cleaning of the remaining outfalls is projected to be complete during the second quarter of 2022.
3. Regulator Rehabilitation Project: Field work commenced in October 2020. It is on schedule and over 30% complete with final completion scheduled for October 2022.
4. Arch St. Pump Station Capacity Expansion: This project upgraded the pump capacity of the three pumps without removing the station from operations. Work was completed in summer of 2020.

The range of overflow frequencies shown in Table 1-2 reflects the overflows occurring during a typical year at the most active and least active outfall structures within the combined sewer system. The typical year overflow frequencies for the individual outfall structures were documented in Section 7.2.2 of the approved System Characterization Report (SCR). The SCR depicts the wide range in individual outfall frequencies cited in the SIAR and can be referenced by the reader if that detail is needed. In order to present the results in a more easily reviewed summary format, the SIAR only includes the ranges.

It is not unusual for there to be a wide variations between overflow event frequencies between individual outfalls within a combined sewer system. The overflow frequency for any given outfall is a function of the sewershed characteristics such as size, land use characteristics, collection sewer hydraulic capacities and physical condition, configuration of the regulator, available interceptor sewer capacity during a wet weather event, and most significantly outfall elevation relatively to tide elevation.

Comment 4: Section 1.4, Overview of Control Alternatives in the DEAR states that the SIAR builds upon and incorporates a number of findings of the DEAR including the following: • "The control performance target will be system-wide 85% capture of wet weather combined sewer flow during the typical year;" The Federal CSO Control Policy and the NJPDES permit at Part IV.G.4.f.ii specify that wet weather capture is a means of compliance under the Presumption Approach as follows: "ii. The elimination of the capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events on a system-wide annual average basis;" The 2015 NJPDES CSO permit requires selection of either the Presumption Approach or the Demonstration Approach. The Department acknowledges that the permittees have selected the Presumption Approach in the DEAR as well as in the LTCP where the minimum percent capture value of 85% must be attained to ensure compliance. As previously stated, the selected CSO projects must be reevaluated and revisited, as well as any statements within the LTCP that include a targeted goal of 81%, since the Presumption Approach requires a minimum of 85% wet weather capture.	**Response to comment 4** Please see Attachment A to this preliminary response letter which contains excerpts of the September 2020 SIAR describing the 85% capture target in the five sub-systems.
Comment 5: Section 1.4, Overview of Control Alternatives in the DEAR includes Figure 1-2 – Combined Sewer System – Five Subsystems. Additional clarification needs to be provided as part of this figure regarding the grouping of Delaware-GL, Newton Creek, and 007A. Specifically, it is the Department's understanding that captured flows from the G-7 sewershed are conveyed into the Gloucester interceptor sewer via the King Street pump station yet the overflows from the G-7 regulator discharge to Newton Creek. In addition, the flow capture rate from G-7 was included in the Newton Creek subsystem statistics and was treated as inflow for the Delaware River-Gloucester subsystem statistics. Please supplement this figure with this information to clarify these points and confirm that percent capture was appropriately calculated and confirm that certain flows were not double counted.	**Response to comment 5** Please see Attachment D for the detailed response to this comment.
Comment 6: Section 1.6, Stakeholder Involvement in the SIAR Development includes a detailed description as to how the City of Camden and CCMUA actively worked together to engage, inform and educate the public and CSO Supplemental Team on CSOs, CSO related flooding and the development of the LTCP as required by the existing NJPDES permit. This is described at length in Section 1.6.2 and includes the Completed Outreach Activities along with the names of groups that participated in those events. Most notably, the City of Camden and CCMUA have a clear plan for the ongoing operation and maintenance of existing green infrastructure in Camden through the utilization of PowerCorps Camden which is an AmeriCorps direct service program. Appendix A also includes materials relevant to the public participation process. However, while it is clear that the required public participation requirements of the 2015 NJPDES permit have been attained in a robust and holistic manner for the City of Camden and CCMUA, there is limited discussion on public participation activities for the City of Gloucester. The LTCP must be supplemented with an update of public participation activities that have occurred for the City of Gloucester since submission of the June 2018 Gloucester City Public Participation Process Report as shown here: https://www.nj.gov/dep/dwq/pdf/CSO_PublicParticipation_GloucesterCity_20180626_1.pdf.Please revise.	**Response to comment 6** Gloucester City has advertised various activities regarding the importance of public participation to help with the LTCP. Gloucester City Green team has advocated residents to participate in planting trees, rain gardens and plant growth which will help rainwater to be absorbed. Rain barrels have been a Green Infrastructure program implemented by the City of Gloucester. Residents are also encouraged to remove debris from the storm grates and curb lines to help water flow during storm events. Please see Attachment C for examples of Gloucester's public participation activities since June 2018.

Section 2.0, Maximizing Flows to WPCF #1

Comment 7: Section 2.1, CCMUA's Water Pollution Control Facility # 1 states the following:

> "In 2017 CCMUA completed a study of alternatives for the upgrading of its WPCF #1. The study recommended a two phase program for the treatment plant. Under phase 1 the plant would be expanded to provide 185 MGD in full secondary treatment capacity. This expansion is underway and is scheduled for completion in 2020. The study also determined that it is feasible to further increase wet weather treatment capacity up to 220 MGD using CSO related bypassing. The potential increase in wet weather treatment capacity up to 220 MGD would provide the equivalent of primary treatment and effluent disinfection prior to discharge into the Delaware River in accordance with CCMUA's NJPDES permit…"

Upgrades to the treatment plant under Phase 1, which will allow the acceptance of additional wet weather combined sewage flows from 150 to 185 MGD, are almost fully completed and the Department acknowledges the proactive manner in which the implementation of increased wet weather capacity is occurring. This project is a component of Program Element 1 and will contribute towards percent capture reductions for the Delaware River – Camden subsystem (including C-3 which is the largest outfall accounting for 16% of the total system flow). As stated in Section 5.1, Additional Control Requirements "The expansion of the WPCF#1 will also help the Newton Creek subsystem in achieving 85% capture." Phase 1 of this project is authorized in a July 18, 2019 NJPDES permit modification and was approved in a November 8, 2018 Treatment Works Approval 18-0290. Please provide a status update on this project.

Phase 2 of this project would entail a wet weather expansion to 220 MGD. This CSO related bypass has already been approved in the final NJPDES permit action dated May 1, 2020 where any CSO related bypass as a future phase is conditioned on TWA approval where there has been no relaxation in effluent limits. A cost value of $36.3 million is provided in Table 5-8 (CCMUA CSO Control Capital Cost Estimates) for this wet weather expansion. Section 4.2 of the LTCP states that "Expanding the plant up to 220 MGD wet weather capacity will enable a significant increase in the capture rate from the large Camden C-3 regulator structure." Note that C-3 comprises 16% of total CSO flow from the system as per Figure 7-1 of the June 2018 System Characterization Report as shown in Comment 12. Despite these projected reductions in percent capture, the LTCP does not include any commitment to this project or any implementation schedule. A CSO related bypass would have benefits to percent capture on a system wide basis with significant benefits to directly connected sub-watersheds. Given the flooding occurring in the City of Camden, provide an estimate on reduced flooding within the City as a result of the CSO related bypass. Please revisit the inclusion of CSO related bypass to 220 MGD as part of the overall selected CSO control strategy.

Response to comment 7:

The CCMUA developed 3 plant expansion projects to increase the plant capacity from 150 to 185 MGD. First, the flow separation project within the plan influent chamber to allow peak flows from Camden City without restricting flow from the County is complete. Second, the Wet Weather Plant modifications to increase the hydraulic throughput has also been completed. Currently, the third project to upgrade the pumping and electrical switchgear in the Preliminary Treatment Facility are 50% complete. 2 of the 4 pumps and speed controls have been replaced with new 60 MGD pumps and variable frequency drives. The 2 remaining pumps, VFDs and related electrical switchgear upgrades are set to be complete by the last quarter of 2021.

As discussed during the May 24, 2021 meeting between NJDEP, CCMUA, Camden and Gloucester the hydraulic limitations of the Camden and Gloucester interceptor systems limit the potential benefit of expanding the WWTP to 220 MGD. The availability of the increased plant capacity would be limited to the Delaware River-Camden and to the Newton Creek sub-systems, as additional flow from the other sub-systems cannot be delivered to the plant headworks (pumping facilities) irrespective of pumping rate there. Further, both of the above-referenced sub-systems are projected to achieve 85% capture through the expansion of the plant capacity to 185 MGD (with cleaning of the Camden system). As shown in the following table, which will be added to Section 2 of the SIAR, overall system-wide capture would only increase by 1% (from 78% to 79%) with expansion to 220 MGD at an estimated cost of around $36 million.

Given the limited financial resources available, the funds will be more cost-effectively utilized near-term addressing the Pennsauken wet weather inter-connection and other high priority CSO controls.

Impacts of Expanding WPCF # 1 to 220 MGD
(excluding 10% DCIA reduction and additional satellite controls)

	Baseline			185 mgd WPCF Camden Pipes Cleaned			220 mgd WPCF Camden Pipes Cleaned		
	%capture	CSO, MG	flooding, MG	%capture	CSO Vol	flooding, MG	%capture	CSO, MG	flooding, MG
System Wide	68%	822.9	79.7	78%	579.9	33.0	79%	553.1	32.8
Delaware River - Camden	71%	404.7	52.3	89%	167.3	13.8	90%	140.2	13.6
Delaware River-Gloucester	69%	75.8	6.5	69%	75.3	6.4	69%	74.9	6.4
Delaware River – Back Channel	69%	140.2	1.9	69%	142.0	0.6	69%	141.7	0.6
Cooper River	69%	170.5	8.7	70%	170.4	6.9	70%	171.1	6.9
Newton Creek	79%	31.7	10.4	85%	24.8	5.2	84%	25.2	5.3

Section 3.0, Green Stormwater Infrastructure Implementation	**Response to comment 8:**
Comment 8: Program Element 3 entails a framework for a Formalized Green Stormwater Infrastructure Program where it is stated that removing 10% (145 acres) of the directly connected impervious area (DCIA) would reduce the flow to the combined sewer system by approximately 100 million gallons per year. The Department acknowledges that green infrastructure can mitigate CSO discharges particularly for smaller rain events yet also has ancillary benefits such as aesthetic improvements and reducing heat island effects. However, there is limited information as to the potential locations for 145 acres of green infrastructure, information as to whether or not 145 acres is available in the City of Camden, and whether or not this program is also intended for the City of Gloucester. This information must be provided in order for the Department to consider this to be a viable LTCP option. In addition, please provide the basis as to how 145 acres equates to a reduction in flow to the combined sewer system by 100 million gallons per typical year and if this value was confirmed through modeling.	Please note that the 145 acres refers to the area of directly connected impervious area (DCIA) for which stormwater runoff could be potentially controlled by the use of green stormwater infrastructure (GSI). The SIAR does not propose 145 acres of GSI facilities. The projected potential reduction in typical year overflow volume was based on the use of the hydrologic-hydraulic model with a 10% reduction in DCIA system-wide. The DCIA reduction is assumed proportionate between Camden and Gloucester based on their relative existing DCIA coverages (roughly 91% Camden / 9% Gloucester). This GSI scenario is deemed feasible based on the current understanding of the Camden and Gloucester combined sewer system drainage areas and the relatively high availability of potential GSI facility sites across these communities. The ultimate extent of DCIA reduction to be achieved through GSI will be determined as the formalization of the Camden and Gloucester GSI program detailed in Section 3 of the SIAR is implemented. This may be less than 10%, in which case additional (or expanded) grey infrastructure controls will be necessary. Or this may be greater than 10%, in which case fewer (or downsized) grey infrastructure controls will be necessary. As described in the SIAR, these uncertainties cannot be firmly established at this early stage in the LTCP process. For this reason, the use of adaptive management during implementation is a prominent feature of the LTCP strategy, which will allow the needed adjustments to the new facilities to be defined as experience with the preceding facilities is gained and their performance quantified. As stated in Section 5.1 of the SIAR (see page 16 of Attachment A to this preliminary response letter), the design capacities for the additional control satellite facilities that will be necessary to achieve 85% system-wide capture have been bracketed to reflect the accomplishment of DCIA reductions ranging from zero to ten percent. CCMUA and the two Cities remain confident that GSI will continue to play a significant role in stormwater management, CSO control, economic redevelopment and environmental and aesthetic benefits in the Cities' neighborhoods. GSI projects that are not likely to be under the direct control of Camden, Gloucester or CCMUA cannot be included in the LTCP as enforceable requirements; hence the proposed formalized GSI program, rapid implementation during the first NJPDES permit cycle and efficacy evaluation to inform the scope and sizing of the longer term structural controls.

Section 4.0, Mitigation of Street Flooding

Comment 9: Section 4.1, Problem Overview states the following regarding flooding in the City of Camden:

> "Street flooding during wet weather remains a major public health and environmental concern within the City of Camden… It should be noted that the relative roles of structural capacity limitations within the sewer system and of non-structural causes such as blockages is not well understood. Therefore, as outlined in this section of the SIAR, a comprehensive program to understand and address the causes of street flooding is proposed.
>
> There are twenty sewersheds that have been associated with the reported street flooding hot spots identified in Camden's 2016 Flood Mitigation Plan. The number of locations where flooding has been reported [are shown in] Table 4-1..."

Table 4-1 – Camden Sewersheds Associated with Street Flooding

Sewershed / Regulator	# of Reported Flooding Locations	Sewershed / Regulator	# of Reported Flooding Locations
Name		Name	
C1	5	C16	1
C3	21	C17	0
C5	5	C22	8
C6	5	C22A	1
C7	4	C23	0
C8	2	C24	1
C9	1	C27	4
C10	2	C28	1
C11	5	CFA	2
C13 / 13A	0	C32	12

Flooding of combined sewage in streets is a public health concern and is not acceptable. The LTCP must address the elimination of street flooding where this should be the utmost priority in the selection of alternatives. Table E-1 shows that after the implementation of a wet weather expansion to 185 MGD, restoration of the Camden collection system, and 10% reduction in directly connected impervious area (DCIA) (145 acres for Camden over a timeframe of 22 years), an estimated 24 million gallons of flooding would remain in the City of Camden during the typical year. In fact, Section 1.6.2, states that "Because of Camden's aging and overtaxed combined sewer system, a one-inch rainstorm can leave major roads impassable, turn parking lots into stagnant lakes, and send sewage into parks, homes, and waterways."

In addition to the above, it appears that street flooding in the City of Camden has already been identified and studied through the preparation of the "2016 Flood Mitigation Plan" which should be provided as part of any amended LTCP. Please provide information regarding any measures that have already been taken based on this report. Also, given this report objective, it is unclear why an additional step has been added within the LTCP to further study street flooding in the City of Camden as Program Element 4 as part of a "Street Flooding Mitigation Program." Since the most significant flooding occurs near C3 and C32, it is unclear why the CSO related bypass to 220 MGD and the reduction of wet weather flow from Pennsauken into the Camden combined sewer system (sewershed C-32) are not given a higher priority within the TCP. These projects in and of themselves could significantly mitigate street flooding. Please clarify.

Response to comment 9:

CCMUA, Camden and Gloucester agree with NJDEP that addressing street flooding is of paramount importance and will have far more immediate and direct benefits for the citizens of Camden and Gloucester than the ultimate achievement of the required discharge reductions at the CSO outfalls.

As discussed with NJDEP on May 24, the actual usable data relating to the occurrence, causes and mitigation of street flooding in Camden and Gloucester are extremely limited:

- The locations, frequencies, and extent of street flooding is not currently and has not been monitored;
- The impacts of prevailing physical system conditions (e.g. levels of solids deposition in catch-basins, outfalls, and collection system pipes), and environmental conditions (storm events, tide levels, etc.) on unmonitored flooding events are unknowable; and
- Empirical data as to the benefits of recent and ongoing system improvements, such as the completion of the Arch Street pump station upgrade and the pipe and outfall cleaning to date, are not available.

Therefore, the relative causes of street flooding among obstructions, tides, changes in land use / impervious area over time and inherent capacity limitations of the current collection sewer system (including catch basins and outfalls) is not known. While Camden's 2016 Flooding Mitigation Plan can serve as a useful starting point, it did not provide the data needed to direct immediate, cost-effective and targeted mitigation.

It should also be noted that the hydrologic / hydraulic model used in the development of the LTCP was formulated for the specific purpose of simulating CSO discharge from the subject combined sewer system. Therefore, the model is generally limited to the Camden / Gloucester / CCMUA interceptor sewer systems, outfalls and the CCMUA treatment plant, i.e. the system components that control CSO discharge. The model includes some of the larger trunk sewers but does not include the majority of the combined sewer system, and it therefore cannot address maintenance or structurally based hydraulic limitations in the upper reaches of the system where the street flooding typically occurs.

For the above reasons, CCMUA and the Cities proposed the immediate development and implementation of a street flooding mitigation program as described in Section 4 of the SIAR.

While the specific impacts on street flooding of restoring the hydraulic capacity of the Camden system through cleaning the collection system and outfalls is unknown, it will be substantial. Because system performance will be significantly improved once the cleaning has been completed, the hydraulic performance of the system must be re-characterized through flow monitoring and the recalibration to reflect the cleaning. The geographic extent of the model will also likely be expanded further up into the collection system to facilitate the evaluation of the impacts of the system cleaning and GSI source reductions on flooding.

Comment 10: Section 4.1, Problem Overview also states the following regarding flooding in the City of Gloucester: "Street flooding can occur in Gloucester City during storm events occurring between two hours before and after high tides. Flooding has occurred near the King Street pumping station which is the low point of the combined system and along Water Street. Gloucester City has a flood pump installed at the King St. pump station and another portable pump available to pump excess combined sewage when tidal conditions preclude normal drainage by gravity. In addition, Gloucester City and CCMUA coordinate the operation of CCMUA's Gloucester City pump station during high tide storm events to minimize flooding conditions. … The current understanding as to the proximate causes of street flooding at the known flooding locations is limited. Flooding event information such as flooding events dates, events per reported location, flooding duration, approximate sizes and depths of street floods and antecedent weather conditions are not currently available." Based on the above, the LTCP contains limited information regarding street flooding in the City of Gloucester and whether this flooding is related to combined sewage or stormwater. Additional information must be provided as well as any CSO control strategies to remedy street flooding.	**Response to comment 10:** Gloucester City has continued to improve the operation and maintenance of our wastewater collection system. It has purchased a Jet/Vac to allow Gloucester to begin jetting and cleaning all mains within the system. As of this date, Gloucester has cleaned approx. 9,000 linear feet of sewer mains and will continue until the entire city system is cleaned. Gloucester City has ongoing water and sewer main replacement also. The Charles Street project is nearing completion and has replaced over 100 year old pipe, mostly brick, with new RCP and manholes. This project has helped reduce the flooding of Charles Street, Water and King Streets. While heavy rains, full moon and high tides from the river increase flooding in Gloucester City, the ongoing cleaning of all storm drains/grates has also helped mitigate some street flooding, especially in this area. The City is performing weekly cleaning of the collection system and is documenting each area cleaned and jetted. There is also an active street sweeping of the entire city on a weekly basis.

Section 5.0, Additional Control Requirements

Comment 11: As stated in Section E.6, Cost / Performance Considerations:

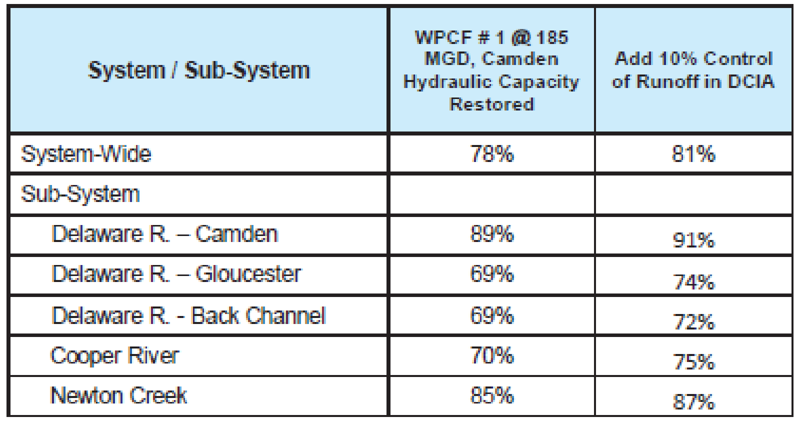
> "The Cities of Camden and Gloucester and CCMUA have determined to use the Presumption Approach as the regulatory basis for their CSO control strategies and have established the control of 85% of wet weather flows generated during the Typical Year as the CSO control performance target…"

The percent capture equation was provided in the June 2018 System Characterization Report and the June 2019 DEAR as follows:

$$\mathit{Percentage\ Capture} = 1 - \frac{(\mathit{Total\ CSO\ Volume} + \mathit{Total\ Flooding\ Volume})}{(\text{Total System WW Inflow} - \text{Total WW Flow from Separate Sanitary Communities})}$$

Given the selection of the Presumption Approach, the derivation of percent capture is central to a review of this report. Table 5-1 is provided as follows to show the percent capture values that will be attained upon completion of upgrades to the WPCF to 185 MGD, restoration of the City of Camden combined sewer system and green infrastructure:

Table 5-1 – Typical Year Capture Impacts of Controlling Runoff from DCIA by 10%



System / Sub-System	WPCF # 1 @ 185 MGD, Camden Hydraulic Capacity Restored	Add 10% Control of Runoff in DCIA
System-Wide	78%	81%
Sub-System		
Delaware R. – Camden	89%	91%
Delaware R. – Gloucester	69%	74%
Delaware R. - Back Channel	69%	72%
Cooper River	70%	75%
Newton Creek	85%	87%

It is then further stated:

> "Additional CSO controls will be evaluated for three of the five sub-systems to achieve the control objective of 85%system-wide wet weather capture during the Typical Year. It should be noted that the controls evaluated to achieve 85% system-wide wet weather capture will be sized to also achieve 85% capture in each individual sub-systems."

In comparing Table 5-1 to Table 1-2 (as provided above in Comment 3), the system-wide percent capture values do not match (i.e., 78% versus 76%) as well as in other sections of the report (i.e., Table 1-2 (76%) versus Table 7-1 (69%)). Please provide one comprehensive table for percent capture including the various inputs to the equation that were used to derive the values above by subsystem as well as on a system-wide basis. In addition, please confirm that the system-wide values include a summation of the inputs across all the subsystems and are not simply an average of the five systems. Approval of this report hinges in part on the inputs and results of this equation being clearly demonstrated and reproducible.

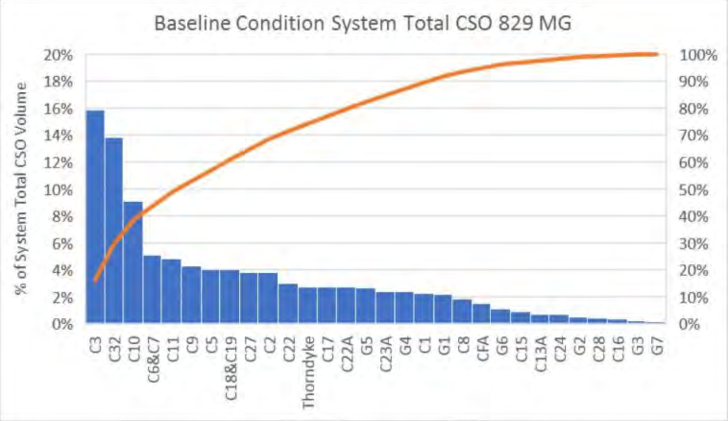
Response to comment 11

Please see Attachment D for the detailed response to this comment.

Comment 12: Section 5.1, Additional Control Requirements states the following regarding the Delaware River backchannel subsystem:

> "CCMUA proposes to achieve 85% capture in the Delaware River backchannel subsystem through the reduction of wet weather flows from Pennsauken Township and increasing the wet weather flow rates through the Baldwins Run pump station."
>
> …
>
> Due to their hydraulic isolation (varies pump stations) from the WPCF #1, the Delaware River – Gloucester City, the Delaware River Back Channel and the Cooper River sub-systems would not achieve increased capture with the potential expansion of the plant treatment capacity. The hydraulic limitations in the existing Camden and Gloucester interceptor sewers preclude the conveyance of additional wet weather flows to WPCF #1…"

Currently, the overflow from the combined sewer system from the C-32 sewershed is discharged through this CCMUA outfall into the Delaware Back Channel which is an important ecosystem that would benefit from protection through a reduction in CSO flow. In addition, the Department is aware that these combined stormwater and sanitary flows that come from Pennsauken take up needed capacity within the Camden combined sewer system. The cost of this project is estimated at $43.3 million as per Section 5.3.3, Permittee Specific Cost Estimates. The location and hydraulic connection of this project within the system mean that it could occur independently from projects related to the restoration of the Camden combined sewer system and it is stated elsewhere in the report that this project would significantly reduce flooding in the Cramer Hill neighborhood. In addition, C-32 comprises a significant portion of the system-wide CSO flow in the CCMUA/Camden/Gloucester system, as per Figure 7-1, Percentage of System Total CSO for Each Outfall and Cumulative Distribution (Baseline Condition) of the June 2018 System Characterization Report:



Based on the above, please supplement this section with additional detail regarding the Camden-Pennsauken disconnect project including an explanation of which flows (i.e., stormwater, combined sewage) would be separated out and diverted to a direct outfall. In addition, please describe any stormwater or satellite treatment (i.e., disinfection) that would be incorporated. Finally, please provide a detailed schedule so that this project is prioritized to take place in the next five year permit cycle.

Response to comment 12:

In Pennsauken Township, Camden County, NJ, the area known as the High Street Watershed is bounded by Westfield Avenue to the southeast, Remington Avenue to the northwest, Lexington Avenue to the northeast and the City of Camden to the southwest. Most of the combined sewer volume within the High Street area flows to the sanitary pump station at 43rd and High Street. From the 43rd Street pump station, combined flows are pumped via force main to Pleasant Avenue and Merchantville Avenue, where the discharge flows by gravity to the CCMUA interceptor, at the former Pennsauken Township Wastewater Treatment Plant on River Road.

During dry weather conditions the pumps can direct 100% of the flow to the CCMUA Pennsauken interceptor sewer. During high intensity wet weather conditions, the volumes of the combined flows are too large for the pumps in the 43rd Street pump station and part of the combined sewer flow bypasses the pump station and is diverted to City of Camden's combined sewer system to CCMUA's C-32 regulator structure which discharges through combined sewer outfall into the Delaware River. In 2011 Pennsauken Township and the Pennsauken Sewage Authority developed conceptual / preliminary plans for sewer separation in the portions of the High Street Watershed.

The Camden-Pennsauken disconnection project is a critical step in achieving 85% typical year wet weather capture in the C-32 (Delaware River Backchannel) sub-system. In brief, the control strategy for C-32 includes:

1. The separation of Pennsauken stormwater from the Camden combined collection system;
2. Subsequent evaluation of the resultant impacts on percent capture and on Camden street flooding;
3. To be followed by the design of improvements needed to the Baldwin's Run pump station and force main or alternative controls (e.g. satellite facilities) necessary to achieve 85% capture.

CCMUA has procured engineering services to update the 2011 evaluation and to prepare a basis of design memorandum. This is scheduled for completion in October of 2021. The procurement of design services will follow. CCMUA anticipates that the separation of stormwater discharges from the High Street Watershed into the Camden combined sewer system will be completed during the forthcoming five year NJPDES permit cycle. Additional information on the separation project is provided as Attachment E.

Comment 13: Section 5.1, Additional Control Requirements includes an analysis of satellite storage and treatment in order to achieve 85% capture in the Cooper River and Gloucester City subsystems. As stated within this section, these subsystems are hydraulically isolated from the WPCF #1 and therefore do not achieve increased capture by the potential expansion of the plant treatment capacity. It is further stated that the hydraulic limitations in the existing Camden and Gloucester interceptor sewers also preclude the conveyance of additional wet weather flows to WPCF #1. The required capacities for storage and satellite are shown in Table 5-2:

Table 5-2 – Required Satellite Control Capacities

Sub-System	Locations	With 10% DCIA Reduction		Without 10% DCIA Reduction	
		Storage Volume in Million Gal.	Treatment Capacity in MGD	Storage Volume in Million Gal.	Treatment Capacity in MGD
Delaware River – Gloucester	G-4 / G-5	0.6	4.1	1.2	6.8
	G-1	0.5	2.3	0.7	4.4
Cooper River	C-22 / C-22A	1.3	20	2.6	21
	C-27 / Thorndyke	3	20.4	3.5	38.5
	C17	NA	NA	0.4	4.8

Section 5.2.1, Satellite Treatment includes a treatment process overview regarding enhanced high rate clarification and includes the following statement:

> "Solids removed through the satellite treatment process range in concentration from around 0.1% to 1.0% with an average of around 0.3% and are typically discharged to the interceptor sewer for transport and treatment at the wastewater treatment plant."

This statement seems misplaced within this section as these estimates do not seem appropriate for enhanced high rate clarification. In addition, while there are cost estimates included in Section 5.0, there is no commitment or schedule for satellite treatment or storage where these technologies are necessary in order to attain 85% capture.

Response to comment 13:

We are unclear as to what this comment is asking. The solids concentrations referenced in the quote refer to the typical concentrations of captured solids side-stream that will need to be disposed of either though discharge to the interceptor sewer when post-storm capacity allows or stored and transported to the treatment plant.

As noted on page 5-3 of the SIAR, typical BOD and TSS removal rates for enhanced high-rate treatment systems range between 65% - 80% and 70% to 95% respectively.

Regarding the comment on scheduling, CCMUA and the Cities proposed that the scope and sizing of the satellite facilities be re-evaluated through an updated LTCP during the third (2031 – 2035) NJPDES permit cycle with construction to occur during the subsequent permit cycle(s) as determined in coordination with NJDEP (Table 8-1 page 8-3). This timing was intended to provide sufficient time for the completion of the system capacity restoration in Camden, the implementation of likely feasible GSI for DCIA removal prior to conducting a comprehensive flow monitoring and modeling update to document the system condition then and re-evaluate control needs.

Based on our discussion with NJDEP on May 24, CCMUA and the Cities are examining ways to accelerate the schedule. The revised report will clarify the commitment to and scheduling of these facilities and reflect any acceleration of the schedule that may be possible.

Comment 14: Section 5.4.2, Potential Impacts of Cooper River Designated Use Reclassification describes amendments to the New Jersey Surface Water Quality Standards at N.J.A.C. 7:9B where the Cooper River is now classified as a Category One waterway from the U.S. Route 30 crossing to the confluence with the Delaware River. Based on this reclassification, the report concludes: "The CSO Policy states that overflows to sensitive areas should be eliminated or relocated wherever physically possible and financially achievable. A conveyance and treatment alternative that would eliminate untreated overflows to the Cooper River was evaluated. To effectively eliminate the CSO discharges to this area, the wet weather conveyance interceptor and high rate treatment facility could be sized to capture 100% of wet weather flow not entering the existing interceptor during the Typical Year..." The Department acknowledges that there has been a recent regulatory change in the receiving waterbody classification for Cooper River in that it has been reclassified as a FW2-NT(C1) waterbody as described above. See https://www.nj.gov/dep/rules/rules/njac7_9b.pdf . The Department also acknowledges that N.J.A.C. 7:9B-1.5(d)2iii states the following: "iii. Category One Waters shall be protected from any measurable changes (including calculable or predicted changes) to the existing water quality. Water quality characteristics that are generally worse than the water quality criteria, except as due to natural conditions, shall be improved to maintain or provide for the designated uses where this can be accomplished without adverse impacts on organisms, communities, or ecosystems of concern." The classification of "sensitive areas" should not be confused with the C1 designation since these are separate and distinct regulatory requirements. Consistent with the intent of the Federal CSO Control Policy Part IV.G.3.a of the NJPDES CSO permit states the following: "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." In its December 17, 2018 findings on the permittees' June 2018 "Baseline Consideration of Sensitive Areas" report the Department agreed with the permittee's contention that all of the outfalls (with the exception of the outfalls that discharge to Newton Creek) are considered sensitive areas thereby minimizing the utility of a prioritization scheme. Because the Federal CSO Control Policy and existing NJPDES permit require that CSOs be addressed in the Cooper River subsystem within the LTCP it is not acceptable to dismiss addressing these outfalls because it is cost prohibitive.	**Response to comment 14:** It was certainly not the intent of Camden or CCMUA to dismiss the need for additional CSO controls on the Cooper River. It remains the intent to implement the controls at C-22 / 22-A and for C-27 / Thorndyke necessary to achieve 85% capture as shown in Table 5-2 and discussed in Section 5-1 . Our point was that if the total elimination of overflows into the Lower Cooper River were to be required due to the C1 designation, the control strategy would likely change to route the captured overflows to a larger satellite facility towards the mouth of the Cooper River and that doing so would be cost-prohibitive without significant external funding. Based upon the discussion with NJDEP during the 5/24/21 meeting we now understand that NJDEP is not requiring the elimination of overflows from the portion of the Cooper River with the C1 designation. We appreciate DEP providing clarification to CCMUA and the Cities on the requirements for CSO control pursuant to the C1 designation for the subject reach of the Cooper River, and we will revise the pertinent sections of the report.

Section 6.0, Financial and Institutional Capability

Comment 15: As previously described, the LTCP lacks specificity regarding CSO control projects and compliance with 85% wet weather capture consistent with the Presumption Approach. Despite this lack of strategy, the LTCP does include an analysis of Financial and Institutional Capability in Section 6.0 where this information is also referenced in other sections of the LTCP. In fact, the Executive Summary E.8.4 and Section 7.8.3 state that the "base case affordability/financial capability assessment assumes a 22-year implementation schedule based on the durations, planning, design and construction." This assessment ultimately results in a "high burden" for the cities of Camden and Gloucester and "mid-range" burden to CCMUA as per Table 6-12 – The Financial Capability Matrix. However, these costs do not match the proposed and/or possible projects. For example, costs are provided for satellite treatment and storage in determining that this LTCP will result in a "high burden" as part of the Financial Capability Assessment yet there is no commitment for satellite and storage for the cities of Camden and Gloucester so the information provided does not conform to the conclusions for Financial Capability.

Since the LTCP does not contain a long term strategy, schedule and implementation framework for implementation of CSO controls in compliance with the Presumption Approach the Department is not commenting on cost and financial analysis at this time. The Department will comment on those the financial capability components as revisions to the LTCP are made and the alternatives are selected.

Section 7.0, Selected Long Term Control Plan

Comment 16: Section 7.1 also states the following:

> "Due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated in Section 6, these controls will require significant external funding and will likely need to be implemented over an extended period of time as resources permit."

The objective of the LTCP is to select CSO control alternatives to demonstrate compliance with the Federal CSO Control Policy where the resultant schedule length is determined based on the financial capability of the affected municipality. The above statement which essentially states that a plan is not being provided is not acceptable.

Response to comments 15 and 16:

Without procuring external and substantial sources of funding, CCMUA and the Cities cannot implement a CSO control program to achieve full compliance with the CSO Policy and permit objectives in a reasonable timeframe. CCMUA and the Cities are currently working with their respective leadership to determine near-term and long-term funding strategies and sources.

Near-term funding will be used to implement defined projects during the next five to ten years (i.e. the next two NJPDES permit cycles) and could include the completion of the initial round of sewer and outfall cleaning, critical spot-repairs, modifications to the C-3 regulator flow controls to optimize flows into the expanded CCMUA WPCF, the implementation of the Street Flooding Mitigation Program, green stormwater projects, the separation of wet weather flows from the Pennsauken Township sewer system and the implementation of CSO controls for the Delaware Back-Channel at C-32, flow monitoring and the expansion and recalibration of the H&H model, evaluating the efficacy of these initial efforts and the preliminary design (facilities planning) for satellite facilities needed to achieve 85% capture in the Cooper River and Gloucester sub-systems.

The selection as to wet weather treatment technologies will be presented in the revised SIAR. These facilities will continue to be sized in the revised SIAR with and without the 10% DCIA reduction being achieved. The specification of treatment technologies in the revised SIAR will be done with the understanding that this technical option is subject to change during implementation as part of the adaptive management approach to the LTCP.

The final sizing of and scheduling for the implementation of the Cooper River and Gloucester satellite facilities will occur as a part of facilities planning. As is intended in the CSO Control Policy, the implementation schedules will need to be flexible based upon the then current financial situations of CCMUA and the Cities and the availability of external funding through New Jersey or Federal programs. The revised SIAR could include alternative potential implementation schedules for the satellite facilities based upon varying levels of available funding.

CCMUA and the Cities look forward to continuing to work with NJDEP, the I-Bank, the State of New Jersey and available federal programs to identify funding sources and to develop -financial strategies for implementing the LTCP and related schedules.

Comment 17: Section 7.1, Selected Long Term Control Program Overview and Sections 7.2 through 7.8 includes detail regarding the various LTCP program elements, that are proposed to be implemented in an iterative manner, and are listed as follows:

1. Completion of Current Projects
2. Efficacy Evaluation
3. Formalized Green Stormwater Infrastructure Program
4. Street Flooding Mitigation Program
5. Cooper River Water Quality Optimization Program
6. Additional Structural Controls

Comments 17a through 17e apply to these steps above.

Comment 17a: Under Program Element 1 – Completion of Current Projects, Section 7.2.2 describes the City of Camden Hydraulic Capacity Restoration where two of the five elements are as follows:

"

- ***Regulator Rehabilitation*** – Camden undertook a comprehensive system-wide inspection of its regulator structures which determined that the regulator mechanisms required extensive repairs. Repairs have been prioritized for the regulator mechanisms for Camden regulators C-1 through C-9, thereby enabling the control of flows into the Camden interceptors. Flows to the other Camden regulators can be controlled through the Arch Street, Pine Street and Baldwin's Run pump stations and through a control gate immediately upstream of the treatment plant, eliminating the need for the regulator controls. To maintain maximum flexibility should the need arise in the future to re-use these regulators as a part of flood prevention, the deteriorated mechanisms will be removed and their anchor systems replaced with stainless steel plates.

- ***Overflow Outfall Cleaning*** - Concurrent with its regulator rehabilitation project, Camden is addressing blockages that it has identified blockages at some of the CSO outfalls. Dredging is required to remove to clear these blockages. The City of Camden has been working closely with CCMUA and NJDEP to complete this program as expeditiously as possible. Two projects were developed with CCMUA currently working on the most critical nine of these outfalls and a second project by City for the clearing the remainder will commence in parallel with regulator project."

It is the Department's understanding that CCMUA has completed 9 of the 18 outfall dredging projects yet the City of Camden has not yet commenced dredging of the remaining 9 outfall pipes. Please verify. It is also the Department's understanding that the regulator replacement project to be completed by the City of Camden has not yet begun. Please provide a status update on both these projects.

Given that these projects relate to Nine Minimum Controls as required by the City of Camden's NJPDES permit, the ongoing failure to progress on these projects could result in enforcement action. These outfall blockages also contribute to street flooding in the City of Camden which is a public health concern.

Comment 17b: Under Section 7.4, Program Element 3 – Formalized Green Stormwater Infrastructure Program the following is stated:

Response to comment 17:

The regulator rehabilitation project has been moving forward, is currently 30% complete, and projected to be completed during the third quarter of 2022. Please see the response to comment #3 for additional information.

> "…CCMUA and the Cities of Camden and Gloucester are targeting a 10% or around a 145 acre reduction in impervious areas that are directly connected to the combined sewer system (DCIA) through the installation of GSI. CCMUA and the Cities are proposing the establishment of a framework for the implementation of GSI that would formalize, expand upon and support the current efforts of groups such as the Camden SMART initiative…The framework will include specific performance targets for GSI implementation, e.g. 30 acres per five year NJPDES permit cycles."

It is then stated later in Section 7.7, Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture that "CCMUA has evaluated the potential to expand the wet weather treatment capacity of its WPCF up to 220 MGD." It is then further stated that "the proposed structural controls outlined above are proposed not to occur until after the results of program elements one through four are fully implemented and their impacts on CSO evaluated though flow monitoring and modeling." This language conflicts with the implementation schedule included in Table E-13 as well as in Table 8-1 where the CSO related bypass is scheduled to occur in years 2031 through 2035. It is not acceptable to delay the effects from a CSO related bypass since they can be realized in the short term, until after "program elements one through four are fully implemented" as described later in Section 7.1. Given the uncertainty and lack of specifics for the locations for green infrastructure sites at the scale described in the LTCP, the CSO related bypass should not be delayed until that step is completed. It is not acceptable to wait for green infrastructure to be implemented.

Comment 17c: Section 7.4, Program Element 5 – Cooper River Regional Water Quality Optimization Strategy describes a strategy that would take a watershed-based approach to reducing the discharge of pathogens and other pollutants into the Cooper River that degrade it's recreational and economic redevelopment usage as well as its aquatic habitat. As noted within this section, the "intent of the strategy is to identify *what, how, and who* – is needed to achieve these goals."

A Water Quality Optimization Strategy is not a CSO control alternative but rather a framework to study and develop a strategy. Such a strategy is more appropriate for an evaluation of alternatives as opposed to the LTCP which requires a selection of a strategy to minimize or eliminate CSOs is required to be included. Note that the DEAR included three 85% capture alternatives in Section 5.3.4 namely Cooper River 1 – Satellite Treatment or Storage Only; Cooper River 2 – Satellite Treatment / Storage + Conveyance Upgrades; and Cooper River 3 – Conveyance Only with a summary table from the DEAR is provided as follows:

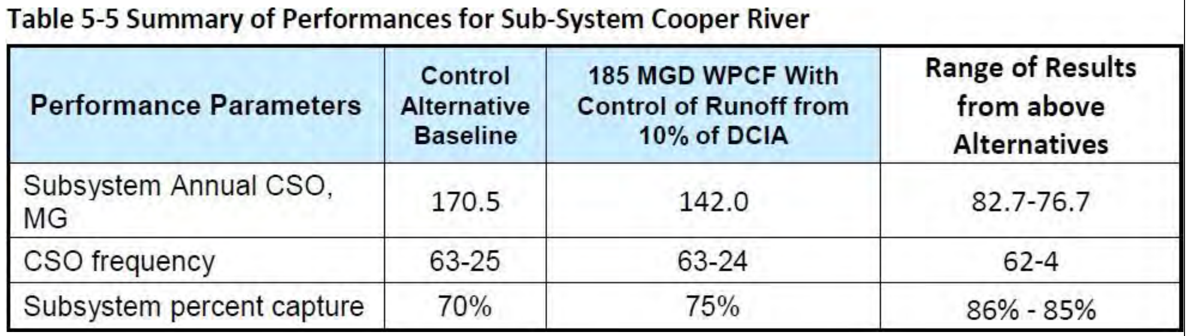


Table 5-5 Summary of Performances for Sub-System Cooper River

Performance Parameters	Control Alternative Baseline	185 MGD WPCF With Control of Runoff from 10% of DCIA	Range of Results from above Alternatives
Subsystem Annual CSO, MG	170.5	142.0	82.7-76.7
CSO frequency	63-25	63-24	62-4
Subsystem percent capture	70%	75%	86% - 85%

Please revisit and select CSO control strategies for the Cooper River.

Comment 17d: Under Section 7.7 Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture, the following is stated:

As detailed in our response to Comment 7, the expansion of the treatment plant capacity to 220 MGD is being deferred due to its lack of impact beyond the Camden Delaware and Newton Creek sub-systems which will achieve 85% capture with the plant capacity at 185 MGD.

As discussed with NJDEP on May 24 and detailed in our response to Comment 7, the expansion of the treatment plant capacity to 220 MGD is being deferred due to its unfavorable benefit/cost characteristics. The Camden Delaware and Newton Creek sub-systems will achieve 85% capture with the plant capacity at 185 MGD, and system wide capture is only slightly improved (by about 1%) with the additional 35 MGD plant capacity at an estimated cost of roughly $36 million.

See response to comment 14

*“**Delaware River Back Channel***: The 85% control target will be achieved in the Delaware River Back Channel through two projects. First, the stormwater (?) wet weather/ combined sewer flows that are currently discharged from the Pennsauken Township sanitary [storm] sewer system into the Camden combined system via Pennsauken’s High Street regulator structure will be re-routed for discharge to the Delaware River back channel after treatment and disinfection. The second component of the Delaware Back Channel controls will be the modification and reconfigurations of regulator structures and power supplies associated with the Baldwins Run pump station to enable full utilization of its 25 MGD capacity.” Despite the clear benefits in the reduction of CSOs by reducing wet weather flows from Pennsauken Township by increasing the wet weather flow rates through the Baldwins Run pump station as described in Section 5.1, this project is designated to take place between 2026 through 2030 as per Table E-13 – Implementation Schedule (Based on five-year NJPDES permit cycles). Please provide a detailed implementation schedule for this project and reschedule it so that it takes place in the first NJPDES five year permit cycle. In addition, please clarify the wastewater components of any remaining CSO discharge and additional details regarding disinfection.	The revised SIAR will include a schedule that brings forward the commencement of the Pennsauken wet weather flow reduction project to the first (2021 – 2025) permit cycle. See the response to comment 12.
Comment 17e: Section 7.7, Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture describes a suite of controls to attain 85% capture. This section also states: “CCMUA and the Cities recommend against the selection between satellite storage and treatment at this time. As will be detailed in Section 8 (Implementation), the proposed structural controls outlined above are proposed not to occur until after the results of program elements one through four are fully implemented and their impacts on CSO evaluated though flow monitoring and modeling. Moreover, additional advancements in wet weather treatment and storage technologies and in are likely to occur. In addition, water quality standards or other regulatory requirements may change, e.g. as a result of DRBC’s current water quality monitoring efforts.” As stated previously, the LTCP is required to include a clear plan to attain compliance and it is unacceptable to not include a plan pending treatment technologies, water quality standards or other regulatory requirements which are always changing.	As noted in the response to comments 15 and 16, the SIAR will be revised to indicate the technologies to be used for the satellite control facilities necessary to achieve 85% capture in the Cooper River and the Delaware River – Gloucester sub-systems. .
In addition to the above, there are no specific projects or implementation schedule within Program Element 6 to address CSOs in the City of Gloucester to mitigate CSO issues. This is in contradiction to the approved DEAR which includes three alternatives to attain 85% capture for the Delaware River – Gloucester subgroup as shown in Section 5.3.2 of the June 2019 DEAR. Below is a summary of these projects from the DEAR: • Delaware River – Gloucester 1 – Satellite Treatment or Storage Only (control of runoff from 10% of the directly connected impervious area (DCIA) reduction using GSI; expansion of WPCF #1 to 185 MGD; 32 MGD high rate treatment or 2.4 MG storage facility serving G-4 and G-5) • Delaware River – Gloucester 2 – Satellite Treatment/Storage + Increased Conveyance (control of runoff from 10% of the DCIA reduction using GSI; expansion of WPCF #1 to 185 or 220 MGD; operate CCMUA’s Gloucester City PS at 35 MGD; 11.7 MGD high rate treatment or 0.9 MG storage serving G-4 and G-5)	Regarding 85 capture, please see Attachment A, particularly pages 4,16 and 18.

- Typic Delaware River – Gloucester 3 – Conveyance (control of runoff from 10% of the DCIA reduction using GSI; potentially adding additional wet weather treatment capacity beyond 220 MGD at the WPCF #1; upgrades to Gloucester City regulators G-3, G-4 and G-5; increased capacity of Gloucester City interceptor between regulators G-3 through G-5 and to CCMUA's Gloucester City PS; increased CCMUA's Gloucester City PS at 45 MGD)

- 130 MGD wet weather capacity to WPCF #1; upgrades to Gloucester City regulators G-3, G-4, and G-5; increased capacity of Gloucester City interceptor between regulators G-3 through G-5 and to CCMUA's Gloucester City PS; Increased CCMUA's Gloucester City PS at 45 MGD)

The objective of the LTCP is to select alternatives from the DEAR. Please provide a strategy to attain a minimum of 85% wet weather capture for the Delaware River - Gloucester subsystem.

Comment 18: Section 7.7 Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture includes a list of projects including satellite and storage. The State of New Jersey and the Department are working to address and mitigate the impacts of change where additional information is available here: https://www.nj.gov/dep/climatechange/. Climate change can have an impact on the design for resiliency for CSO storage and high rate treatment and resiliency requirements must be considered in the design of any infrastructure. Specifically, in accordance with the provisions of Executive Order 11988, the USEPA and the New Jersey Water Bank require that funded infrastructure be located outside of floodplains or elevated above the 500-year flood elevation. Where such avoidance is not possible, the following hierarchy of protective measures has been established:

1. Elevation of critical infrastructure above the 500-year floodplain;
2. Flood-proofing of structures and critical infrastructure;
3. Flood-proofing of system components.

Please address how the selected CSO control alternatives address climate change and sea level rise.

Section 8.0, Implementation Schedule and Adaptive Management

Comment 19: Adaptive Management is referenced throughout the LTCP where Section 8.3, Adaptive Management states the following:

> "The implementation schedule outlined in Table 8-1 above includes an evaluation at the completion of each five year NJPDES permit cycle. Based on these evaluations, CCMUA and the Cities will revise the LTCP as necessary with NJDEP's coordination and approval. This process exemplifies the concept of adaptive management.
>
> Adaptive Management, as defined by the EPA, is "the process by which new information about the health of a watershed is incorporated into the watershed management plan."[8-1] In the context of the SIAR adaptive management assumes that while the CSO control goals will remain constant, the tactical approaches to achieving the goals must be adjustable.
>
> [8-1] Watershed Analysis and Management Guide for Tribes (2000) EPA Watershed Analysis and Management Project. Step 5 page 1."

As noted in this section, an Adaptive Management approach could serve as a compliance "check in" as the projects proceed and an Adaptive Management requirement could be a component of the next NJPDES permit renewal to allow flexibility from the perspective of treatment technology advancements. However,

Response to Comment 18

The NJ CSO Group is currently considering the subject of climate change and the considerations for it that must be accommodated in the individual permittees' CSO LTCPs. We expect that the Group will collectively develop a response on this subject that will be provided to NJDEP. In the meantime, the following provides an initial response to address this comment:

The 2015 NJPDES permit required the permittees to formulate a long term plan for mitigating CSO impacts to a selected target level of control. The long term plan includes elements of green infrastructure, satellite storage/treatment facilities, and other CSO control projects, and is a conceptual planning document intended to define the general characteristics of the planned CSO controls. During the implementation phase of the LTCP (in future NJPDES permit cycles), more detailed facility planning and design will be carried out and climate change impact will be incorporated into those design processes.

Flood-proofing of CSO control facilities will be an integral part of facility planning and design during LTCP implementation. To the extent possible, facilities will be located outside of floodplains or elevated above the 500-year flood elevation. To accommodate future sea level rise, adaptable design will be incorporated wherever necessary and to the extent possible to maximize the resiliency of the facilities.

There is significant predictive uncertainty in the magnitude and timing of the expected climate change-driven impacts on sea level. The current uncertainties in the climate change predictions will likely be reduced as time goes on, and updated information will allow designers to better understand going forward any modifications to the proposed facilities that may be required or appropriate as they are designed. This is considered an important element of adaptive management in the implementation of the LTCP.

the permittee is obligated to set forth a path for compliance with the 85% wet weather capture requirement under the Presumption Approach through measures set forth in the LTCP to ensure that compliance is attained. Note that any changes to projects set forth in the NJPDES permit as part of the LTCP will require a NJPDES permit modification or renewal. While this comment does not necessitate a response at this time, the Department hereby notes this information for the Administrative Record.	**Response to comments 19 and 20:**
Comment 20: Section 8.3, Adaptive Management also states the following: "CCMUA and the Cities will also be subject to a variety of future conditions beyond their controls which may materially affect the benefits, feasibility and scheduling of the CSO controls described in this SIAR, thereby triggering a need to revise the LTCP…" The LTCP then lists a number of triggering conditions including, but not limited to, changing demographics, municipal collection system conditions, emergent regulatory requirements, emergent economic conditions and trends, changing water quality standards and guidance, changes in technologies, unavailability of supplies, materials, contractors or labor necessary to implement the LTCP etc. While the Department acknowledges that there are factors that can impact the schedule, any changes to the LTCP must be provided as an amended document with a certification statement as required by the NJPDES permit. Changes to the LTCP could also result in the need for a modification to the NJPDES permit provided the implementation schedule for those projects is included in the permit.	Sub-Section 8.3 (Adaptive Management) includes examples of emergent conditions beyond the control of CCMUA and the Cities that could materially affect their abilities to implement the CSO control approaches established in the SIAR. In particular, the proposed LTCP is highly dependent upon yet unknown potential sources of outside funding. CCMUA and the Cities have therefore proposed a provisional LTCP and associated implementation schedule based on the assumed availability of significant outside funding, subject to change depending on actual funding availability. CCMUA and the Cities understand that in such cases, the LTCP would need to be formally revised and approved by NJDEP and that the provisions of the then current NJPDES permit would need to be modified by NJDEP.
Please incorporate these changes to the report and submit a revised version of the report to the Department no later than 60 days from the date of this letter. Thank you for your continued cooperation. Sincerely, Susan Rosenwinkel Susan Rosenwinkel Bureau Chief Bureau of Surface Water and Pretreatment Permitting C: Marzooq Alebus, Bureau of Surface Water and Pretreatment Permitting Dianne Crilly, Office of Economic Analysis Teresa Guloy, Bureau of Surface Water and Pretreatment Permitting Molly Jacoby, Bureau of Surface Water and Pretreatment Permitting Dwayne Kobesky, Bureau of Surface Water and Pretreatment Permitting Joseph Mannick, Bureau of Surface Water and Pretreatment Permitting Marcus Roorda, CSO Team Lead, Bureau of Environmental Engineering and Permitting Adam Sarafan, Bureau of Surface Water and Pretreatment Permitting Brian Salvo, Bureau of Surface Water and Pretreatment Permitting Stephen Seeberger, Bureau of Surface Water and Pretreatment Permitting	

CCMUA / Camden / Gloucester

Responses to NJDEP Comment Letter of May 7, 2021

85% Capture Control Target

Attachment A

Selected References to 85% Typical Year Capture Commitment

SELECTION AND IMPLEMENTATION OF ALTERNATIVES REPORT

Camden County Municipal Utilities Authority

City of Camden
Gloucester City

NJPDES Permit Nos.

NJ0026182

NJ0108812

NJ0108847

September 2020

CDM Smith
cdmsmith.com

Executive Summary

E.1 Introduction

This document constitutes Camden County Municipal Utilities Authority's (CCMUA) *Selection and Implementation Report* (SIAR) developed on behalf of CCMUA, the City of Camden and Gloucester City (the Cities). The SIAR is the third of the three NJPDES required documents which comprise the Authority's and the Cities' CSO Long Term Control Plan (LTCP).

The 2018 System Characterization Report documented the physical nature and baseline performance of the combined sewer system. The 2019 Development and Evaluation of Alternatives (DEAR) evaluated approaches to controlling combined sewer overflows. This SIAR documents the selection of a long term strategy, schedule and institutional framework for implementation of CSO controls. This SIAR maintains the CSO control target of capturing for treatment 85% of the combined sewage generated during precipitation events occurring over the Typical Year. A Typical Year is an empirically determined historical year that is representative of typical weather and other conditions driving the behavior of a sewer system. The combined sewer system addressed by this report is shown on Figure E-1 on the following page.

Due to the unique and challenging circumstances facing Camden and Gloucester, it was apparent to CCMUA, the City of Camden and Gloucester City from the outset that the communities and the environment will be best served by leveraging a coordinated and collaborative approach combining regulatory compliance, sustainable redevelopment and environmental justice. Towards these ends, the program outlined in this SIAR focuses on near term community benefits through:

- Sustainable community redevelopment using green stormwater infrastructure (GSI);
- Reduce street and basement flooding of combined sewage during storms; and
- The optimization of and reinvestment in existing community assets such as the restoration of the Camden sewer system through comprehensive cleaning.

E.2 Long Term Control Strategy

The proposed long term control strategy is straightforward:

- ***Optimizing the Current System*** – which is well underway. CCMUA is completing the capacity expansion of its Delaware Water Pollution Control Facility #1 (WPCF) from 150 million gallons per day (MGD) to 185 MGD. This project will also enable the ultimate expansion of wet weather treatment capacity to 220 MGD as may be determined necessary in the future. Meanwhile, City of Camden is restoring the hydraulic capacity of its combined collection sewer system and is making related capital improvements such as the upgrading of capacity of Camden's Arch Street pump station.

Key benefits of optimizing the current system include:

- A reduction in annual overflow volumes of 243 million gallons per year;
- An increase in the system-wide rate of wet weather capture and treatment from 69% to 78%; and
- Modeled street flooding volume reduced by roughly 60%.

Despite these significant gains, optimizing the current system and the best case implementation of green infrastructure still leaves the system-wide wet weather capture rate at less than 85%. Therefore, over the long term additional controls will be required.

E.4 Getting to 85% System-Wide Capture

E.4.1 Satellite Control Facility Capacity Requirements

For purposes of developing control strategies, the 30 active outfalls within the combined sewer system have been divided into hydraulically isolated and sub-systems as shown on Figure E-2 (following page). While all of the sub-systems are ultimately connected to CCMUA's WPCF, providing the conveyance capacities necessary to convey the required wet weather flows to the treatment plant from the Gloucester City, Cooper River, Delaware River Back Channel and Newton Creek sub-systems would be cost prohibitive. Moreover, site limitations at WPCF preclude expanding the wet weather treatment capacity to what would be needed if these flows could be conveyed cost-effectively (details in Section 2). Therefore, additional controls will be needed for certain CSO discharges to the Cooper River in Camden and to the Delaware River in Gloucester City.

The capacities of additional controls needed to achieve 85% system-wide in all five sub-systems are shown on Table E-2. Either remote (satellite) storage tanks or remote (satellite) treatment facilities would be required. Table E-2 includes capacity requirements with and without the accomplishment of the targeted green source reduction. Decisions about the size, configuration and type of satellite facilities must be deferred until a long term determination as to the efficacy of green source reduction can be made, ascertained.

Table E-2 – Required Satellite Control Capacities

Sub-System	Serving Sewersheds	With a 10% DCIA Reduction		Without a 10% DCIA Reduction	
		Tanks (Million Gallons)	Treatment (Million Gallons / Day)	Tanks (Million Gallons)	Treatment (Million Gallons / Day)
Delaware River – Gloucester	G-1 and G-4 / G-5	1.1	6.4	1.9	11.2
Cooper River	C-22 / C-22A	1.3	20.0	2.6	21
	C-27 / Thorndyke	3.0	20.4	3.5	38.5
	C-17	NA	NA	0.4	4.8

E.4.3 Preliminary Site Considerations

The preliminary site requirements for the potential satellite treatment or storage facilities described above are shown on Table E-3. Approximate site vicinity and current land use maps for these potential satellite facilities are shown on Figures E-5 through E-8.

Table E-3 Potential Satellite Facilities Vicinity Information

Subsystem		Vicinity of Regulators	Approximate Area Required (acres)	Vicinity Notes
1	Delaware River – Gloucester	G1 or the CCMUA Gloucester City Pump Station	~1.5	A facility would be located either in the vicinity of the G-1 regulator or near the Gloucester City Pump Station. A new pipe would convey wet weather flows from regulators G-4 and G-5 and, as needed G-1 to this facility. Current brownfield site.
2	Cooper River	C22 – C22A	~1.5	Brownfield (status unknown) private bus yard, Federal Street pump station.
		C27 - Thorndyke	~1.5	Grassed area of Gateway Park
		C17	~1.5	Only required if green control targets can't be met in the Cooper River sub-system.

Gloucester City – Satellite Facility for Wet Weather Flows from G4/G5 and G-1 Regulators

Additional controls are needed for Gloucester City's volumetrically largest CSOs, namely regulator structures G-4 and G-5. From a technical perspective, the most effective approach would be a satellite facility capturing overflows from G-4 and G-5 in or in the vicinity of Proprietors Park as outlined in the 2019 DEAR report. While hydraulically efficient, this location is not acceptable to Gloucester City. As an alternative, wet weather flows from G-4 and G-5 that would otherwise overflow into the Delaware River could be conveyed by a new pipe to a downstream facility. This facility could be located either in the vicinity of regulator structure G-1 or a bit further upstream in the vicinity of CCMUA's Gloucester City pump station (shown on Figure E-5).

The facility would receive wet weather flows from G-4, G-5 and G-1 and would be sized to achieve the 85% wet weather capture target for Gloucester City. During future facilities planning work that will be required to implement the LTCP, the cost-effectiveness of different options will be evaluated including the number of facilities, the preferred locations, the size and how flow is conveyed from G4/G5 to the facility.

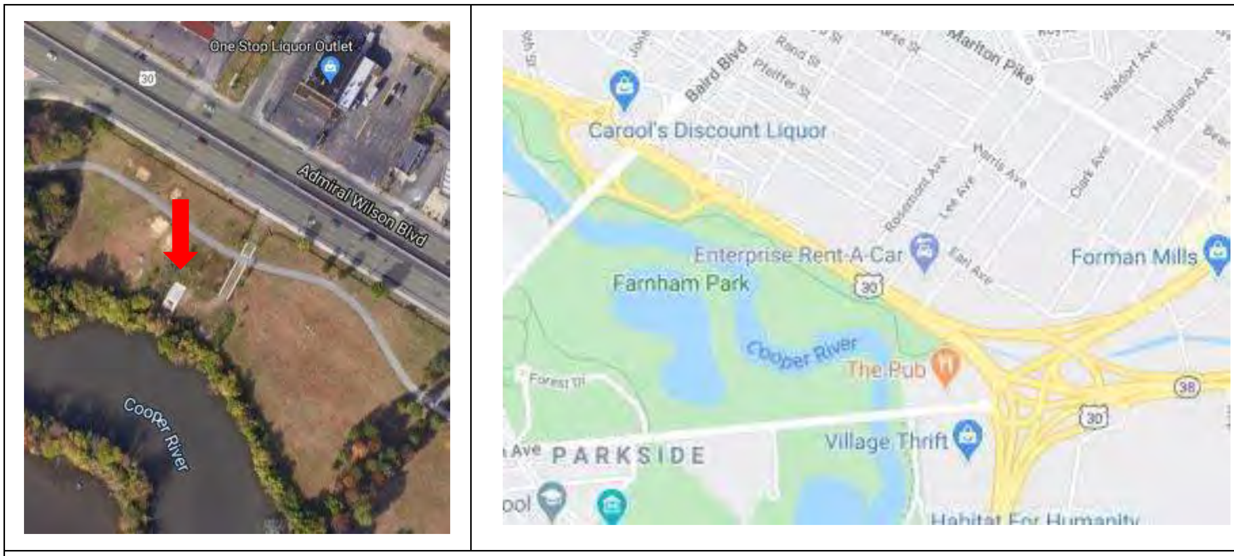


Figure E- 7 – Vicinity of the Camden C-27 and Thorndyke St. Outfalls

Cooper River – Camden C-17 Regulator

If the long term goal of reducing runoff from directly connected impervious in the Cooper River sub-system is not met, an additional satellite treatment facility for the C-17 sewershed will be needed to meet the 85% control objective. The C-17 regulator structure is across the Cooper River and slightly upstream from the C-22 regulator. Should additional controls for C-17 prove to be necessary in the long term; the cost-effectiveness of upsizing and consolidating either the C-22 or the C-17 satellite facilities and conveying the wet weather flows across the river for treatment or storage could be evaluated.

Figure E- 8 – Vicinity of the Camden C-17

It should be noted that the estimated costs for controls in the Camden combined sewer system shown above in Table E-4 do not include the costs of eliminating overflows from the lower Cooper River described in Section E.7. Section E.7 concerns the reclassification of lower Cooper River to a C-1 (exceptional ecological significance) designation usage, thereby potentially triggering a requirement for the complete elimination of combined sewer overflows. As demonstrated in Section E-7 and detailed in Section 5.4.2 ***the elimination of all overflows is financially not achievable and is not included in the proposed long term control program defined in this SIAR.***

E.6 Cost / Performance Considerations

The Cities of Camden and Gloucester and CCMUA have determined to use the Presumption Approach as the regulatory basis for their CSO control strategies and have established the control of 85% of wet weather flows generated during the Typical Year as the CSO control performance target. NJDEP requires that permittees utilizing the Presumption Approach to analyze various levels of CSO controls to determine where the increment of pollution reduction achieved in the receiving waters diminish compared to the increased costs. Such and evaluation often is referred to as a "knee of the curve" analysis.

For this analysis, CCMUA and the Cities initially evaluated the relationship between the frequencies of overflows during a Typical Year and the volumes of combined sewage discharged from the overflows. The use of an overflow-event based performance target, e.g. 4 to 6 overflows per year requires that controls be in place at every outfall that exceeds the target frequency under baseline conditions. Therefore, decisions as to where to allocate scarce resources may not be driven by the optimization of overflow reductions.

The modeling done for this cost-performance analysis indicates that achieving 85% capture system-wide will reduce CSO volumes by roughly 485 million gallons per Typical Year. This level of CSO reduction approximates (and slightly betters) that which would be accomplished with control levels resulting in about ten overflows per year at roughly one half of the capital cost. A cost-control level curve showing the CSO removal volumes at CSO frequency controls ranging from twenty overflows per year down to zero is presented in Figure E-9.

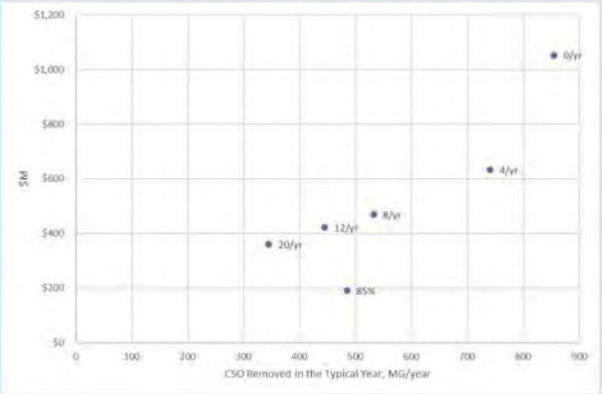


Figure E-9 – Cost / Performance Relationship of Overflow Frequency Based and 85% System-Wide Capture Control Strategies – Typical Year Overflow Reduction Volumes

E.7 Cooper River Designated Use Reclassification

On April 6, 2020 NJDEP finalized a change the use designation of the segment of the Cooper River from the U.S. Route 30 crossing to the confluence with the Delaware River from FW-2NT (fresh-water non-trout) to Category 1 as having exceptional ecological significance due to the presence of the Eastern Pondmussel within this segment of the river.

Figure E-10 – Eastern Pondmussel *(Ligumia Nasuta)* – photo source: Conserve Wildlife Foundation of N.J.

The USEPA CSO Control Policy suggests that overflows to such areas be eliminated or relocated wherever physically possible and financially achievable. Six Camden CSO outfalls discharge into the Cooper River downstream of U.S. Route 30. These are shown on Figure E-11.

Figure E-11: Six impacted outfalls: C15, 16, 17, C22, C22A, and C28.

A conveyance and treatment alternative that would eliminate untreated overflows to the Cooper River was evaluated. To eliminate the CSO discharges to a sensitive area, the wet weather conveyance interceptor and high rate treatment facility would be sized to capture 100% of wet weather not entering the existing Camden combined sewer system during the typical year.

In lieu of the satellite treatment or storage facilities needed for 85% capture in the Cooper River, wet weather flows not entering the existing Camden interceptor would be conveyed via a new wet weather relief conveyance interceptor pipe terminating at a new EHRC treatment facility. The treated effluent would be discharged to the Delaware near the confluence with the Cooper River.

Cost Implications

The estimated capital costs to eliminate CSO discharges to the Cooper River are $272.1 million. The control elements comprising this amount are shown on Table E-5. For perspective, this capital cost estimate may be compared to the estimated capital cost of achieving 85% Typical Year wet weather capture in Camden which range from $102 million and $130 million depending upon control technologies selected. As summarized below and

Item	**Permittee**		
	Camden	**Gloucester**	**CCMUA**
Projected Residential Indicator After Full Implementation in 2042 [a]			
	With Inflation		
Least Cost	4.8%	4.0%	0.80%
Most Cost	5.0%	4.7%	
	Without Inflation		
Least Cost	2.5%	3.0%	0.75%
Most Cost	2.6%	3.7%	

[a] 2042 is used for example only. It is based on the approval of the SIAR in 2021 and implementation of the long term control program through 2041. These dates may not be appropriate for Camden and Gloucester.

Key observations about the data in these table include:

- Owing to its number of outfalls on three receiving streams, the projected least capital cost controls for Camden's CSOs are at $102 million are roughly four times those estimated for Gloucester and 30% more than CCMUA.
- Camden's least cost controls would push the Camden residential indicator to at least 2.5% even if inflation is excluded.
- Gloucester's controls would likewise result in Gloucester's residential indicator being at least 3.0% with or without inflation.

As shown on Table E-8, there is a huge gap between the estimated costs of the selected long term control program and the economic and financial resources of the residents and municipal governments of Camden and Gloucester.

E.8.4 Potential Responses to the Affordability Conundrum

A variety of scheduling and financing options to improve on the affordability of the 85% capture program for Camden and Gloucester have been evaluated.

Scheduling Variations

The base case affordability / financial capability assessment assumes a 22 year implementation schedule based on the durations for facilities planning, design and construction shown in Table E-9.

Table E-9 – Base Case Implementation Schedule for Affordability Analysis

Start Date	2021
Facilities Planning	1
Design & Permitting	3
Construction	17
Total Years to Implement LTCP (inclusive)	21

The assumed start date is based on the submittal and approval of the SIAR in 2020 and coincides with the effective date of the next NJPDES permit. The impacts of extending the implementation schedule on the residential indicators depend on whether or not inflation is considered as shown in Table E-10.

Table E-10 – Impacts of Implementation Scheduling on the Residential Indicators

Implementation Duration in Years	Camden Residential Indicator		Gloucester Residential Indicator	
	With Inflation	Without Inflation	With Inflation	Without Inflation
22	4.8%	2.5%	4.0%	3.0%
32	5.9%	2.2%	4.2%	2.2%
42	7.1%	2.1%	4.1%	2.1%

If as is assumed in the base-case affordability model that costs will continue to outpace income growth, affordability decreases as the implementation period is extended. If inflation is not included in the analysis, extending the implementation period does improve affordability, however even with an implementation period extending more than forty years, the residential indicators for both Camden and Gloucester are projected to remain well over the 2.0% high burden threshold.

Annual Pay-as-You-Go Funding

The amounts that each city could spend on an annual basis without causing their respective residential indicators to exceed 2.0% have also been calculated and are shown on Table E-11.

Table E-11 – Maximum Annual Expenditures Without Trigger a 2.0% Residential Indicator

Implementation Duration in Years	Camden		Gloucester Residential Indicator	
	With Inflation	Without Inflation	With Inflation	Without Inflation
22	None	~$1.0 million	$80,000	$530,000
32	None		None	
42	None		None	

External Funding

As documented above, the least capital cost 85% control options would result in residential indicators of well over the 2.0% high burden threshold with or without factoring in inflation. A meaningful CSO control program is not feasible for Camden or for Gloucester without external funding that would effectively reduce the capital expenditures by the two cities. Shown on Table E-12 are the impacts of various levels of external capital funding and/or capital cost reduction on the residential indicators.

Table E-12 – External Funding and/or Capital Cost Reduction Impacts on Residential Indicators

Municipal Cost Reduction	Camden		Gloucester	
	With Inflation	Without Inflation	With Inflation	Without Inflation
0%	4.8%	2.5%	4.0%	3.0%
25%	4.4%	2.3%	3.6%	2.5%
50%	4.1%	2.1%	3.2%	2.2%

Municipal Cost Reduction	Camden		Gloucester	
	With Inflation	Without Inflation	With Inflation	Without Inflation
75%	3.7%	2.0%	2.8%	1.8%
100%	3.5%	1.9%	2.4%	1.6%

The combinations of implementation schedule and external funding or cost reductions that would result in a projected residential indicator of 2.0% or less are highlighted in green. No combinations of schedule and funding work if inflation is included.

E.9 Selected Long Term Control Program

E.9.1 Framework

Through the expansion of CCMUA's WPCF # 1 to 185 MGD, the restoration of the hydraulic capacity of Camden collection system, flow reduction through green infrastructure and street flooding mitigation the capture level is projected to reach 81% capture of combined sewage generated during wet weather. This falls short of the 85% capture target that CCMUA, Camden and Gloucester selected as the basis for LTCP compliance under the terms of their respective NJPDES permits.

Long term, additional controls will be necessary for the Cooper River, Delaware River back channel, and the Delaware River Gloucester City sub-systems to achieve 85% system-wide capture. The technical options for doing this have been refined. For purposes of long term control planning these options focus on storage through tanks or treatment and disinfection at remote (satellite) facilities. This SIAR is not making a recommendation between storage and treatment. It is assumed that the ultimate choice is best left to future municipal decision makers based on then current conditions.

Whatever the ultimate decision, **due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated above and detailed in Section 6 of this report, these controls will require significant external funding and will likely need to be implemented over an extended period of time as resources permit.**

E.9.2 Control Program Elements

The selected long term control program consists of five program elements that will have phased and overlapping implementation schedules (detailed in Section 8). These five elements are:

1. ***Completion of Current Projects* -** Timely completion of ongoing control projects including the capacity expansion of CCMUA's Delaware Water Pollution Control Facility # 1 to 185 MGD, the restoration of the hydraulic capacity of Camden's combined collection sewer system through a comprehensive sewer cleaning and rehabilitation program and related capital improvements such as the upgrading of Camden's Arch Street pump station capacity.

2. ***Iterative Efficacy Evaluation*** - The evaluation of the efficacy of these current improvements through comprehensive flow monitoring which will inform the

refinement and recalibration of the existing hydrologic / hydraulic model to then current conditions. This will establish a new baseline of overflow statistics informed by the wet weather operating history with these capacity improvements in place. Similar evaluations may occur after the implementation of the formalized green stormwater infrastructure and the street flooding mitigation program elements.

3. ***Formalized Green Stormwater Infrastructure Program*** – Accelerating green stormwater infrastructure through a coordinated, formalized and expanded GSI Implementation Program with the goal of achieving a ten percent reduction in the directly connected impervious areas contributing stormwater runoff to the combined sewer system.

4. ***Street Flooding Mitigation Program*** – The development and rapid implementation of a comprehensive Street Flooding Mitigation Program will be developed within the City of Camden to provide an empirical understanding of the frequency, location and extent of street flooding remaining after the Camden sewer system is cleaned. This will serve as the basis for short and long term operational and capital improvements.

5. ***Cooper River Water Quality Optimization Program*** – The Cooper River is an important environmental, recreational and economic asset for the City of Camden's economic redevelopment. Eliminating Camden's CSOs from the Cooper River is not financially feasible and would not result in water quality compliance. CCMUA and the City of Camden are committing to the work with the other Cooper River municipalities, stakeholders and NJDEP to develop a **Cooper River Water Quality Optimization Strategy** during the first NJPDES permit cycle after this SIAR is approved.

6. ***Additional Structural Controls*** – Within the limitations imposed by affordability constraints, structural controls in each of the five sub-systems that will raise the level of CSO capture in each sub-system and system-wide to no less than 85% of wet weather flows during the Typical Year. These additional controls include satellite control facilities and the potential build out of the WPCF #1 capacity to 220 MGD. **Due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated in Section 6, these controls will require significant external funding and will likely need to be implemented over an extended period of time as resources permit.**

E.10 Implementation Scheduling and Adaptive Management

The implementation scheduling strategy proposed in this SIAR has been is informed by the following:

- CCMUA and the Cities will focus initially on projects that will provide significant near-term overflow and street flooding benefits such as the expansion of the WPCF # 1 and the restoration of the hydraulic capacity of the Camden collection system;
- The projected costs to fully implement the CSO control strategy are far greater than the financial resources currently available to the Cities of Camden and Gloucester ; and
- The complete implementation of the CSO control strategy presented in this SIAR will span decades; and will be implemented in the midst of changes and uncertainties.

Permit Cycle	– (2030) Revised Street Flooding Mitigation Program as needed based on lessons learned during previous five year cycle • Reduction of wet weather flow from Pennsauken into the Camden combined sewer system in sewershed C-32 – ***Program Element 6.*** • Efficacy Evaluation - ***Program Element 2***. • Feasibility study for further expansion of WPCF # 1 up to 220 MGD as necessary – ***Program Element 6.*** • Updated Financial Capability Assessment and Construction & Financing Schedule for inclusion in next NJPDES Permit - ***Program Element 2***.
2031 – 2035: Third Five-Year NJPDES Permit Cycle	• Continued implementation of GSI and Flood Mitigation Program – ***Program Elements 3 & 4*** • Update Long Term Control Plan – ***Program Element 2.*** – Adjust the target for GSI based on prior performance experience. – Refine the need for additional controls for long term achievement of 85% system-wide capture based on the results of the update system performance characterization. – Other evolving environmental, regulatory and community conditions • Design and construction of the expansion of WPCF # 1 up to 220 MGD if needed – ***Program Element 6*** • Updated Financial Capability Assessment and Construction & Financing Schedule for inclusion in next NJPDES Permit - ***Program Element 2***.
Subsequent five-year NPDES permit cycles	• Continued implementation of the GSI Program (target 2% DCIA removal – 30 acres) each five-year cycle • Continued implementation of the Camden Street Flooding Mitigation Program • Implementation of additional controls that were identified as being needed to reach the 85% capture goal. • Compliance Monitoring Program upon completion of the additional controls • Updated Financial Capability Assessment and Construction & Financing Schedule for inclusion in next NJPDES Permit.

The implementation schedule outlined in Table E-14 above includes an evaluation at the completion of each five year NJPDES permit cycle. Based on these evaluations, CCMUA and the Cities will revise the LTCP as necessary with NJDEP's coordination and approval. This process exemplifies the concept of adaptive management.

Adaptive Management, as defined by the EPA, is "the process by which new information about the health of a watershed is incorporated into the watershed management plan."[12-1] In the context of the SIAR adaptive management assumes that while the CSO control goals will remain constant, the tactical approaches to achieving the goals must be adjustable.

A key component of adaptive management will be the inclusion of an affordability and financial capability trigger in the Construction and Financing Schedule. The projects and activities to be included in each five-year permit cycle would be selected and scheduled such that the residential indicator in either City and in the CCMUA service area not exceed the

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[E-1] Watershed Analysis and Management Guide for Tribes (2000) EPA Watershed Analysis and Management Project. Step 5 page 1.

2.2 Regulatory Context

The regulatory basis for CCMUA's potential expansion of wet weather treatment capacity through a CSO related bypass of the secondary treatment process train is based the 1994 CSO Control Policy:

> "In some communities, POTW treatment plants may have primary treatment capacity in excess of their secondary treatment capacity. One effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the POTW treatment plant for treatment. Delivering these flows can have two significant benefits: first, increasing flows during wet weather to the POTW treatment plant may enable the permittee to eliminate or minimize overflows to sensitive areas; second this would maximize the use of available POTW facilities for wet weather flows and would ensure that combined sewer flows receive at least primary treatment prior to discharge."[2-2]

The utilization of primary treatment capacities at treatment plants that exceed secondary treatment capacities is one of the options that combined sewer system permittees are required to evaluate under their respective NJPDES permits.[3-3] CCMUA's NJPDES permit was modified in July of 2019 to reflect the expansion of full secondary treatment capacity to 185 MGD. In it, NJDEP notes an expectation that CCMUA will consider CSO related bypassing options at WPCF # 1 in the SAIR.[3-4] The expansion of wet weather treatment capacity to up to 220 MGD using a CSO related bypass is one potential component of the CSO control strategy.

2.3 Wet Weather Capacity Expansion Beyond 220 MGD

It has been determined that additional controls beyond the expansion of WPCF # 1 of up to 220 MGD plus flow reduction through the use of green stormwater infrastructure will not achieve the system-wide control target of 85% wet weather capture during the typical year. To increase the targeted capture rate to 85%, additional controls will be needed for the Gloucester City CSO discharges on the Delaware River, the City of Camden discharges to the Cooper River and to the City of Camden and CCMUA discharges to the backchannel of the Delaware River.

CCMUA has determined that a wet weather treatment facility at or in the vicinity of WPCF #1 is not feasible due to site constraints. Land is not available at WPCF # 1 as evidenced by the already tight configuration of facilities at WPCF # 1 shown on Figure 2-2 on the following page. Moreover, the acquisition of additional land in the vicinity of WPCF # 1 is not realistic. The plant is bounded by the Delaware River, an active railroad, a recently completed brownfield to public park, expanding shipping and cargo businesses and a residential neighborhood. Therefore, it is not feasible to provide wet weather treatment beyond 220 MGD at or in the vicinity of WPCF #1.

[2-2] 59 FR 18693

[2-3] Part IV-G.4-e(vii)

[2-4] "Overview of Wet Weather Upgrades of Delaware WPCF # 1" included in the July 18, 2019 Final Surface Water Minor Modification Permit Action for Delaware WPCF #1 NJPDES number NJ0026182.

interceptor should be fully discharged through the combined sewer overflow pipe, (assuming that the outfall pipes are maintained and open). Future analysis may reveal the need for the pumping of wet weather flows during high tides at certain locations. If necessary for CSO control purposes, satellite facilities would capture wet weather flows that would otherwise be discharged through the outfall pipes necessary to meet their performance standard (e.g. 85% capture).

A better understanding as to the causes of street flooding within the sewersheds that contribute to the potential satellite facilities is needed. If it were to be determined that street flooding in a sewershed is caused by hydraulic limitations in the collection system, then consideration of increasing the capacity and the implications of the resulting additional flow to the regulator structure and into the satellite facility could then be considered. Street flooding will be better understood and quantifiable after the collection system cleaning program is completed and prior to the design and construction of any satellite facilities.

4.3 Street Flooding Mitigation Program

It is proposed that a Comprehensive Street Flooding Mitigation Program be developed by each city and CCMUA as an early long term CSO control plan implementation action by the City of Camden with the support of CCMUA. The objective is to establish a framework for a comprehensive program to mitigate street flooding.

Key program elements could include:

- Establish flood location mitigation priorities and the criteria for prioritization;
- Development of System Performance Goals
- Documenting the implementation of the 2016 Wastewater System Flood Mitigation Plan;
- Identification and involvement of stakeholders and the identification of an institutional structure for the development and implementation of the mitigation program;
- Coordination with or working within existing green stormwater and sustainable redevelopment groups and programs;
- Establishing a GIS based street flooding event data base. This would involve establishing a flood event spotting and reporting system to track the occurrence, duration, approximate size and depth, preceding weather conditions and tides and integrating these data into a geo-referencing data base;
- Evaluate the principal causes of street flooding by location including but not limited to system hydraulic limitations situational hydraulic limitations (e.g. pipe or catch basin clogs, not enough inlets), changes in run-off characteristics, etc.;
- Targeted flow monitoring and the extension of the H&H model by Camden in flood prone segments of the Camden collection system within reasonable proximity to a regulator structure. This would could be implemented after the restoration of the hydraulic capacities through cleaning and the observation as to the impacts of this restoration on the occurrences of street flooding;

Section 5
Additional Structural Controls

5.1 Additional Control Requirements

The system wide control target of 85% capture cannot be met through the wet weather treatment capacity increase and source reduction alone, therefore sub-system level controls using satellite control facilities was evaluated. The anticipated levels of CSO controls with the expansion of CCMUA's WPCF # 1 to 185 MGD plus a system-wide 10% reduction in DCIA are shown in Table 5-1.

Table 5-1 – Typical Year Capture Impacts of Controlling Runoff from DCIA by 10%

System / Sub-System	WPCF # 1 @ 185 MGD, Camden Hydraulic Capacity Restored	Add 10% Control of Runoff in DCIA
System-Wide	78%	81%
Sub-System		
Delaware R. – Camden	89%	91%
Delaware R. – Gloucester	69%	74%
Delaware R. - Back Channel	69%	72%
Cooper River	70%	75%
Newton Creek	85%	87%

Additional CSO controls will be evaluated for three of the five sub-systems to achieve the control objective of 85%system-wide wet weather capture during the Typical Year. It should be noted that the controls evaluated to achieve 85% system-wide wet weather capture will be sized to also achieve 85% capture in each individual sub-systems.

The 85% capture target for the Delaware River – Camden subsystem will be achieved through the expansion of the wet weather treatment capacity at WPCF # 1 to 185 MGD along with modification to the C-3 regulator structure and its operating rules. The expansion of the WPCF#1 will also help the Newton Creek subsystem in achieving 85% capture.

Due to their hydraulic isolation (varies pump stations) from the WPCF #1, the Delaware River – Gloucester City, the Delaware River Back Channel and the Cooper River sub-systems would not achieve increased capture with the potential expansion of the plant treatment capacity. The hydraulic limitations in the existing Camden and Gloucester interceptor sewers preclude the conveyance of additional wet weather flows to WPCF #1. Moreover, the additional conveyance option is mooted by the infeasibility of expanding the wet weather capacity at the WPCF beyond 220 MGD (see Chapter 5.3.2 of the DEAR report).

Ultimately, there are only four broad options for controlling combined sewer overflows:

1. Source reduction – through the removal or reduction of stormwater through green stormwater infrastructure or sewer separation;
2. Conveyance of wet weather flows to a central treatment facility;
3. Satellite storage of wet weather flows until they can be bled back into the combined sewer system for centralized treatment; or
4. Satellite treatment at or near the CSO outfall to provide at least the equivalent of primary treatment and disinfection.

CCMUA proposes to achieve 85% capture in the Delaware River backchannel subsystem through the reduction of wet weather flows from Pennsauken Township and increasing the wet weather flow rates through the Baldwins Run pump station.

Satellite storage or treatment will be required to achieve 85% capture in the Cooper River and Gloucester City sub-systems. The required capacities for these facilities are shown on Table 5-2. Capacity requirements are bracketed based on the achievement of 0% and 10% reductions in DCIA. A ten percent reduction in DCIA is the target established by CCMUA and the Cities as noted in Section 3 of this report. Zero percent reduction reflects the baseline current conditions and is used as a worst-case scenario. After the green stormwater program outlined in Section 3 has been underway for a while, the achievability of the 10% DCIA reduction goal can be re-evaluated.

Table 5-2 – Required Satellite Control Capacities

Sub-System	Locations	With 10% DCIA Reduction		Without 10% DCIA Reduction	
		Storage Volume in Million Gal.	Treatment Capacity in MGD	Storage Volume in Million Gal.	Treatment Capacity in MGD
Delaware River – Gloucester	G-4 / G-5	0.6	4.1	1.2	6.8
	G-1	0.5	2.3	0.7	4.4
Cooper River	C-22 / C-22A	1.3	20	2.6	21
	C-27 / Thorndyke	3	20.4	3.5	38.5
	C17	NA	NA	0.4	4.8

5.2 Overview of Alternative Control Technologies Evaluated

5.2.1 Satellite Treatment

Treatment Process Overview

Enhanced high-rate clarification (EHRC) has been used as the satellite treatment process for planning purposes. The term EHRC is generally used to describe a physical-chemical process in which coagulant and polymer are added to wastewater to remove solids from the stream.

5.3.2 Treatment and Storage Cost Estimation

Generic planning level capital, operation and maintenance (O&M) and life-cycle costs for Enhanced High Rate Clarification and for storage facilities have been developed utilizing process equipment manufacturer data as presented in the January 2018 PVSC Updated Technical Guidance Manual (TGM) that was included as Appendix A in the approved CCMUA / Camden / Gloucester Development and Evaluation of Alternatives Report.[5-1]

5.3.3 Permittee Specific Cost Estimates

Detailed capital and O&M cost estimates have been developed for the Cities of Camden and Gloucester and for the CCMUA. These estimates are premised upon 1) the inclusion of green stormwater infrastructure sufficient to reduce the directly connected impervious areas of Camden and Gloucester by 10%, and 2) that each permittee will be responsible for the future capital and operating costs of CSO controls located within their respective collection systems.

City of Camden

The estimated capital costs (in 2020 dollars) and O&M costs for satellite treatment and for satellite storage at Camden regulators C-22 & C-22A (Cooper River) and C-27 & Thorndyke (Cooper River) are shown on Tables 5-4 and 5-5.

Table 5-4 – Camden CSO 85% Typical Year Wet Weather Capture Control Cost Estimates*

Sub-System	Treatment		Storage	
	Capacity in MGD	Cost	Capacity in MG	Cost
Cooper River				
C-22 / C-22A	20 MGD		1.2 MG	
Construction Cost		$8,316,000		$10,447,000
Land Acquisition & Remediation		$605,000		$605,000
28% Non-Construction		$2,328,000		$2,925,000
Total Capital		$11,249,000		$13,977,000
50% of Construction for Contingency		$4,158,000		$5,223,500
Total With Contingency		$15,407,000		$19,200,500
C-27 / Thorndyke	20 MGD		1.2 MG	
Construction Cost		$8,316,000		$21,765,000
Land Acquisition & Remediation		$770,000		$770,000
28% Non-Construction		$2,328,000		$6,094,000
Total Capital		$11,414,000		$28,629,000
50% of Construction for Contingency		$4,158,000		$10,882,500
Total With Contingency		$15,572,000		$39,511,500
Total Cooper River				
Construction Cost		$16,632,000		$32,213,000
Land Acquisition & Remediation		$1,375,000		$1,375,000
28% Non-Construction		$4,657,000		$9,020,000
Total Capital		$22,664,000		$42,608,000
50% of Construction for Contingency		$8,316,000		$16,106,500
Total With Contingency		$30,980,000		$58,714,500

[5-1] Tables 2-18 through 2-22 for ballasted flocculation facilities and Tables 2-29 through 2-31 for disinfection.

construction contingency and are therefore lower than the total capital costs shown in Table 5-6 which do include construction contingencies.

It should be noted that the estimated costs for controls in the Camden combined sewer system shown above in do not include the costs of eliminating overflows from the lower Cooper River described in Section 5.4.2 concerning the reclassification of lower Cooper River to a C-1 (exceptional ecological significance) designation usage, thereby potentially triggering a requirement for the complete elimination of combined sewer overflows. As demonstrated in Section 5.4.2 the elimination of all overflows is financially not achievable and is not included in the proposed long term control program defined in this SIAR.

Gloucester City Cost Estimates

The estimated capital costs (in 2019 dollars) and O&M costs for satellite treatment and for satellite storage serving Gloucester are shown on Table 5-6. The estimated capital costs for a treatment based approach to achieving 85% wet weather capture in Gloucester is approximately $27 million. Estimated capital costs for storage are $45 million.

Incremental annual costs for Gloucester would range between around $2.0 million for the treatment option and $3.0 million for the storage options as shown on Table 5-7. These figures include financing of the capital costs through the N.J. Clean Water SRF as was the case for Camden.

Table 5-6 – Gloucester CSO Control Cost Estimates

Sub-System	Treatment		Storage	
	Capacity	Cost	Capacity	Cost
Gloucester City - Delaware River				
Satellite Treatment or Storage	6.4 MGD		1.1 MG	
Construction Cost		$10,943,000		$20,895,000
Land Acquisition & Remediation		$550,000		$550,000
28% Non-Construction		$3,064,000		$5,850,000
Total Capital		$14,557,000		$27,295,000
50% of Construction for Contingency		$5,471,000		$10,447,000
Total With Contingency		$20,028,000		$37,742,000
10% DCIA Reduction via GSI				
Construction Cost		$3,993,000		$3,993,000
28% Non-Construction		$1,118,000		$1,118,000
Total Capital		$5,111,000		$5,111,000
50% of Construction for Contingency		$1,996,500		$1,996,500
Total With Contingency		$7,107,500		$7,107,500
Total Gloucester Capital Costs				
Construction Cost		$14,935,000		$24,887,000
Land Acquisition & Remediation		$550,000		$550,000
28% Non-Construction		$4,182,000		$6,968,000
Total Capital		$19,667,000		$32,405,000
50% of Construction for Contingency		$7,468,000		$12,444,000
Total With Contingency		$27,135,000		$44,849,000

* Excludes future costs for system renewal and replacement necessary to maintain design capacities.

Table 5-7 – Gloucester CSO Control Estimated Annual & Life Cycle Costs

Present Worth & Annual Cost Calculations	Treatment & Green	Storage & Green
Annual O&M Cost Estimates		
Non-GSI		
	$394,000	$118,000
GSI Costs	$33,000	$33,000
Total Annual	$427,000	$151,000
Present Worth		
Present Worth of O&M	$6,504,000	$2,300,000
Plus Capital Costs (without contingency)	$19,667,000	$32,406,000
Total Present Worth	$26,171,000	$34,706,000
Estimated Annual Costs		
Debt Service Payments	$1,322,000	$2,178,000
Annual O&M	$427,000	$151,000
Total Annual Costs	$1,749,000	$2,329,000

CCMUA Cost Estimates

The estimated capital costs for CSO controls for CCMUA total approximately $80 million as detailed on Table 5-8. This figure includes $36.6 million for the expansion of the wet weather capacity at WPCF # 1 from 185 MGD to 220 MGD and $44.3 to reduce overflows from CCMUA's C-32 regulator sufficiently to achieve 85% capture of wet weather flows during the Typical Year.

Table 5-8 – CCMUA CSO Control Capital Cost Estimates

Sub-System		Cost
Delaware Back Channel		
C-32		
Construction Cost		
Regulator Modifications		$156,300
Flow Restriction Modification		$39,100
Source Reduction		$19,379,300
Baldwins Run PS Modification		$5,000,000
Subtotal Construction		$24,574,700
Land Acquisition & Remediation		$550,000
28%	Non-Construction	$6,880,900
Total Capital		$32,005,600
50%	of Construction for Contingency	$12,287,300
Total With Contingency		$44,292,900

5.4 Cost / Performance Considerations

5.4.1 Cost / Performance Evaluation

The Cities of Camden and Gloucester and CCMUA have determined that the Presumption Approach[5-2] should be used as the basis for their CSO control strategies and have established the control of 85% of wet weather flow volume generated during the Typical Year as the CSO control performance target.

Paragraph G-5(a) of the respective NJPDES permits require that permittees utilizing the Presumption Approach to analyze various levels of CSO controls to determine where the increment of pollution reduction achieved in the receiving waters diminish compared to the increased costs. Such an evaluation often is referred to as a "knee of the curve" analysis.

For this analysis, CCMUA and the Cities initially evaluated the relationship between the frequencies of overflows from the 30 active outfalls during a Typical Year and the volumes of combined sewage discharged from the overflows. As is typical for combined sewer systems with diverse sewershed sizes and land use characteristics, there is little correlation between overflow frequencies and annual overflow volumes from individual out falls. This is shown graphically for the Camden / Gloucester / CCMUA combined sewer system on Figure 5-3.

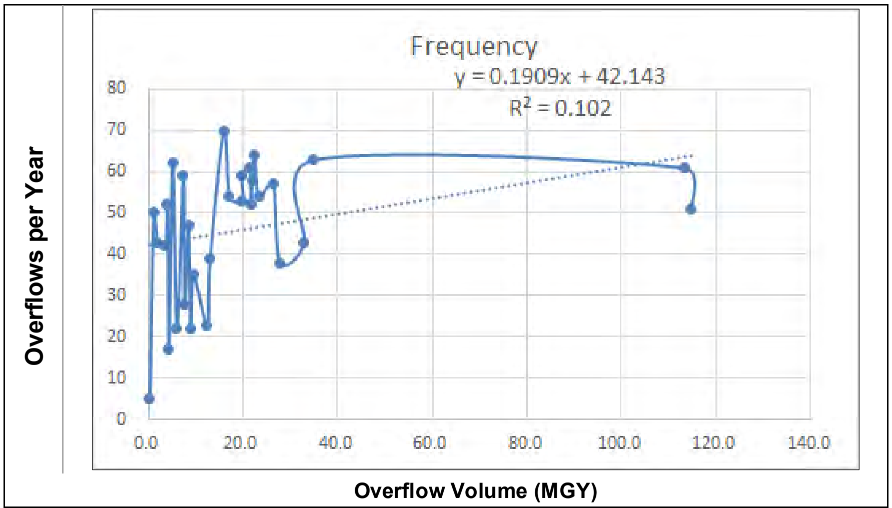


Figure 5-3 – Correlation Between Overflow Frequencies and Annual Discharge Volumes

The variability in overflow volumes between outfalls and the weak relationship between frequency and volume supports the selection of the 85% system-wide capture performance standard. The use of an overflow-event based performance target, if strictly applied across the 30-outfall system, e.g. 4 to 6 overflows per year, could require that controls be in place at every outfall that exceeds the target frequency under baseline conditions. Therefore, decisions as to where to allocate scarce resources would not be driven by the optimization of overflow reduction benefits, as compared to a more flexible volume-based target applied at the system or sub-system level.

The modeling performed for this cost-performance analysis indicates that achieving 85% capture system-wide will reduce annual CSO volumes by roughly 485 million gallons. This level of CSO

[5-2] Under the USEPA CSO Control Policy (59 FR 18692) a CSO control program that eliminates or captures for treatment no less than 85% of the volume of combined sewage that is collected in the combined sewer system during precipitation events during a Typical Year would be presumed to provide an adequate level of control.

reduction approximates (and slightly betters) that which would be accomplished with control levels between eight and twelve overflows per year.

As shown on Table 5-10, the estimated capital costs for system-wide 85% control is around $200 million (excluding construction contingencies). This figure is based on the averaging of the system-wide costs using satellite treatment and those using satellite storage and is net of the 50% construction contingency. The $200 million estimated compares with the approximately $450 million in estimated capital costs for reducing overflows to eight times per Typical Year. A cost-control level curve showing the CSO removal volumes at CSO frequency controls ranging from twenty overflows per year down to zero is presented in Figure 5-4. Included on this graph are the costs and overflow removal volume under an 85% capture strategy. A corollary cost curve showing the Typical Year remaining annual CSO volumes is shown in Figure 5-5.

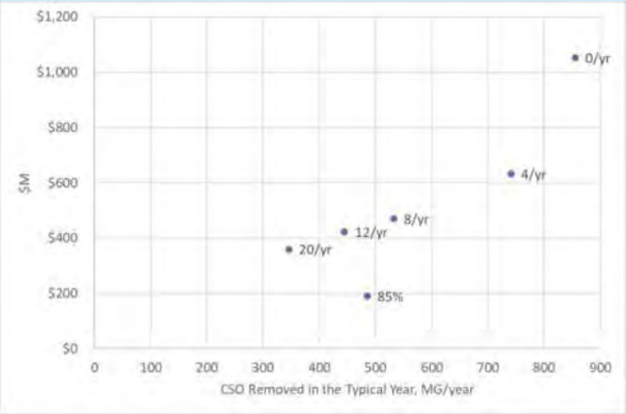


Figure 5-4 – Cost / Performance Relationship of Overflow Frequency Based and 85% System-Wide Capture Control Strategies – Typical Year Overflow Reduction Volumes

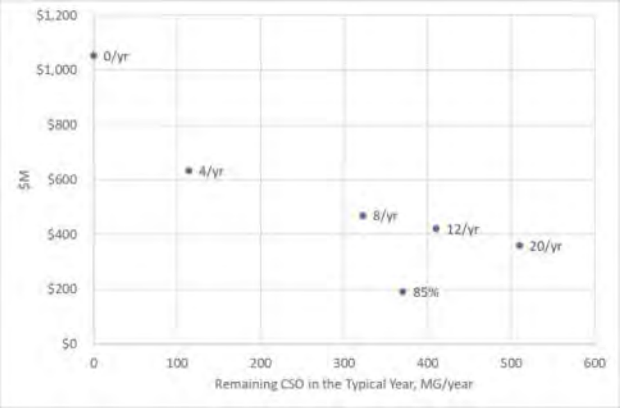


Figure 5-5 – Cost / Performance Relationship of Overflow Frequency Based and 85% System-Wide Capture Control Strategies – Typical Year Remaining Overflow Volumes

5.4.2 Potential Impacts of Cooper River Designated Use Reclassification

On April 6, 2020 NJDEP finalized a change in the use designation of the segment of the Cooper River from the U.S. Route 30 crossing to the confluence with the Delaware River from FW-2NT (fresh-water non-trout) to Category 1. Category 1 waters are those listed in N.J.A.C 7:9B1-15(c) as having exceptional ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resources.

Figure 5-6 – Eastern Pondmussel *(Ligumia Nasuta)* – photo source: Conserve Wildlife Foundation of N.J.

Section 7

Selected Long Term Control Program

7.1 Selected Long Term Control Program Overview

The selected long term control program consists of six program elements that will have phased and overlapping implementation schedules (detailed in Section 8). These six elements are:

1. ***Completion of Current Projects* -** Timely completion of ongoing control projects including the capacity expansion of CCMUA's Delaware Water Pollution Control Facility # 1 to 185 MGD, the restoration of the hydraulic capacity of Camden's combined collection sewer system through a comprehensive sewer cleaning and rehabilitation program and related capital improvements such as the upgrading of Camden's Arch Street pump station capacity.

2. ***Efficacy Evaluation*** - The evaluation of the efficacy of these current improvements through comprehensive flow monitoring which will inform the refinement and recalibration of the existing hydrologic / hydraulic model to then current conditions. This will establish a new baseline of overflow statistics informed by the wet weather operating history with these capacity improvements in place. Similar evaluations may occur after the implementation of the formalized green stormwater infrastructure and the street flooding mitigation program elements.

3. ***Formalized Green Stormwater Infrastructure Program*** – Accelerating green stormwater infrastructure through a coordinated, formalized and expanded GSI Implementation Program with the goal of achieving a ten percent reduction in the directly connected impervious areas contributing stormwater runoff to the combined sewer system.

4. ***Street Flooding Mitigation Program*** – The development and rapid implementation of a comprehensive Street Flooding Mitigation Program will be developed within the City of Camden to provide an empirical understanding of the frequency, location and extent of street flooding remaining after the Camden sewer system is cleaned. This will serve as the basis for short and long term operational and capital improvements.

5. ***Cooper River Water Quality Optimization Program*** – The Cooper River is an important environmental, recreational and economic asset for the City of Camden's economic redevelopment. Eliminating Camden's CSOs from the Cooper River is not financially feasible and would not result in water quality compliance. CCMUA and the City of Camden are committing to the work with the other Cooper River municipalities, stakeholders and NJDEP to develop a **Cooper River Water Quality Optimization Strategy** during the first NJPDES permit cycle after this SIAR is approved.

6. ***Additional Structural Controls*** – Within the limitations imposed by affordability constraints, structural controls in each of the five sub-systems that will raise the level

of CSO capture in each sub-system and system-wide to no less than 85% of wet weather flows during the Typical Year.

Due to the extremely limited affordability and financial capabilities of the Cities of Camden and Gloucester, as demonstrated in Section 6, these controls will require significant external funding and will likely need to be implemented over an extended period of time as resources permit.

Each of these program elements are described in further detail in Sub-section 7.2. The anticipated cumulative CSO control performance as the program is implemented is shown on Table 7-1.

Table 7-1 – Project Cumulative CSO Control Levels as the Program is Implemented

Program Element		**System Wide**	**Delaware River - Camden**	**Delaware River-Gloucester**	**Delaware River – Back Channel**	**Cooper River**	**Newton Creek**
Baseline	**Baseline Conditions**						
	Percent Capture	69%	71%	69%	69%	69%	79%
	Overflow Volume (MGY)	822.9	404.7	75.8	140.2	170.5	31.7
	Modeled Street Flooding (MGY)	79.7	52.3	6.5	1.9	8.7	10.4
Program Element 1	**System Optimization - Completion of Current Projects**						
	Percent Capture	78%	89%	69%	69%	70%	85%
	Overflow Volume (MGY)	579.9	167.3	75.3	142.0	170.4	24.8
	Modeled Street Flooding	33.0	13.8	6.4	0.6	6.9	5.2
Program Element 2	**Efficacy Evaluation**	This program element will evaluate the levels of control achieved after the completion program elements 1 and may also be conducted as needed after program elements 3 and 5.					
Program Element 3	***Formalized Green Stormwater Infrastructure Program (results of 10% DCIA reduction)***						
	Percent Capture	81%	91%	74%	72%	75%	87%
	Overflow Volume (MGY)	487.0	135.3	63.9	125.3	141.5	20.9
	Modeled Street Flooding	24.4	10.3	4.7	0.3	4.9	4.2
Program Element 4	***Street Flooding Mitigation Program***	The CSO control impacts of the street flooding mitigation cannot be quantified prior to its development and implementation.					

Program Element		**System Wide**	**Delaware River - Camden**	**Delaware River-Gloucester**	**Delaware River – Back Channel**	**Cooper River**	**Newton Creek**
Program Element 5	***Cooper River Regional Water Quality Optimization Strategy***	This program element will not directly impact CSO overflow levels. It will identify steps that CCMUA, Camden, NJDEP and the other Cooper River municipalities can take to improve water quality and enhance safe recreational use of the Cooper River.					
Program Element 6	***Additional Structural Controls*** (statistics are for satellite storage for Del-GL and Cooper)						
	Percent Capture	86%	91%	85%	85%	85%	87%
	Overflow Volume (MGY)	341.5	135.3	35.2	68.0	82.2	20.9
	Modeled Street Flooding	<24.4	<10.3	<4.7	<0.3	<4.9	<4.2

7.2 Program Element 1 – Completion of Current Projects

7.2.1 Treatment Plant Capacity Expansion

In 2016 CCMUA proactively undertook the expansion of treatment capacity at its Delaware Water Pollution Control Facility No. 1 from 150 MGD to 185 MGD. Improvements required for this increase include:

- *Influent Pump Upgrades* – CCMUA is completing a major capacity expansion of its influent pumping capacities including upgrading two of the four pumps from 45 MGD to 60 MGD, resulting in a firm pumping capacity of 180 MGD with one pump out of service and a total pumping capacity of 240 MGD. Improvements also include new high efficiency variable frequency drive motors and related upgrades to the power distribution equipment.

- *Process Train Hydraulic Improvements* – CCMUA is reducing hydraulic bottlenecks in the primary sedimentation tankage piping and channels to enable full treatment of up to 185 MGD.

7.2.2 City of Camden Hydraulic Capacity Restoration

The City of Camden is currently undertaking a number of projects intended to restore and optimize the use of the design hydraulic capacities of its collection system:

- *Collection System Cleaning and Spot* Repairs – Through its collection system contract operator, American Water Operations & Maintenance LLC, Camden has embarked on a multi-year project to address deferred cleaning and to make spot repairs within its collection system.

- *Regulator Rehabilitation* – Camden undertook a comprehensive system-wide inspection of its regulator structures which determined that the regulator mechanisms required extensive repairs. Repairs have been prioritized for the regulator mechanisms for Camden regulators C-1 through C-9, thereby enabling the control of

5. Identify and support feasible and implementable green stormwater management, other source reduction and modifications as appropriate of municipal and county land use and redevelopment regulations and policies that enhance compliance with MS-4 requirements and reduce the impacts of non-point source runoff.

7.7 Program Element 6 – Sub-System Additional Structural Controls to Achieve 85% Capture

Subject to changing conditions and understanding, e.g. as a result of flow monitoring and model updates under program element 2, CCMUA and the Cities of Camden and Gloucester propose the following suite of structural controls that along with the GSI will achieve the 85% wet weather capture during the Typical Year control performance goal.

- ***Delaware River – Camden***: CCMUA will undertake modifications to the C-3 regulator structure and implement revised wet weather operating procedures. These, coupled with the completion of the capacity expansion at WPCF # 1 to 185 MGD will enable 85% capture from the Delaware River – Camden sub-system.

- ***Delaware River – Gloucester***: A satellite control facility will be installed to capture overflows from the G-4 and G-5 regulators. This could be either a 2.4 million gallon storage tank or a 31.9 high rate wet weather treatment facility that would provide at least the equivalent of primary treatment as well as for disinfection and dechlorination (as necessary depending on the disinfection approach selected).

- ***Cooper River***: Satellite control facilities will be installed in two locations. One facility will capture flows from Camden regulators C-22 and C-22A and have either a storage capacity of 1.2 million gallons or a 20 MGD treatment capacity. It is anticipated that the location will be adjacent to or in the vicinity of Camden's Federal Street pump station. The second facility will capture flows from Camden's C-27 regulator and from the Thorndyke Street outfall, which receives flows from several upstream regulators. This facility would have a storage capacity of 3.0 million gallons or a treatment capacity of 20.1 MGD located near the Thorndyke outfall.

- ***Delaware River Back Channel***: The 85% control target will be achieved in the Delaware River Back Channel through two projects. First, the stormwater (?) wet weather/ combined sewer flows that are currently discharged from the Pennsauken Township sanitary [storm] sewer system into the Camden combined system via Pennsauken's High Street regulator structure will be re-routed for discharge to the Delaware River back channel after treatment and disinfection. The second component of the Delaware Back Channel controls will be the modification and reconfigurations of regulator structures and power supplies associated with the Baldwins Run pump station to enable full utilization of its 25 MGD capacity.

- ***Expansion of CCMUA's WPCF #1 Wet Weather Treatment Capacity:*** As detailed in Section 2 of this SIAR; CCMUA has evaluated the potential to expand the wet weather treatment capacity of its WPCF up to 220 MGD as determined necessary in the future.

CCMUA and the Cities recommend against the selection between satellite storage and treatment at this time. As will be detailed in Section 8 (Implementation), the proposed structural controls outlined above are proposed not to occur until after the results of program elements one through four are fully implemented and their impacts on CSO evaluated though flow monitoring and modeling. Moreover, additional advancements in wet weather treatment and storage technologies and in are likely to occur. In addition, water quality standards or other regulatory requirements may change, e.g. as a result of DRBC's current water quality monitoring efforts.

Another reason to defer a decision on the satellite control technology is uncertainty as to the feasibility of reaching the 10% DCIA reduction target. The targeted 10% reduction in DCIA is aggressive and unlike structural controls such as satellite storage or treatment, the implementation of green infrastructure, the timing and scope of green stormwater projects are not completely under the control of the Cities.

Should the 10% DCIA goal prove to be unachievable in a regulatorily acceptable time-frame, the capacities of the satellite treatment facilities described in Section 4 that are anticipated to be necessary to achieve 85% system-wide wet weather capture would be upsized. The estimated revised facility sizes required with a zero percent reduction in DCIA are shown on Table 7-3 to bracket the sizes needed.

Table 7-3 – Control Facility Sizing Implications of Zero DCIA Reduction

Sub-System	**Locations**	**Required Capacities**			
		Storage (MGY)		**Treatment (MGD)**	
		0% DCIA Reduction	**10% DCIA Reduction**	**0% DCIA Reduction**	**10% DCIA Reduction**
Delaware River – Gloucester	G-4 / G-5	0.6	1.2	4.1	6.8
	G-1	0.5	0.7	2.3	4.4
Cooper River Newton Creek	C-22 / C-22A	1.3	2.6	20	21
	C-27 / Thorndyke	3	3.5	20.4	38.5
	C-17	NA	0.4	NA	4.8

The final size requirements of satellite facilities will be finalized after the GSI Implementation Program has been implemented long enough to determine the level of GSI that is achievable and the system performance with the green and other improvements has been quantified through future flow monitoring and modeling.

7.8 Implications of the Financial Capability Assessment

7.8.1 Problem Statement

The long term CSO control planning process set forth in the NJPDES permits is based on the logical progression from system characterization to a broad evaluation of control alternatives to the selection of the optimal control strategy for a given permittee. Included in this process is a consideration of the impacts of the long term controls on ratepayer affordability and on the permittee's financial capability to finance the controls. Per the USEPA CSO Control Policy, these financial factors serve to inform the setting of the implementation schedule for the long term controls.

CCMUA / Camden / Gloucester

Responses to NJDEP Comment Letter of May 7, 2021

Camden Project Status

Attachment B

ATTACHMENT B

CITY OF CAMDEN RESPONSES TO NJDEP COMMENTS 3 AND 17(a)

TABLE OF CONTENTS

A: CLEANING OF SEWERS

To adequately respond to providing a timeline for completion of sewer cleaning as addressed in the LTCP it is necessary to provide the following background. The City and its contract operator, AWO&M have focused significant attention to address cleaning as well as the many factors impacting this work. Rather than shy away from problems the City/AWO&M have aggressively addressed the issues to include allocating substantial additional funds. It is noted that these efforts have continued as the City addresses similar difficult hurdles in the water system with PFAS contamination and in the billing and collection efforts with poor records left by the City's prior contractor and the impacts of COVID-19.

Background

In 2015, as Camden sought proposals on a new operating contract for their water and sewer systems, there was a concerted effort to improve the sewer cleaning efforts from the prior contract. Based upon limited available historical information from that contract, the City and AWO&M projected a three-year cleaning program to make a first pass through the entire system of 194.5 miles at an estimated cost of $4,000,000. This estimate was quickly identified as insufficient. Camden and AWOM negotiated an amendment to the agreement based upon the first two years of actual results projecting it would take about five years to complete and require additional City expenditures more than doubling the projection to $9,200,000.

In the third year of the contract, a higher than normal rainfall period highlighted a new concern. The cleaning efforts with the large percentage of the sewer system being brick, resulted in a significant increase in sewer collapses. An analysis of sewer collapses showed that cleaned sewers were five to six times those more than collapses on sewers not cleaned. Compounding that finding was at that time the ratio of uncleaned to cleaned sewers was over two to one. Maintenance, Repair and Replacement (MR&R) costs were readjusted to address these collapse responses. A decision was made to expedite the corrective actions on pipe of the poorest condition. Exhibit A shows sinkholes (collapses) to date overlaid on "cleaned" versus "to be cleaned" pipe (Note there is no detail listing of data but with the modified approaches, the ratio is reduced). Exhibit B shows cleaned pipe by category ratings.

Prior to the new contract, the City's corrective actions were replacement programs as larger Capital Improvement Programs. The process took multiple years to complete. It began with a consultant reviewing all CCTV work to identify locations in need of replacements, then proceeded through normal review and approval process through City and State Agencies. However, the most significant impact of delay came from changes to the project scope of sewer replacements with the growing influx of road reconstruction work. This work was properly and justifiably inserted into the funded work but work deleted further delayed replacement of deteriorating lines.

The City / AW Teams with the use of NASSCO (National Association of Sewer Service Companies) certified CCTV technicians eliminated the post review of data to have a more current identification of immediate needs to reduce the risk of cleaned pipe collapses. An approach of utilizing in place relining of sewers was investigated and recommended as a more timely and cost effective approach. With most of the City's brick sewers being egg shaped, there were still developing approaches to these lining efforts. In 2020, a pilot project was identified, implemented and proved successful. As a result, the City and AWO&M are now immediately addressing spot repairs. Projected costs for implementing relining rather than replacement program were prepared showing significant cost benefits to Camden.

Overall, cleaning efforts have been impacted by other issues. The most significant being that the projected cost of cleaning the sewers continues to rise as the volume of material in the sewers removed is large and found to be highly concentrated in some areas, which are not readily predictable or identifiable in advance. With concerns on storm related flooding and associated Capital Improvement Projects such as Tiger Grant and County projects, at this time, the City & AWO&M approach is to address priority areas identified by these concerns.

Cleaning Cost Projection Update

Again, the City has reviewed cost expenditures to date and updated projections to complete the first pass cleaning effort. The previous amendment anticipated cleaning efforts would balance between the first two year results. Through CY2 through CY5, Camden has sustained that projected cost for cleaning efforts. What has been found is that the past three years generated costs exceeding the earlier projection and more paralleling the results of CY2 and exceeding that at times. The efforts of CY6 to date greatly highlight extreme efforts required at some locations in the City. For CY6, through April the unit cost per foot averaged over $32, almost three times the average for the first five years! With May results the average dropped but still is almost two times the five year average. Unexpected pockets of large volumes may be found in other sections of the system.

These updated projections are based upon results to date, and allowances for continuing to find problem areas as the remaining sections have largely been cleaned only to remove blockages. The projections are based on sustaining the current level of funding for cleaning efforts. This level of effort is sustained based on consideration of the following:

- There is a limited supply of third party resources to perform the cleaning.
- While additional equipment could be solicited, the availability and management of certified of CCTV technicians, AW supervision, traffic control, and other related issues will likely result in problems quickly diluting the cost efficiencies now in place.
- Funding increases by the City will require additional income most likely from rate increases that are currently under study but not expected to be adjusted in the near term.
- Funding needs to be identified and implemented for the immediate short term addressment of a cost effective relining program for Category 5 rated sewers. Category 5 is a NASSCO classification, which is defined as in danger of immediate failure or with

an expected failure within five years. (See Exhibit C (NASSCO Classifications) and Exhibit D (Category 5 Locations))

- Funding needs to then be addressed for Category 4 (Poor) rated sewers. These sewers are rated as having an expected life remaining of up to 10 years. As there are slightly more Category 4 sewer lines than Category 5, a preliminary projection should be to use the Category 5 numbers with some allowances to address the timing in years 6 through 10, cost increases and contingencies.

CCTV results of the prior contract, showed about 1/3rd of the system was found to be Category 1 (Excellent - projects an unforeseeable expected life), 1/3rd as Category 2 and 3 (Category 2 (Good) rating projects expected life of over twenty years; Category 3 (Fair) rating an expected life of 10 to 20 years), and a third as Category 4 and 5. CCTV results from the AWO&M contract (larger volume of data) are slightly better. With Category 1 at 40%, 2 at 12%, 3 at 20%, 4 at 15% and 5 at 13%, findings show the City system while very aged over half of the system has a remaining life expectancy of twenty or more years. As stated above just under 15% of the system was found to be in the Category 5 rating i.e., needing immediate action within the next five years.

On the negative side of this finding is that the presence of more material in the pipe requires repeated cleaning passes. These repeated passes present serious erosion problems to the brick sewer mortar. The ultimate solution may require a continuing long term if not permanent lining program to protect the brick sewers.

Of concern to the City/AWO&M Team is the level of cleaning effort required to perform a repetitive and ongoing cleaning schedule after the first pass. Of primary concern is the fact that the cleaning effort with the removal of large amounts of material results in some residuals flowing downstream, not being removed and requiring removal at a later time. To verify and assess any such impacts, the intent is to select certain sections of pipe cleaned several years ago and examine. Just as the lining efforts for egg shaped sewers presented unique challenges, the use of technology such as the SL-RAT to perform these assessments does also. We are investigating this equipment to augment our efforts.

The attached spreadsheet (Exhibit E) summarizes this information. It shows the original three year cleaning schedule and $4,000,000 cost now could be eight and a half years and almost $13,300,000.

Please note that these costs do not include the disposal costs with material and debris removed from the sewer systems. From commencing the partnership, 4,176 tons of material have been removed in cleaning operations through May 31, 2021. Street sweeping efforts are provided to minimize the introduction of additional waste into the system and in the corresponding period resulted in 3,745.3 tons removed and an additional 940 tons in the MS4 area. For full disclosure of cleaning efforts, the CSO Netting facilities have removed an additional 1,025 tons since the current contract began (includes nets).

Cleaning Schedule

Based upon the experience of the City and its O&M Partner, AWO&M over the past five years and a thorough analysis of performance data, the City projects that the initial cleaning pass of the entire combined and sanitary sewer systems will be complete as of June 30, 2023. The City believes this to be a very realistic target date.

Due to various unknowns associated with the cleaning operations in particular, where sections of heavy debris may exist, there may be an unforeseen need for additional time. This possible additional need has and will continue to be monitored monthly. The AW Team provides as part of their monthly progress meeting, detailed information on cleaning work performance. While monthly fluctuations have been seen, these are best assessed over an extended period of time. Camden proposes in order to keep NJDEP updated if such conditions arise, i.e. heavy deposit areas or other unexpected circumstances, that the City of Camden will provide a quarterly update of information similar to that presented in Exhibit E.

As shown there, the impacts identified by contingency allocations could be significant and result in possible extended time needs of up to a year or more.

B: CSO REGULATOR REHABILITATION

Camden's CSO Regulator Rehabilitation Project began in October 2020, after significant delays. At the City's requests to NJDEP and AWO&M considering the proprietary technology of the regulators after the inspection and assessment report prepared in 2016 by Waterware (under the AWO&M contract), the project was assigned to AWO&M on a cost plus basis. Waterware is the surviving technology firm who provided and installed the regulators in the 1960s. They also renovated the regulators under a CCMUA contract in the 1990s. From 2017 until 2020, there were delays associated with permitting, loans and contract modifications. However, as stated, the work began in October on the two year project. At this time, the work is on schedule and approximately 30% complete. It is anticipated the completion will meet the October 2022 schedule. Exhibit F is a copy of notes from a recent Biweekly Progress Meeting with updated schedule.

C: CSO OUTFALL PROJECTS

The City of Camden previously split the CSO Outfall Projects into two projects The first project, considered the priority outfalls were done under an inter-municipal Shared Services Agreement by CCMUA for the City with significant coordination and input from the City's Contract Operator AWO&M. These outfall upgrades were completed earlier this year and are in service.

The City scope of work for this project includes the rehabilitation of approximately 10 stormwater sewer outfalls, 12 combined sewer outfalls, and associated structures. This shall include but not be limited to outfall cleaning, repair of outfall pipes and related structures. This was contracted for design to RVE and the work was completed in September 2018. These documents will need to be updated (i.e., wage rates, boiler plate, etc.). There are 2 separate specifications for this project:

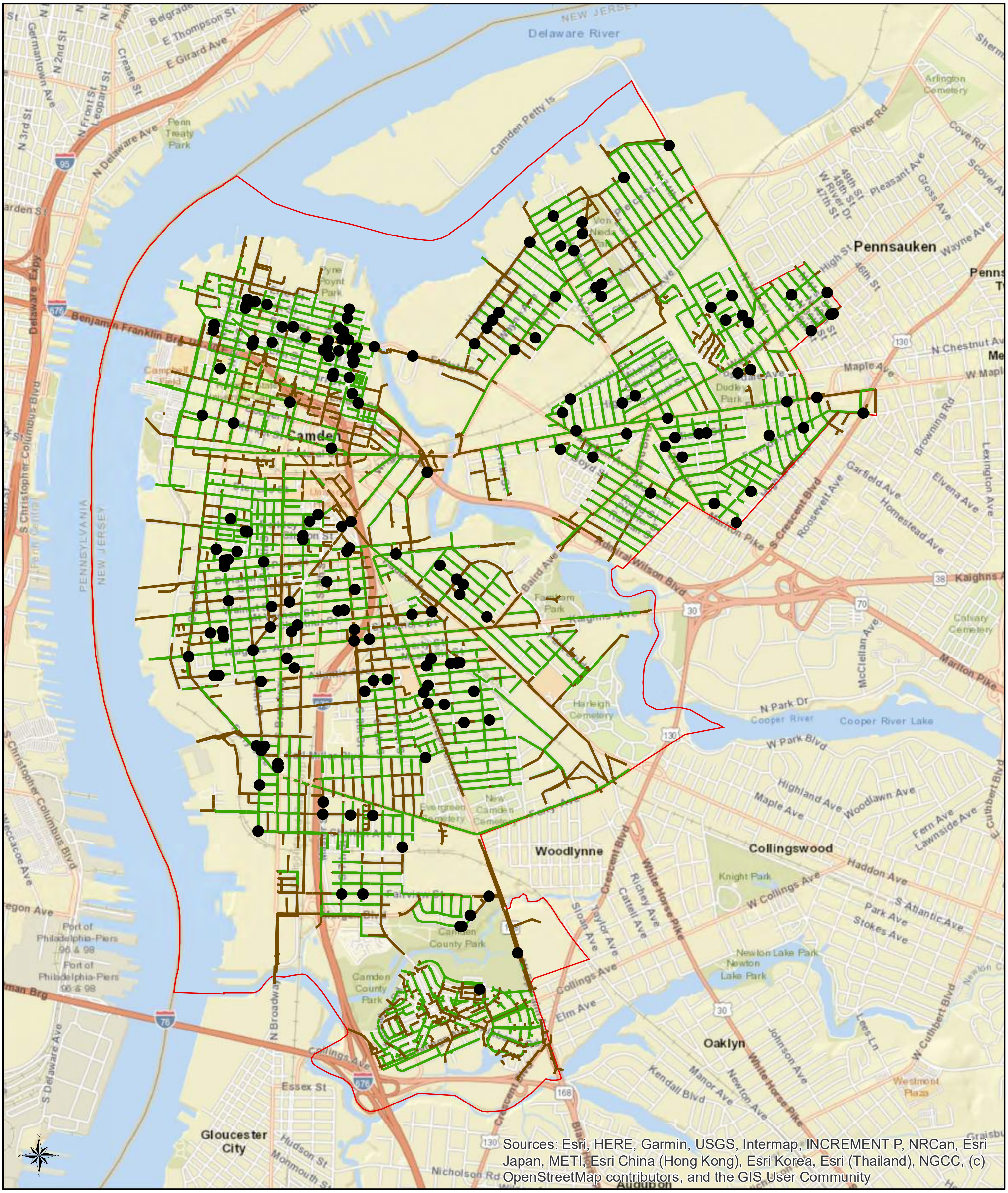
- Combined Sewer Outfalls - Contract Time: 120 Days
- Storm Sewer Outfalls - Contract Time: 150 Days

The City Engineer and NJDEP have been addressing review comments. NJDEP issued an initial review and questions response. The City responded and is awaiting response from NJDEP that is anticipated by the end of June. Upon approval of NJDEP, City will advertise for CM services for the work shortly followed by construction advertising in the Fall. It is currently anticipated that field work will commence later in the Fall of this year. The City anticipates having AWO&M review the drawing package from an operational perspective shortly to determine if there are any issues or experiences including those from the first project that should be addressed. The contract duration is one of these points.

This would result in an estimated completion date around May 2022.

D. SEWER LINE UPGRADES

The cleaning efforts need to be augmented with the Capital Improvements Program for line replacements or upgrading by lining. Based upon the short life of pipe rated Category 5, there is the need to either line or replace within five years. Consequently, the Category 4 rating with an anticipated 10 year life is projected as primary for the following five year cycle. The recommended Capital Improvement Plan currently allows for additional projects such as road reconstruction, development or other need driven criteria to be accomplished.

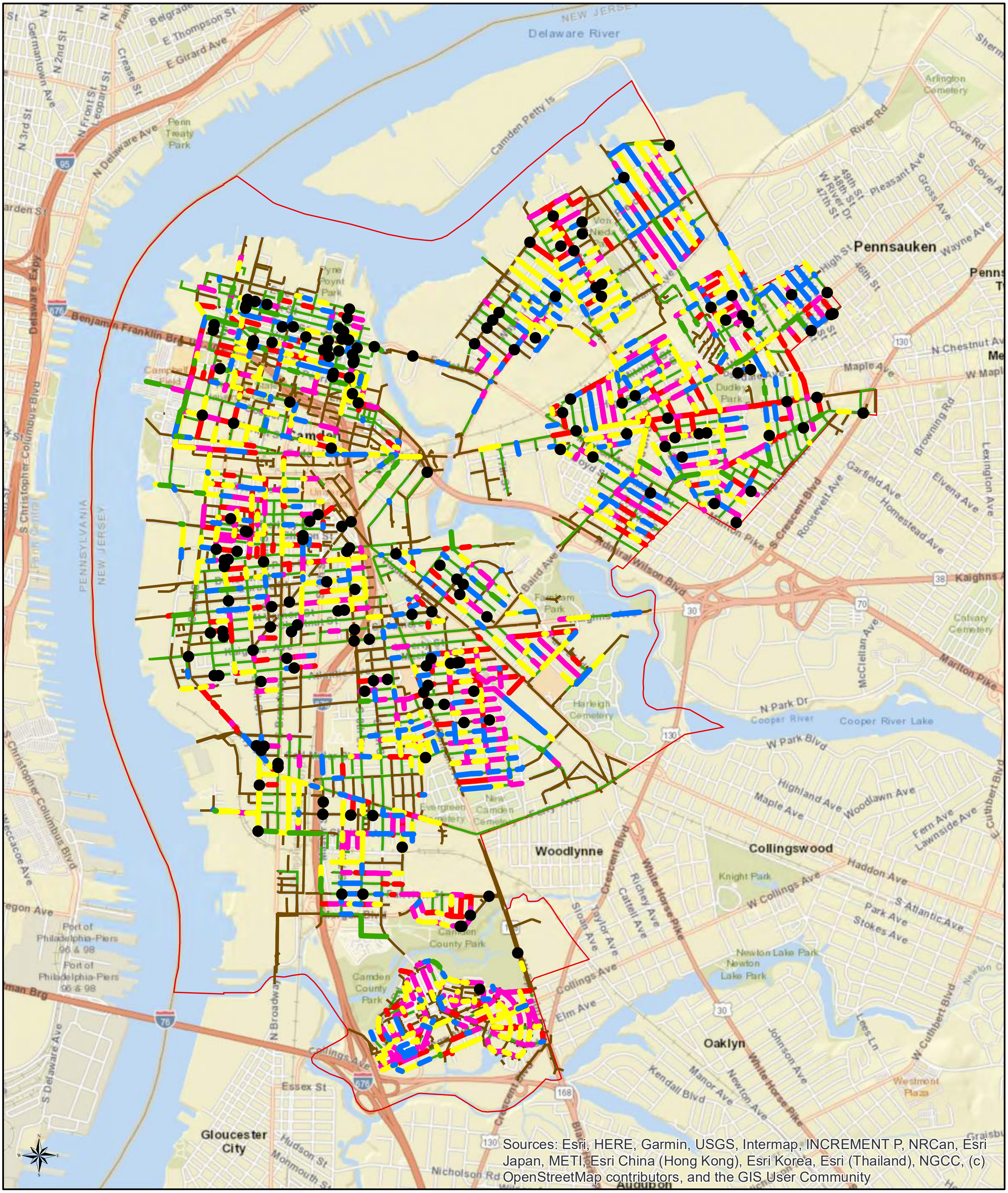


Sinkhole through June 2021

- ● Sinkholes
- Not Cleaned
- Yes
- Camden_Boundary_NJSP
- World Street Map

Miles
0 0.2 0.4 0.6 0.8

AMERICAN WATER
Contract Services Group



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Sinkhole through June 2021 featuring Pipe Grade

- ● Sinkholes
- Grade 1 Pipe
- Grade 2 Pipe
- Grade 3 Pipe
- Grade 4 Pipe
- Grade 5 Pipe
- Not Cleaned
- Yes
- Camden_Boundary_NJSP
- World Street Map

0 0.2 0.4 0.6 0.8 Miles

AMERICAN WATER
Contract Services Group

For example, a pipe with a QSR = 5123 would indicate that there is one defect that was rated a 5 (requires immediate attention), and 3 defects that are rated as 2 (defects that have not begun to deteriorate). Table 1 provides a description of the NASSCO rating criteria. The same protocol is used for quick maintenance scores (QMRs).

Table 1. NASSCO Rating Criteria

Grade	Description	Estimated Time to Failure
0	EXCELLENT: No Defects.	Unlikely in the foreseeable future
1	EXCELLENT: Minor Defects.	Unlikely in the foreseeable future
2	GOOD: Defects that have not begun to deteriorate.	20 years or more
3	FAIR: Moderate defects that will continue to deteriorate.	10 to 20 years
4	POOR: Severe defects that will become grade 5 defects within the foreseeable future.	5 to 10 years
5	IMMEDIATE ATTENTION: Defects requiring immediate attention.	Has failed or will likely fail within the next 5 years

Pipe assessments were conducted using PACP (Pipe Assessment Certification Program) protocol and data results were compiled in an PACP-compliant Access database. Videos and photographs were linked to the database.

Information collected during pipe condition assessment included the following:

General information

- Surveyor and NASSCO Certification Number
- Date and Time of Survey
- Weather Conditions
- Road Conditions
- Address
- Pipe ID
- Direction of survey (upstream or downstream)
- Length of pipe
- Pipe diameter
- Pipe material
- Length of survey
- Comments

Specific information

- Type and location of defects (coded according to PACP protocol) including:
    - Cracks
    - Deposits
    - Collapsed or broken pipes

City of Camden Response to NJDEP Comments 3 & 17(a) - Exhibit D
CITY OF CAMDEN SEWER LINES FOR REPAIR / REPLACE
BASED UPON CCTV INSPECTION AND RATED AS NEEDING ACTION WITHIN FIVE YEARS

MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
72 Inch													
428.4	SM-4472	RCP	72	FEDERAL ST	MH-2777	MH-2780	428.4	6/1/2017	69	5			Surface reinforcement visible
184.6	SM-1662	BRK	72	FRONT ST	MH-2321	B-444	184.6	9/5/2017	81	5			Infilitrition gusher
184.6	SM-2304	BRK	72	FRONT ST	B-444	B-445	184.6	9/5/2017	81	5			Inflitrition gusher
Subtotal							**797.6**				$975	$777,660	
48 INCH													
376.1	SM-7125	RCP	48	MARKET ST	MH-3344	MH-4125	376.1	1/6/2017	22	5			Surface reinforcement visible
378.7	SM-4749	BRK	48	RAMONA GONZALEZ ST	B-422	MH-2167	378.7	9/4/2020	HD	5			Surface damage reinforcement visible
Subtotal							**754.8**				$525	$396,270	
42 INCH													
346.7	SM-416	RCP	42	MARKET ST	MH-3344	MH-4127	346.7	1/6/2017	22	5			Surface reinforcement visible
178.1	SM-5780	RCP	42	MT VERNON ST	MH-399	MH-400	178.1	11/25/2020	HD	5			Surface damage visible
Subtotal							**524.8**				$350	$183,680	
40 INCH													
41.1	SM-3575	BRK	40	LOCUST ST	MH-2658	B-501	**41.1**	8/9/2019	HD 15	5	$350	$14,385	Pipe collasped
36 INCH													
106.7	SM-386	BRK	36	ARCH ST	MH-2469	MH-2470	106.7	2/24/2017	35	5			Deformed hole in the main
361.72	SM-6455	BRK	36	BECKETT ST	MH-3478	MH-3480	361.72	8/26/2020	HD	5			Deformed main hole in the main
190	SM-4740	BRK	36	BENSON ST	MH-2065	MH-2066	190	7/7/2020	HD 22	5			Hole in the pipe
12.9	SM-3171	BRK	36	CLINTON ST	MH-1165	B-219	12.9	9/14/2016	14	5			surface reinforcment visible
420.9	SM-4464	RCP	36	CLINTON ST	MH-2687	MH-2688	420.9	5/17/2017	67	5			
246.4	SM-1961	RCP	36	DELAWARE AVE	MH-1871	MH-1879	246.4	1/27/2017	26	5			
354	SM-6948	RCP	36	DELAWARE AVE	MH-1875	MH-1888	354	1/5/2021	HD	5			
184.2	SM-2310	RCP	36	FERRY AVE	MH-5045	MH-5046	184.2	5/14/2019	HD 12	5			Deformed crick
49.2	SM-4536	BRK	36	FRIENDS AV	MH-292	MH-3338	49.2	1/20/2021	HD	5			Hole in the pipe roots in the main missing mortar
313.7	SM-279	BRK	36	FRONT ST	MH-2523	MH-3446	313.7	2/24/2017	35	5			Deformed missing mortar obstacles
237.2	SM-4592	BRK	36	FRONT ST	TG-9	MH-269	237.2	11/28/2020	HD	5			Hole in the main surface damage visible
118.1	SM-2713	BRK	36	LAWRENCE ST	B-155	MH-3342	118.1	1/22/2021	HD	5			Fracture in the main obstruction in the main
177.4	SM-2149	BRK	36	MICKLE BLVD	MH-1719	MH-3569	177.4	3/31/2017	54	5			Hole and cracks in the main
224.6	SM-1874	CONC	36	N 32ND ST	MH-1203	MH-1204	51	7/16/2018	55	5			Tap breakin intrusion
232.5	SM-1875	CONC	36	N 32ND ST	MH-1202	MH-1203	70.1	7/16/2018	55	5			Tap breakin intrusion
67.7	SM-3743	CONC	36	N 32ND ST	MH-1201	MH-1202	67.7	7/16/2018	55	5			Tap breakin intrusion
190.1	SM-1936	BRK	36	N 3RD ST	MH-3323	B-620	190.1	3/15/2017	45	5			Surface reinforcement visible
141.6	SM-2071	BRK	36	N 3RD ST	MH-3343	B-621	35	2/14/2017	34	5			Obstacles in the main
236.6	SM-2072	BRK	36	N 3RD ST	MH-3330	MH-3343	236.6	2/14/2017	34	5			Surface reinforcement visible
88	SM-3391	BRK	36	N 3RD ST	MH-3327	MH-3328	88	9/9/2020		5			Surface reinforcement visible
100	SM-3392	BRK	36	N 3RD ST	MH-3327	1	100	9/9/2020		5			Surface reinforcement visible
22.2	SM-3301	BRK	36	PENN ST	B-486	MH-4214	22.2	1/18/2021	HD	5			Surface damage visible
205.63	SM-3653	BRK	36	PINE ST	MH-682	B-118	205.63	8/26/2020	HD	5			Obstruction in the main
205.6	SM-7227	BRK	36	PINE ST	B-118	MH-683	205.6	8/26/2020	HD	5			
164	SM-2844	RCP	36	S 27TH ST	MH-4199	MH-4201	164	7/26/2017	76	5			Surface reinforcement visible
188.5	SM-4109	RCP	36	S 2ND ST	MH-971	MH-973	188.5	10/20/2016	11	5			Surface reinforcement visible
188.6	SM-6745	RCP	36	S 2ND ST	MH-973	MH-974	188.6	8/31/2020		5			Surface reinforcement visible
173.5	SM-7150	RCP	36	S 3RD ST	MH-3303	MH-4177	173.5	3/22/2017	51	5			Surface aggregate visible
221.4	SM-1536	RCP	36	S 4TH ST	MH-4607	MH-4608	221.4	2/20/2018		5			Roots in the main surface reinforcement visible
135.4	SM-3042	BRK	36	S 4TH ST	MH-3478	MH-3479	135.4	8/21/2020	HD	5			Main collapsed
245.7	SM-3507	RCP	36	S 4TH ST	B-878	MH-4607	245.7	2/21/2018	24	5			
245.7	SM-3761	RCP	36	S 4TH ST	MH-4605	B-878	245.7	2/21/2018	24	5			
245.7	SM-5089	RCP	36	S 4TH ST	MH-4604	MH-4605	245.7	2/21/2018	24	5			
42	SM-5090	RCP	36	S 4TH ST	B-877	MH-4604	42			5			Surface reignforcment visible
187	SM-7312	RCP	36	S 4TH ST	MH-4602	B-877	187	2/22/2018	25	5			Surface reignforcement visble
39	SM-4906	BRK	36	S 6TH ST	B-151	MH-3119	39	10/13/2020	HD	5			Defromed main missing brick hole in the main
33.1	SM-3437	BRK	36	SYLVAN ST	MH-4356	MH-5166	33.1	4/20/2018	41	5			Tap intruding in the main
141.9	SM-3438	BRK	36	SYLVAN ST	MH-4355	MH-4356	141.9	4/20/2018	41	5			Taps intruding into the main
171	SM-3439	BRK	36	SYLVAN ST	B-817	MH-4354	171	4/25/2018	41	5			Pipe intruding into the main
138.6	SM-1303	BRK	36	THORN ST	MH-504	MH-2677	138.6	7/11/2019	HD-14	5			Surface damage visible missing pipe wall
159.5	SM-5730	RCP	36	W ST	MH-4157	MH-4158	159.5	7/14/2020	HD 22	5			Surface reinforcment visible
87.5	SM-6183	RCP	36	W ST	MH-796	MH-4157	87.5	7/17/2020	HD 22	5			Surface reinforcement visible
226.9	SM-6364	BRK	36	WALNUT ST	MH-3457	MH-3458	226.9	8/15/2019	HD 15	5			Deformed brick dropped invert missing mortar

City of Camden Response to NJDEP Comments 3 & 17(a) - Exhibit D
CITY OF CAMDEN SEWER LINES FOR REPAIR / REPLACE
BASED UPON CCTV INSPECTION AND RATED AS NEEDING ACTION WITHIN FIVE YEARS

MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
192.2	SM-5385	BRK	36	WASHINGTON ST	MH-793	MH-794	192.2	9/3/2020	HD	5			Displaced brick and obstacles in the main object intruding thru the main
341.7	SM-5854	BRK	36	WASHINGTON ST	MH-795	MH-796	341.7	7/14/2020	HD 22	5			Dropped invert
306	SM-2105	BRK	36	YORK ST	MH-1465	MH-1466	306	3/2/2017	46	5			Deformed main
Subtotal							**7919.3**				$320	$2,534,160	
33 INCH													
230.8	SM-1884	BRK	33	DELAWARE AVE	MH-1887	MH-1889	33			5			
189.8	SM-4289	BRK	33	DELAWARE AVE	MH-1885	MH-1887	189.8			5			
Subtotal							**222.8**				$300	$66,840	
32 INCH													
200	SM-3174	BRK	32	BERKLEY ST	B-233	MH-1214	200	8/28/2020	HD	5			Obstacles in the main displaced brick
288.2	SM-28	BRK	32	VINE ST	B-35	MH-213	288.2	3/8/2017	47	5			Fracture in the main
204.1	SM-1349	BRK	32	VINE ST	MH-225	MH-226	204.1	8/3/2017	77	5			Hole in the main
Subtotal							**692.3**				$300	$207,690	
30 INCH													
214	SM-4465	RCP	30	CLINTON ST	MH-2689	MH-2690	214	8/24/2020	HD	5			Surface aggregate visible
102.5	SM-1327	RCP	30	ELM ST	MH-97	B-246	102.5	12/13/2016	18	5			Reinforcement visible
374.6	SM-1328	RCP	30	ELM ST	MH-96	MH-97	374.6	12/13/2016	18	5			Reinforcement visible
374.6	SM-6800	RCP	30	ELM ST	MH-96	MH-113	374.6	12/13/2016	18	5			Reinforcement visible
276	SM-1718	RCP	30	FEDERAL ST	MH-2742	MH-2744	276	12/29/2016	21	5			Surface reinforcment visible
341.4	SM-4830	RCP	30	FEDERAL ST	MH-2790	MH-2794	341.4	1/23/2017	25	5			Surface reinforcement visible
128	SM-1315	RCP	30	N 5TH ST	MH-35	MH-1602	128	6/19/2020	HD 24	5			Hole in the pipe
131.2	SM-242	BRK	30	PEARL ST	MH-3383	B-630	131.2	2/1/2017	28	5			Deformed main
Subtotal							**1942.3**				$280	$543,844	
26 INCH													
294.2	SM-3601	BRK	26	ATLANTIC AV	MH-142	B-23	294.2	9/26/2018	83-84	5			Taps intruding into the main
266.97	SM-5458	PVC	26	BUREN AV	MH-1246	B-253	266.97	8/26/2019	HD 15	5			Dropped invert deformed brick
210.4	SM-1714	PVC	26	FEDERAL ST	MH-2716	B-600	210.4	3/26/2020	HD 21	5			Deformed brick dropped invert
229.4	SM-5556	BRK	26	PERSHING ST	MH-3601	MH_3602	229.4	6/3/2019	HD 13	5			Deformed brick dropped invert
Subtotal							**1001**				$260	$260,252	
24 INCH													
57.8	SM-6076	BRK	24	ANCONA ST	MH-4885	MH-4887	57.8	3/23/2018		5			Deformed main collapse brick sewer
282.4	SM-4548	BRK	24	CHERRY ST	B-152	MH-915	282.4	10/6/2017	10	5			Deformed main and missing brick
302.48	SM-4502	PVC	24	DUPONT ST	MH-58	MH-59	302.48	7/1/2020	HD 22	5			Dropped invert missing mortar displaced brick
275.8	SM-455	BRK	24	FEDERAL ST	MH-2731	MH-2732	275.8	3/18/2020	HD 21	5			Dropped invert deformed brick
250.4	SM-856	BRK	24	FEDERAL ST	MH-2734	MH-2735	250.4	3/23/2020	HD 21	5			Broken main missing brick
250.4	SM-857	BRK	24	FEDERAL ST	MH-1035	MH-2735	250.4	3/23/2020	HD 21	5			Broken main missing brick
229.3	SM-1286	BRK	24	FEDERAL ST	MH-2730	MH-2731	229.3	3/18/2020	HD 21	5			Dropped invert deformed brick
108.85	SM-2824	BRK	24	FEDERAL ST	MH-2727	MH-2728	108.85	3/6/2020	HD 21	5			Dropped invert deformed brick missing mortar
153.29	SM-2825	BRK	24	FEDERAL ST	MH-2728	MH-2729	153.29	3/6/2020	HD 21	5			Dropped invert
185.48	SM-2826	BRK	24	FEDERAL ST	MH-2729	MH-2730	185.48	3/6/2020	HD 21	5			Dropped invert
254.2	SM-3035	BRK	24	FEDERAL ST	B-528	MH-2734	34.4	3/20/2020	HD 21	5			Dropped invert deformed brick hole in the pipe
34.4	SM-4015	BRK	24	FEDERAL ST	MH-2733	B-528	34.4	3/20/2020	HD 21	5			Deformed brick repair patch
35	SM-2541	RCP	24	MARKET ST	B-621	MH-3344	35	2/14/2017	34	5			
455	RM-52	TC	24	MINNESOTA RD	B-926	MR-107	455	7/1/2016	HD 16	5			Broken in mutiply places
326	SM-5307	PVC	24	MT VERNON ST	MH-418	MH-419	326	8/12/2019	HD 15	5			Hole in the main
74.5	SM-1475	BRK	24	N 26TH ST	B-109	MH-617	74.5	2/5/2020	HD 20	5			Hole in the main surface damage corrision
213.7	SM-3091	BRK	24	N 26TH ST	MH-614	MH-615	213.7	2/4/2020	HD-19	5			Roots in the main deformed brick missing bricks
40	SM-1924	BRK	24	ROYDEN ST	MH-1311	B-589	40	9/11/2020	HD	5			Collasped sewer
251	SM-1925	BRK	24	ROYDEN ST	MH-1313	MH-1314	251	9/10/2020		5			Collasped man missing mortar
246.4	SM-3180	BRK	24	ROYDEN ST	MH-1310	MH-1311	246.4	10/9/2020	HD	5			Deformed main and missing brick
248	SM-3355	BRK	24	WESTFIELD AVE	MH-730	B-132	248	11/26/2019	36, HD 19	5			Dropped invert
Subtotal							**4054.6**				$250	$1,013,650	
22 INCH													
149	SM-3939	BRK	22	FERRY AVE	MH-2345	MH-2346	149	7/1/2019	HD-14	5			Infiltration dripper
87.1	SM-3940	BRK	22	FERRY AVE	MH-2346	B-447	87.1	6/25/2019	HD 13	5			Deformed brick fracture in the pipe
149	SM-3942	BRK	22	FERRY AVE	MH-2343	MH-2345	149	6/24/2019	HD 13	5			Fractured pipe missing brick
228	SM-4098	BRK	22	CARL MILLER BLVD	MH-2959	MH-2960	228	3/15/2019	hd 10	5			deposits attached
254	SM-4099	BRK	22	CARL MILLER BLVD	MH-2956	MH-2959	254	3/15/2019	hd 10	5			deposits in the main
208	SM-5188	BRK	22	FERRY AVE	MH-2341	MH-2342	208	6/24/2019	HD 13	5			Fracture in the pipe
141.3	SM-6106	BRK	22	FERRY AVE	MH-2347	MH-2349	141.3	7/1/2019	HD-14	5			Dropped invert missing mortar fracture hole in the pipe
23.7	SM-6107	BRK	22	FERRY AVE	MH-2349	B-998	23.7	7/2/2019	HD-14	5			Displaced brick

City of Camden Response to NJDEP Comments 3 & 17(a) - Exhibit D
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BASED UPON CCTV INSPECTION AND RATED AS NEEDING ACTION WITHIN FIVE YEARS

MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
Subtotal							**1240.1**				$230	$285,223	
21 INCH													
23.5	SM-5412	VCP	21	S 2ND ST	MH-992	MH-3468	23.5	11/28/2020	HD	5			Gusher
29.6	SM-3066	PVC	21	LANSDOWN AV	MH-511	MH-3512	29.6	11/14/2018	hard drive	5			Deformed brick and obstruction intruding thru the wall
210.4	SM-1857	BRK	21.14	STEWART ST	B-603	MH-3244	210.4	12/5/2020	HD-20	5			Lining failure
196	SM-5874	BRK	21.14	STEWART ST	MH-3244	MH-3245	196	12/5/2020	HD 20	5			Lining failure
Subtotal							**459.5**				$220	$101,090	
20 INCH													
315	SM-42	BRK	20	CLEVELAND AVE	B-56	B-57	315	8/2/2018	64	5			Tire in the main displaced brick
203	SM-394	BRK	20	BAILEY ST	MH-2554	MH-2555	203	2/28/2017	40	5			Hole in the pipe
240	SM-970	BRK	20	PFEIFFER ST	MH-868	MH-874	240	9/24/2019	HD 16	5			Pipe in th main dropped invert deformed brick
26.6	SM-1005	BRK	20	S 2ND ST	MH-1010	B-179	26.6	1/29/2020	HD-19	5			Cable in the main
74.8	SM-1067	BRK	20	MT EPHRAIM AVE	MH-3515	B-656	74.8	1/10/2020	HD-19	5			Displaced brick rocks in the main
14.5	SM-1295	BRK	20	W ST	MH-2690	MH-4163	14.5	8/24/2020		5			Deformed brick
84	SM-1296	BRK	20	W ST	MH-2831	B-774	84	8/24/2020	HD	5			Displaced brick missing brick missing mortar hole in the main
176	SM-1638	BRK	20	LINDEN ST	MH-3701	MH-3702	176	3/20/2017	51	5			Hole in the main missing brick missing mortar displaced brick
212.5	SM-1666	BRK	20	FERRY AVE	MH-5069	MH-5070	212.5	2/25/2019	hd 9	5			missing brick and missing mortar deformed main
25.4	SM-1886	BRK	20	N 8TH ST	MH-1895	MH-1896	25.4	2/20/2017	37	5			Broken main
200.8	SM-2195	BRK	20	HENRY ST	MH-1850	B-348	200.8	11/9/2016	14	5			Hole in the pipe
55.5	SM-2392	BRK	20	N 5TH ST	MH-229	MH-1295	55.5	3/30/2017	55	5			Roots in the main and hole in the main
25.8	SM-2742	BRK	20	EVERETT ST	MH-2363	MH-2364	25.8	3/18/2019	hd 10	5			Deformed brick
190	SM-2827	BRK	20	FEDERAL ST	MH-2714	MH-2715	190	3/26/2020	HD 21	5			Dropped invert deformed brick
191.1	SM-2833	BRK	20	STATE ST	MH-2815	MH-2816	191.1	1/30/2017	30	5			
151.9	SM-2836	BRK	20	WEST ST	1	MH-2832	55	8/26/2020	HD	5			Obstruction in the main displaced brick missing mortar
201.8	SM-2961	BRK	20	NORRIS ST	MH-2367	MH-2368	201.8	3/14/2019	hd 10	5			Deformed brick bulging
315	SM-3048	BRK	20	CLEVELAND AVE	MH-306	B-56	315	8/2/2018	64	5			
197	SM-3049	BRK	20	CLEVELAND AVE	MH-305	MH-306	197	7/27/2018	63	5			Tire in main
160.6	SM-3134	BRK	20	FEDERAL ST	B-523	MH-2717	160.6	3/26/2020	HD 21	5			Dropped invert bulging brick
161.1	SM-3136	BRK	20	FEDERAL ST	MH-2717	MH-2718	161.1	3/26/2020	HD 21	5			Deformed brick dropped invert
38	SM-3161	BRK	20	WASHINGTON ST	MH-908	B-151	38	10/13/2020	HD	5			deformed main missing brick hole in the pipe
184.3	SM-3296	BRK	20	W ST	MH-4163	MH-4165	184.3	8/24/2020	HD	5			Deformed main missing brick pipe in the main
119.7	SM-3309	BRK	20	LOUIS ST	MH-79	MH-80	119.7	7/11/2018	53	5			Obstruction in themain and roots in the main
224.82	SM-3634	BRK	20	RIVER RD	MH-3092	MH-3093	224.82	10/31/2019	HD 17	5			Dropped invert tapps intruding into the main
157.2	SM-3663	BRK	20	WESTFIELD AVE	MH-731	MH-3690	157.2	2/15/2017	36	5			Hole fracture in the pipe
331.9	SM-3949	BRK	20	N 30TH ST	MH-2370	MH-2374	331.9	7/10/2020	HD 22	5			Broken main hole in the main missing mortar deformed brick
137	SM-4046	BRK	20	S 4TH ST	MH-253	MH-254	137	8/28/2020	HD	5			Missing brick dropped invert
242.5	SM-4280	BRK	20	PRINCESS AVE	MH-3614	MH-3615	242.5	7/5/2018	49	5			Obstruction in the main
256.7	SM-4387	BRK	20	FERRY AVE	B-1004	B-1005	9	3/19/2019	hd 10	5			Unable to get thru
129	SM-4410	BRK	20	MECHANIC ST	MH-3133	MH-3846	129	1/22/2018	38	5			Obstacles in the main hole in the main
241.52	SM-5473	BRK	20	27TH ST	MH-1318	MH-1319	241.52	8/24/2019	HD 15	5			Deformed brick
244.5	SM-5670	BRK	20	NORRIS ST	B-454	MH-2369	244.5	3/14/2019	hd 10	5			Dropped invert deformed main
73.1	SM-5977	BRK	20	S 4TH ST	MH-4518	MH-4519	73.1	9/22/2017	9	5			Missing brick collapsed main missing mortar
232	SM-6116	BRK	20	NORRIS ST	B-452	MH-2363	232	3/18/2019	hd 10	5			Deformed brick bulging
214.1	SM-6206	BRK	20	LIBERTY ST	MH-73	MH-74	214.1	2/1/2018	38	5			Deformed main
152.4	SM-6210	BRK	20	LIBERTY ST	MH-68	MH-69	152.4	2/5/2018	39	5			Hole in the main
157.7	SM-6584	BRK	20	MECHANIC AV	MH-3664	MH-3665	157.7	10/12/2018	76-79	5			Obstruction through the main
111.8	SM-7170	BRK	20	S 3RD ST	MH-1820	MH-3856	111.8	2/14/2018	40	5			Collasped brick sewer
255	SM-7333	BRK	20	S 8TH ST	MH-1615	B-293	255	11/17/2017	16	5			Hole in the main displaced brick and missing mortar
232	SM-7498	BRK	20	THORN ST	B-452	B-510	232	3/18/2019	hd 10	5			
Subtotal							**6613**				$200	$1,322,608	
18 INCH													
358.3	SM-819	RCP	18	MARKET ST	MH-4142	MH-4143	358.3	5/15/2017	67	5			Surface aggregate visible surface reinforcemnt visible
231	SM-4647	RCP	18	N 33RD ST	MH-1355	MH-1356	231	6/4/2020	HD 24	5			Hole in the pipe.
208.9	SM-6174	RCP	18	PINE ST	MH-2699	MH-2700	208.9	9/2/2016	10	5			Hole in the pipe surface aggregate projecting
208.9	SM-6696	RCP	18	PINE ST	MH-2699	MH-2700	208.9	9/2/2016	10	5			Hole in the pipe surface aggregate projecting
282.4	SM-6739	BRK	18	CHERRY ST	MH-914	B-152	282.4	9/28/2017	10	5			deformed main and missing brick
Subtotal							**1289.5**				$130	$167,635	
16 INCH													
177.8	SM-11	BRK	16	S 36TH ST	MH-84	MH-85	177.8	4/9/2020	HD 22	5			Dropped invert missing mortar
137.4	SM-120	BRK	16	LINE STREET	MH-842	MH-1098	137.4	4/9/2020	HD 22	5			Dropped invert deformed brick sag in the pipe
182	SM-246	BRK	16	WALDORF AV	MH-3426	MH-3428	182	3/20/2020	HD 21	5			Hole in the pipe

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MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
138.7	SM-268	BRK	16	N 36TH ST	MH-1526	MH-1534	138.7	4/30/2020	HD 22	5			Deformed brick dropped invert
46.2	SM-382	BRK	16	N 24TH ST	MH-2462	1	29	8/1/2018	hard drive	5			Obstacles intruding in the main
256.5	SM-393	BRK	16	BAILEY ST	MH-2552	MH-2553	256.5	3/1/2017	42	5			Tap intruding into the main missing mortar and displace brick
221.8	SM-450	BRK	16	FEDERAL ST	MH-2720	MH-2723	221.8	3/25/2020	HD 21	5			Dropped invert missing mortar
198.9	SM-561	BRK	16	RIVER RD	MH-3068	MH-3086	198.9	10/8/2019	HD 17	5			Dropped invert missing mortar
200.9	SM-647	BRK	16	LAWRENCE ST	MH-1612	MH-1613	200.9	5/16/2017	67	5			Missing mortar
198.7	SM-729	BRK	16	MECHANIC AV	MH-2315	MH-2316	198.7	7/9/2019	HD-14	5			Dropped invert missing mortar deformed brick
145.1	SM-756	BRK	16	COOPER ST	MH-3819	MH-3822	145.1	6/23/2020	HD 24	5			Missing brick dropped invert
293	SM-776	BRK	16	N 2ND ST	MH-2778	MH-4129	293	2/27/2017	41	5			Surface aggregate missing and visible broken pipe
264.4	SM-794	BRK	16	HOWELL ST	MH-3946	MH-3947	264.4	2/6/2020	HD 20	5			Pipe in the main displaced brick missing mortar
35.6	SM-809	BRK	16	N 31ST ST	1	B-766	35.6	7/18/2020	56	5			
103.2	SM-818	BRK	16	MARKET ST	MH-4126	MH-4129	103.2	2/27/2017	41	5			Surface aggregate missing
108.6	SM-948	BRK	16	EVERETT ST	B-129	MH-766	108.6	7/6/2017	73	5			Missing brick and mortar
220.9	SM-955	BRK	16	LANSDOWNE AV	MH-812	B-135	220.9	10/8/2019	76-82	5			Hole in the pipe missing bricks roots in the main
158	SM-1017	BRK	16	DUDLEY AV	MH-742	MH-3208	158			5			Cracked main joint offset broken main
169.5	SM-1051	BRK	16	RAND ST	MH-1160	MH-1161	169.5	3/2/2020	HD 21	5			Dropped invert deformed brick
186.2	SM-1170	BRK	16	MECHANIC AV	MH-2316	MH-3662	186.2	7/9/2019	HD-14	5			Dropped invert missing mortar deformed brick
74.54	SM-1248	BRK	16	HOWELL ST	B-109	MH-3944	74.54	2/5/2020	HD 20	5			Hole in the main corrision surface damage
163	SM-1319	BRK	16	WAYNE AV	MH-48	MH-49	163	8/20/2019	HD 15	5			Dropped invert deformed brick
199.97	SM-1320	BRK	16	WAYNE AV	MH-49	MH-50	199.97	8/20/2019	HD 15	5			Dropped invert missing mortar deformed brick
232	SM-1321	BRK	16	POLK ST	MH-53	MH-54	232	9/21/2018	harddrive	5			Obstacles intrruding in the main
30.7	SM-1500	BRK	16	LINE STREET	MH-841	B-143	30.7	6/30/2020	HD 24	5			Dropped invert missing mortar
297.3	SM-1643	BRK	16	RARITAN ST	MH-3751	MH-3752	297.3	10/10/2019	HD 17	5			Dropped invert deformed brick
324.9	SM-1647	BRK	16	RARITAN ST	MH-3752	MH-3573	324.9	10/1/2019	HD 17	5			Roots in the main dropped invert
198.67	SM-1758	BRK	16	DUPONT ST	MH-56	MH-57	198.67	7/2/2020	HD 22	5			Dropped invert deformed brick
160.9	SM-1792	BRK	16	LINE STREET	MH-196	MH-3351	160.9	4/9/2020	HD 22	5			Dropped invert deformed brick
256.4	SM-1793	BRK	16	CHANDLER AV	MH-862	MH-863	256.4	9/23/2019	HD 16	5			Deformed brick dropped invert missing mortar
249.7	SM-1795	BRK	16	PFEIFFER ST	MH-874	MH-875	249.7	9/24/2019	HD 16	5			Deformed brick dropped invert
239.1	SM-1803	BRK	16	PLEASANT RD	MH-3194	MH-3195	239.1	8/7/2018	65	5			Dropped invert
200.7	SM-1809	BRK	16	LEMUEL AV	MH-931	MH-932	200.7	8/10/2018	harddrive	5			Dropped inver roots in the main and displaced main
27.8	SM-1836	BRK	16	N 36TH ST	B-286	MH-1533	27.8	5/4/2020	HD 23	5			Dropped invert
197.9	SM-1969	BRK	16	N 32ND ST	MH-1919	B-441	197.9	8/8/2018	65	5			Dropped invert displaced brick
114.1	SM-1996	BRK	16	N 7TH ST	MH-1171	MH-1176	114.1	6/2/2017	69	5			Hole in the main
166	SM-2021	BRK	16	S 28TH ST	MH-3391	MH-3392	166	3/30/2020	HD 21	5			Deformed brick
240.1	SM-2212	BRK	16	N 32ND ST	MH-2044	MH-3658	240.1	3/31/2020	65/HD21	5			Missing brick missing mortar displaced brick
150.2	SM-2256	BRK	16	JACKSON ST	MH-4895	MH-4896	150.2	1/7/2019	HD 6	5			Dropped invert
433	SM-2264	BRK	16	REMINGTON AV	MH-2312	MH-2313	433	8/8/2018	harddrive	5			Roots in the main
27.2	SM-2315	BRK	16	MICKLE ST	MH-2507	B-601	27.2	3/19/2020	HD 21	5			Missing mortar dropped invert
223	SM-2316	BRK	16	MICKLE ST	MH-2507	MH-2508	223	3/19/2020	HD 21	5			Missing mortar dropped invert deformed brick
276.6	SM-2324	BRK	16	CLINTON ST	MH-3929	MH-3930	276.6	7/2/2020	HD 22	5			Dropped invert missing brick missing mortar
91	SM-2338	BRK	16	GARDEN ST	MH-190	MH-191	91	6/25/2020	HD 24	5			Dropped invert missing brick
37	SM-2339	BRK	16	GARDEN ST	MH-189	MH-190	37	6/25/2020	HD 24	5			Dropped invert missing mortar
223	SM-2340	BRK	16	GARDEN ST	MH-188	MH-189	223	6/26/2020	HD 24	5			Dropped invert missing mortar missing brick
143.6	SM-2341	BRK	16	GARDEN ST	MH-187	MH-188	143.6	6/26/2020	HD 24	5			Dropped invert missing brick
284.8	SM-2349	BRK	16	BIRCH ST	MH-207	MH-209	284.8	6/19/2020	HD 24	5			Dropped invert missing mortar
128.4	SM-2382	BRK	16	N 7TH ST	MH-1177	MH-117	128.4	6/17/2020	HD 24	5			Missing brick dropped invert missing mortar broken main
199.7	SM-2439	BRK	16	S 28TH ST	MH-3389	MH-3390	199.7	3/30/2020	HD 21	5			Dropped invert missing mortar deformed brick
200	SM-2450	BRK	16	PINE ST	MH-1364	MH-3454	200	1/8/2021	HD	5			Missing brick
207.5	SM-2484	BRK	16	N 36TH ST	MH-1533	MH-1534	207.5	5/4/2020	HD 23	5			Dropped invert deformed brick
231.1	SM-2520	BRK	16	LOUIS ST	MH-3960	MH-3961	231.1	11/20/2018	87-91	5			Dropped invert and missing bricks
176	SM-2522	BRK	16	N 10TH ST	B-692	MH-3966	176	3/20/2017	51	5			Deformed main
248.76	SM-2537	BRK	16	N 28TH ST	MH-4065	MH-4066	248.76	8/20/2019	HD 15	5			Dropped invert missing mortar deformed brick
178	SM-2589	BRK	16	ROWE ST	MH-339	MH-2130	178	6/26/2020	HD 24	5			Deformed
253	SM-2651	BRK	16	CRAMER ST	MH-2372	B-455	253	12/16/2019	HD-19	5			Surface wall missing
174.4	SM-2682	BRK	16	S 29TH ST	MH-780	MH-781	174.4	3/30/2020	HD 21	5			Deformed brick missing mortar
26.4	SM-2683	BRK	16	S 29TH ST	B-86	MH-780	26.4	3/30/020	HD 21	5			Missing mortar dropped invert
170	SM-2690	BRK	16	CHANDLER AV	MH-863	MH-864	170	9/19/2019	HD 16	5			Dropped invert
143	SM-2704	BRK	16	POINT ST	MH-3199	MH-3200	143	9/9/2020		5			Obstacles in the man a manhole lid
224.6	SM-2885	BRK	16	HOWELL ST	MH-3947	MH-3948	224.6	2/5/2020	HD 20	5			Object in the main a pipe missing mortar displaced brick
265.7	SM-2886	BRK	16	HOWELL ST	MH-3940	MH-3948	265.7	2/7/2020	HD 20	5			Missing brick hole in the main
253	SM-2964	BRK	16	N 30TH ST	MH-2372	MH-2373	253	12/16/2019	HD 19	5			Surface wall missing missing birck dropped invert

City of Camden Response to NJDEP Comments 3 & 17(a) - Exhibit D
CITY OF CAMDEN SEWER LINES FOR REPAIR / REPLACE
BASED UPON CCTV INSPECTION AND RATED AS NEEDING ACTION WITHIN FIVE YEARS

MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
167.1	SM-2994	BRK	16	BAILEY ST	MH-1896	MH-2549	167.1	2/20/2017	35	5			Tap intruding in the main
247.7	SM-3007	BRK	16	N 28TH ST	MH-4066	MH-4068	247.7	8/22/2019	HD 15	5			Brick bulging dropped invert
169.6	SM-3025	BRK	16	N 34TH ST	MH-931	MH-2622	169.6	8/9/2018	65	5			Missing brick and obstruction through the pipe wall
167.5	SM-3071	BRK	16	FAIRVIEW ST	MH-4362	MH-4363	167.5	4/12/2019	HD 11	5			Root ball in the main
225	SM-3109	BRK	16	N 28TH ST	MH-2617	MH-2616	225	12/13/2019	HD 19	5			missing brick displaced brick collasped main pipe running through the main
222.9	SM-3127	BRK	16	FEDERAL ST	MH-2719	MH-2720	222.9	3/25/2020	HD 21	5			Dropped invert deformed brick
93.9	SM-3128	BRK	16	FEDERAL ST	MH-2718	MH-2719	93.9	3/26/2020	HD 21	5			Deformed brick
168	SM-3425	BRK	16	N 36TH ST	MH-1520	MH-1521	168	5/8/2020	HD 23	5			Deformed brick
184	SM-3426	BRK	16	N 36TH ST	MH-1536	MH-1538	184	4/1/2020	HD 22	5			Deformed brick dropped invert missing mortar
157.6	SM-3428	BRK	16	N 28TH ST	MH-3471	MH-3472	157.6	3/31/2020	HD 21	5			Missing brick missing mortar dropped invert
174.7	SM-3429	BRK	16	N 28TH ST	MH-3472	MH-3473	174.7	3/31/2020	HD 21	5			Dropped invert missing mortar deformed bulging brick
58.1	SM-3473	BRK	16	N 39TH ST	MH-782	MH-791	58.1	5/4/2020	HD 23	5			Dropped invert deformed brick
156	SM-3532	BRK	16	N 21ST ST	MH-2150	MH-2151	156	8/22/2018	harddrive	5			Broken main
72.7	SM-3558	BRK	16	FERRY AVE	MH-2334	MH-2336	72.7	7/8/2019	HD-14	5			Dropped invert external cable in the pipe
113.8	SM-3559	BRK	16	FERRY AVE	MH-2336	MH-2339	113.8	7/8/2019	HD-14	5			Bottom of pipe is missing
202.39	SM-3581	BRK	16	DUPONT ST	MH-57	MH-58	202.39	7/2/2020	HD 22	5			Displaced brick deformed main
134.3	SM-3674	BRK	16	S 29TH ST	MH-778	MH-779	134.3	3/23/2020	Hd 21	5			Deformed brick dropped invert
34.3	SM-3675	BRK	16	S 29TH ST	B-86	MH-779	34.3	3/23/2020	HD 21	5			Deformed brick dropped invert
50	SM-3691	BRK	16	PLEASANT RD	MH-1521	MH-1522	50	5/8/2020	HD 23	5			Hole in the pipe
202.29	SM-3733	BRK	16	RAND ST	MH-1153	MH-1159	202.29	3/5/2020	HD 21	5			Dropped invert
54.8	SM-3810	BRK	16	CHELTON AV	1	B-965	54.8	1/2/2019	HD 5	5			Wood in the main
54.8	SM-3885	BRK	16	MILLER ST	MH-4900	B-965	54.8	1/2/2019	HD 5	5			Wood in the main
143	SM-3969	BRK	16	N 10TH ST	B-746	MH-3975	143	4/28/2017		5			Deformed main missing mortar roots in the main
143	SM-3970	BRK	16	N 10TH ST	MH-3966	MH-3975	143	4/28/2017		5			Deformed main
178.5	SM-3974	BRK	16	S 10TH ST	MH-5156	MH-5157	178.5	1/4/2019	HD 5	5			Missing brick missing mortar brick in the main
197.6	SM-3981	BRK	16	MEMORIAL AVE	MH-4051	MH-3609	197.6	7/2/2018	46	5			Objects intruding thru the wall
157.22	SM-3984	BRK	16	N 28TH ST	MH-4061	MH-4062	157.22	8/13/2019	HD 15	5			Dropped invert bulging brick missing mortar
155.21	SM-3985	BRK	16	N 28TH ST	MH-4059	MH-4061	155.21	8/14/2019	HD 15	5			Roots in the main missing mortar dropped invert deformed brick
250	SM-3987	BRK	16	BERGEN AV	MH-4092	MH-4093	250	7/17/2018	hard drive	5			Obstacles intruding thru the wall
40.4	SM-4004	BRK	16	LOCUST ST	B-501	MH-2661	40.4	8/9/2019	HD 15	5			Pipe collasped
221.8	SM-4017	BRK	16	FEDERAL ST	MH-2725	MH-2726	221.8	3/25/2020	HD 21	5			Deformed brick missing mortar dropped invert
221.8	SM-4020	BRK	16	FEDERAL ST	MH-2720	MH-2723	221.8	3/25/2020	HD 21	5			Dropped invert missing mortar
198.3	SM-4092	BRK	16	CHANDLER AV	MH-865	MH-866	198.3	9/19/2019	HD 16	5			Dropped invert roots missing mortar
251.3	SM-4348	BRK	16	37TH ST	MH-2308	MH-2309	251.3	5/2/2020	HD 23	5			Dropped invert missing brick pipe running through the main
15.4	SM-4350	BRK	16	37TH ST	B-436	MH-2307	15.4	5/4/2020	HD 23	5			Deformed brick dropped invert missing mortar
328.1	SM-4416	BRK	16	BRADLEY AV	MH-3888	MH-3889	328.1	5/30/2019	HD 12	5			Roots in the main deformed brick
40.8	SM-4419	BRK	16	LOUIS ST	MH-3961	B-745	40.8	11/20/2018	87-91	5			Dropped invert and missing mortar
200.88	SM-4442	BRK	16	N 28TH ST	MH-4063	MH-4064	200.88	8/13/2019	HD 15	5			Cable in the main missing mortar deformed brick and dropped invert
93.95	SM-4443	BRK	16	N 28TH ST	MH-1320	MH-4059	93.95	8/14/2019	HD 15	5			Dropped invert missing mortar
330.1	SM-4541	BRK	16	LINE STREET	MH-845	MH-846	330.1	3/17/2020	HD 21	5			Dropped invert deformed brick
376.13	SM-4637	BRK	16	RAND ST	MH-1161	MH-1162	376.13	3/2/2020	HD 21	5			Dropped invert missing mortar fracture roots in the main
19.6	SM-4655	BRK	16	S 28TH ST	B-633	MH-3389	19.6	3/30/2020	HD 21	5			Dropped invert deformed brick
170	SM-4664	BRK	16	CAMDEN AV	MH-1386	MH-1390	170	5/18/2020	HD 23	5			
246.4	SM-4685	BRK	16	N 36TH ST	MH-1529	MH-1530	246.4	4/29/2020	HD 22	5			Missing brick missing mortar dropped invert
38.2	SM-4686	BRK	16	N 36TH ST	B-284	MH-1529	38.2	4/29/2020	HD 22	5			Dropped invert displaced brick
225	SM-4688	BRK	16	N 36TH ST	MH-1530	MH-1535	225	4/29/2020	HD 22	5			Missing brick missing mortar dropped invert
201.4	SM-4689	BRK	16	N 36TH ST	MH-1538	MH-1539	201.4	4/1/2020	HD 22	5			Dropped invert missing mortar deformed brick
198.9	SM-4690	BRK	16	N 36TH ST	MH-1537	MH-1539	198.9	4/2/2020	Hd 22	5			Dropped invert deformed invert
210.3	SM-467	BRK	16	GARFIELD AV	MH-43	MH-4299	210.3	7/6/2020	MH	5			Obstacles in the main pipe or cable
253.29	SM-2830	BRK	16	HARRISON AVE	MH-2807	MH-2805	253.29	8/12/2019	HD 15	5			Deformed brick roots in the main wood in the main missing mortar dropped invert
253.39	SM-3102	BRK	16	N 28TH ST	MH-4064	MH-4065	253.39	8/13/2019	HD 15	5			Dropped invert missing mortar
260.5	SM-4760	BRK	16	MECHANIC AV	MH-2314	MH-2315	260.5	6/7/2019	HD 13	5			Hole in the pipe deformed brick
171.2	SM-4819	BRK	16	WHITMAN AV	MH-2629	MH-2630	171.2	6/3/2019	HD 12/13	5			Dropped in vert brick bulging missing mortar
37.8	SM-4876	BRK	16	EUCLID AVE	MH-298	B-699	37.8	5/24/2019	HD 12	5			Dropped invert
104.8	SM-4933	BRK	16	EVERETT ST	MH-765	B-129	104.8	11/12/2018	hard drive	5			Missing brick and mortar
37.8	SM-5165	BRK	16	GREENWOD AV	MH-3720	B-699	37.8	5/24/2019	HD 12	5			Dropped invert
146.5	SM-5177	BRK	16	ROSE ST	MH-3812	MH-3813	146.5	11/8/2018	hard drive	5			eformed brick missing mortar and displaced bricks dropped invert
196.86	SM-5316	BRK	16	N 29th ST	MH-438	MH-439	196.86	8/14/2019	HD 15	5			Dropped invert deformed brick
138.2	SM-5506	BRK	16	MT EPHRAIM AVE	MH-3512	MH-3513	9.6	7/7/2017	73	5			Obstacles in the main
240.7	SM-5594	BRK	16	CHESTNUT ST	MH-2114	B-501	21.1	4/11/2019	HD 11	5			Deformed brick bick falling when jetting

City of Camden Response to NJDEP Comments 3 & 17(a) - Exhibit D
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MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
34.7	SM-5595	BRK	16	CHESTNUT ST	MH-2113	MH-2114	34.7	4/12/2019	HD 11	5			Displaced brick brick bulging
243	SM-5629	BRK	16	N 9TH ST	MH-2277	B-435	243	6/18/2020	HD 24	5			Dropped invert missing brick
243	SM-5630	BRK	16	N 9TH ST	MH-2276	B-435	243	6/18/2020	Hd 24	5			Dropped invert missing brick
199.67	SM-5701	BRK	16	N 28TH ST	MH-4062	MH-4063	199.67	8/13/2019	HD 15	5			Dropped invert deformed brick
73.6	SM-5733	BRK	16	BUDD ST	MH-5215	MH-5216	73.6	1/16/2019	HD 7	5			Tap intruding in the main
271.6	SM-5758	BRK	16	ATLANTIC AV	MH-144	MH-145	271.6	9/28/2018	83-84	5			Missing bricks dropped invert taps intruding into the main
213.15	SM-5916	BRK	16	27TH ST	MH-1317	MH-1320	213.15	8/14/2019	HD 15	5			Missing mortar dropped invert bulging brick
189.7	SM-5991	BRK	16	CHASE ST	MH-1569	MH-1570	189.7	1/18/2019	HD 7	5			Tap intruding into main
193.7	SM-5992	BRK	16	CHASE ST	MH-1570	MH-1571	193.7	1/18/2019	HD 7	5			Tap intruding into main
67	SM-6014	BRK	16	PINE ST	MH-1650	MH-1651	67	1/5/2021	HD	5			Obstacles running thru pipe
157	SM-6091	BRK	16	GREENWOD AV	MH-3891	MH-3892	157	6/5/2019	HD 13	5			Deformed brick missing brick
97.3	SM-6117	BRK	16	NORRIS ST	B-548	MH-5106	97.3	2/28/2019	hd 9	5			Dropped invert cable in the main
142.3	SM-6154	BRK	16	N 28TH ST	MH-4071	MH-4072	142.3	8/22/2019	HD 15	5			Pipe in the main missing mortar dropped inver
207	SM-6158	BRK	16	S 5TH ST	MH-2571	MH-2572	207	11/2/2020	HD	5			Missing brick obstacles running through the main
175.5	SM-6160	BRK	16	WHITMAN AV	MH-2635	MH-2637	175.5	4/12/2019	HD 24	5			Hole in the pipe
184.5	SM-6161	BRK	16	WHITMAN AV	B-452	MH-2632	184.5	11/20/2018	87-91	5			Dropped invert
240.61	SM-6234	BRK	16	CRAMER ST	MH-603	MH-610	240.61	1/7/2020	HD-19	5			Dropped invert missing mortar
218.4	SM-6379	BRK	16	THURMSN ST	MH-1576	MH-1577	218.4	3/20/2019	hd 10	5			Dropped invert missing bricks
66.7	SM-6408	BRK	16	ORCHARD ST	1	MH-3867	66.7	7/11/2018	53	5			Cable in the main
135.3	SM-6411	BRK	16	BRADLEY AV	MH-3887	B-737	135.3	5/30/2019	HD 12	5			Deformed brick roots in the main
233.7	SM-6422	BRK	16	PIERCE AV	MH-3999	MH-4000	233.7	8/20/2019	HD 15	5			Missing brick dropped invert missing mortar deformed brick
300.1	SM-6423	BRK	16	CHELTON AVE	MH-4470	MH-4472	300.1	2/16/2018	23	5			Broken main
207.9	SM-6515	BRK	16	PRINCESS AVE	MH-3606	MH-3607	207.9	6/29/2018	51	5			Obstacles intruding in the main
197.6	SM-6520	BRK	16	PRINCESS AVE	B-676	MH-3609	197.6	7/2/2018	49	5			Obstruction thru wall
197.8	SM-6595	BRK	16	RARITAN ST	MH-3755	MH-3756	197.8	9/27/2019	HD 16	5			Roots in the main dropped invert
194.1	SM-6652	BRK	16	S 7TH ST	MH-4638	MH-4639	194.1	10/26/2018	harddrive	5			Missing mortar displaced brick and taps intruding into the main
168.5	SM-6716	BRK	16	LANSDOWN AV	MH-502	MH-5282	168.5	6/3/2019	HD 13	5			Dropped invert missing mortar deformed brick
392.7	SM-6805	BRK	16	BROWNING ST	MH-4299	MH-4300	392.7	2/27/2019	hd 9	5			Deformed brick
132.6	SM-6842	BRK	16	MITCHELL ST	MH-3107	MH-3108	132.6	8/10/2018	HD 22	5			Dropped invert
350	SM-6863	BRK	16	SYLVAN TER	MH-722	MH-724	350	5/18/2020	HD 23	5			Missing mortar displaced brick dropped invert
80.2	SM-6913	BRK	16	NEWTON AVE	MH-2243	MH-3301	80.2	7/1/2019	HD-14	5			Hole in the pipe missing bricks
231	SM-7024	BRK	16	ROWE ST	MH-3659	MH-3660	231	3/30/2020	HD 21	5			Dropped invert missing mortar displaced brick
332.4	SM-7115	BRK	16	BRADLEY AV	MH-3892	MH-3893	332.4	6/5/2019	HD 13	5			Missing brick deformed brick
297.8	SM-7116	BRK	16	BRADLEY AV	MH-3893	MH-3894	297.8	6/5/2019	HD 13	5			Dropped invert displaced brick collapsing
190.3	SM-7186	BRK	16	MORGAN BLVD	MH-4757	MH-5096	190.3	4/2/2019	HD 11	5			Obstacles inuding thru the wall
362.3	SM-7190	BRK	16	BROWNING ST	B-804	MH-4299	362.3	2/22/2019	hd 9	5			deformed main cable in the main
143.3	SM-7317	BRK	16	THURMSN ST	MH-1573	MH-1574	143.3	4/5/2019	HD 11	5			Deformed brick
168.2	SM-7437	BRK	16	TULIP ST	MH-4700	MH-5101	168.2	4/25/2019	HD 11	5			Fractures in the pipe broken main
157.3	SM-7472	BRK	16	BRADLEY AV	MH-3891	MH-3982	157.3	6/5/2019	HD 13	5			Deformed brick missing brick
197.6	SM-7489	BRK	16	MEMORIAL AVE	MH-4051	B-767	197.6	7/2/2018	49	5			obstruction thru wall
142.3	SM-7490	BRK	16	N 28TH ST	MH-4071	MH-4072	142.3	8/22/2019	HD 15	5			Dropped invert missing mortar
196	SM-7491	BRK	16	S 5TH ST	MH-2569	MH-2570	196	10/29/2020	HD	5			Obstacles in the main
267.9	SM-7495	BRK	16	WHITMAN AV	MH-2633	MH-3960	267.9	11/15/2018	hard drive	5			Missing mortar dropped in vert
Subtotal							**29722**				$105	$3,120,797	
15 INCH													
130.7	SM-17	RCP	15	ELM ST	MH-114	MH-115	130.7	12/12/2016	18	5			Broken main
291	SM-289	TC	15	PERSHING ST	MH-3603	MH-3605	291	6/14/2019	HD 13	5			Cracked main pipe or cable in the main
46.2	SM-428	RCP	15	S 5TH ST	MH-3311	MH-4150	46.2	4/3/2017	57	5			Surface aggregate visible joint seperated fracture in the pipe
234.81	SM-430	RCP	15	S 5TH ST	MH-4149	MH-4150	234.81	9/1/2016	10	5			Surface aggregate visible joint seperated fracture in the pipe
263.4	SM-623	TC	15	N CHESAPEAKE RD	MH-2902	MH-5227	263.4	12/16/2020	HD	5			Debris in the main
141	SM-1160	VCP	15	BROADWAY	MH-2232	MH-2509	141	8/17/2017	79	5			Broken in multiple places
234	SM-1764	RCP	15	ELM ST	MH-95	MH-114	234	12/13/2016	18	5			Cracks in the main obstacles in the main surface reignforcement visible
184.5	SM-2082	RCP	15	CARPENTER ST	MH-3360	MH-3361	56.2	5/9/2017	64	5			Surface reinforcement visible
231	SM-3207	RCP	15	S 3RD ST	MH-1814	MH-1815	231	9/28/2020	HD	5			Surface reinforcement visible
232.7	SM-3243	RCP	15	BROADWAY	MH-2217	MH-2222	232.7	8/17/2017	79	5			Roots int the main surface reinforcement visible
280	SM-3831	RCP	15	S 3RD ST	MH-1816	MH-1834	280	9/28/2020	HD	5			Surface wall missing
136	SM-3980	RCP	15	N 31ST ST	MH-4049	B-766	136	7/18/2018	56	5			Intruding seal in the main
288	SM-4097	VCP	15	DENFIELD ST	MH-2932	MH-2933	288	2/28/2018	28	5			Broken and cracked main
237	SM-4358	VCP	15	MORGAN BLVD	MH-2932	MH-4270	237	2/28/2017		5			Hole in the pipe cracks in the main
208.2	SM-4723	TC	15	PERSHING ST	MH-1143	MH-3603	208.2	6/14/2019	HD 13	5			Cracks in the main
258.7	SM-5325	RCP	15	KENWOOD AV	MH-534	MH-535	258.7	7/20/2018	57	5			tap intruding into main

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157.1	SM-5407	TC	15	WOODLAND AV	MH-2989	MH-4693	157.1	4/10/2019	HD 11	5			Hole in the pipe
142.5	SM-5727	VCP	15	FEDERAL ST	MH-1035	MH-2737	142.5	2/7/2020	HD 20	5			Cracks in the main
148.4	RM-362	TC	15	TUCKAHOE RD	B-1035	B-1036	148.4	10/8/2020	HD	5			Broken main
148.4	RM-363	TC	15	TUCKAHOE RD	OF-50	B-1035	148.4	10/8/2020	HD	5			Broken main
137	SM-7507	RCP	15	PINE ST	MH-2704	MH-2705	137	9/6/2016	12	5			Hole in the main sag in the pipe
Subtotal							**4002.3**				$93	$372,215	
12 INCH													
288.2	SM-185	TC	12	MAIN ST	B-35	MH-3233	288.2	3/8/2017	47	5			Mulitply fractures in the main
110.1	SM-826	TC	12	S 5TH ST	MH-2564	MH-2565	110.1	10/12/2016	9	5			Broken main
170.1	SM-983	TC	12	WOODLAND AV	MH-2990	MH-4693	170.1	4/23/2019	HD 11	5			Joint offset
67.2	SM-1965	TC	12	N 8TH ST	MH-1897	MH-1898	67.2	2/21/2017	38	5			Deformed
211.1	SM-2051	RCP	12	PARK BLVD	MH-1265	MH-1266	211.1	6/17/2019	HD 13	5			Hoil in the pipe
77.3	SM-3212	TC	12	HENRY ST	MH-1843	MH-1844	8.1	10/29/2020	HD	5			Broken main
64.1	SM-3447	BRK	12	FAIRVIEW ST	MH-4371	MH-4372	64.1	4/16/2019	HD 11	5			Obstacles in the main
143.4	SM-4054	VCP	12	WAINWRIGHT ST	MH-4271	MH-4272	143.4	3/1/2018	29	5			Tap intruding in the main
251	SM-4055	VCP	12	WAINWRIGHT ST	MH-4270	MH-4271	251	3/1/2018	29	5			Cracks in the main taps intruding in the main
144.7	SM-4469	TC	12	PINE ST	MH-2704	B-518	144.7	9/6/2016	12	5			Cracks in the main
176.4	SM-4584	TC	12	S 4TH ST	MH-259	MH-1297	176.4	8/27/2020	HD	5			Cracks in the main hole in the pipe
117.2	SM-5207	TC	12	MECHANIC ST	MH-2561	MH-2562	117.2	1/18/2018	21	5			Multiply fractions in the main taps within 8" of joint broken taps
184.4	SM-6187	TC	12	WEST ST	B-773	MH-4161	63	10/13/2016	9	5			Broken main
144.7	SM-7142	TC	12	PINE ST	MH-2155	B-518	144.7	9/6/2016	12	5			Cracks in the main
Subtotal							**1959.3**				$75	$146,948	
10 INCH													
304.1	SM-376	TC	10	COLLINGS RD	MH-5093	MH-5172	304.1	6/28/2019	HD 13	5			Broken and cracked hole in pipe
133.8	SM-792	TC	10	HOWELL ST	MH-3943	MH-3950	133.8	2/4/2020	HD-17-20	5			Obstruction in the main
391.7	SM-893	TC	10	VINE ST	MH-2514	MH-3326	44.3	4/3/2017	55	5			Collasped main
261.6	SM-1630	TC	10	REEVES AV	MH-2188	MH-2189	261.6	8/18/2020	HD	5			Roots and too much debris
163.4	SM-2319	TC	10	BAILEY ST	MH-1896	MH-2545	163.4	2/20/2017	37	5			Broken main hole in the pipe
120.1	SM-3231	VCP	10	MACARTHUR ST	MH-4818	MH-4819	120.1	2/23/2018	27	5			Hole in the main
326.3	SM-3597	TC	10	KOSSUTH AV	MH-4258	MH-4259	326.3	11/16/2018	hard drive	5			Cracked main deformed multiply fractures
112.3	SM-4498	TC	10	CUSHING RD	MH-4233	MH-4234	112.3	10/31/2019	HD 17	5			Hole in the pipe cracked main
196.4	SM-4573	TC	10	COLLINGS RD	MH-4429	MH-5094	196.4	6/26/2019	HD 13	5			Multiply fractures in the pipe
130	SM-5488	TC	10	WASHINGTON ST	MH-1405	MH-1406	130	7/11/2016	1	5			Multiply cracks and fractures
138.6	SM-5489	TC	10	WASHINGTON ST	MH-1406	MH-1407	138.6	7/11/2016	1	5			Multiply cracks and fractures
260.6	SM-5588	VCP	10	MACARTHUR ST	MH-4819	MH-4820	260.6	2/23/2018	27	5			Hole in the pipe broken main
115	SM-6048	VCP	10	MACARTHUR ST	MH-4814	MH-4815	115	2/26/2018	27	5			Hole in the main breaks in the main
146	SM-7019	VCP	10	MACARTHUR ST	MH-4814	MH-4816	146	2/26/2018	28	5			Cracks and holes in the main
52	SM-7022	VCP	10	MACARTHUR ST	MH-4811	MH-4812	52	2/26/2018	28	5			Broken and cracked main
286.6	SM-7244	VCP	10	PATTON ST	MH-2926	MH-4819	286.6	2/23/2018	27	5			Cracks in the main tap intruding in the main
146.5	SM-7385	TC	10	S 7TH ST SECONDARY	MH-2208	B-428	90.1	7/11/2016	1	5			Broken main
Subtotal							**2881.2**				$60	$172,872	
8 INCH													
154	SM-141	TC	8	TENNESSEE RD	MR-5	MH-2931	154	7/1/2019	HD-14	5			Hole in the pipecracks in the main
331.9	SM-374	TC	8	COLLINGS RD	MH-2906	MH-5231	331.9	12/16/2020	HD	5			Multiple fractures in the main hole in the pipe
140.3	SM-378	TC	8	COLLINGS RD	MH-5090	MH-5091	140.3	7/16/2019	HD-14	5			Collapsed sewer
202.7	SM-804	TC	8	HIGH ST	MH-4037	MH-4038	202.7	12/3/2020	HD-20	5			Broken pipe
316.2	SM-907	BRK	8	BIRCH ST	MH-490	MH-2523	316.2	3/21/2017	51	5			
313.7	SM-1230	BRK	8	N 2ND ST	MH-2523	Mh-3446	313.7	2/24/2017	35	5			
124.3	SM-1696	RCP	8	N 27TH ST	MH-2597	MH-2598	124.3	8/9/2017	78	5			Surface reinforcement visible
162.1	SM-1828	BRK	8	YORK ST	MH-1466	MH-1467	162.1	3/27/2017	46	5			deformed main
144.8	SM-3083	TC	8	WILLIAMS ST	MH-1305	MH-3049	144.8	11/15/2016	14	5			Broken main in multiply places
124	SM-4025	TC	8	ROSE ST	MH-2798	MH-5288	124	9/25/2020	HD	5			repair patch settle
275.4	SM-4126	TC	8	E IRONSIDE RD	MH-4401	MH-5276	275.4	12/9/2020	HD	5			Broken and cracked main
154	SM-4518	TC	8	MERRIMAC RD	MR-5	B-799	154	7/1/2019	HD-14	5			hole in the pipe cracked main
100.2	SM-4519	TC	8	MERRIMAC RD	B-799	1	100.2	6/25/2019	HD-14	5			Hole in the pipe joint offset
100.4	SM-4700	TC	8	NIAGRA RD	MH-4393	MH-4618	100.4	7/16/2019	HD-14	5			Broken main
70.9	SM-4775	TC	8	OCTAGON RD	MH-4513	MH-4973	70.9	12/31/2020	HD	5			Hole in the main joints offset
224.4	SM-4781	TC	8	KANSAS RD	MH-4991	MH-4992	224.4	9/27/2019	HD 16	5			Cracks in the main hole in the main
222	SM-4841	TC	8	TUCKAHOE RD	MH-5244	MH-5245	222	7/18/2019	HD-14	5			Surface wall missing cracked main joint offset
204	SM-5093	TC	8	NIAGRA RD	MH-2984	MH-4396	204	12/16/2020	HD	5			Broken main main separated
82.7	SM-5192	TC	8	COLLINGS RD	MH-5088	MH-5089	82.7	7/10/2019	HD-14	5			Hole and cracks in the pipe

City of Camden Response to NJDEP Comments 3 & 17(a) - Exhibit D
CITY OF CAMDEN SEWER LINES FOR REPAIR / REPLACE
BASED UPON CCTV INSPECTION AND RATED AS NEEDING ACTION WITHIN FIVE YEARS

MeasuredLength	LegacyID	Material	Diameter	AssetLocation	MANHOLE1	MANHOLE2	Length	Date_Cleaned	DVD	Grade	Lining Cost per LF	Est. Cost	Grading_Comments
178	SM-5226	TC	8	MT EPHRAIM AVE	MH-5187	MH-5189	178	9/13/2019	HD 16	5			Hole in the pipe
188.9	SM-5253	TC	8	TUCKAHOE RD	MH-5175	MH-5239	188.9	12/28/2020	HD	5			multiply fractures in the main joints offset hole in the main
136.5	SM-5494	TC	8	ARGUS RD	MH-2972	MH-4982	136.5	12/28/2020	HD	5			Holes and multiply fractures
86	SM-6300	TC	8	HADDON AVE	MH-1135	MH-1136	86	12/31/2020	HD	5			Broken main and hole in the main
150.2	SM-6447	TC	8	N CHESAPEAKE RD	MH-2973	MH-4566	150.2	12/16/2019	HD 19	5			Broken main cracked main
266.8	SM-6845	TC	8	OLYMPIA RD	MH-2836	MH-4592	266.8	9/13/2019	HD 16	5			Broken main hole in the pipe
263.03	SM-6984	TC	8	MINNESOTA RD	MH-4795	MH-4796	263.03	9/9/2019	HD 16	5			Hole in the pipe broken pipe foots in the main
47.9	SM-7401	UNK	8	W IRONSIDE RD	MH-4892	MH-4893	47.9	12/30/2020	HD	5			Fractures and holes in the main
253.9	SM-7420	TC	8	OCTAGON RD	MH-4375	MH-4984	253.9	12/23/2020	HD	5			Holes and fractures in the main
Subtotal							**5019.2**				$50	$250,962	
TOTAL FOOTAGE							**71137**					$11,938,780	**Equals approximately 13.5 miles for approximately 60% CCTV (time list prepared)**
												$14,326,537	**Cost Plus 20% Contingency**
												$23,877,561	**Extrapolated Cost for 22.5 miles of Category 5**
NOTES												$30,351,033	**Estimated Cost for 26 miles of Category 4**
Start & End Location Manholes Are:												**$4,775,512**	**Cat. 5 spread - Annual Cost Yr 1 to 5**
MH = MANHOLE												**$6,070,207**	**Annual Cost for Cat. 4 over YR 6 to 10**
MR = CATCHBASIN													
OF = OUTFALL													
TG = TIDEGATE													
,1 = SWEEPS, DEADENDS, Y'S AND T'S													
Legacy ID, DVD Reference refer to GIS Database maintained by AWO&M for City of Camden													
Highlighted comments for larger pipe show immediate needs and intrusions by third party utilities and others													

Camden Response to NJDEP Comments 3 and 17(a) - Exhibit E

Contract Year	Footage Cleaned	Miles Cleaned	Tons Removed	Tons Removed per mile	Total MR & R Expense (*1)	Sewer Cleaning Cost		
						per Mile	per Foot	
02.2016-01.2017	105,083	19.90	617.15	31.01	$ 548,256.55	$ 27,986.55	$ 5.30	
02.2017-01.2018	101,950	19.31	748.93	38.79	$ 1,423,140.44	$ 66,626.43	$ 12.62	
02.2018-01.2019	133,432	25.27	746.06	29.52	$ 1,464,536.68	$ 57,955.55	$ 10.98	
02.2019-01.2020	134,061	25.39	930.85	36.66	$ 1,901,179.00	$ 74,879.05	$ 14.18	
02.2020-01.2021	158,248	29.97	754.90	25.19	$ 1,910,086.19	$ 63,733.27	$ 12.07	
02.2021-05.2021	19,214	3.64	378.10	103.87	$ 416,744.83	$ 114,490.34	$ 21.69	
Total to Date		**123.48**			**$ 7,663,943.69**	**$ 62,065.88**	**$ 11.75**	
						$ 68,698.36	$ 13.01	Discounting CY1

SYSTEM TOTAL	194.50
Less Force Main	-7.41
Less Storm Sewer	-5.00

To Be Cleaned	58.61

*1 - Third party costs only

$ 3,637,631.60	Cost Based Upon Average to Date
2.02	Years to Complete (current funding)
$ 5,032,944.93	Cost Based on Avg CY2-CY6 + 25% Contingency
2.80	Years to Complete (current funding)
5,636,898.32	Cost Based on Avg CY2-CY6 + 40% Contingency
3.13	Years to Complete (current funding)

Notes:

A. Increased funding allocation will require additional management/ supervision to handle addditional crews, estimated $150K per year

B. Based on current heavy cleaning, there may be another "tier" of costs to complete cleaning, hence the 25% contingency (i.e. Tons removed)

American Water Operations & Maintenance
City of Camden CSO Regulator Project

Minutes for Progress Meeting No. 14
May 12, 2021 @ 1:00 pm
Microsoft Teams Teleconference Meeting

Attendance:

Andrew Bock - AWWSC	Jim Hopkins - BH
Gary Brooks - AWOM	Jim Cowley - GECG
Harold Sofield – AWOM	Adeola Owolabi - GECG
Adam McDonough - AWOM	Sadia Salam - GECG
Eric Thompson – AWOM	Steve Byrnes – Waterware
Brian Cianfrani - AWOM	Kevin Byrnes – Waterware
Anthony Coppola – NJDEP	Bob Cornforth - CCMUA

I. Safety Moment

II. Open Items

a. COVID- 19 – Waterware, Grant Engineering, AWO&M, and the City of Camden did not have any COVID-19 related issues or exposures to discuss. AWO&M did not have any updates to the COVID related guidance.

b. Status of City memo regarding D&B Guarino information – Orion J. to review draft and respond.

c. CSO 11 – Access to the manhole is partially obstructed by the sidewalk. Waterware restored the site back to existing conditions after completing the concrete repair work in the regulator chamber. Gary B. is evaluating alternatives to allow for better access in the future, which would be implemented when Waterware returns to epoxy the regulator chamber.

III. Work Progress

A. Waterware reviewed the status of work completed since last meeting.

Key highlights include:

a. CSO 15 – Concrete work was completed in this chamber

b. CSO 18 – Tide gate servicing has started.

c. Regulators will be epoxy coated once shipment is received and weather warms.

III. Construction Schedule

A. Current Construction Schedule is attached.

B. Problems/Revisions/Corrections to Schedule – Potential problems were discussed.

C. The project final completion date remains September 14th, 2022.

IV. Submittals

A. The submittal log was reviewed. No additional discussion required.

V. As Built Drawings

A. No discussion required.

VI. Potential Changes/RFIs

A. There were no open RFIs to discuss. Waterware had previously submitted 6 RFIs and have received responses to 6 RFIs.

B. Waterware to review the condition of the remaining regulator chamber manhole frames and will provide any recommendations for restorations/improvements.

VII. Progress Payments

A. Waterware and Grant Engineering have submitted May payment applications. AWOM to submit April and May payment applications to the city for reimbursement.

VIII. Safety and Security

A. No Safety or Security issues required discussion.

IX. New Issues

A. No additional discussion required.

X. Adjournment:

A. Upcoming Meetings – **May 26 @ 1:00 PM via teleconference.**
June 9 @ 1:00 PM via teleconference.

Attachments
Construction Schedule
Submittal Log
RFI Log

Customer: American Water Contract Services
100 South 17th Street
Camden, NJ 08105

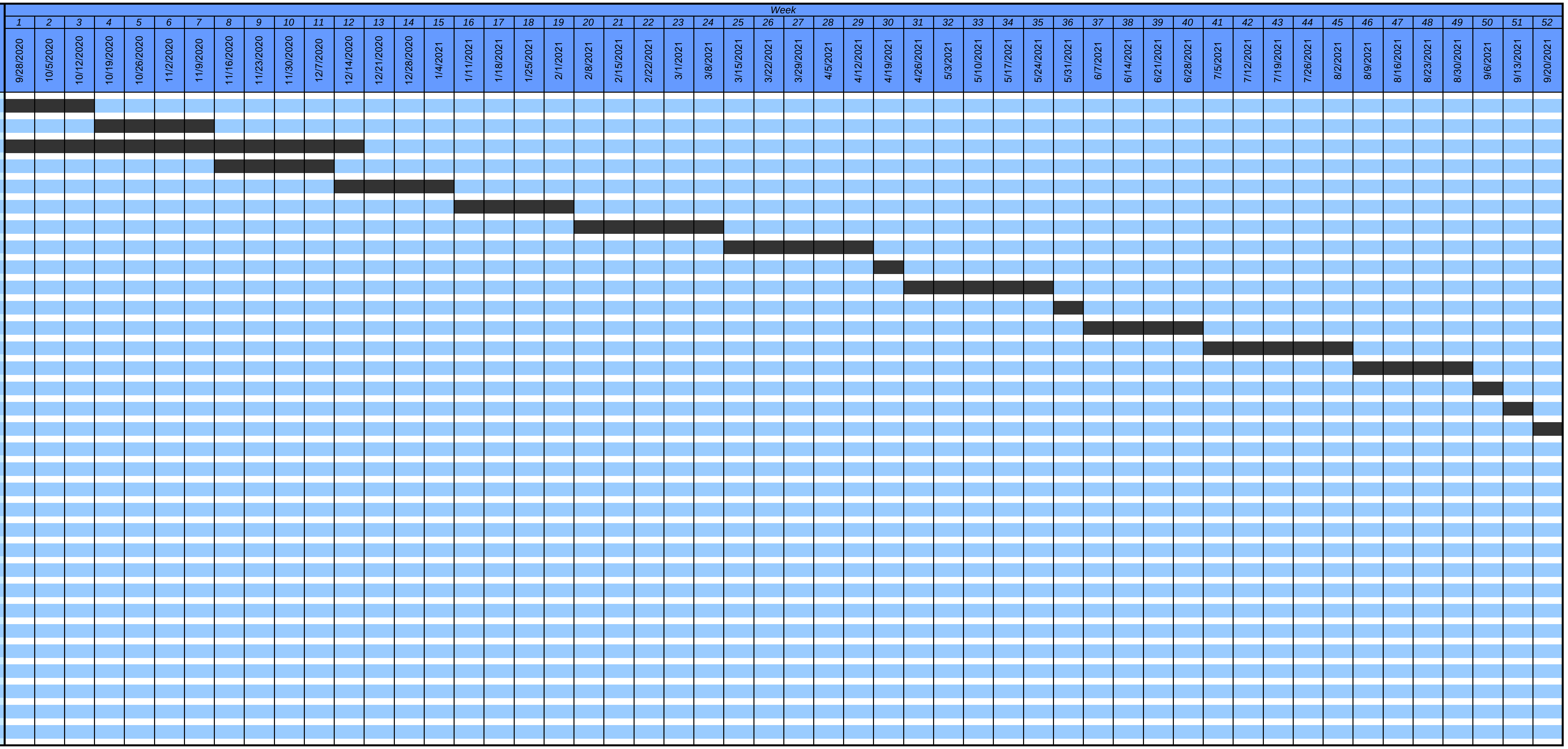
Project #: S340366-15

Project: Rehabilitation of Combined Sewer Regulator Chambers

NTP 9/24/2020
Schedule Update 11/24/2020

Start Date: 9/24/2020
Completion Date: 9/24/2022

Item	Tasks	Start Week	End Week	Duration (Weeks)
1	Initial Submittals	1	3	3
2	Initial Submittal Review and Approval	4	7	4
3	Initial Manufacturing of New Regulating Equipment	1	12	12
4	Regulator C-28	8	11	4
5	Regulator C-24	12	15	4
6	Regulator C-16	16	19	4
7	Regulator C-10	20	24	5
8	Regulator C-18	25	29	5
10	Regulator C-12	30	30	1
11	Regulator C-13A	31	35	5
12	Regulator C-14	36	36	1
14	Regulator C-23	37	40	4
9	Regulator C-11	41	45	5
13	Regulator C-15	46	49	4
15	Regulator C-23A	50	50	1
16	Regulator C-22BE	51	51	1
17	Regulator C-17	52	55	4
18	Regulator C-22	56	56	1
19	Regulator C-22A	57	57	1
20	Regulator C-19	58	61	4
21	Regulator C-27	62	62	1
22	Regulator CMT	63	64	2
23	Regulator CFA	65	65	1
24	Regulator C-09	66	69	4
25	Regulator C-08	70	73	4
26	Regulator C-07	74	77	4
27	Regulator C-06	78	82	5
28	Regulator C-05	83	86	4
29	Regulator C-03	87	91	5
30	Regulator C-02	92	96	5
31	Regulator C-01	97	100	4



Customer: **American Water Contract Services**
100 South 17th Street
Camden, NJ 08105

Project #: **S340366-15**

Project: **Rehabilitation of Combined Sewer Regulator Chambers**

NTP 9/24/2020
Schedule Update 11/24/2020

Start Date: 9/24/2020
Completion Date: 9/24/2022

Item	Tasks	Start Week	End Week	Duration (Weeks)	Week																																														
					53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
					9/27/2021	10/4/2021	10/11/2021	10/18/2021	10/25/2021	11/1/2021	11/8/2021	11/15/2021	11/22/2021	11/29/2021	12/6/2021	12/13/2021	12/20/2021	12/27/2021	1/3/2022	1/10/2022	1/17/2022	1/24/2022	1/31/2022	2/7/2022	2/14/2022	2/21/2022	2/28/2022	3/7/2022	3/14/2022	3/21/2022	3/28/2022	4/4/2022	4/11/2022	4/18/2022	4/25/2022	5/2/2022	5/9/2022	5/16/2022	5/23/2022	5/30/2022	6/6/2022	6/13/2022	6/20/2022	6/27/2022	7/4/2022	7/11/2022	7/18/2022	7/25/2022	8/1/2022	8/8/2022	8/15/2022	8/22/2022	8/29/2022	9/5/2022	9/12/2022	9/19/2022
1	Initial Submittals	1	3	3																																																				
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20	Regulator C-19	58	61	4						■	■	■	■																																											
21	Regulator C-27	62	62	1										■																																										
22	Regulator CMT	63	64	2											■	■																																								
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24	Regulator C-09	66	69	4														■	■	■	■																																			
25	Regulator C-08	70	73	4																		■	■	■	■																															
26	Regulator C-07	74	77	4																						■	■	■	■																											
27	Regulator C-06	78	82	5																										■	■	■	■	■																						
28	Regulator C-05	83	86	4																															■	■	■	■																		
29	Regulator C-03	87	91	5																																			■	■	■	■	■													
30	Regulator C-02	92	96	5																																								■	■	■	■	■								
31	Regulator C-01	97	100	4																																													■	■	■	■				

SUBMITTAL LOG - PRINTED 1/25/2021

AMERICAN WATER OPERATIONS MAINTENANCE
CITY OF CAMDEN CSO REGULATOR PROJECT
CAMDEN, NEW JERSEY

DIVISION	SUBMITTAL NO.	SUBMITTAL TITLE	RECEIVED	RETURNED	GRANT	CAMDEN	AWO&M	STATUS
GENERAL CONDITIONS								
	1950-001-01	Concrete Rehabilitation	11/3/2020	12/2/2020	RC	RC	RR	CLOSED
	1950-002-01	Regulator CO1 Arrangement	11/3/2020	12/2/2020	RC	RC	RR	CLOSED
	1950-002-02	Regulator CO1 Arrangement (Resubmittal)	1/20/2021					OPEN
	1950-003-01	SS Access Ladders	11/3/2020	12/2/2020	RC	RC	RR	CLOSED
	1950-003-02	SS Access Ladders (Resubmittal)	1/20/2021					OPEN
	1950-004-01	Anchor Bolts and Anchor Adhesives	11/3/2020	12/2/2020	RNC	RNC	APP	CLOSED
	1950-005-01	Health & Safety Plan, Certificate of Insurance	11/3/2020	11/13/2020	RC	RC	RR	CLOSED
	1950-005-02	Health & Safety Plan (Resubmittal)	11/13/2020	11/13/2020			APP	CLOSED
	1950-006-01							
	1950-007-01							
	1950-008-01							

Approved Submittals	2	
Open Submittals	0	
Average Return Time	25.2	days

RFI LOG - PRINTED 4/7/2021

AMERICAN WATER OPERATIONS MAINTENANCE
CITY OF CAMDEN CSO REGULATOR PROJECT
CAMDEN, NEW JERSEY

RFI NO.	RFI TITLE	RECEIVED	RETURNED	GRANT	CAMDEN	AWO&M	STATUS
1	Diversion Chamber Ladder Installation at CSO 28	12/16/2020	12/22/2020	12/18/2020	12/18/2020	12/21/2020	CLOSED
2	Level Equipment Installation at Regulator C24	12/16/2020	12/22/2020	12/18/2020	12/18/2020	12/21/2020	CLOSED
3	Regulator Chamber Access at Regulator C-10	12/16/2020	12/22/2020	12/18/2020	12/18/2020	12/21/2020	CLOSED
4	Overflow Conduit at Regulator C24	12/16/2020	12/23/2020	12/18/2020	12/18/2020	12/21/2020	CLOSED
5	CSO 12 Flow/Surcharge Investigation	3/17/2021	3/19/2021	3/18/2021	3/18/2021	3/19/2021	
6	CSO 13 Flow Investigation	3/17/2021	3/19/2021	3/18/2021	3/18/2021	3/19/2021	

CCMUA / Camden / Gloucester

Responses to NJDEP Comment Letter of May 7, 2021

Gloucester City Public Participation

Attachment C

Gloucester City Trail Awareness & Stewardship Work Plan

Developed by the New Jersey Tree Foundation
Lead support provided by the William Penn Foundation
July 2019

Gloucester City Trail Awareness & Stewardship Work Plan

Table of Contents

Introduction & Background

This work plan is designed to offer potential locations to plant trees along the Circuit Trail and recommendations for the maintenance of existing trees in Gloucester City. Gloucester City has potential for several locations to plant trees along planned Circuit routes, and has an active Green Team and Shade Tree Board. The NJ Tree Foundation would enlist the help of both of these groups to design tree planting projects.

There are two smaller watersheds that run through Gloucester City: Newton Creek and Big Timber Creek. These watersheds lead out to the Delaware River. Both watersheds provide wildlife habitat, drinking water, and recreation opportunities. Gloucester City is a Combined Sewer Outfall (CSO) community, which creates significant water pollution in the watersheds. In normal situations, sewage and stormwater combine and are sent to the water treatment plant for processing. However, when the system becomes overwhelmed during heavy rain events or significant snow melt, the combined sewage is dumped untreated into the nearest waterbody. A small portion of Gloucester City falls under an MS4, or Municipal Separate Storm Sewer System. This system keeps sewage and stormwater separate as it makes its way to the water treatment plant to be processed, which keeps the sewage out of the watershed. The NJ Tree Foundation recommends removing concrete and planting trees as an answer to urban stormwater runoff. The trees are a part of green infrastructure and can help reduce water pollution, both in MS4 and CSO sewersheds. Trees absorb significant amounts of water and their roots help to process and filter pollutants. By removing concrete and opening up the sidewalk, rain seeps back into the ground naturally instead of running off untreated into the sewer or closest waterbody. Trees also help reduce air pollution, beautify neighborhoods, reduce the “urban heat island effect,” and enhance wildlife habitat. It is for these reasons that the NJ Tree Foundation recommends planting trees both on and off the Circuit Trail in Gloucester City. The trees should be planted in the public right-of-way with concrete removal for the greatest impact.

Immediate Opportunities

Stewardship of Existing Trees in Gloucester City

The stewardship of existing trees in Gloucester City is important for the long-term health of the overall tree canopy. Maintenance can be done on both young and old trees. While most heavy tree pruning is best over the winter when the tree is dormant, mulching and some immediate maintenance can be done year round.

Over the past three years, the NJ Tree Foundation has worked on two tree planting projects in Gloucester City. To ensure the long term survival of the trees, the NJ Tree Foundation recommends checking all trees planted in the last two years and correcting any issues before they become a problem. New trees should be checked for the following:

- Proper use of stakes, if any
- Presence of disease/infestation
- Pruning of all dead, diseased, and damaged branches

Proper use of stakes - While the NJ Tree Foundation does not typically stake new trees, we will stake if a new tree is leaning after it is planted. The NJ Tree Foundation will stake trees on a case by case basis. Staking can provide stability to a tree, but it can also restrict the tree’s growth if left on too long. If the staking ties are left on for over a year, they can create bark inclusions on the tree, which leaves the tree vulnerable to disease and damage. If a tree is determined to need staking for extra support, the NJ Tree Foundation recommends using ArborTie when the tree is initially staked and removing the tie after one year. Typically, 2-3 stakes are enough to straighten one tree.

Pruning dead, diseased, and damaged branches - pruning any diseased, damaged, or dead branches is essential to tree health and can be done any time of year. Removing the branches properly prevents the introduction of pests and disease into the tree. Remove the branch directly outside of the branch collar, or raised a portion of the branch. Do not leave any long stubs or cut into the branch collar. Do not remove more than 25% of the total tree canopy. Any heavy pruning, pruning around utility wires, or work on large trees should be completed by a trained professional or Licensed Tree Expert (LTE). Pruning of lower or smaller branches can be done with volunteers. Residents who are interested in learning how to properly prune are encouraged to attend the NJ Tree Foundation's annual TreeKeepers workshop for more information and hands on practice.

Prune along the green line, in front of the branch collar. The branch collar is highlighted in blue.

Example of a good pruning cut. This pruning cut will seal properly.

Example of a bad pruning cut. The stubs left behind will not seal properly.

Emerald Ash Borer & the Spotted Lanternfly

Keeping an eye out for tree diseases and pests allows problems to be treated quickly and prevents long term damage to the tree. The removal of any existing ash trees is one project that should be undertaken as soon as possible. Ash trees are currently under threat from the invasive pest Emerald Ash Borer (EAB). EAB is a beetle from northeastern Asia that arrived in New Jersey in 2014 and has destroyed thousands of ash trees across the state. Female beetles lay their eggs on the bark and emerge as adults leaving holes in the tree. As the larva feed they prevent the tree from transporting water and nutrients to its branches, causing the tree to die. Ash trees become brittle and very hazardous once dead, so removal of live ash trees will help to stop the spread of EAB and prevent ash trees from becoming a dangerous problem in Gloucester City.

Recently, the Spotted Lanternfly has also become a problem in Pennsylvania and New Jersey, and is something that should be monitored as this pest continues to spread in the state. Spotted lanternfly attacks fruit trees, fruiting vines, and deciduous trees such as red maples or black walnut (Rutgers NJAES). It feeds on the sap of these plants, leaving behind oozing wounds. This pest could take over and destroy street and fruiting trees in Gloucester City. Being vigilant for new sightings and removing egg sacks is a critical component of halting this invasive pest from spreading further in New Jersey. The NJ Tree Foundation recommends hiring a Licensed Tree Expert to evaluate the tree canopy and advise on action steps if either Emerald Ash Borer or Spotted Lanternfly is found in Gloucester City.

Spottled Lanternfly egg sac.

Emerald Ash Borer in the adult stage.

An adult Spotted Lanternfly. Note the striking red colors.

Dead Tree Inventory & Removal

The NJ Tree Foundation recommends that dead trees be inventoried and removed when possible. This will keep the number of standing dead trees in the city to a minimum, and allow for new trees to be planted in their place. Currently, the Gloucester City Shade Tree Board keeps an inventory of dead and hazardous standing trees in the city. If the dead tree is small and young, the tree could potentially be removed with volunteers as part of a service project.

Larger trees, especially those that are deemed hazardous, should be removed by a Licensed Tree Expert or Arborist and in compliance with American National Standards Institute A300 and Z133 standards for arboricultural operations and safety. Signs of a hazardous tree include: decayed wood, cracks, root problems (girdling roots), weak branches, cankers, poor tree architecture, and dead branches in the crown/top half of the tree.

Maintenance Work Days with residents

A TreeKeepers attendee prunes a tree in Camden as part of the workshop training.

The NJ Tree Foundation proposes implementing twice-yearly maintenance workshops or "pruning parties" with residents to teach them how to care for trees long term. Maintenance includes hand pruning techniques, mulching, and surveying trees to note any damage or disease. Resident-led workshops or maintenance groups will ensure that newly planted street trees survive the critical two-year established period. This workshop would also empower residents to care for the trees by learning what it takes to manage trees as they begin to grow. The NJ Tree Foundation would first maintain trees that were planted during our community tree planting events between 2016-2018. Some of the trees are located in close proximity to the Circuit's planned Gloucester County Light Rail Trail. Programming could also include a discussion about Combined Sewer Outfalls (CSOs), urban stormwater runoff, pollution from CSOs in Gloucester City, how trees are a major component of green infrastructure, and reducing the impacts of stormwater runoff. This would complement the work already done by the NJ Tree Foundation for the 2017-2019 William Penn Foundation grant. The maintenance workshop can also teach resident attendees how to spot hazardous trees in their community. Being able to spot structural problems and/or taking corrective action before it becomes a serious issue will increase the overall health of the tree canopy in Gloucester City. More details about potential locations for maintenance and a timeline for implementation are covered later in this work plan. The NJ Tree Foundation would partner with the Gloucester City Green Team and Shade Tree Advisory Board to make the "pruning parties" happen. Both groups are explained in greater detail in the following paragraph.

Key Partners in Gloucester City

There are several key partner groups in Gloucester City that should be included in any tree planting project. The Gloucester City Green Team is comprised of residents, nonprofits, and city employees. The Green Team meets once a month to discuss environmental projects in the city. The Green Team has assisted the NJ Tree Foundation with two tree plantings over the last several years, and is a key partner in implementing Green Infrastructure projects around Gloucester City. The Gloucester City Shade Tree Board, as previously mentioned, maintains a running list of dead and hazardous trees throughout the city. The Gloucester City Shade Tree Board has also worked with the NJ Tree Foundation on past tree planting projects and sent members to participate in our annual TreeKeepers workshop in 2017 and 2018. The Shade Tree Board continues to grow and look for ways to promote the planting and care of trees in Gloucester City. The Gloucester City Garden Club is an offshoot of the Shade Tree Board. This group is made up of skilled residents who maintain the City community garden. Garden Club volunteers can assist with tree maintenance and care for newly planted trees in Gloucester City. The NJ Tree Foundation plans to work with the Green Team, Garden Club and the Shade Tree Board in future tree planting and green infrastructure projects, as well as continue to invite members from the three groups to TreeKeepers.

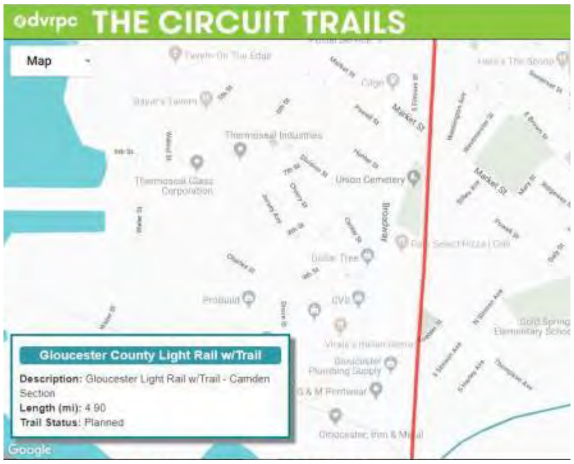
Long term Opportunities

Planting trees along the Circuit Trail in Gloucester City

The NJ Tree Foundation and partners working along the Circuit Trail in Gloucester City have identified several potential locations that are in need of trees close to or on the Circuit Trail. The NJ Tree Foundation believes that planting trees at the following locations will add shade and beauty to planned portions of the Circuit Trail, while increasing the total tree canopy for Gloucester City. The following paragraphs highlight portions of the Circuit that can host future tree plantings.

The Gloucester County Light Rail Trail

The proposed Gloucester County Light Rail Trail begins in Camden and makes its way through Gloucester City all the way south to Glassboro. Approximately 4.9 miles of the trail stretch from Camden through Gloucester City. There is potential to host a tree replacement project in a neighborhood adjacent to this proposed trail. In 2018, multiple trees along Brown Street had to be removed because they were improperly planted and were inappropriate species to be used as street trees. The city has asked the NJ Tree Foundation for tree recommendations and advice to replace these trees. The Green Team is especially interested in partnering with the NJ Tree Foundation to host a tree planting along Brown and Paul Streets to plant “the right tree for the right place” with resident input. Planting trees along Brown Street will shade the area, restore a massive loss of tree canopy left from

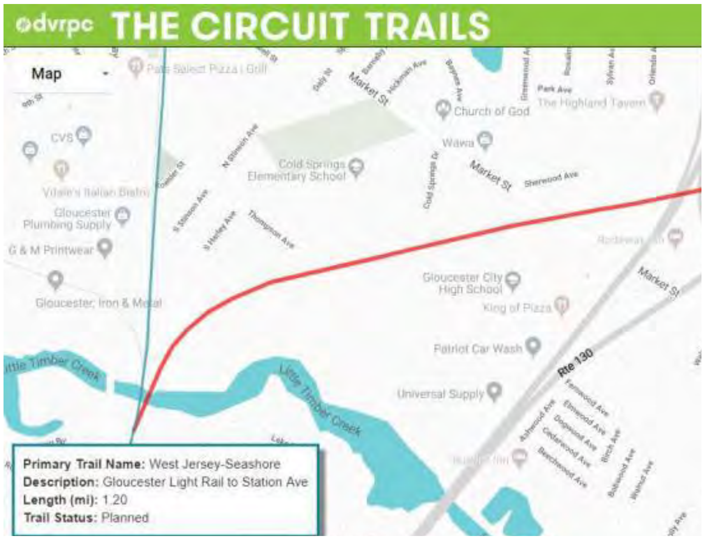


Gloucester County Light Rail w/Trail
Description: Gloucester Light Rail w/Trail - Camden Section
Length (mi): 4.90
Trail Status: Planned

The Gloucester County Light Rail Trail, highlighted in red.

removing the older trees, and provide environmental benefits to the neighborhood. This street is only two blocks away from the proposed Gloucester County Light Rail Trail, so it serves as a perfect opportunity to teach residents in Gloucester City about the importance of the Circuit and increase their general awareness about the regional trail network. In the spring of 2019, Gloucester City Shade Tree Board recently received 40 trees from PSE&G to compensate for the removal of improperly planted trees. Some of these trees will be planted along Brown Street, but there is potential for additional trees along these streets and in the neighborhood.

West Jersey Seashore Alignment Trail



Primary Trail Name: West Jersey-Seashore
Description: Gloucester Light Rail to Station Ave
Length (mi): 1.20
Trail Status: Planned

West Jersey Seashore Trail branches off from the Light Rail Trail.

On February 13th, 2019, the Gloucester City Green Team hosted a presentation from John Boyle of the Bicycle coalition. John presented on feasible connector Circuit trails that can lead into Gloucester City and why these would benefit the city as a whole. The first trail mentioned was the West Jersey Seashore Alignment Trail. This connector trail would link Gloucester City to Audubon and West Haddonfield. It would also allow trail users access to the Camden Cross County Trail, which runs from Camden City south to Winslow Township. The West Jersey Seashore Alignment Trail acts as a connector in multiple ways. It first branches off from the Gloucester County Light Rail trail at Big Timber Creek, allowing trail users to access the eastern half of the City. The West Jersey Seashore Alignment routes past parks like the Shane Chapman Memorial Park, located at Park & Miller Avenues. The NJ Tree Foundation plans to plant trees at the park in October 2019. The trail continues under the I-76 interchange and onto the Cross Camden County Trail in Mount Ephraim. The NJ Tree Foundation recommends planting trees in Gloucester City along this planned route and will identify additional planting locations as the trail develops.

Shane Chapman Park in Gloucester City. A tree planting is scheduled in the park for the Fall 2019 season.

Other Potential Opportunities

The NJ Tree Foundation is aware of other locations along the Circuit that could result in future planting projects. The Cross Camden County Trail is located outside of Gloucester City, but serves as a major Circuit Trail connecting the northern part of the county to southern communities. The West Jersey Seashore Alignment connects directly to the Cross County Trail, allowing Gloucester City residents access to other portions of the county.

The Grenloch Industrial Alignment, highlighted in red. Note the connection to the West Jersey Seashore Alignment. Johnson Park is shaded in green.

In addition to the opportunities near the Cross Camden County Trail, there is another potential connector trail that would give Gloucester City residents access to large portions of the Circuit Trails outside of the city. The Bicycle Coalition and Tri-State Transportation, two nonprofits that work on Circuit-related trail construction and community efforts, recently identified an area that could house a small connector trail, called the Grenloch Industrial Alignment. The Grenloch Industrial Alignment would serve as an alternate trail to connect to the West Jersey Seashore Alignment. This trail would use the rail line right-of-way to bypass the I-76 junction along Johnson Blvd and Klemm Ave. The NJ Tree Foundation has planted trees at nearby Johnson Park and along Martin Lake a few years ago. There is a neighborhood located across Johnson Blvd that would be close enough to this proposed trail that could receive trees if there is interest from the community. We could also invite residents to participate in a “pruning party” style event at Johnson Park, where attendees will learn how to prune and maintain trees. Funding to cover this type of event has been written into our 2019-2021 grant with the William Penn Foundation, and planning for the first event of this type will begin over the winter 2020.

Cultivating Community Relationships

The NJ Tree Foundation sees this opportunity of working along the Circuit Trail as a way to expand and strengthen partnerships in Gloucester City. Prioritizing tree plantings near the Circuit means that residents and volunteers alike can learn about how the Circuit Trail can fit into their daily lives. Residents can utilize the Circuit for

Gloucester City Shade Tree Board and volunteers during a tree planting event in April 2018.

commuting, exercise, and recreation.

The NJ Tree Foundation plans to continue to incorporate all CSO and Green Infrastructure messaging currently used at our tree plantings. The messaging and visuals, such as the NJ Tree Foundation's informational poster displayed at all tree plantings, helps to inform residents and the general public about why trees are a critical component of urban ecology and how they can be "the solution to the pollution". Continuing to work in Gloucester City will help the NJ Tree Foundation strengthen partnerships with established groups such as the Gloucester City municipal government, Green Team, Garden Club, and the Shade Tree Board. The NJ Tree Foundation would also like to partner with schools, community groups, and residents in order to make these potential tree plantings a reality. Other groups that have yet to be identified would be potential partners and can help to spread awareness of the importance of trees and the value of the Circuit Trail network. The NJ Tree Foundation will continue to attend monthly Green Team and Shade Tree Board meetings and partner with these groups where appropriate.

Conclusion

The NJ Tree Foundation makes the following recommendations for tree care in Gloucester City along the Circuit Trail:

- Basic tree maintenance on all existing trees planted over the last two years
- Evaluate trees for potential problems
- Monitor for the invasive pests - Spotted Lanternfly and Emerald Ash Borer
- Remove all existing ash trees (dead or alive) to prevent the spread of Emerald Ash Borer and protect against hazardous ash trees
- Host a resident-led maintenance workshop or "pruning party" to prune and mulch trees along the Circuit
- Further evaluate potential trails for future tree plantings - Gloucester County Light Rail Trail, West Jersey Seashore Alignment, Cross Camden County Trail, and the Grenloch Industrial Alignment
- Engage the Gloucester City Green Team and Shade Tree Board to implement tree planting events and tree maintenance events in Gloucester City

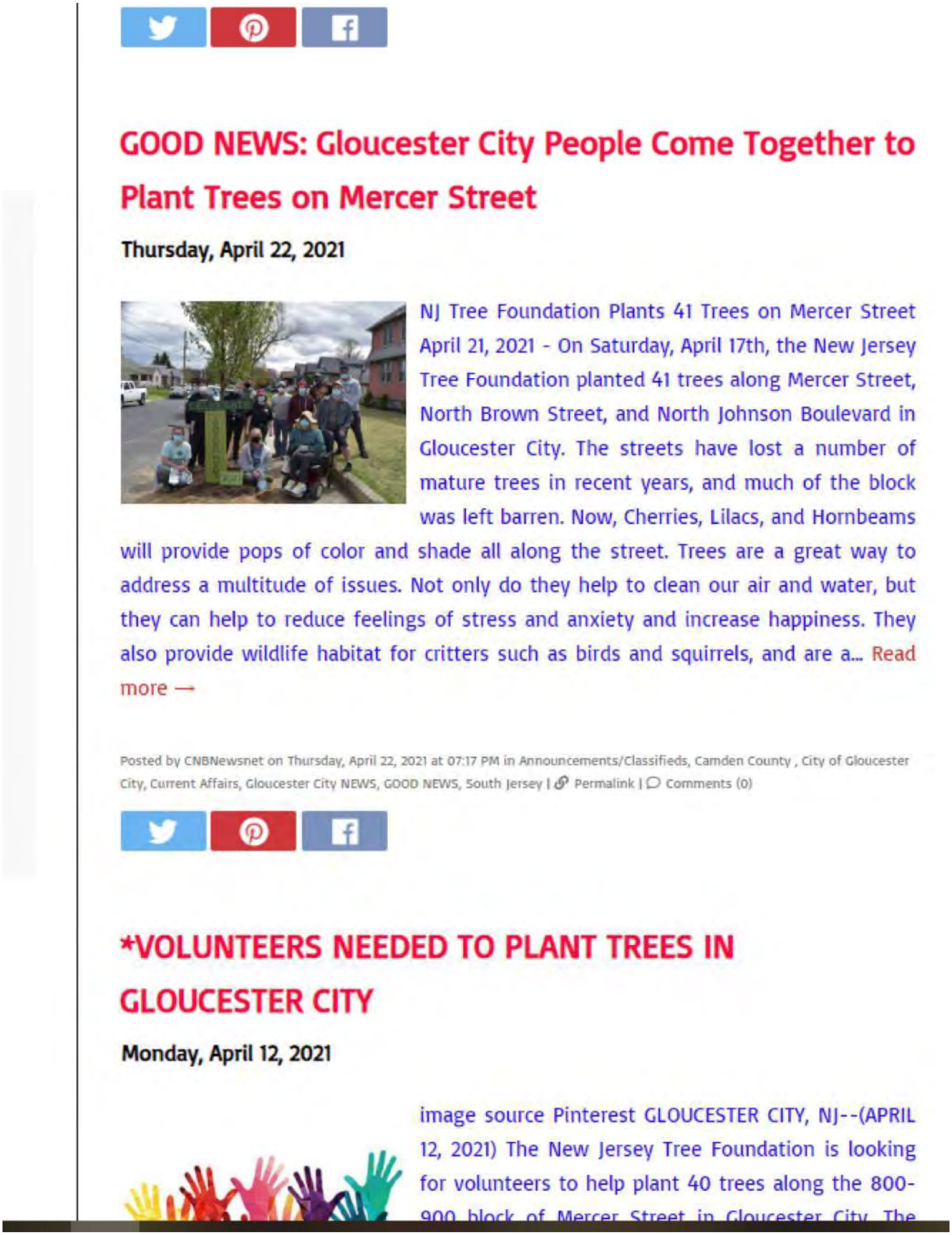
In conclusion, the NJ Tree Foundation has outlined some immediate and long-term opportunities for work in Gloucester City. There is strong potential for future tree plantings along the Circuit and connector trails. The NJ Tree Foundation will continue to attend monthly meetings in Gloucester City to strengthen these partnerships and we look forward to future funding to allow these potential projects to take shape. The NJ Tree Foundation thanks the William Penn Foundation for the opportunity to develop this work plan and for their support of tree plantings around the Circuit Trail in Camden County.

References

NJ Agricultural Experimental Station: https://njaes.rutgers.edu/spotted-lanternfly/

State of NJ Department of Agriculture (photo credit):
https://www.state.nj.us/agriculture/news/press/2018/approved/press180823.html

What is Emerald Ash Borer? (photo credit):
https://www.nj.gov/agriculture/divisions/pi/prog/whatiseab.html



GOOD NEWS: Gloucester City People Come Together to Plant Trees on Mercer Street

Thursday, April 22, 2021

NJ Tree Foundation Plants 41 Trees on Mercer Street April 21, 2021 - On Saturday, April 17th, the New Jersey Tree Foundation planted 41 trees along Mercer Street, North Brown Street, and North Johnson Boulevard in Gloucester City. The streets have lost a number of mature trees in recent years, and much of the block was left barren. Now, Cherries, Lilacs, and Hornbeams will provide pops of color and shade all along the street. Trees are a great way to address a multitude of issues. Not only do they help to clean our air and water, but they can help to reduce feelings of stress and anxiety and increase happiness. They also provide wildlife habitat for critters such as birds and squirrels, and are a... Read more →

Posted by CNBNewsnet on Thursday, April 22, 2021 at 07:17 PM in Announcements/Classifieds, Camden County , City of Gloucester City, Current Affairs, Gloucester City NEWS, GOOD NEWS, South Jersey | Permalink | Comments (0)

*VOLUNTEERS NEEDED TO PLANT TREES IN GLOUCESTER CITY

Monday, April 12, 2021

image source Pinterest GLOUCESTER CITY, NJ--(APRIL 12, 2021) The New Jersey Tree Foundation is looking for volunteers to help plant 40 trees along the 800-900 block of Mercer Street in Gloucester City. The

GlouCity Lori Ryan

April 17 at 4:39 PM ·

Thank you to the NJ Tree Foundation and the GC shade tree commission led by Joyce Calzonetti for 40 new trees planted on Mercer Street and Johnson Blvd this morning. It's hard work and these volunteers deserve all the credit. These trees beautifully line our streets with color for years to come.


2021
ARBOR DAY
CELEBRATE
I Camden
CHAMPION ATH. DEPT.
EASTER

Water Treatment Plant Rain Garden and Rainwater Harvesting System

ADDRESS: 100 N. Johnson Blvd

Brief Project Description

The project team is proposing to install a rain garden in the front of the water treatment plant to manage rooftop runoff from a portion of the building. Water from existing downspouts will be directed into the rain garden. The rain garden will be located in an existing lawn area. Existing turf grass will be replaced with native perennial wildflowers, grasses, and shrubs. Tree plantings are also proposed. In addition to the rain garden, an existing unused storage tank at the plant is being proposed to store rooftop runoff. Existing gutters and downspouts will be modified to carry rainwater from the roof into the tank. The existing tank plumbing will be modified so that water stored in the tank can be pumped into water trucks and then used to water landscaping and planters throughout Gloucester City.

Estimate of Probable Costs			
Rain Garden	**Quantity**	**Unit Cost**	**Total Cost**
Excavation (Ton)	40	$40.00	$1,600.00
Bioretention Soil (CY)	15	$80.00	$1,200.00
Hardwood Mulch (CY)	8	$30.00	$240.00
PVC Pipe and Fittings (LF)	60	$15.00	$900.00
Native Plants (Quarts)	200	$5.00	$1,000.00
PROJECT TOTAL			**$4,940.00**
Rainwater Harvesting System	**Quantity**	**Unit Cost**	**Total Cost**
Gutter modifications & plumbing	1	$5,000.00	$5,000.00
PROJECT TOTAL			**$5,000.00**
Tree Planting	**Quantity**	**Unit Cost**	**Total Cost**
Tree Planting	5	$350.00	$1,750.00
PROJECT TOTAL			**$1,750.00**
SUBTOTAL			$11,690.00
CONTINGENCY (20%)			$2,338.00
TOTAL COST			**$14,028.00**

GLOUCESTER WATER TREATMENT PLANT

RAIN GARDEN IMPLEMENTATION PROJECT
100 N. JOHNSON BLVD, GLOUCESTER CITY
CAMDEN COUNTY, NEW JERSEY

PROJECT DESCRIPTION:

A 375 SF RAIN GARDEN IS TO BE CONSTRUCTED NEAR THE PLAYGROUND TO CAPTURE AND INFILTRATE ROOFTOP AND BLACKTOP RUNOFF FROM THE ADJACENT BUILDING. A SECOND 810 SF RAIN GARDEN WILL CAPTURE ROOFTOP RUNOFF FROM THE WATER TREATMENT PLANT BY REDIRECTING DOWNSPOUTS.

LIST OF DRAWINGS:

SHEET NAME	TITLE
COVER	COVER SHEET
P-1	EXISTING CONDITIONS AND DEMOLITION PLAN
P-2	PROPOSED SITE PLAN
P-3	PLANTING PLAN
DT-1	RAIN GARDEN DETAILS

LOCATION MAP:

LEGEND:

EXISTING DRAINAGE AREA
EDGE OF PAVEMENT
EXISTING CENTERLINE
EXISTING FENCE
EXISTING TREELINE
EXISTING TREE
▭ EXISTING BUILDING
⦶ EXISTING UTILITY POLE
■ EXISTING CATCH BASIN
EXISTING CONTOURS
EXISTING SPOT ELEVATIONS
LIMIT OF WORK
▭ PROPOSED GREEN INFRASTRUCTURE

CHRISTOPHER C. OBROPTA, PH.D., P.E.

GLOUCESTER WATER TREATMENT PLANT
RAIN GARDEN IMPLEMENTATION PROJECT
100 N. JOHNSON BLVD, GLOUCESTER CITY
CAMDEN COUNTY, NJ

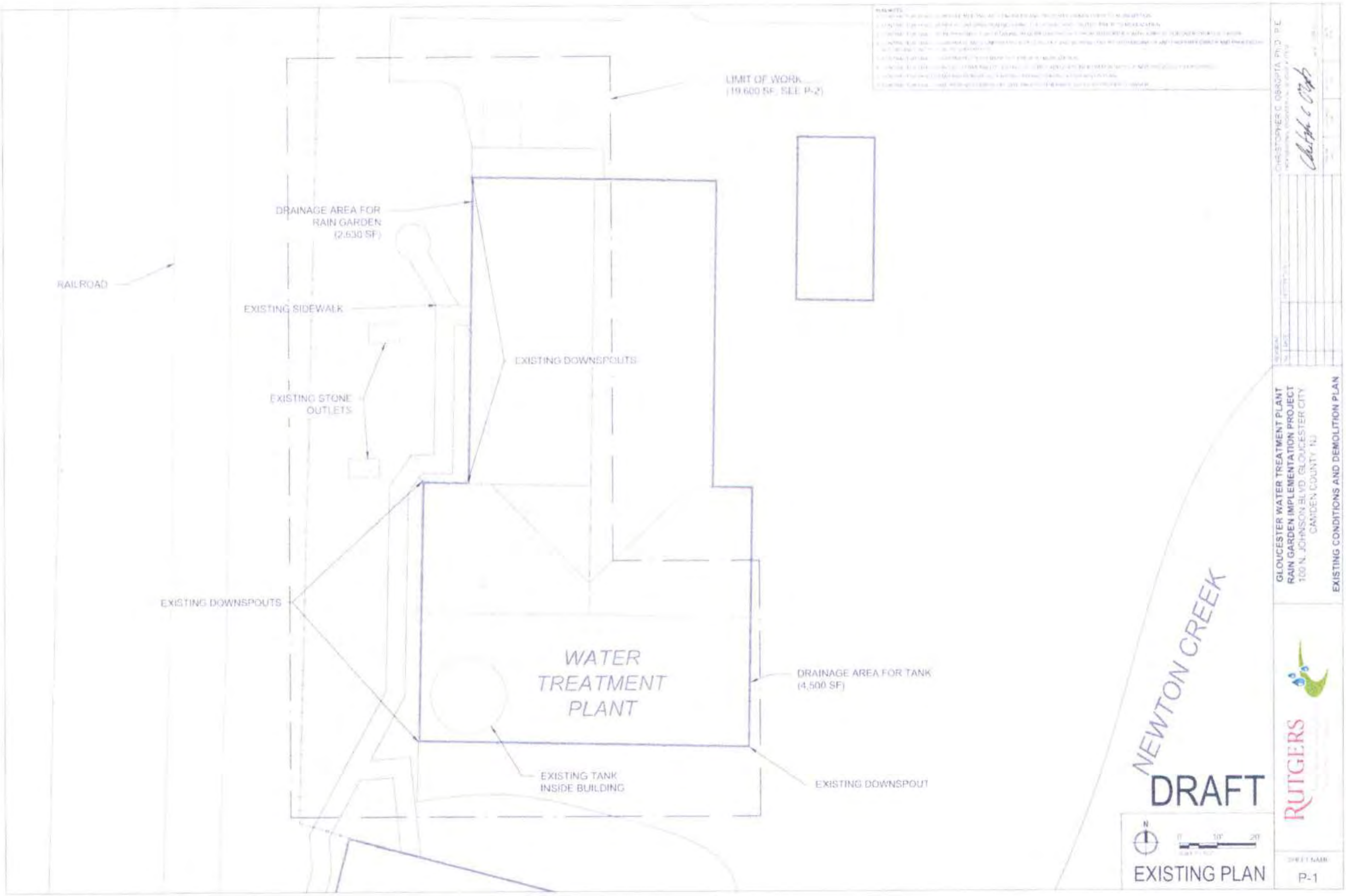
COVER SHEET

RUTGERS

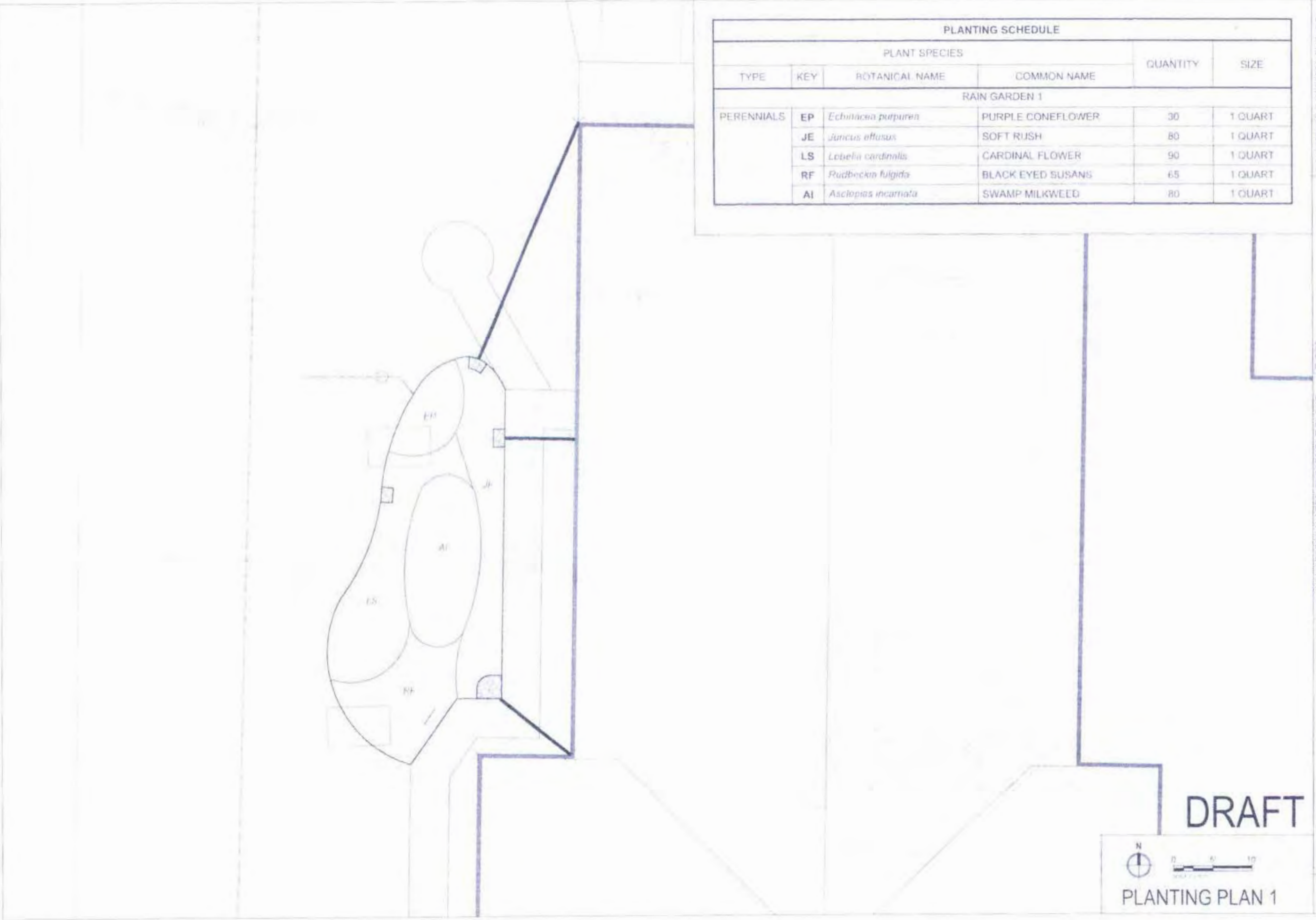
DRAFT

RAIN GARDEN LOCATION TO BE REVISED

SHEET NAME
COVER


LIMIT OF WORK
(19,600 SF, SEE P-2)
DRAINAGE AREA FOR
RAIN GARDEN
(2,630 SF)
RAILROAD
EXISTING SIDEWALK
EXISTING DOWNSPOUTS
EXISTING STONE
OUTLETS
EXISTING DOWNSPOUTS
WATER
TREATMENT
PLANT
DRAINAGE AREA FOR TANK
(4,500 SF)
EXISTING TANK
INSIDE BUILDING
EXISTING DOWNSPOUT
NEWTON CREEK
DRAFT
N
0
10'
20'
EXISTING PLAN
CHRISTOPHER C. OBROPTA, PH.D, P.E.
GLOUCESTER WATER TREATMENT PLANT
RAIN GARDEN IMPLEMENTATION PROJECT
100 N. JOHNSON BLVD. GLOUCESTER CITY
CAMDEN COUNTY, NJ
EXISTING CONDITIONS AND DEMOLITION PLAN
RUTGERS
P-1

PLANTING SCHEDULE					
PLANT SPECIES				QUANTITY	SIZE
TYPE	KEY	BOTANICAL NAME	COMMON NAME		
RAIN GARDEN 1					
PERENNIALS	EP	*Echinacea purpurea*	PURPLE CONEFLOWER	30	1 QUART
	JE	*Juncus effusus*	SOFT RUSH	80	1 QUART
	LS	*Lobelia cardinalis*	CARDINAL FLOWER	90	1 QUART
	RF	*Rudbeckia fulgida*	BLACK EYED SUSANS	65	1 QUART
	AI	*Asclepias incarnata*	SWAMP MILKWEED	80	1 QUART



PLANTING PLAN 1

DRAFT

CHRISTOPHER C. OBROPTA, Ph.D., P.E.

Christopher C. Obropta

GLOUCESTER WATER TREATMENT PLANT
RAIN GARDEN IMPLEMENTATION PROJECT
100 N. JOHNSON BLVD, GLOUCESTER CITY
CAMDEN COUNTY, NJ

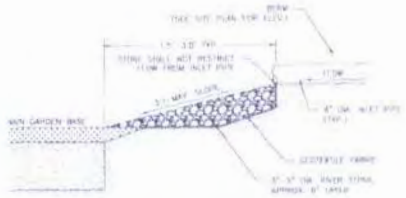
PLANTING PLAN

RUTGERS

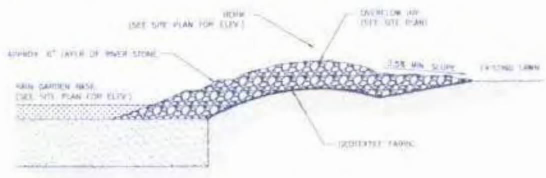
P-3

1 DT-1 RAIN GARDEN EXCAVATION SECTION
N.T.S.

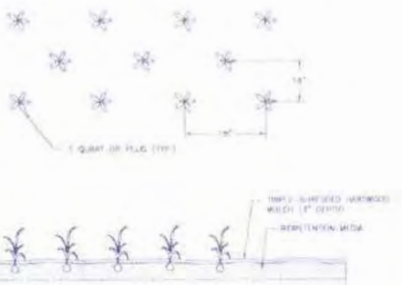
2 DT-1 RAIN GARDEN CROSS-SECTION
N.T.S.



3 DT-1 INLET PROTECTION CROSS-SECTION
N.T.S.



4 DT-1 ROCK-LINED OVERFLOW DETAIL
N.T.S.



5 DT-1 HERBACEOUS PLUG PLANTING DETAIL
N.T.S.

PLANTING SCHEDULE					
PLANT SPECIES				TOTAL QUANTITY	SIZE
TYPE	KEY	BOTANICAL NAME	COMMON NAME		
PERENNIALS	EP	[illegible]	PURPLE CONEFLOWER	55	1 QUART
	JE	[illegible]	SOFT RUSH	115	1 QUART
	LB	[illegible]	CARDINAL FLOWER	110	1 QUART
	RF	[illegible]	BLACK EYED SUSANS	55	1 QUART
	AI	[illegible]	SWAMP MILKWEED	120	1 QUART

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL INFORMATION PRIOR TO EXCAVATION INCLUDING ELEVATIONS AND LOCATIONS OF EXISTING UTILITIES.
2. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF ANY FIELD CONDITIONS DIFFER MATERIALLY FROM THOSE REPRESENTED ON THESE DRAWINGS AND THE SPECIFICATIONS OR IF, IN THE CONTRACTOR'S OPINION, SAID CONDITIONS CONFLICT WITH THE DESIGNS SHOWN HEREON.
3. THE ENGINEER SHALL INSPECT ALL PLANTING BED AREAS BEFORE MULCHING TO INSURE THAT ADEQUATE DRAINAGE EXISTS. IF ANY AREAS TO BE MULCHED SHOW EVIDENCE OF POOR DRAINAGE, THE CONTRACTOR SHALL TAKE CORRECTIVE ACTION.
4. THE CONTRACTOR SHALL AVOID DISTURBING ALL EXISTING TREES. ANY DISTURBANCE TO TREES OR THEIR ROOTS MUST BE COORDINATED WITH THE PROPERTY OWNER.
5. DIMENSIONS AND SHAPE WILL VARY. REFER TO SITE PLAN.
6. RIVER STONE PROTECTION DIMENSIONS ARE TYPICAL AND MAY VARY PER SITE. CONSULT THE ENGINEER AND SITE PLAN FOR DIMENSIONS ON A PER SITE BASIS.
7. RIVER STONE PROTECTION SHALL SLOPE TO RAIN GARDEN BASE.
8. REFER TO SITE PLAN TO DETERMINE OUTLET TYPE (ROCK-LINED OVERFLOW OR DRAINAGE INSERT).
9. REFER TO SITE PLAN FOR ALL ELEVATIONS AND INVERTS.
10. THE CONTRACTOR SHALL EXCAVATE 12" LOWER THAN THE BASE ELEVATION SHOWN ON THE SITE PLANS. THE SLOPES OF THE RAIN GARDEN SHALL BE AT A 3:1 MAXIMUM.
11. THE SUBGRADE OF THE RAIN GARDEN SHALL BE LEVEL TO ENSURE PROPER DRAINAGE. CONTRACTOR SHALL OBTAIN ENGINEER APPROVAL PRIOR TO BACKFILLING WITH 12" OF BIORETENTION MEDIA.
12. THE CONTRACTOR SHALL INSTALL OVERFLOW IF SPECIFIED IN SITE PLANS PRIOR TO BACKFILLING WITH BIORETENTION MEDIA.
13. THE BIORETENTION LAYER SHALL BE LEVEL TO ENSURE PROPER DRAINAGE. CONTRACTOR SHALL OBTAIN ENGINEER APPROVAL PRIOR TO SPREADING MULCH AND PLANTING.
14. INLET AND OUTLET PROTECTION SHALL BE UNDERLAIN WITH GEOTEXTILE FABRIC.
15. INLETS AND OUTLETS SHALL NOT INHIBIT THE FLOW OF WATER FROM THE STREET. THE RIVER STONE SHALL BE PLACED BELOW THE BOTTOM OF THE PIPE.
16. THE CONTRACTOR SHALL FILL THE BERM SECTION AND BACKFILL WITH TOPSOIL.
17. ALL DISTURBED AREAS EXCLUSIVE OF RAIN GARDEN AND SLOPED BERM SHALL BE RESTORED TO ORIGINAL CONDITIONS BY CONTRACTOR.
18. THE CONTRACTOR SHALL HAVE A PRE-CONSTRUCTION MEETING WITH THE PROJECT ENGINEER PRIOR TO ANY WORK ON SITE.
19. CONTRACTOR SHALL PERFORM REQUIRED TESTING TO DETERMINE SOIL PERMEABILITY AND SEASONAL HIGH WATER TABLE ELEVATION AT THE SITE TO VERIFY INFILTRATION CAPABILITIES. TESTING SHALL BE DONE PRIOR TO EXCAVATION AND INSTALLATION OF THE PROPOSED PROJECTS. PROJECT ENGINEER SHALL BE PRESENT DURING TESTING AND SHALL BE INFORMED OF THE RESULTS.

SPECIFICATIONS:

1. MAX COVER OVER TOP OF PIPE IS A [illegible] CONTACT [illegible] IF OTHERWISE GREATER.
2. THE APPROVAL OF MATERIALS AND MIXING OF SAND, COMPOST, AND SOIL SHALL BE DONE UNDER THE SUPERVISION OF THE PROJECT ENGINEER/LANDSCAPE ARCHITECT. BIORETENTION MEDIA SHALL CONSIST OF 70% SAND AND 30% COMPOST MIXTURE.
3. SAND SHALL AT THE MINIMUM CONFORM TO THE SIEVE ANALYSIS FOR CONCRETE AGGREGATE SAND (ASTM C-33). [illegible] SIEVE GRADATION MIX IS PREFERABLE WHERE AVAILABLE.
4. UNDERLYING SOILS SHALL BE TILLED/SCARIFIED PRIOR TO SPREADING/MIXING OF BIORETENTION MEDIA.
5. ALL BIORETENTION MEDIA SHALL BE PLACED FROM THE SIDES OF THE FACILITIES, AND IN NO EVENT SHALL ANY TRACKED OR WHEELED EQUIPMENT BE PERMITTED TO CROSS THE RAIN GARDEN.
6. RAIN GARDEN SHALL BE CONSTRUCTED TO DIMENSIONS INDICATED ON THE SITE PLAN.
7. 3-5 INCH DELAWARE RIVER STONE SHALL BE USED FOR STONE CHANNEL AND INLET/OUTLET PROTECTION.
8. NON-DYED, TRIPLE-SHREDDED HARDWOOD MULCH SHALL BE USED.
9. PLANTING OF RAIN GARDEN AND SLOPED BERM SHALL BE COMPLETED AS INDICATED ON THE SITE PLAN.
10. THE CONTRACTOR SHALL PERFORM ALL WORK IN CONFORMANCE WITH THE NJDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2007 OR LATEST VERSION.

OPEN LAWN AND TURF AREAS

1. SEED ALL REMAINING PARK AREAS WITH TURF TYPE TALL FESCUE AND PERENNIAL RYEGRASS BLEND [illegible] SUMMER [illegible] MIX [illegible] OR APPROVED EQUIVALENT. INSTALL AT A RATE OF 350 LBS. PER ACRE PER MANUFACTURERS SPECIFICATIONS.

TOPSOILING, SEEDING AND MULCHING NOTES

1. ANY UNDISTURBED AREA ON WHICH ACTIVITY HAS CEASED AND WHICH WILL REMAIN EXPOSED FOR MORE THAN 10 DAYS MUST BE SEEDED AND MULCHED IMMEDIATELY. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT THE REQUIRED RATES. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE REDISTURBED WITHIN 1 YEAR SHALL BE SEEDED AND MULCHED WITH A QUICK GROWING TEMPORARY SEEDING MIXTURE AND MULCH. DISTURBED AREAS WHICH ARE EITHER AT FINISHED GRADE OR WILL NOT BE REDISTURBED WITHIN 1 YEAR MUST BE SEEDED AND MULCHED WITH A PERMANENT SEED MIXTURE AND MULCH.

2. DIVERSIONS, CHANNELS, SEDIMENTATION BASINS, SEDIMENT TRAPS, AND STOCKPILES MUST BE SEEDED AND MULCHED IMMEDIATELY.

3. GRADED AREAS SHALL BE TEMPORARILY SEEDED AND MULCHED IMMEDIATELY FOLLOWING EARTH MOVING PROCEDURES. TEMPORARY SEED SHALL BE ANNUAL RYE GRASS APPLIED AT A RATE OF 3 LBS. PER 1000 SQ. FT.

4. AFTER SEEDING, HAY OR STRAW MULCH MUST BE APPLIED AT A RATE OF AT LEAST 3.0 TONS PER ACRE. MULCH SHALL BE ANCHORED BY EITHER CRIMPING WITH A COULTER IMPLEMENT, OR BY STAPLING BIODEGRADABLE NETTING TO THE SURFACE.

5. SITE PREPARATION TO UPLAND AREAS: APPLY 1 TON OF AGRICULTURAL GRADE LIMESTONE PER ACRE PLUS 10-20-10 FERTILIZER AT THE RATE OF 500 LB. PER ACRE. WORK IN WHERE POSSIBLE. SEEDING OF DISTURBED UPLAND AREAS (BEYOND LIMITS OF RIPARIAN ENHANCEMENT AREA) TO BE DONE USING MIX OF FINE FESCUE AT 75 LBS/ACRE (PURE LIVE SEED) PLUS PERENNIAL RYEGRASS AT 15 LBS/ACRE (PURE LIVE SEED).

6. TOPSOIL SHALL BE A CLEAN FRIABLE LOAM WITH SUFFICIENT ORGANIC CONTENT (2-5%) TO PROMOTE PLANT VIGOR. AMENDMENTS SHALL BE ADDED AS NEEDED TO IMPROVE DEFICIENT SOILS. TOPSOIL SHALL BE RETURNED AT A LOOSE DEPTH OF FIVE INCHES TO ALLOW FOR SETTLEMENT.

7. ESTABLISH PERMANENT SEEDING AS SOON AS POSSIBLE AFTER FINAL GRADING IS COMPLETE. UNLESS OTHERWISE INDICATED, PERMANENT SEEDING SHALL BE SEED MIXTURE SPECIFIED IN TABLE.

8. SEE TABLES FOR SEED SPECIES, MIXTURE AND APPLICATION RATES.

9. SEED MIXES ARE AVAILABLE AT ERNST CONSERVATION SEEDS IN MEADVILLE, PA. WEBSITE: WWW.ERNSTSEED.COM OR PHONE: 1-800-873-3321.

10. NATIVE SHRUBS AND HERBACEOUS PLUGS ARE AVAILABLE AT PINELANDS NURSERY AND SUPPLY, COLUMBUS NJ. WEBSITE: WWW.PINELANDSNURSERY.COM OR PHONE: 1-800-667-2729.

GENERAL LANDSCAPING NOTES

1. ALL PLANT MATERIALS SHALL CONFORM TO THE AMERICAN ASSOCIATION OF NURSERYMEN'S AMERICAN STANDARD FOR NURSERY STOCK (LATEST EDITION).

2. INSPECTION OF PLANTING BEDS - THE LANDSCAPE ARCHITECT SHALL INSPECT ALL PLANTING AREAS BEFORE ANY TOPSOILING OR PLANTING IS BEGUN TO INSURE THAT ADEQUATE DRAINAGE EXISTS. IF ANY AREAS TO BE LANDSCAPED SHOW EVIDENCE OF POOR DRAINAGE, THE LANDSCAPE ARCHITECT SHALL NOTIFY THE OWNER IMMEDIATELY FOR CORRECTIVE ACTION.

3. THE LANDSCAPE ARCHITECT SHALL APPROVE ALL PLANT MATERIAL AND STAKED PLANT LOCATIONS PRIOR TO INSTALLATION. ALL HERBACEOUS PLUG PLANTINGS SHALL BE A MINIMUM 3 INCH DEPTH. PLUGS SHALL BE PLANTED 1 FOOT O.C. AS INDICATED ON PLAN.

4. ALL TREES, SHRUBS, AND GROUNDCOVER SHALL BE PLACED IN CONTINUOUS MULCHED BEDS 3" IN DEPTH. MULCH SHALL BE TRIPLE SHREDDED HARDWOOD.

5. ALL TREES, SHRUBS, AND GROUNDCOVER SHALL BE AS SPECIFIED AND SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS AND COMMENTS NOTED ON THE DRAWINGS.

6. TOPSOIL SHALL BE PROVIDED BY THE LANDSCAPE CONTRACTOR FOR PLANTING ACCORDING TO THE PLANS AND DETAILS.

7. PREPARED TOPSOIL FOR BACKFILLING AROUND TREE BALLS SHALL BE A MIXTURE OF VOLUME OF THE FOLLOWING MATERIALS IN QUANTITIES SPECIFIED: ⅓ COMPOST, ⅔ TOPSOIL.

8. ALL HERBACEOUS PLUG PLANTINGS SHALL BE MINIMUM 3 INCH DEPTH. PLUGS SHALL BE PLANTED 1 FOOT O.C. AS INDICATED ON PLAN.

CHRISTOPHER C. OBROPTA, PH.D., P.E.

Christopher C. Obropta

GLOUCESTER WATER TREATMENT PLANT
RAIN GARDEN IMPLEMENTATION PROJECT
100 N. JOHNSON BLVD. GLOUCESTER CITY
CAMDEN COUNTY, NJ

RAIN GARDEN DETAILS

RUTGERS

SHEET NAME
DT-1

CCMUA / Camden / Gloucester

Responses to NJDEP Comment Letter of May 7, 2021

Data Relating to Percent Capture Calculations

Attachment D

CCMUA Response to NJDEP Comment 5

As detailed in Table 2-5 of the DEAR, the following flow components were used to calculate percent capture for each sub-system as well as for the total system. A schematic showing the relative geographic and hydraulic relationships between the CSO groupings is provided on page 3 of this Attachment D.

	CSO Grouping	Wet Weather (WW) Inflow		WW Flow from separate sewered area
		Contributing area inflows	Other inflows	
1	Delaware River – Camden	C2, C3, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14	Pine St PS, C1 & Fairview, CFA & CMT	None
2	Delaware River – Gloucester	G1, G2, G3, G4, G5, G6	King St PS (captured flow from G7)	None
3	Delaware River – Back Channel	C23, C24, C32	Part of C22 inflow splits into C23; Pennsauken High St connection; Pennsauken Int	Pennsauken Int
4	Cooper River	C15, C16, C17, C18, C19, C22, C17	None	None
5	Newton Creek	C1, CFA, G7	None	None
6	System wide	from all contributing sewersheds including separated communities	None	Pennsauken Int, Cooper River Interceptor, Big Timber Creek Interceptor

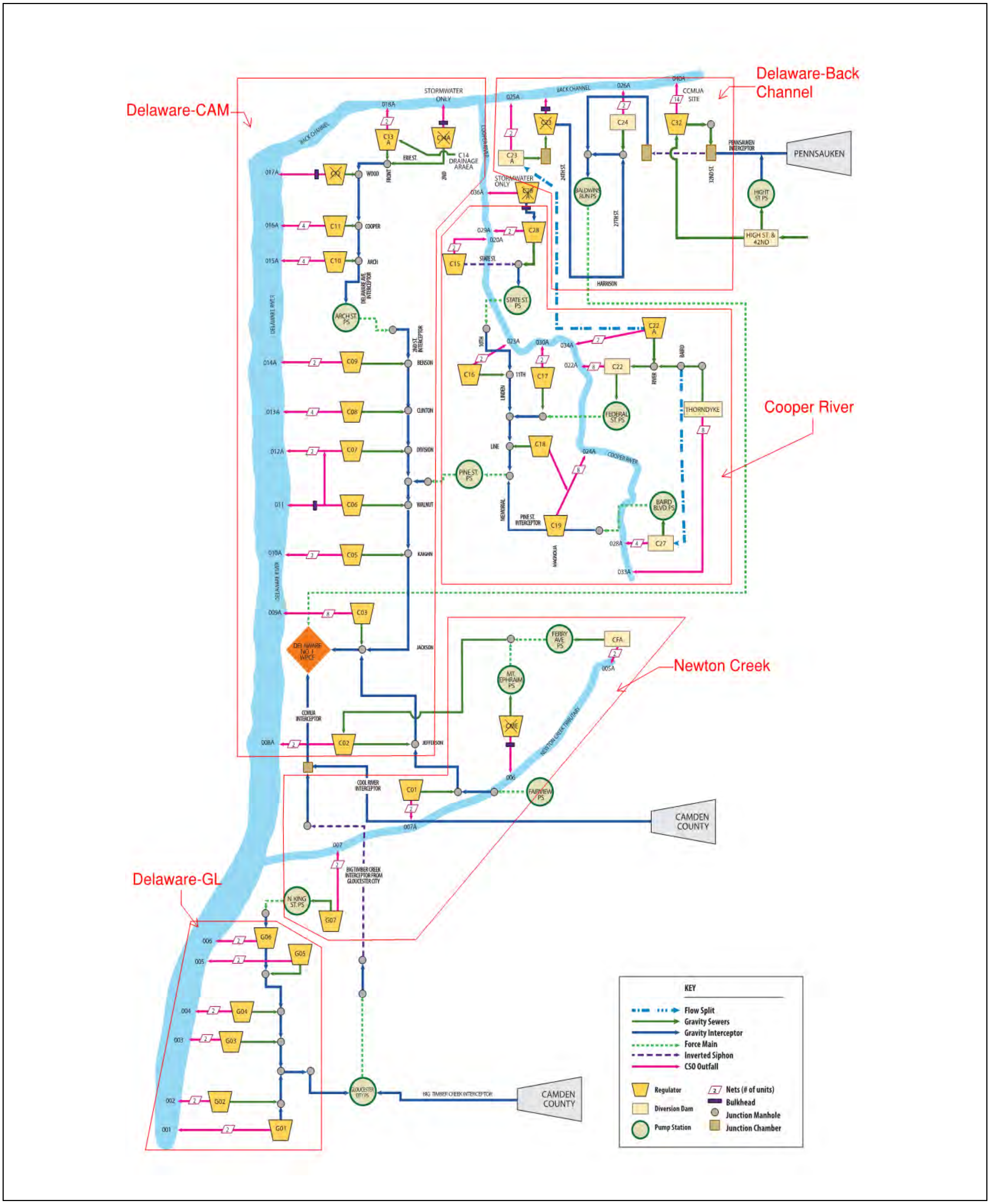
(excerpt from the Minor Comments Table)

Figure 1-2 in the SIAR is Figure 2-2 of the DEAR. Section 2.2 of DEAR described the grouping of the outfalls based on their respective receiving waters. Table 2-5 of the DEAR detailed the flow components used for percentage capture calculation for each Outfall Group.

For the Newton Creek sub-system, the inflow includes runoff from contributing areas of C1, CFA, and G7. Any flooding in these areas and CSO at these regulators are considered not captured. The flow from G-7 pumped through King St. PS (0.13 MGD peak capacity) is considered captured flow for the Newton Creek sub-system. This flow is pumped into the G-6 sewershed and becomes part of the inflow to the Delaware River – Gloucester system.

For the Delaware River – Gloucester system, the pumped flow from G7 through King St. PS is not considered captured flow but rather inflow that must be captured, and any of this flow not captured becomes overflow at the G-6 outfall. The King St PS flow must therefore be accounted for as part of the system inflow for the Delaware River – Gloucester system. This is strictly counting the flows into and out of each sub-system as stated in the "percent capture" definition.

The formula used for the percent capture calculation does not use captured flow directly. Instead the flow components of (1) total inflow within each sub-system during wet weather and (2) overflows (CSO and flooding, i.e. flows not captured) are used. For the System Wide percent capture calculation wet weather inflows and overflows from all the combined catchments are used to independently calculate percent capture (i.e. independent from the sub-system specific calculations). With this approach, cross sub-system captured flows that must be accounted for at the sub-system level are not used in the System Wide calculation, which avoids the potential for any double counting of the cross sub-system captured flows.


Delaware-CAM
Delaware-Back Channel
Cooper River
Newton Creek
Delaware-GL
STORMWATER ONLY
BACK CHANNEL
CCMUA SITE
PENNSAUKEN
PENNSAUKEN INTERCEPTOR
C14 DRAINAGE ARAEA
BALDWINS RUN PS
HIGHT ST PS
HIGH ST. & 42ND
HARRISON
DELAWARE RIVER
ARCH ST PS
STATE ST. PS
FEDERAL ST. PS
THORNDYKE
PINE ST. PS
BAIRD BLVD. PS
COOPER RIVER
PINE ST. INTERCEPTOR
DELAWARE NO. 1 WPCF
CCMUA INTERCEPTOR
FERRY AVE PS
CFA
MT. EPHRAIM PS
NEWTON CREEK TRIBUTARY
FAIRVIEW PS
COOL RIVER INTERCEPTOR
CAMDEN COUNTY
BIG TIMBER CREEK INTERCEPTOR FROM GLOUCESTER CITY
N KING ST. PS
GLOUCESTER CITY PS
BIG TIMBER CREEK INTERCEPTOR
KEY
Flow Split
Gravity Sewers
Gravity Interceptor
Force Main
Inverted Siphon
CSO Outfall
Regulator
Diversion Dam
Pump Station
Nets (# of units)
Bulkhead
Junction Manhole
Junction Chamber

CCMUA Response to NJDEP Comment 11

Percent capture is defined in the U.S. EPA's CSO Policy as the percentage of wet weather combined sewer flow captured for treatment. The concept of percent capture was developed for determining the level of CSO control to be achieved in the LTCP and the Policy further defined the concept of "typical year", or the average annual hydrologic conditions, for which wet weather flow volume would be calculated. The Policy is, however, silent on the definition of "wet weather" flow. This leads to various interpretations and computational approaches for determining the volume of wet weather flow in the typical year.

The period during the typical year that is used to define wet weather flow is not simply the period when rainfall is occurring. Although the start of an individual wet weather period is often at (or shortly following) the start of a rainfall event, the point in time when this period ends can vary from sewershed to sewershed, and even from event to event for a specific sewershed This is because in all sewer systems, the hydrologic response to rainfall (runoff and/or inflow/infiltration) and the hydraulic response (routing through the sewer network) continue after the end of the rainfall event. This post-rainfall response is often referred to as the falling limb of the hydrograph. Two of the more common, and valid, approaches to account for the falling limb of the hydrograph in determining the periods of wet weather flow during the typical year are:

1. Review the modeled flows for the typical year and determine the normal or average time after the end of the rainfall events until flows return to dry weather flow levels. This evaluation can identify a period that can be added to the end of each rainfall event (of sufficient magnitude to produce a flow response) to define wet weather flow. For example, 12 hours is a common period which, when added to each runoff-producing precipitation event period, produces a reasonable total period of wet weather flow for the typical year.
2. A more complex, but often more accurate, approach uses the diurnally-varied and seasonally-adjusted dry weather flow as the baseline and compares the modeled flow at each time step to that value. When the modeled flow exceeds the baseline by a pre-determined threshold (generally 10%), that time step is flagged as wet weather flow. In this manner the wet weather periods are defined with variable durations to best fit each event; smaller events with shorter falling limbs and larger events with longer falling limbs are more accurately defined than would be the case with a fixed duration.

Section 2.3 of the DEAR included the following equation for calculating percentage capture for the full CCMUA combined sewer system, as well as the values for each of the five sub-systems (as shown in Figure 2-2 of the DEAR). The "WW" in the equation below stands for wet weather.

$$Percentage\ Capture = 1 - \frac{(Total\ CSO\ Volume + Total\ Flooding\ Volume)}{(\text{Total System WW Inflow} - \text{Total WW Flow from Separate Sanitary Communities})}$$

The second approach to determine the periods of wet weather flow outlined above (i.e. the "*x* percent over baseline" approach) was used with the 10 percent threshold value. Due to the differences in flow magnitude and time of concentration among the different sub-systems and the full system, the wet weather time steps are different in each case. Once the wet weather time steps are flagged, total system inflow and separate sanitary community flows at those time steps can be summed and used in the above formula to calculate percent capture.

Table 1 lists the different flow components used for each term in the equation. The total system inflow term can be separated into two parts, inflow from the contributing areas and other inflows. These two parts are specified in Table 1 for each sub-system as well as system wide. Inflow from the contributing areas is the runoff response from modeled catchments that entered the sewer system. The “other inflows” only applies to the sub-systems where flows leave one sub-system and enter another. They are necessary to account for all the flows entering a sub-system for the percent capture calculation. As shown in Table 1, for each sub-system and system wide, each flow component is calculated separately. System wide flow components and the resulting percent capture are not a summation or average of the sub-system values.

Table 1 Flow components used to calculate percent capture for each sub-system and the total system

	CSO Grouping	Wet Weather (WW) Inflow		WW Flow from separate sewered area
		Contributing area inflows	Other inflows	
1	Delaware River – Camden	C2, C3, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14	Pine St PS, C1 & Fairview, CFA & CMT	None
2	Delaware River – Gloucester	G1, G2, G3, G4, G5, G6	King St PS (captured flow from G7)	None
3	Delaware River – Back Channel	C23, C24, C32	Part of C22 inflow splits into C23; Pennsauken High St connection; Pennsauken Int	Pennsauken Int
4	Cooper River	C15, C16, C17, C18, C19, C22, C17	None	None
5	Newton Creek	C1, CFA, G7	None	None
6	System wide	from all contributing sewersheds including separated communities	None	Pennsauken Int, Cooper River Interceptor, Big Timber Creek Interceptor

Tables 2 to 4 list the values used for each of the terms in the formula as well as the number of wet weather hours flagged for the following three scenarios. All values below are from the Typical Year simulation.

Scenario: Baseline

- Calibrated condition with 150 mgd WWTP

- Silted pipes and outfalls were based on 1997 CH2MHILL study

Scenario: Completion of Current Improvements

- WWTP 185 mgd
- All silted pipes and outfalls are cleaned
- C3 capture line increase with real time control rule
- Arch St. pumping increased in smaller storm to utilize available capacity in the 2nd St. Interceptor
- C1 capture line upsized

Scenario: Completion of Current Improvements with 10% system wide DCIA removal with GI

- All of the above
- 10% DCIA removal from both Camden and Gloucester through GI projects

Table 2 Values of flow components used to calculate percent capture for Baseline Scenario

	Baseline	Total WW hours	WW Inflow			Total CSO (MG)	Total Flooding (MG)	Total WW Separate Community Flow (MG)	% Capture
			Contributing area WW Inflow (MG)	Other WW Inflow (MG)	Total WW Inflow (MG)				
1	Del-CAM	1006	999	579	1577	405	52	-	71%
2	Del-GL	2032	262	2.5	264	76	6	-	69%
3	Del-BackChannel	1623	471	219	690	140	2	236	69%
4	Cooper River	1092	586	-	586	171	9	-	69%
5	Newton Creek	1339	196	-	196	32	10	-	79%
6	System Wide	1433	5320	-	5320	823	80	2516	68%

Note: In preparing the detailed breakdown of the calculation presented here, a minor correction was made resulting in a 0.6% decrease in the system wide percent capture. As a result of rounding, this value decreased from 69% to 68% in the table above.

Table 3 Values of flow components used to calculate percent capture for Scenario Completion of Current Improvements

	Completion of Current Improvements	Total WW hours	WW Inflow			Total CSO (MG)	Total Flooding (MG)	Total WW Separate Community Flow (MG)	% Capture
			Contributing area WW Inflow (MG)	Other WW Inflow (MG)	Total WW Inflow (MG)				
1	Del-CAM	1006	999	589	1588	167	14	-	89%
2	Del-GL	2040	262	2.5	265	75	6	-	69%
3	Del-BackChannel	1624	471	219	690	142	1	236	69%
4	Cooper River	1095	587	-	587	170	7	-	70%

5	Newton Creek	1340	196	-	196	25	5	-	85%
6	System Wide	1437	5330	-	5330	580	33	2524	78%

Table 4 Values of flow components used to calculate percent capture for Scenario Completion of Current Improvements with 10% GI

	Completion of Current Improvements with 10% GI	Total WW hours	WW Inflow			Total CSO (MG)	Total Flooding (MG)	Total WW Separate Community Flow (MG)	% Capture
			Contributing area WW Inflow (MG)	Other WW Inflow (MG)	Total WW Inflow (MG)				
1	Del-CAM	987	992	563	1555	135	10	-	91%
2	Del-GL	2040	262	2.5	265	64	5	-	74%
3	Del-BackChannel	1624	471	219	690	125	0	236	72%
4	Cooper River	1095	587	-	587	142	5	-	75%
5	Newton Creek	1340	196	-	196	21	4	-	87%
6	System Wide	1437	5330	-	5330	487	24	2524	82%

Note: : In preparing the detailed breakdown of the calculation presented here, a minor correction was made resulting in a 0.5% increase in the system wide percent capture. As a result of rounding, this value increased from 81% to 82% in the table above.

In reviewing the above tables, the following information may be helpful:

- The reviewer may observe that the WW hours differ among different sub-systems.
  Each sub-system has its own hydrologic characteristics which lead to different timing and magnitude of the runoff responses to rainfall. When the total inflow during the Typical Year rainfall is compared to total inflow in a dry weather simulation for a specific subsystem, the timing and magnitude of the wet weather response determines if the 10% threshold is met, therefore directly impacting the number of wet weather hours. It should be noted that the System Wide calculation of WW hours is performed independently, and not by simply averaging the individual sub-system periods. But because the contributing area inflows from all the sub-systems are included in the System Wide calculation, the hydrology of the sub-systems with fewer WW hours (larger subsystems with large flow) offsets the hydrology of those with more WW hours (smaller subsystems with small flow). Thus the System Wide WW hours falls between the high and low values in the table.

- The reviewer may observe that the sub-system contributing area WW inflow values do not add up to the System Wide value.
  Contributing area wet weather inflow is the runoff response during the wet weather period. If the wet weather period definition is the same for all sub-systems, the summation of contributing area WW inflow from each sub-system would add up to that of system wide value subtracting total separate community flow. However as explained above, since the wet weather periods were defined specifically for each sub-system, and defined independently for the

System Wide calculation, the sub-system contributing area WW inflow values do not add up to the System Wide value.

- The reviewer may observe that contributing area WW inflow differs slightly among scenarios. For each sub-system, the contributing area WW inflows are consistent among the three scenarios presented above (Tables 2 to 4), but not identical. These flow values are generated using the model, which applies a complex numerical solution to generate the flow values with convergence error (rather than a direct solution of a specific value). In this case the model results reflect slight deviations in WW inflow from scenario to scenario, with only +0.2% to -0.6% differences. For a dynamic model using a numerical solution method, these numerical solution errors are well within the range of acceptable model accuracy.

CCMUA Response to NJDEP Comment 11

Percent capture is defined in the U.S. EPA's CSO Policy as the percentage of wet weather combined sewer flow captured for treatment. The concept of percent capture was developed for determining the level of CSO control to be achieved in the LTCP and the Policy further defined the concept of "typical year", or the average annual hydrologic conditions, for which wet weather flow volume would be calculated. The Policy is, however, silent on the definition of "wet weather" flow. This leads to various interpretations and computational approaches for determining the volume of wet weather flow in the typical year.

The period during the typical year that is used to define wet weather flow is not simply the period when rainfall is occurring. Although the start of an individual wet weather period is often at (or shortly following) the start of a rainfall event, the point in time when this period ends can vary from sewershed to sewershed, and even from event to event for a specific sewershed This is because in all sewer systems, the hydrologic response to rainfall (runoff and/or inflow/infiltration) and the hydraulic response (routing through the sewer network) continue after the end of the rainfall event. This post-rainfall response is often referred to as the falling limb of the hydrograph. Two of the more common, and valid, approaches to account for the falling limb of the hydrograph in determining the periods of wet weather flow during the typical year are:

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2. A more complex, but often more accurate, approach uses the diurnally-varied and seasonally-adjusted dry weather flow as the baseline, and compares the modeled flow at each time step to that value. When the modeled flow exceeds the baseline by a pre-determined threshold (generally 10%), that time step is flagged as wet weather flow. In this manner the wet weather periods are defined with variable durations to best fit each event; smaller events with shorter falling limbs and larger events with longer falling limbs are more accurately defined than would be the case with a fixed duration.

Section 2.3 of the DEAR included the following equation for calculating percentage capture for the full CCMUA combined sewer system, as well as the values for each of the five sub-systems (as shown in Figure 2-2 of the DEAR). The "WW" in the equation below stands for wet weather.

$$Percentage\ Capture$$
$$= 1 - \frac{(Total\ CSO\ Volume + Total\ Flooding\ Volume)}{(\text{Total System WW Inflow} - \text{Total WW Flow from Separate Sanitary Communities})}$$

The second approach to determine the periods of wet weather flow outlined above (i.e. the "*x* percent over baseline" approach) was used with the 10 percent threshold value. Due to the differences in flow magnitude and time of concentration among the different sub-systems and the full system, the wet weather time steps are different in each case. Once the wet weather time steps are flagged, total system inflow and separate sanitary community flows at those time steps can be summed and used in the above formula to calculate percent capture.

Table 1 lists the different flow components used for each term in the equation. The total system inflow term can be separated into two parts, inflow from the contributing areas and other inflows. These two parts are specified in Table 1 for each sub-system as well as system wide. Inflow from the contributing areas is the runoff response from modeled catchments that entered the sewer system. The "other inflows" only applies to the sub-systems where flows leave one sub-system and enter another. They are necessary to account for all the flows entering a sub-system for the percent capture calculation. As shown in Table 1, for each sub-system and system wide, each flow component is calculated separately. System wide flow components and the resulting percent capture are not a summation or average of the sub-system values.

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		Contributing area inflows	Other inflows	
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2	Delaware River – Gloucester	G1, G2, G3, G4, G5, G6	King St PS (captured flow from G7)	None
3	Delaware River – Back Channel	C23, C24, C32	Part of C22 inflow splits into C23; Pennsauken High St connection; Pennsauken Int	Pennsauken Int
4	Cooper River	C15, C16, C17, C18, C19, C22, C17	None	None
5	Newton Creek	C1, CFA, G7	None	None
6	System wide	from all contributing sewersheds including separated communities	None	Pennsauken Int, Cooper River Interceptor, Big Timber Creek Interceptor

Tables 2 to 4 list the values used for each of the terms in the formula as well as the number of wet weather hours flagged for the following three scenarios. All values below are from the Typical Year simulation.

Scenario: Baseline

- Calibrated condition with 150 mgd WWTP

- Silted pipes and outfalls were based on 1997 CH2MHILL study

Scenario: Completion of Current Improvements

- WWTP 185 mgd
- All silted pipes and outfalls are cleaned
- C3 capture line increase with real time control rule
- Arch St. pumping increased in smaller storm to utilize available capacity in the 2nd St. Interceptor
- C1 capture line upsized

Scenario: Completion of Current Improvements with 10% system wide DCIA removal with GI

- All of the above
- 10% DCIA removal from both Camden and Gloucester through GI projects

Table 2 Values of flow components used to calculate percent capture for Baseline Scenario

	Baseline	Total WW hours	WW Inflow			Total CSO (MG)	Total Flooding (MG)	Total WW Separate Community Flow (MG)	% Capture
			Contributing area WW Inflow (MG)	Other WW Inflow (MG)	Total WW Inflow (MG)				
1	Del-CAM	1006	999	579	1577	405	52	-	71%
2	Del-GL	2032	262	2.5	264	76	6	-	69%
3	Del-BackChannel	1623	471	219	690	140	2	236	69%
4	Cooper River	1092	586	-	586	171	9	-	69%
5	Newton Creek	1339	196	-	196	32	10	-	79%
6	System Wide	1433	5320	-	5320	823	80	2516	68%

Note: In preparing the detailed breakdown of the calculation presented here, a minor correction was made resulting in a 0.6% decrease in the system wide percent capture. As a result of rounding, this value decreased from 69% to 68% in the table above.

Table 3 Values of flow components used to calculate percent capture for Scenario Completion of Current Improvements

	Completion of Current Improvements	Total WW hours	WW Inflow			Total CSO (MG)	Total Flooding (MG)	Total WW Separate Community Flow (MG)	% Capture
			Contributing area WW Inflow (MG)	Other WW Inflow (MG)	Total WW Inflow (MG)				
1	Del-CAM	1006	999	589	1588	167	14	-	89%
2	Del-GL	2040	262	2.5	265	75	6	-	69%
3	Del-BackChannel	1624	471	219	690	142	1	236	69%
4	Cooper River	1095	587	-	587	170	7	-	70%

5	Newton Creek	1340	196	-	196	25	5	-	85%
6	System Wide	1437	5330	-	5330	580	33	2524	78%

Table 4 Values of flow components used to calculate percent capture for Scenario Completion of Current Improvements with 10% GI

	Completion of Current Improvements with 10% GI	Total WW hours	WW Inflow			Total CSO (MG)	Total Flooding (MG)	Total WW Separate Community Flow (MG)	% Capture
			Contributing area WW Inflow (MG)	Other WW Inflow (MG)	Total WW Inflow (MG)				
1	Del-CAM	987	992	563	1555	135	10	-	91%
2	Del-GL	2040	262	2.5	265	64	5	-	74%
3	Del-BackChannel	1624	471	219	690	125	0	236	72%
4	Cooper River	1095	587	-	587	142	5	-	75%
5	Newton Creek	1340	196	-	196	21	4	-	87%
6	System Wide	1437	5330	-	5330	487	24	2524	82%

Note: : In preparing the detailed breakdown of the calculation presented here, a minor correction was made resulting in a 0.5% increase in the system wide percent capture. As a result of rounding, this value increased from 81% to 82% in the table above.

In reviewing the above tables, the following information may be helpful:

- The reviewer may observe that the WW hours differ among different sub-systems.
  Each sub-system has its own hydrologic characteristics which lead to different timing and magnitude of the runoff responses to rainfall. When the total inflow during the Typical Year rainfall is compared to total inflow in a dry weather simulation for a specific subsystem, the timing and magnitude of the wet weather response determines if the 10% threshold is met, therefore directly impacting the number of wet weather hours. It should also be noted that the System Wide period is less than the period for two of the sub-systems, which may be counterintuitive. The reason for this is that the dampening effect of dry weather flow in the full system produces fewer hours exceeding the 10% threshold value than the low flow periods in those two individual sub-systems (when it is easier to exceed the 10% threshold). This prompted a detailed review of the wet weather periods in each sub-system and it was confirmed that all periods flagged as wet weather in all sub-systems (and the full system) include or immediately follow precipitation events.

- The reviewer may observe that the sub-system contributing area WW inflow values do not add up to the System Wide value.
  Contributing area wet weather inflow is the runoff response during the wet weather period. If the wet weather period definition is the same for all sub-systems, the summation of contributing area WW inflow from each sub-system would add up to that of system wide value subtracting total separate community flow. However as explained above, since the wet weather periods were defined specifically for each sub-system, and the wet weather periods for the

larger sub-systems (Del – CAM and Cooper River) are much shorter than those of the smaller sub-systems, the summation of the contributing area WW inflow is less than the system wide total WW inflow (after subtracting total WW separate community flow.

- The reviewer may observe that contributing area WW inflow differs slightly among scenarios. For each sub-system, the contributing area WW inflows are consistent among the three scenarios presented above (Tables 2 to 4), with only +0.2% to - 0.6% differences. These flow values are generated using the model, which applies a complex numerical solution to generate the flow values with convergence error (rather than a direct solution of a specific value). For a dynamic model using a numerical solution method, these numerical solution errors are well within the range of acceptable model accuracy.

CCMUA / Camden / Gloucester

Responses to NJDEP Comment Letter of May 7, 2021

Pennsauken Stormwater Disconnection Project Information

Attachment E

Professional Engineering Services
RFP #2021-15P

Provide a Location Analysis and Constructability review of Forcemains, Sanitary Sewers and Pump Stations at the High Street Area of Pennsauken

Camden County Municipal Utilities Authority

REMINGTON
& VERNICK
ENGINEERS

232 Kings Highway East
Haddonfield, NJ 08033

856-795-9595
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Section A

Scope of Services

The project will be beneficial to meeting Long Term Control Plan objectives for the City of Camden CSOs and for CCMUA's C32 Regulator. Tasks under the scope of work include:

1. Proposed Stormwater Pump Station, Force Main and Outfall Location

- Finalizing the stormwater force main size, alignment and discharge outfall location
- Finalizing retrofits, if necessary, to convert the existing CSO pump station to a stormwater only pump station
- Confirming that the forcemain and outfall are hydraulically adequate to convey the anticipated volume of stormwater flow to the Delaware River.
- Determining if a stormwater management basin is necessary as part of the forcemain/outfall configuration
- Identifying permitting requirements for the force main alignment, outfall location and stormwater pump station including all Local, County, State, Army Corp of Engineers, NJDEP, Railroad Occupancy and Camden County Soil Conservation District permits
- Providing timeframes for permit review; particularly those associated with NJDEP Land Use Permitting
- Identifying easement requirements for the new stormwater outfall location and force main alignment
- Identifying construction constraints such as paving moratoriums, extensive paving / concrete subbase restoration or traffic impact concerns
- Providing a cost estimate for the selected force main alignment, outfall location and stormwater pump station modifications
- Evaluating operation and maintenance requirements and costs as part of the analysis
- Determining what level of storm event will be handled by the stormwater infrastructure

2. Sanitary Pump Station, and Force Main Routing to Existing Interceptor

- Performing a hydraulic evaluation of the existing 24-inch diameter force main to determine its suitability for continued use as the sanitary-only force main or should the evaluation conclude that the existing force main is hydraulically inadequate for the new sanitary pump station, evaluating and identifying the most effective alignment and routing of a new proposed sanitary sewer force main from the new sanitary pump station to the Pleasant Avenue and Merchantville Avenue connection point; the review will include the alternative of slip lining the new force main within the existing force main as part of the analysis
- Evaluating the site adjacent to the existing 43rd St. P.S. to determine the feasibility of locating the new sanitary sewer pump station on that site; the evaluation will include the location of all utilities and below ground interferences
- Coordinate with the Pennsauken Sewerage Authority (PSA) to determine the type, depth and design conditions for a sanitary sewer only pump station
- Recommending a design concept for the new sanitary sewer pump station given the information obtained from the site evaluation and the flow data provided

- Determining the odor control system needs for the new pump station, in coordination with PSA
- Determining the power needs for the new sanitary pump station and recommending either an additional stand-by emergency generator for the pump station or the replacement of the existing stand-by generator with a larger generator capable of servicing both the sanitary and stormwater pump stations
- Complete a geologist desk top review for determining if borings of the pump station lot or forcemain routes are necessary for proper analysis and identifying and quantifying the proposed boring locations and conducting same, if needed
- Identifying permitting requirements for all alignment options including the new pump station to include all Local, County, State and NJDEP permits
- Providing timeframes for permit review
- Identifying any easement requirements for the alignment of the new sanitary force main and pump station
- Identifying construction constraints such as paving moratoriums, extensive paving / concrete subbase restoration or traffic impact concerns
- Examining the segments of sanitary sewer immediately downstream of the forcemain connection at Pleasant Avenue and Merchantville Avenue to determine the need for rehabilitation due to corrosion
- Providing cost estimates for the selected sanitary sewer force main route, downstream rehabilitation work if required, construction of the new pump station and emergency power needs
- Evaluating operation and maintenance requirements and costs as part of the analysis

Five hard copies of a draft report will be provided to CCMUA summarizing and recommending the selected force main alignments and sizes, outfall location, configuration of the stormwater and sanitary pump stations, emergency power needs, construction constraints, permit and easement requirements and construction cost estimates.

The draft report will be updated, incorporating all resolutions and updates to address comments made by CCMUA on the draft report. An electronic version (PDF) and five hard copies of the final report will be provided to CCMUA.

3. Project Meetings

- Attending five meetings for this project, namely, a project kickoff meeting, three progress meetings and a draft report review meeting
- One of the meetings will be an NJDEP permitting meeting
- Preparing all necessary agenda and meeting minutes for the meetings; meeting attendees will include the CCMUA, PS&S, PSA and the Township of Pennsauken

Section B

Project Approach

1. Project Understanding and Approach

RVE’s understanding of the project including the work to be completed under this proposal is as follows:

In Pennsauken Township, Camden County, NJ, the area known as the High Street Watershed is bounded by Westfield Avenue to the southeast, Remington Avenue to the northwest, Lexington Avenue to the northeast and the City of Camden to the southwest.

The High Street Watershed Area includes the following Pennsauken Township streets:

1.	41st Street	Combined Sewers
2.	42nd Street	Combined Sewers
3.	43rd Street	Separate Sewers
4.	44th Street	Combined Sewers
5.	46th Street	Separate Sewers
6.	47th Street	Separate Sewers
7.	West River Drive	Separate Sewers
8.	48th Street	Separate Sewers
9.	49th Street	Separate Sewers
10.	Browning Road	Separate Sewers
11.	Tinsman Avenue	Separate Sewers
12.	Lexington Avenue	Separate Sewers
13.	High Street	Combined Sewers
14.	Amon Avenue	Combined Sewers
15.	Jersey Avenue	Combined Sewers

The streets listed above as having separate sewers are sanitary only sewers that discharge into the combined sewers. In addition, stormwater-only sewers are in 47th Street and 41st Street. Theses separate sewers also contribute flow to the combined sewers. The combined sewer in the Jersey Avenue right of way is located in the City of Camden.

Most of the combined sewer volume within the High Street area flows to the sanitary pump station at 43rd and High Street. From the 43rd Street pump station, combined flows are pumped via force main to Pleasant Avenue and Merchantville Avenue, where the discharge flows by gravity to the CCMUA interceptor, at the former Pennsauken Township Wastewater Treatment Plant on River Road.

During dry weather conditions the pumps can direct 100% of the flow to the CCMUA combined sewer collection system. During high intensity wet weather conditions, the volumes of the combined flows are too large for the pumps in the 43rd Street pump station and part of the combined sewer flow bypasses the pump station and is diverted to City of Camden’s combined sewer system which discharges through a combined sewer outfall into the Delaware River.

RVE has completed previous studies and flow monitoring of the High Street Watershed Area. The work was completed to assess the regional system as well as develop conceptual / preliminary plans for the necessary improvements. RVE completed a study previously for Pennsauken Township and the Pennsauken Township Sewerage Authority. The work was completed over 10 years ago and needs to be updated prior to final design.

During the assessment, three viable alternatives were considered for the separation of the sanitary and stormwater flows. The three options considered were as follows:

1. New Storm Sewer System
2. New Parallel Gravity Sanitary Sewer System
3. New Single Deep Gravity Sanitary Sewer System

In deciding on the best alternative, a major consideration was whether to use the existing combined sewer mains for stormwater flows only or sanitary flows only. Another consideration was determining the best use of the existing pump station at 43rd Street & High Street. Presently the capacity of the triplex pump station exceeds the standard wastewater pump station peaking factors for sanitary flows only. If pumping sanitary flows only, the excess pump capacity will impact the cycle times and the station will not be utilized to its full capacity.

An additional consideration with the separation of the sewers is how to address the stormwater only flow. Presently, during high intensity wet weather events, the combined sewer flows bypass the pump station and is diverted to the City of Camden's combined sewer system. This occurs when water levels in the influent manhole to the pump station exceed about 16 inches, which is a weir height for the overflow connection. The investigation considered the possibility of mitigating the impact on the City of Camden combined sewer system by reducing or eliminating the volume of stormwater bypassing the pump station. This study will increase the weir height or propose elimination of the overflow connection. Separation of sewers will present considerable improvements to the City of Camden in the Cramer Hill Section which has historically had flooding issues.

Based on the cost benefit analysis, the installation of a new single deep sanitary sewer is considered the least cost alternative but not without its limitations. The new sewer would need to be two (2) feet deeper than the parallel system alternative. This option eliminates the cost of a second sewer main in exchange for a slight increase in cost to install the deeper sewer pipe and a deeper pump station wet well. The existing laterals can be reinstalled under the existing sewer and connected to the new sanitary main. This approach also reduces potential damage to the existing mature trees. The existing large diameter sewer can then be used for stormwater flow only. A downside of this alternative is the stormwater pipe will only be capable of handling a one-year storm event without street storage and flooding. RVE will approach the combined sewer separation to maximize the capacity to handle, at a minimum, a one-year storm event for the separated stormwater conveyance system. This will be a drastic improvement to the current combined system, as when flooding occurs today, sewage and wastewater floods the streets. After construction of the improvements, any street flooding will be limited to stormwater. The storm event design parameters and capacity of the separated storm sewer system will be confirmed with all stakeholders during this study phase.

Due to its high capacity, the existing pump station at 43rd and High Street could be utilized for the pumping of the stormwater only via force main to the Delaware River. During the investigation, the most direct route to the Delaware River was via High Street to 47th Street and continuing down 47th street, under the railroad discharging to the river. Since the completion of the 2011 study, a housing project has been constructed on the site of the original targeted discharge point. This location may still be viable, but the jack and bore pit for the railroad crossing would be extremely deep. An alternate force main path to the river will be investigated with the basin and pipe crossing at Delaware Gardens Park as a potential alternative. The pumping of the stormwater to the Delaware River significantly reduces the volume of flow that impacts the City of Camden's combined sewer system and will help CCMUA meet the CSO Long Term Control Plan objectives.

The current concept has the existing pump station being modified and utilized for pumping of stormwater, with a new sanitary pump station to be constructed. Although the site footprint is limited, our assessment will confirm that sufficient space exists at the 43rd and High Street location to add the second pump station. The sewer forcemain discharge would be at the same location at Pleasant Ave. and Merchantville Ave. However, the new sanitary sewer pumping discharge would be reduced at a to be confirmed reduced pump rate. The existing force main sizing would be evaluated.

Also a new electrical services and emergency generator or second generator will be required to support proposed electrical loads.

Other items which will be considered as part of the Route Analysis/Constructability Report include the following:

1. The stormwater and sanitary sewer main, location and discharge points will be recommended.
2. Permitting requirements for the outfall location including local, County and State permits will be identified. In addition, we will provide timeframes for permit review; particularly those associated with NJDEP Land Use Permitting.
3. Identification of easement requirements.
4. Construction constraints such as paving moratoriums, extensive paving / concrete subbase restoration or traffic impact concerns.
5. Cost estimates for the selected outfall will be provided in the analysis.
6. Operation and maintenance requirements will be considered in the analysis.

The above information will be presented to the CCMUA for review and discussion.

Task 1 – Force Mains - Route Analysis and Constructability Study

1. The stormwater and sanitary sewer force mains from the pump stations will be sized and the location and discharge points will be determined. The design requirements will be based upon flow data and NJDEP regulations.
2. The alignment of the force mains including review of existing utilities, conflicts and tie in locations and potential path to the Delaware River will be determined. While an alignment for the force main was provided in the original concept plan, we will examine alternate routes and provide details on the constructability of each alignment. Environmental constraints will be investigated for the selected route.
3. Identify Permitting requirements for each alignment including local, County and State permits. In addition, we will provide timeframes for permit review; particularly those associated with any NJDEP Land Use Permitting. A preapplication permit meeting will be scheduled with NJDEP.
4. Identification of easement requirements for the alignments and coordinate required railroad crossings, if any.
5. Construction constraints such as paving moratoriums, extensive paving / concrete subbase restoration or traffic impact concerns.
6. Cost estimates for the selected route will be provided in the analysis.
7. Operation and maintenance requirements will be considered in the route analysis. Accordingly, ease of operational inspection and maintenance will be considered during the route analysis.

8. The sewer discharge location will be reviewed to identify pipe segments needing improvements from sulfide releases common with long force main detention times.
9. A determination as to how best to reuse or repurpose the existing force main will be considered.

A report and summary table will be generated to detail the selected pipe routes and sizes, their constraints and positive/negative aspects of each alternative. This report will be the basis of design report for review and selection of an alignment alternative that will work within the operational and construction parameters.

Task 2 – Design Memorandum

Once the preferred separation plan for force main alignments is determined, we will commence with the design phase of the project. The design of the new lift station and modified stormwater pump station will begin with a Basis of Design Memorandum. The memorandum will outline the design parameters of the new lift station, peaking factors, gravity main and force main based upon historical metered flow.

Included under this phase will be review of existing flow monitoring to establish the average and peak flows at the existing station.

Preliminary pump sizes, wet well diameter, wet well settings and force main diameter will be established and outlined for submission and review by Pennsauken Sewerage Authority personnel. This information will also be used to layout out the lift station for review by Pennsauken Sewerage Authority personnel from an operational and maintenance perspective. We will also determine odor control requirements. Coordination with both Pennsauken Township (stormwater) and Pennsauken Sewerage Authority (sanitary sewer) are important for this project. RVE has long-standing and ongoing working relationships with both entities.

As part of the Basis of Design Memorandum, we will provide two concept sketches of the lift station layout including the wet well, valve vault, generator and control/electrical panel location for review by stakeholders. Included in the conceptual layout will be concepts to allow the existing station to remain operational during the construction of the new station. The layout will be shown on a site plan. In addition, our survey crew will pick up any supplemental information needed for the site including ROW to ROW survey for the selected piping alignment of the force mains and gravity main.

We will also look at the preliminary size of the generator and coordinate with stakeholders. A diesel generator will be required with sound attenuation based on size requirements.

Included in the Basis of Design Memorandum will be potential construction methodologies (i.e., open excavation, caisson method, etc.). The feasibility of the construction method cannot be established until the geotechnical borings are completed.

RVE will meet with stakeholders to review the Basis of Design Memorandum and discuss the stormwater and sewer pump lift station layouts, force main alignments sewer separation plan for agreement and selection.

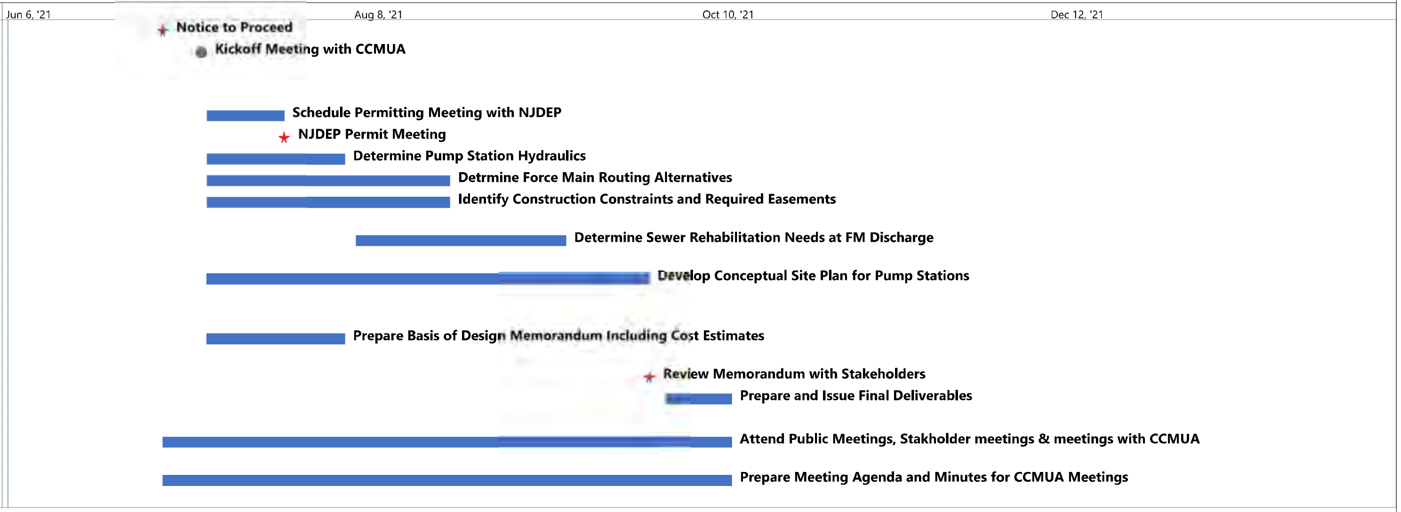
2. Project QA/QC Plan

RVE has an internal QA/QC policy that is implemented for all projects. Our approach to any project begins with the Quality Assurance/Quality Control Plan. At project start, the project manager will implement quality management by specifying the quality standards, practices, resources, specifications and the sequence of activities and how those standards will be accomplished and validated. Every project has an approved project schedule which highlights milestones and deliverables. Accordingly, we will propose progress meetings with the CCMUA during the course of this project.

Critical Project Timeline
Camden County Municipal Utilities Authority

HIGH STREET AREA OF PENNSAUKEN LOCATION ANALYSIS & CONSTRUCTABILITY REVIEW

ID	Task Name	Start	Finish
1	**Notice to Proceed**	Mon 7/5/21	Mon 7/5/21
2	**Kickoff Meeting with CCMUA**	Mon 7/12/21	Mon 7/12/21
3	**Task 1 -Storm Sewer & Sanitary Sewer Force Main Route Analysis**	**Tue 7/13/21**	**Mon 7/26/21**
4	Schedule Permitting Meeting with NJDEP	Tue 7/13/21	Mon 7/26/21
5	NJDEP Permit Meeting	Tue 7/27/21	Tue 7/27/21
6	Determine Pump Station Hydraulics	Tue 7/13/21	Fri 8/6/21
7	Detrmine Force Main Routing Alternatives	Tue 7/13/21	Wed 8/25/21
8	Identify Construction Constraints and Required Easements	Tue 7/13/21	Wed 8/25/21
9	Determine Sewer Rehabilitation Needs at FM Discharge	Mon 8/9/21	Wed 9/15/21
10	Develop Conceptual Site Plan for Pump Stations	Tue 7/13/21	Thu 9/30/21
11	**Task 2 - Design Memorandum**	Tue 7/13/21	Fri 11/19/21
12	Prepare Basis of Design Memorandum Including Cost Estimates	Tue 7/13/21	Fri 8/6/21
13	Review Memorandum with Stakeholders	Fri 10/1/21	Fri 10/1/21
14	Prepare and Issue Final Deliverables	Mon 10/4/21	Fri 10/15/21
15	**Task 3 - Meeting Attendance**	**Mon 7/5/21**	**Fri 10/15/21**
16	Attend Public Meetings, Stakholder meetings & meetings with CCMUA	Mon 7/5/21	Fri 10/15/21
17	Prepare Meeting Agenda and Minutes for CCMUA Meetings	Mon 7/5/21	Fri 10/15/21



State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

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

SHAWN M. LATOURETTE
Commissioner

October 22, 2021
Via E-mail

Scott Schreiber, Executive Director
Camden County Municipal Utilities Authority
1645 Ferry Avenue
Camden, NJ 08104

Donna Domico
Department of Utilities
City of Gloucester
512 Monmouth Street
Gloucester City, NJ 08030

Orion Joyner
Department of Planning and Development
City of Camden
520 Market Street, Suite 325
Camden, NJ 08101

Re: Review of Response to Department's Technical Comment Letter
Camden County Municipal Utilities Authority (CCMUA), NJPDES Permit No. NJ0026182
City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847

Dear Permittees:

Thank you for your submission dated July 2, 2021, which was submitted in response to the Department's May 7, 2021 technical comment letter on the September 2020 "Selection and Implementation of Alternatives Report" (SIAR) as submitted to the New Jersey Department of Environmental Protection (the Department) by CCMUA, the City of Camden and the City of Gloucester. This SIAR report (also referred to as the Long Term Control Plan or LTCP) was submitted in a timely manner as required by the above referenced New Jersey Pollutant Discharge Elimination System (NJPDES) permits.

This subject letter provides response to those projects that pertain to the proper operation and maintenance of the conveyance system as well as issues related to CSO related flooding. The timely completion of these projects is of paramount importance since they will serve to mitigate ongoing flooding which is a public health issue. In addition, certain projects specified in the LTCP cannot be properly designed and/or may not be able to become fully functional until the projects specified in this letter are completed. Please note, the Department will provide technical comments on the entire LTCP under separate cover. Specific detail is as follows:

CCMUA

<u>Pennsauken Disconnect</u>: The C-32 watershed, which discharges through CCMUA's outfall, comprises a significant portion (approximately 16%) of the system-wide CSO flow in the LTCP as identified in the Department's May 7, 2021 letter. In addition, based on information from Camden's 2016 Flood Mitigation Plan, Table 4-1 of the LTCP identifies that the most significant number of reported flooding locations occur at sewersheds C-3 and C-32. As identified in the July 2, 2021 response, "The Camden-

Pennsauken disconnection project is a critical step in achieving 85% typical year wet weather capture in the C-32 (Delaware River Backchannel) sub-system."

Given the importance of this project in reducing CSO flows and mitigating street flooding, this project should be given the highest priority. In addition, provide an update on the procurement of design services to update the existing evaluation as well as any schedule moving forward. Provide status updates on this project within the quarterly progress report as submitted to njcsoprogram@dep.nj.gov.

City of Camden

Collection Sewer Cleaning: In Comment 3 of its July 2, 2021 letter, the Department requested a status update on collection system cleaning given that the proper operation and maintenance of the system is a required Nine Minimum Control per the NJPDES permit. The July 2, 2021 response states that "The City projects that the initial cleaning pass of the entire combined and sanitary sewer system will be completed as of June 30, 2023." While the Department acknowledges that work is progressing, the Department is concerned about the overall schedule given that this has an impact on the functioning of the conveyance system and ongoing flooding. Based on the Department's records a total of 1,029,600 linear feet (195 miles) is targeted to be cleaned where 628,865 linear feet has already been cleaned for the period from February 2016 up until September 2021. However, this leaves approximately 39% of the total system to clean namely 400,735 linear feet. Given that an average of 110,911 linear feet has been completed on average per year thus far, a significant portion of the system still remains to be completed. This work must be expedited in order to comply with Part IV.F.7 namely "Maximization of flow to the POTW for treatment." In addition, provide status updates on this project within a quarterly progress report. See Progress Report requirement below.

Outfall Cleaning: As described in the LTCP the City of Camden is working to dredge certain CSO outfalls to clear blockages. While dredging of nine of these outfalls has been completed, the July 2, 2021 response states that "The cleaning of the remaining outfalls is projected to be complete during the second quarter of 2022." However, at this time the Department's Bureau of Environmental Engineering and Permitting (Project No. S340366-14) is still waiting for supplemental information so that a Level 1 Environmental Decision Document can be issued. In addition, this dredging project has required that other permits be secured such as the United States Army Corps of Engineers permit which has an expiration date of March 31, 2022. Additional detail is needed to describe how this project can be completed by the second quarter of 2022. Given that these projects relate to Nine Minimum Controls as required by the City of Camden's NJPDES permit, the lack of progress on these projects could result in enforcement action. This work must be expedited in order to comply with Nine Minimum Controls of the existing NJPDES CSO permit. In addition, provide status updates on this project within a quarterly progress report. These outfall blockages also contribute to street flooding in the City of Camden which is a public health concern. See Progress Report requirement below.

Regulator Rehabilitation Project: The Department acknowledges that the City of Camden has identified that regulator mechanisms required extensive repairs. Based on the most recent information received in October 2021, 46% of the regulator rehabilitation project has been completed to date. This work must be expedited in order to comply with Nine Minimum Controls of the existing NJPDES CSO permit. In addition, provide status updates on this project within a quarterly progress report of any remaining repairs including regulators C-1 through C-9 which enable the control of flows into the Camden interceptors as identified within the LTCP. See Progress report requirement below.

Gloucester City

Collection Sewer Cleaning: In Comment 10 of its May 7, 2021 letter, the Department requested information on CSO strategies to address street flooding in the City of Gloucester as identified in the LTCP. The July 2, 2021 response states:

> "Gloucester City has continued to improve the operation and maintenance of our wastewater collection system. It has purchased a Jet/Vac to allow Gloucester to begin jetting and cleaning all mains within the system. As of this date, Gloucester has cleaned approx. 9,000 linear feet of sewer mains and will continue until the entire city system is cleaned. Gloucester City has ongoing water and sewer main replacement also. The Charles Street project is nearing completion and has replaced over 100 year old pipe, mostly brick, with new RCP and manholes. This project has helped reduce the flooding of Charles Street, Water and King Streets. While heavy rains, full moon and high tides from the river increase flooding in Gloucester City, the ongoing cleaning of all storm drains/grates has also helped mitigate some street flooding, especially in this area. The City is performing weekly cleaning of the collection system and is documenting each area cleaned and jetted. There is also an active street sweeping of the entire city on a weekly basis."

While the Department acknowledges that work is progressing, a status of the overall cleaning schedule is needed in order to assess compliance with the Nine Minimum Controls of the existing NJPDES CSO permit. In addition, provide status updates on this project within a quarterly progress report of the total length of the combined sewer collection system as well as how many linear feet have been completed to date. See Progress Report requirement below.

Progress Reports

Periodic updates are needed specific to these Nine Minimum Control Measures and other projects to address ongoing flooding. Beginning on January 1, 2022, each permittee is required to provide a detailed discussion of, and document compliance with, the continued implementation of these projects. This shall include the following specific information in quarterly progress reports as shown in the attached form:

- Status of Pennsauken disconnect (CCMUA only)
- Status of linear feet completed for collection system on a monthly basis (Camden and Gloucester)
- Status of outfall dredging (Camden only)
- Status of Regulator repair (Camden only)
- Identify known locations of flooding on a quarterly basis; any measures to remedy such (all permittees).

Progress reports can be sent to njcsoprogram@dep.nj.gov. See attached template. Feel free to contact me or CSO Team Leader Marcus Roorda at marcus.roorda@dep.nj.gov if you have any questions regarding this letter. Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Bureau Chief
Bureau of Surface Water and Pretreatment Permitting

C: CSO Team Leader, Marcus Roorda, Bureau of Environmental, Engineering & Permitting
Molly Jacoby, Bureau of Surface Water and Pretreatment Permitting
Dwayne Kobesky, Bureau of Surface Water and Pretreatment Permitting
Joseph Mannick, Bureau of Surface Water and Pretreatment Permitting

Summary of Quarterly Progress on Operations and Maintenance

Permittee:	Date of Progress Report:
NJPDES Number:	Calendar Quarter:

Instructions

Operations and Maintenance progress reports are due within 25 days after the end of every calendar quarter beginning on January 1, 2022. Submit Progress Reports to njcsoprogram@dep.nj.gov.

Status

Progress in the most recent monitoring quarter including any CSO control measures implemented.

Status of progress related to Pennsauken Disconnect for C-32 (CCMUA only):

Status of linear feet cleaned for collection system on a monthly basis (Camden and Gloucester):

1/22:	5/22:	9/22:	1/23:	5/23:
2/22:	6/22:	10/22:	2/23:	6/23:
3/22:	7/22:	11/22:	3/23:	
4/22:	8/22:	12/22:	4/23:	

Status of outfall dredging (Camden only):

Status of Regulator repair (Camden only):

Identify known locations of flooding on a quarterly basis; any measures to remedy such (Camden, Gloucester and CCMUA):

NJDEP Comment Letter of 6/12/23 & CCMUA / Camden / Gloucester City Responses of 7/10/23

Appendix C

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

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

SHAWN M. LATOURETTE
Commissioner

Via E-mail
June 13, 2023

Scott Schreiber, Executive Director
Camden County Municipal Utilities Authority
1645 Ferry Avenue
Camden, NJ 08104

Donna Domico, Superintendent
City of Gloucester
100 North Johnson Boulevard
Gloucester, NJ 08030

Orion Joyner, City Engineer
City of Camden
520 Market Street, Suite 325
Camden, NJ 08101

Re: Review of Selection and Implementation of Alternatives Report (SIAR)
City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847
Camden County Municipal Utilities Authority (CCMUA), NJPDES Permit No. NJ0026182

Dear Permittees:

Thank you for the submission dated September 2020 entitled: "Selection and Implementation of Alternatives Report" for CCMUA, the City of Camden and the City of Gloucester. This report constitutes the Selection and Implementation of Alternatives Report (SIAR) for the Long Term Control Plan (LTCP). in response to Part IV.D.3.b.vi of the above referenced New Jersey Pollutant Discharge Elimination System (NJPDES) permits as issued March 12, 2015. The New Jersey Department of Environmental Protection (the Department) issued comments on the LTCP on May 7, 2021 and the Department acknowledges the submission of your responses on July 1, 2021.

The Department is in the process of preparing draft NJPDES CSO renewal permits. A primary focus of the renewal process is the defined implementation schedule for CSO controls that will be set forth within those permits. This subject letter serves to request additional information on the implementation schedule to better understand the status of the selected projects.

The LTCP includes an Implementation Schedule in Table 8-1 up to the year 2035 for Nine Minimum Control enhancements as well as LTCP elements. Provide a status update and the permittee lead on each of the below projects in tabular format as shown below.

Time Frame	Projects	Permittee Lead	Status
2020	Continued cleaning of Camden CSO outfalls.		
	Completion of Camden regulator mechanism rehabilitation.		
	Completion of Arch Street Pump Station capacity expansion.		
2021 – 2025	Completion of initial Camden collection system and outfall cleaning.		
	Completion of the expansion of CCMUA's WPCF # 1 to 185 MGD as approved in a NJPDES permit modification dated July 18, 2019.		
	Ongoing collection system maintenance, inspection & cleaning.		
	Development and Implementation of Green Stormwater Infrastructure (GSI) Program Plan – target reduction of 2% (30 acres).		
	Development and implementation of Camden Street Flooding Mitigation Program.		
	Develop the Cooper River Regional Water Quality Optimization Strategy.		
	Reduction of wet weather flow from Pennsauken into the Camden combined sewer system in sewershed C-32.		
2026 – 2030	Continued Implementation of GSI Program – target reduction of 2% (30 acres).		
	Continued Implementation of the Street Flooding Mitigation Program.		
	Feasibility study for further expansion of WPCF # 1 up to 220 MGD as necessary.		
2031 – 2035	Continued implementation of GSI and Flood Mitigation Program.		
	Design and construction of the expansion of WPCF # 1 up to 220 MGD if needed.		

In addition, the Division of Water Quality and Division of Land Use Regulation met with representatives of Camden County and CCMUA on May 25, 2023 regarding sewer separation in the vicinity of the Camden City Port Road Project. If appropriate, this project can be added to the schedule if it will result in a reduction of combined sewer overflows.

There are funding opportunities within the Department to address CSO controls including green infrastructure. The Department and the New Jersey Infrastructure Bank (NJIB) partner together as New Jersey Water Bank (NJWB) to administer New Jersey's State Revolving Fund in order to provide low-cost financing for the design, construction, and implementation of projects that help to protect, maintain and improve water quality. Projects eligible for financing include a wide variety of wastewater treatment works, stormwater management, drinking water systems, land acquisition, and landfill activities. For additional information visit http://nj.gov/dep/dwq/cwpl.htm.

Please provide this information to the Department no later than 30 days from the date of this letter. Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Assistant Director
Water Pollution Management Element

C: Dwayne Kobesky, Bureau of Surface Water and Pretreatment Permitting
Joseph Mannick, Bureau of Surface Water and Pretreatment Permitting
Molly Jacoby, Bureau of Surface Water and Pretreatment Permitting
Andrew Koske, Division of Water Quality
Charles Jenkins, Municipal Finance Construction Element

From: Scott Schreiber <sschreiber@ccmua.org>
Sent: Monday, July 10, 2023 9:59 AM
To: Rosenwinkel, Susan [DEP]; orionj@ci.camden.nj.us; donna.domico@cityofgloucester.org
Cc: Jacoby, Molly [DEP]; Mannick, Joe [DEP]; Dwayne.kobesky; Koske, Andrew [DEP]; Jenkins, Charles [DEP]; mayorbaile@cityofgloucester.org; vanessa@cityofgloucester.org; dablackb@ci.camden.nj.us; Kim Michelini; Michael Watson; Schevtchuk, Thomas; Brian Morrell; Timothy J. Cunningham; Howard Long; Holly Cass
Subject: RE: Request for Information on the LTCP
Attachments: Executed NJDEP Response to 06132023.pdf; Joint SIAR Implementation Status Worksheet 07-07-23.pdf

Good Morning, Sue:

Please find the coordinated Camden City, Gloucester City and CCMUA response to below captioned matter. Please note that it would be helpful to have a meeting among all three permitted entities and the NJDEP to better explain the issues raised in Section 3 of the letter. As always, Camden, Gloucester and the CCMUA look forward to working collaboratively with the NJDEP to address this important issue.

Thank you,
Scott

Scott Schreiber
Executive Director
Camden County MUA
Office – 856-583-1261
Cell – 609-330-6880
sschreiber@ccmua.org

From: Rosenwinkel, Susan [DEP] <Susan.Rosenwinkel@dep.nj.gov>
Sent: Tuesday, June 13, 2023 4:06 PM
To: orionj@ci.camden.nj.us; donna.domico@cityofgloucester.org; Scott Schreiber <sschreiber@ccmua.org>
Cc: Jacoby, Molly [DEP] <Molly.Jacoby@dep.nj.gov>; Mannick, Joe [DEP] <Joe.Mannick@dep.nj.gov>; Kobesky, Dwayne [DEP] <Dwayne.Kobesky@dep.nj.gov>; Koske, Andrew [DEP] <Andrew.Koske@dep.nj.gov>; Jenkins, Charles [DEP] <Charles.Jenkins@dep.nj.gov>
Subject: Request for Information on the LTCP

Hello – hope everyone is enjoying the beginning of the summer. Please see the attached request for information regarding the Combined Sewer Overflow Long Term Control Plan.

A reply is requested by July 13, 2023.

If you have any questions please feel free to contact Molly Jacoby as copied here.

Susan Rosenwinkel
Assistant Director
Water Pollution Management Element
NJDEP-Division of Water Quality
401 E. State St, P.O. Box 420
Mail Code 401-02B
Trenton, NJ 08625-0420
Tel: (609) 292-4860
Susan.rosenwinkel@dep.nj.gov

THE CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
1645 Ferry Avenue ● Camden, NJ 08104
Phone (856) 541-3700 ● Fax (856) 964-1829
www.ccmua.org

July 12, 2023

Via Email

Susan Rosenwinkel, Assistant Director
Department of Environmental Protection
Water Pollution Management Element
P.O. Box 420 – 401 E. State Street
Trenton, NJ 08625-0420

Re: Response to Department Request for Status Update on Implementation of LTCP Schedule

City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847
Camden County Municipal Utilities Authority, NJPDES Permit No. NJ0026182

Dear Ms. Rosenwinkel:

Please accept this correspondence and attachments as the Camden County Municipal Utilities Authority (CCMUA), the City of Camden (Camden City), and the City of Gloucester City (Gloucester City), collectively "the Entities", response to the New Jersey Department of Environmental Protection's (Department) June 13, 2023 request for a status update on the implementation of the Entities' respective projects and obligations (the "Response"), as identified in the Entities' September 30, 2020 Selection and Implementation of Alternatives Report which constituted the completion of the overall joint Long Term Control Plan (LTCP).

For the Department's reference and review, this response is comprised of the following sections:

- **Section I** provides a Procedural and Factual Background with pertinent facts and dates leading up to the date of this response;

- **Section II** provides an updated Implementation Schedule and general status as to each of the Entities' respective projects under the LTCP. As referenced in Section II, the Entities have included the attached "SIAR Implementation Status Worksheet," which addresses the status of each project in greater detail;

- **Section III** identifies several Additional Issues and Updates for the Department's consideration through follow-up discussions between NJDEP and the Entities; and

- **Section IV** sets forth each individual Entity's acknowledgement of its individual compliance obligations under the LTCP, in accordance with the conditions and requirements within each Entity's respective NJPDES Permit.

Each of these objectives are set forth in detail below.

I. Procedural and Factual Background

In 1994, the federal Environmental Protection Agency (EPA) issued its National Control Policy for Combined Sewer Overflows, which created a framework for controlling CSO discharges through the issuance of permits to affected municipal and public entities. The EPA's stated purpose for the National Control Policy was to establish a consistent national approach for controlling discharges from CSOs to the nation's waters through the National Pollutant Discharge Elimination System (NPDES) permit program.

In 2015, pursuant to its delegated authority under the EPA's National Control Policy, the Department issued individual NPDES Permits to Camden City, Gloucester City, the CCMUA, and other affected CSO entities within the State of New Jersey. The NJPDES Permits stated that, by 2020, all CSO entities must provide the Department with a "Long Term Control Plan" demonstrating the measures and projects that each respective CSO entity will complete to capture at least 85% of the combined sewage that enters its wastewater system. Since the CCMUA, City of Camden, and Gloucester City's systems are hydraulically connected, the Department encouraged the Entities to coordinate the development of their LTCP.

On September 30, 2020, the Entities delivered their LTCP to the Department. The Department provided comments to the LTCP in May 2021 and, in turn, the Entities submitted their requested responses in July 2021. In an October 22, 2021 response letter NJDEP focused on projects pertaining to the proper operation and maintenance of the conveyance system as well as issues related to CSO related flooding.

On June 13, 2023, the Department issued a joint letter to the Entities requesting an update on the various components of the LTCP in anticipation of issuing renewed individual NJPDES Permits to each Entity. Specifically, the Department requested additional information and updates as to the implementation of the Entities' respective projects and obligations under the LTCP, including the identity of the lead entity for implementing each project.

The Entities now respectfully submit this response to the Department's requests for information related to the LTCP.

II. Updated Implementation Schedule

The updated Implementation Schedule below provides a general overview of the Entities' implementation of their respective obligations under the LTCP.

Project	Permittee Lead	Status
Continued cleaning of Camden CSO outfalls	Camden	Estimated ~ 90% complete, projected completion 2023
Completion of Camden regulator mechanism rehabilitation.	Camden	Completed 2022
Completion of Arch Street Pump Station capacity expansion.	Camden	Completed 2020
Completion of initial Camden collection system and outfall cleaning.	Camden	~ 76% completed (linear footage)
Completion of the expansion of CCMUA's WPCF # 1 to 185 MGD as approved in a NJPDES permit modification dated July 18, 2019.	CCMUA	Completed
Ongoing collection system maintenance, inspection & cleaning.	Camden	on-going: Please see appendix A to the attached SIAR Implementation Status Worksheet
	Gloucester City	on-going: Please see appendix B to the attached SIAR Implementation Status Worksheet

Project	Permittee Lead	Status
Development and Implementation of Green Stormwater Infrastructure (GSI) Program Plan – target reduction of 2% (30 acres).	Camden	A variety of GSI projects are under planning, design, construction or have been completed. Please see the attached SIAR Implementation Status Worksheet
	CCMUA	
	Gloucester City	
Develop and implementation of Camden Street Flooding Mitigation Program	Camden	Design – CCMUA and Camden City have several large street flooding mitigation / CSO flow reduction projects under planning and design in the Cramer Hill / C-32 sewershed area(s). Please see the SIAR Implementation Status Worksheet.
Develop the Cooper River Regional Water Quality Optimization Strategy.	CCMUA	on-going – baseline water quality program monitoring program has been implemented
Reduction of wet weather flow from Pennsauken into the Camden combined sewer system in sewershed C-32.	CCMUA	Design & permitting review – Please see appendix C to the attached SIAR Implementation Status Worksheet.
Post 2025 NJPDES Permit Cycle Activities		
Continued Implementation of GSI Program – target reduction of 2% (30 acres).	Camden & Gloucester	Pending – will be ongoing
Continued Implementation of the Street Flooding Mitigation Program.	Camden (& Gloucester as applicable)	Pending – will be ongoing
Feasibility study for further expansion of WPCF # 1 up to 220 MGD as necessary.	CCMUA	Deferred pending efficacy evaluations of initial LTCP projects
Continued implementation of GSI and Flood Mitigation Program.	Camden & Gloucester	Pending – will be ongoing
Design and construction of the expansion of WPCF # 1 up to 220 MGD if needed.	CCMUA	Deferred pending determination as to the need for and benefits of this expansion.

Please note that a detailed status update for each Project – including a Project Synopsis, Milestones, and Comments – is included in the attached "SIAR Implementation Status Worksheet."

III. Additional Issues and Information for the Department's Consideration

It is difficult to convey the breadth and complexities of the many interacting projects and activities that will comprise the implementation of the LTCP during the forthcoming permit cycle. We would therefore request an opportunity to meet with NJDEP to discuss the following aspects of the LTCP implementation:

- Completion of Initial Camden City collection system and outfall cleaning;
- Completion of CCMUA expansion to 185 MGD – and positive impact on LTCP goals;
- Entities' anticipated coordination with NJDEP for Permittee-Specific Construction and Financing Schedules;
- Camden City challenges re: LTCP compliance (short-term and long-term);
- Gloucester City challenges re: LTCP compliance (short-term and long-term);
- CCMUA challenges if required to implement LTCP projects and EPA/DRBC nutrient limits and Dissolved Oxygen requirements concurrently;
- Initial comments re: CSO Public Engagement requirements;
- Additional or modifications to CSO control measures/changes to implementation schedule in September 2020 LTCP to reflect evolving conditions; and
- Sewer separation in vicinity of Camden City Port Road Project

IV. Stakeholders' Acknowledgement of Individual Obligations under LTCP

The Entities have consistently recognized that their respective communities will be best served through a collective approach toward their individual LTCP compliance obligations. Notwithstanding their anticipated collaborative efforts moving forward, the CCMUA, City of Camden, and Gloucester City recognize that the renewal(s) of their respective NJPDES Permit is contingent upon each entity's timely satisfaction of any applicable requirements and conditions of its individual NJPDES Permit, in accordance with N.J.A.C. 7:14A-1, et seq. and Appendix C, and related New Jersey law. The Entities understand that their individual NJPDES Permit obligations include, but are not limited to, completing their respective projects and obligations under the LTCP.

The CCMUA, City of Camden, and Gloucester City also acknowledge that any of the Entities' non-compliance with its respective obligations under the LTCP may result in the denial, modification, suspension, or revocation of that Entity's NJPDES Permit and/or the commencement of enforcement action(s) against that Entity including, but not limited to, the issuance of consent

decrees and complaints by the EPA and/or Department, pursuant to their express and delegated authority under the Clean Water Act, 33 U.S.C. 1251 et seq.

V. Conclusion

The Entities thank you and the Department for your time and attention to this important matter. If you or your staff have any questions or need any additional information, please contact the Entities and their representatives at your convenience. In addition, representatives of the Entities are available to schedule or attend any meetings with the Department upon request.

Respectfully Submitted,

Camden County MUA	**City of Camden**	**City of Gloucester City**
__________	__________	__________
Name: Scott Schreiber	Name: __________	Name: __________
Title: Executive Director	Title: __________	Title: __________

cc: Camden City Mayor Victor Carstarphen
Camden City Attorney Daniel Blackburn
Gloucester City Mayor Dayl Baile
Gloucester City Clerk Vanessa Little
CCMUA Board of Commissioners
CCMUA Secretary to the Authority Kim Michelini

decrees and complaints by the EPA and/or Department, pursuant to their express and delegated authority under the Clean Water Act, 33 U.S.C. 1251 et seq.

V. Conclusion

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Respectfully Submitted,

Camden County MUA	**City of Camden**	**City of Gloucester City**
Name:	Name: T.J. CUNNINGHAM	Name:
Title:	Title: BUSINESS ADMIN.	Title:

cc: Camden City Mayor Victor Carstarphen
Camden City Attorney Daniel Blackburn
Gloucester City Mayor Dayl Baile
Gloucester City Clerk Vanessa Little
CCMUA Board of Commissioners
CCMUA Secretary to the Authority Kim Michelini

decrees and complaints by the EPA and/or Department, pursuant to their express and delegated authority under the Clean Water Act, 33 U.S.C. 1251 et seq.

V. Conclusion

The Entities thank you and the Department for your time and attention to this important matter. If you or your staff have any questions or need any additional information, please contact the Entities and their representatives at your convenience. In addition, representatives of the Entities are available to schedule or attend any meetings with the Department upon request.

Respectfully Submitted,

Camden County MUA

____

Name: _______________

Title: _______________

City of Camden

____

Name: _______________

Title: _______________

City of Gloucester City

____

Name: Brian Morrell

Title: City Administrator

cc: Camden City Mayor Victor Carstarphen
Camden City Attorney Daniel Blackburn
Gloucester City Mayor Dayl Baile
Gloucester City Clerk Vanessa Little
CCMUA Board of Commissioners
CCMUA Secretary to the Authority Kim Michelini

Attachment 1: Joint CCMUA / City of Camden / Gloucester City SIAR Implementation Status Worksheet [July 7, 2023]

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis	Comments
2020					
Continued cleaning of Camden CSO outfalls.	Camden	CCMUA	Estimated ~ 90% complete, projected completion 2023	• 2016 AW inspection report indicated 17 outfalls required dredging, 10 downstream of CSO regulators and 7 storm waters. • Camden City and CCMUA implemented two parallel cleaning and dredging projects to expedite restoring the hydraulic capacities of the affected outfalls.	• CCMUA undertook the cleaning and dredging of nine of the outfalls: C1, C2, C3, C10,C11,C13,C16,C23 and C24. Cleaning project was completed as of March 4, 2021. •City's Contractor is 80% complete with projected completion in 2023.
Completion of Camden regulator mechanism rehabilitation.	Camden	CCMUA	Completed 2022	• 28 regulators were rehabilitated. • C-1 to C-9 all new mechanical equipment installed. All remaining regulator equipment was removed, and chambers were cleaned and coated.	
Completion of Arch Street Pump Station capacity expansion.	Camden		Completed 2020	• 3 new 100 hp motors • 3 new 24.25" impellers (upsized) • Increased firm capacity from 7,000 GPM per pump to 11,000 GPM per pump.	• The project enables increased wet weather flows from sewersheds C-10 through C-14. • The upgrades to Arch Street Pump Station and repairs to C-10 CSO outfall have significantly helped to reduce street flooding on Delaware Ave. and the frequency of Arch Street PS shut down
2021 through 2025					
Completion of initial Camden collection system and outfall cleaning.	Camden		~ 76% completed (linear footage)	• Ongoing system cleaning to address deferred maintenance prior to 2016. • 179 miles of combined and sanitary collection sewers. • 146 miles (82%) cleaned to date. • Tons removed per mile have increased significantly in recent years, slowing linear progress.	• See Appendix A for year-by-year stats on lengths cleaned and tons of debris removed. • $12,040,800 expenditures to date. • The cleaning each year represents what was CCTV'ed inspected as well. • Inspected pipe conditions were evaluated and integrated into asset management data base using NASSCO standards.
Completion of the expansion of CCMUA's WPCF # 1 to 185 MGD as approved in a NJPDES permit modification dated July 18, 2019.	CCMUA		Completed	• Reconfiguration of influent chamber to separate the Camden and County interceptor sewers (2020) • Upgraded influent pumps & related power supply equipment.(2021) • Optimization of existing tankage & equipment and removed hydraulic bottlenecks (2020)	Plant now routinely accepting wet weather flows at rates in excess of 150 MGD, thereby reducing combined sewer overflows and street flooding system-wide.
Ongoing collection system maintenance, inspection & cleaning.	Camden		on-going	• Ongoing regular and preventive maintenance of Camden system by American Water Services pursuant to contract and NMC requirements. • Spot repairs and renewal/replacement projects in response to inspection results.	Examples of recent sewer lining projects completed. • November 2020 Lined 770' LF of sewer main on Steward & High Street. • May 2021 lining Trent Rd multiple joint repairs. • October 2021 Lined 300' LF of brick sewer on River Rd. • November 2021 Lined 80' LF of sewer main on Haddon Ave. • June 2022 N 30th & Cleveland Ave replaced 225' LF of sewer main.

Attachment 1: Joint CCMUA / City of Camden / Gloucester City SIAR Implementation Status Worksheet [July 7, 2023]

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis	Comments
	Gloucester City		on-going	• Approximately 18 miles of combined and sanitary sewers cleaned and jetted in 2021 – May 2023 out of 39 miles system-wide (46%); also regular cleaning of storm sewers. • Weekly street sweeping occurs. • Outfall nets replaced 132 times 2021 – May 2023 with 264 cubic yards disposed of. • Regulators are cleaned regularly; all were inspected in February 2023. NJDEP inspection occurred 2/21/23. • Daily inspection and cleaning of the 7 pump stations. • Spot repairs, lining and replacements made as needed.	• See Appendix B for additional details. • Remedial inspection and cleaning of G-1 regulator occurred 5/23/23 resulting in a significant reduction in street flooding on Charles St. • $400,000 grant for Division Street sewer main and road reconstruction in fall of 2023.
Development and Implementation of Green Stormwater Infrastructure (GSI) Program Plan – target reduction of 2% (30 acres).	Camden	CCMUA / Camden Co.	Design	Port Road improvements	• 96 acres of sewer separation • Separated storm sewerage will include GSI; acreage to be managed through GSI is to be determined during design. • Projected project completion before the end of 2026.
		CCMUA	Planning / Design	Harrison Avenue / State Street - Complete Streets Project(s)	• Up to **6 acres** controlled through GSI. • Projected project completion before the end of 2026
		CCMUA, Camden SMART	2017 – 2020 Completed	Various Camden SMART GSI projects totaling **2.75 acres**	• 4th & Washington project • CCMUA Administration parking lot • Bonsall School • Broadway triangle • Cramer School • Elijah Perry Park • Westfield Ave. • Phoenix Park Phase 2 • 9th & Woodland Ave. infiltration trench • Dudley School • Early Childhood Development Center planter boxes • Princess Ave. infiltration trench
			2021 - 2023	Various GSI projects totaling **6 acres**.	• Camden Labs / Whitman Park Project – **3.5 acres** • Dominic Andujar Park – **0.5 acres** • Coopers Poynt & Molina Schools project – **2 acres.**
	CCMUA	Camden	Planning / conceptual design	C-32 sewershed green stormwater infrastructure	• Currently evaluating GSI opportunities throughout Camden C-32 sewershed. • Projecting up to **10 acres** controlled through GSI. • Includes catch-basin location and configuration optimization. .

Projects	Permittee Lead (NJPDES Responsible Party)	Project Partners	Status	Project Synopsis	Comments
	Gloucester City		Design / planning	• Conceptual design for **4 acre** GSI target area completed in dense older area subject to street flooding bounded by Monmouth, Ellis, ,Mercer and King Streets. • Johnson Blvd. Park improvements to include rain gardens. • Repairs to the rain gardens at the water treatment facility have been completed.	• $830,000 NJDEP Green Acres grant received.
	A total of 28.75 acres of drainage area are or will be controlled by GSI projects completed since 2017 or which are currently under planning / design. 2017 is used as the base year since it was base-year for the current conditions documented in the 2018 System Characterization Report				
Develop and implementation of Camden Street Flooding Mitigation Program	Camden	CCMUA	Design	Harrison Avenue street flooding mitigation project elements: • ____ • ____ • ____ Also see flood mitigation under C-32 project.	• Flow monitoring & rain gauges 2022 and 2023 • Expansion of H&H modeling extents to support flooding mitigation & GSI design, • Real-time flood sensors installed, • Crowd sourcing flood reporting application rolled out,
Develop the Cooper River Regional Water Quality Optimization Strategy.	CCMUA		on-going	CCMUA developed Cooper River water quality sampling plan and program started May 2023.	Intended to provide current baseline Cooper River WQ assessment.
Reduction of wet weather flow from Pennsauken into the Camden combined sewer system in sewershed C-32.	CCMUA	Pennsauken, Camden	design	C-32 Program Elements: • Implementation of Pennsauken Sewer Separation projects. • Conveyance of separated Pennsauken stormwater to Delaware back channel in new dedicated pipe and/or • Targeted sewer separation in East Camden to synch with Pennsauken separation. • Includes catch basin location and configuration optimization.	• Pennsauken collection system separation design is substantially complete. • CCMUA (with Camden) currently completing ground-truthing of current C-32 collection system. • 2022 and 2023 flow monitoring enabling expansion and improvement of the model • Expansion of H&H model to better analyze alternatives such as sewer separation. • Engineering evaluation of stormwater conveyance & routing (C-32 Camden + separated Pennsauken flows) • Please see Appendix C for additional details.
2026 – 2030					
Continued Implementation of GSI Program – target reduction of 2% (30 acres).	Camden & Gloucester	CCMUA	Will be ongoing		• Specific projects and program may be refined to meet changing conditions and in response to coordination with NJDEP. • Update Construction & Financing Schedules
Continued Implementation of the Street Flooding Mitigation Program.	Camden (& Gloucester as applicable)	CCMUA	Will be ongoing		
Feasibility study for further expansion of WPCF # 1 up to 220 MGD as necessary.	CCMUA		Pending		
2031 – 2035					
Continued implementation of GSI and Flood Mitigation Program.	Camden & Gloucester		Will be ongoing		Specific projects and program may be refined to meet changing conditions and in response to coordination with NJDEP
Design and construction of the expansion of WPCF # 1 up to 220 MGD if needed.	CCMUA		Pending		

Appendix A: City of Camden Collection System First Pass Cleaning Status - June 2023

The City of Camden-Division of Utilities sewer collection system consists of a total of 191.5 miles of pipe. The gravity combined sewer collection system contains 154 miles plus 25 miles of separated gravity sanitary sewers. There also exists 7.5 miles of combined sewer force main and approximately 5 miles of separated Storm Sewer (MS4).

The focus since 2016 has been on a first pass cleaning of the combined and separated gravity collection system. The City of Camden, through its operations and maintenance contractor, American Water Operations and Maintenance, LLC (“AWO&M”), utilizes funding from the City’s Maintenance Repair and Replacement Allocation to fund the subcontract cleaning effort through AWO&M who has engaged a company Mobile Dredge-Video Pipe (“Mobile-Dredge”).

Mobile Dredge typically operates 10-11 months per year and has on average three (3) to four(4) unit crews deployed to the City of Camden. The table and graph next page summarize the first pass cleaning effort since February 2016 through May 2023.

There remains approximately 30 miles of gravity combined and separated collection main to be cleaned to compete the first pass. The City has spent over $12 million dollars since 2016 on first pass sewer cleaning. As one can see in the table that cost per mile for cleaning and increased dramatically in the last three years and has more than tripled as has the amount of debris removed per mile cleaned which has dramatically slowed the process.

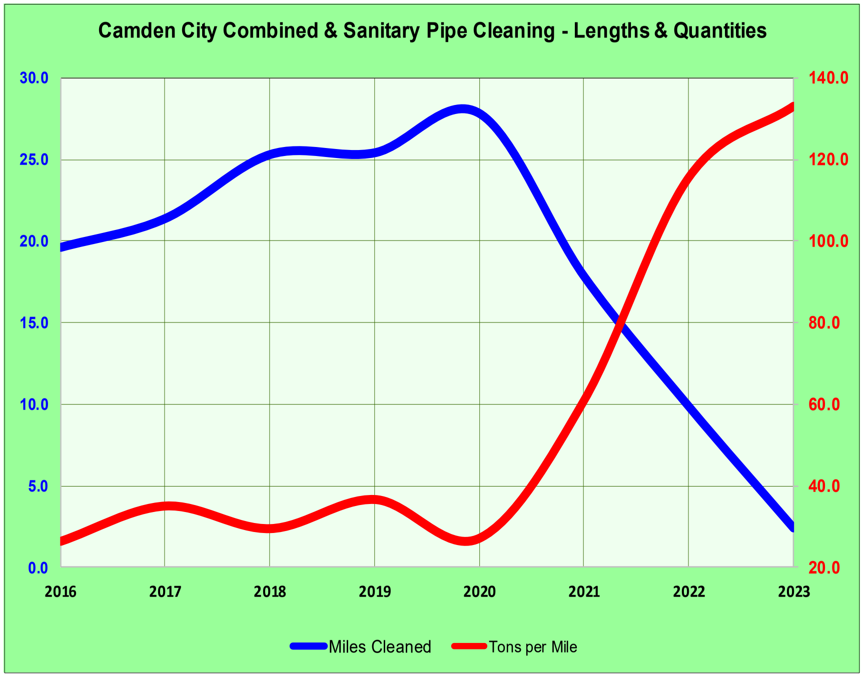
The efforts continue in earnest to complete the first pass cleaning. The City of Camden, CCMUA and AWO&M are working closely together to develop a plan to complete the cleaning as soon as possible. It is anticipated that this plan will be able to be discussed with NJDEP within 30 days of this letter.

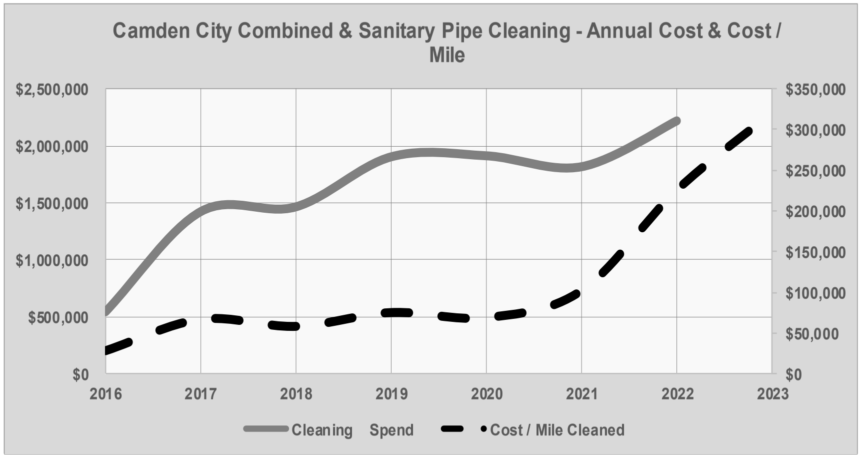
07/07/23

City of Camden Combined and Sanitary Sewer Cleaning 2016 - May 2023

Year		Feet	Miles	% Total	Tons	Tons per Mile
2016	2016 - 2019 length cleaned is averaged	103,429	19.6	11%	517.2	26.4
2017		112,791	21.4	12%	748.9	35.1
2018		133,482	25.3	14%	746.1	29.5
2019		134,061	25.4	14%	930.9	36.7
2020		146,798	27.8	16%	755.0	27.2
2021		94,047	17.8	10%	1085.9	61.0
2022		51,926	9.8	5%	1137.3	115.6
2023 through May		12,582	2.4	1%	317.2	133.1
	Total Cleaned	**789,116**	**149.5**	**83%**	**6,238.5**	
Average 2016 - 2022		110,933	21.0	12%	845.9	47.3
	Yet to Clean	156,004	29.5	17%		
Total Combined & Sanitary		945,120	179.0	100%		

Year	Cleaning Spend	Cost / Mile Cleaned	Cost per Ton Debris
2016	$548,256	$27,988	$1,060
2017	$1,423,140	$66,620	$1,900
2018	$1,464,536	$57,931	$1,963
2019	$1,901,178	$74,878	$2,042
2020	$1,910,086	$68,702	$2,530
2021	$1,814,775	$101,885	$1,671
2022	$2,215,376	$225,266	$1,948
2023 through May	$763,478	$320,391	$2,407
Total	**$12,040,825**		
Averages per Year		$117,958	$1,940





Appendix B

CITY OF GLOUCESTER DEPT. OF UTILITIES 100 NORTH JOHNSON BLVD. GLOUCESTER CITY, NJ 08030

1. Green Infrastructure- Rain gardens have been repaired at the Water treatment facility on Johnson Blvd. This was built with a coop from Rutgers. Studies and design for flood mitigation are being conducted on King Street, Ellis, Monmouth and Mercer Streets. Pennoni Engineers are working on design of porous sidewalks and parking areas. Conceptual drawings are being worked on.
2. Linear footage of Sanitary Sewers cleaned and jetted for 2021 – approx.. 20,000 ‘, 2022 – 48092’ and 2023 – 26210’ quarterly reports are sent to DEP.
3. 55 Nets were changed times in 2020 – 110 cy yds disposed
   2021 31 Nets changed – 62 cy yds disposed
   2022 – 36 nets changed – 72 cu yds. Disposed
   2023 10 nets changed – 20 cy yds. Disposed
4. Regulators are cleaned regularly and all were cleaned and inspected in February 2023. Confined Space Entry was made. NJDEP Inspection on CSO system was conducted on 2/21/23
5. 5/23/23 G-1 Regulator on Charles Street was cleaned and inspected and was found to have debris in it. The chamber was cleared and has been functioning properly. The Storm sewers were vacuumed out as well. The flooding that occurred on Charles Street has reduced drastically and the regulator and chamber are inspected regularly.
6. 7 pump stations are checked on a daily basis in Gloucester City. Cleaning and maintenance are performed on a daily basis. O and M is ongoing.
7. Storms ewers are cleaned on a regular basis and materials are removed and disposed of. 2021 disposed was 1.9 tons, 2022 – 2.04 tons.
8. Streets are swept weekly in Gloucester City. 2021- 4275 miles were swept and 151.18 tons of material were disposed of. 2022 , 4275 miles were swept and 189.04 collected and disposed of.

GRANTS/SEWER MAIN REPLACEMENT/REPAIRS

- 2021 - SEWER MAIN REPLACEMENTS - CHARLES STREET 48” BRICK REPLACED
- 2022 -SUSSEX STREET SEWER MAIN CLEANED AND RELINED FROM MARKET ST TO CUMBERLAND ST. APPROX. 700’
- 2022 – BARNARD AVE SEWER MAIN REPLACEMENT APPROX. 900 ‘ OF 10” SDR 35 WAS REPLACED AND MANHOLES REPAIRED.
- 2023- 400 BLOCK OF HUDSON STREET 36” SEWER MAIN REPLACED NEW STORM INLETS REPLACED ON SUSSEX ST AND HUDSON.

- SEWER MAIN REPAIRS – VARIOUS SEWER MAIN REPAIRS ARE MADE AS NEEDED. RECORDS ARE KEPT OF ALL REPAIRS.

GRANTS RECEIVED BT GLOUCESTER CITY 2023

- $ 400,000 FOR DIVISION STREET SEWER MAIN /ROAD RECONSTRUCTION – 2023 ANTICIPATE FALL 2023 CONSTRUCTION
- $ 10,00 GRANT FOR CEP COMMUNITY ENERGY PLAN -2023
- $830,000 GRANT NJDEP FOR GREEN ACRES FOR THE JOHNSON BLVD. PARK IMPROVEMENTS. PROJECT TO INCLUDE RAIN GARDENS.

Appendix C

The CCMUA is a taking a multi-prong and multi-phase approach to controlling combined sewer overflows and street flooding in the C-32 sewershed (C-32) and the other contributing sewersheds to the Baldwins Run pumping station (BRPS).

In C-32, the CCMUA has completed design of the Pennsauken Separation project which is at the NJDEP for permitting. This project separates two combined sewer areas in Pennsauken that currently contribute combined sewage to Camden City. The design calls for separation with the sanitary flow ultimately coming to the Delaware #1 WPCF and the stormwater only flow continuing into the Camden system.

While NJDEP reviews the permit for this work, the CCMUA and its consultants continue to work through a combination of planning and design efforts to address CSO and street flooding in C-32. On the planning side, CDM Smith and Drexel University are assisting the CCMUA in putting together an alternatives analysis to understand the best triple bottom line approach to this work (the CCMUA can provide more information on the specific alternatives that will be analyzed). Those planning efforts will likely be completed by the end of September 2023 and the CCMUA will then work with a designer to complete the design and permitting. Every effort will be made to have this project awarded by December 31, 2024 in order to take advantage of the significant principal forgiveness currently being offered by the NJ Water Bank.

While these planning efforts continue in C-32, the CCMUA is also planning other projects to improve the current collection system as well as disconnection of up to 10% of the impervious area. The CCMUA and Remington and Vernick are working together to upgrade the stormwater infrastructure in C-32 including the construction of new inlets. Visual inspection of C-32 shows that during periods of rain there is ponding on the roadways, especially at intersections, which is being caused by not enough inlets and/or the inlets being too small. At the same time, CCMUA is working with PS&S to implement a disconnection of up to 10% of the C-32 impervious areas via green infrastructure. Those designs should be finalized by year-end 2023 and will be put out to bid as soon as permits are obtained to take advantage of the principal forgiveness previously mentioned.

The CCMUA believes that the design that comes from the alternatives analysis in C-32 and the improved/additional stormwater infrastructure and new green infrastructure will allow for 85% capture of the wet weather flow in the Delaware River back channel and significantly reduce street flooding for the area.

The other area where CCMUA continues to work is aimed at limiting the amount of stormwater that needs to be pumped by the BRPS. To that end, the CCMUA is working with CDM Smith and Drexel University on a modeling effort to inform the work. While the modeling continues, the CCMUA and Camden Community Partnership have obtained more than $2.5 million in grant funding for the implementation of green infrastructure along Harrison Avenue and State St (both contribute flow directly to the BRPS). The CCMUA will likely award a design contract at its July Board meeting for the development of the green infrastructure as well as some targeted grey infrastructure improvements in Harrison Avenue. The CCMUA has also applied for more than $20 million in grant funding from FEMA. If awarded, the project will provide street flooding mitigation and control of combined sewage flow in the Harrison Ave area.

From: Scott Schreiber <sschreiber@ccmua.org>
Sent: Tuesday, August 1, 2023 10:58 AM
To: Donna Domico; Brian Morrell
Cc: Howard Long; Holly Cass; Michael Watson; Schevtchuk, Thomas; Huang, Xin (Cindy)
Subject: RE: August 2nd NJDEP meeting

Thanks, Donna. This looks good. I was just be prepared to discuss this with the NJDEP tomorrow. Thanks for the email.

Scott Schreiber
Executive Director
Camden County MUA
Office – 856-583-1261
Cell – 609-330-6880
sschreiber@ccmua.org

From: Donna Domico <donna.domico@cityofgloucester.org>
Sent: Tuesday, August 1, 2023 9:16 AM
To: Scott Schreiber <sschreiber@ccmua.org>; Brian Morrell <bmorrell@gloucesterpolice.com>
Cc: Howard Long <hlong@wlwklaw.net>; Holly Cass <Holly.Cass@camdencounty.com>; Michael Watson <mwatson@brownconnery.com>; Schevtchuk, Thomas <SchevtchukTA@cdmsmith.com>; Huang, Xin (Cindy) <HuangX@cdmsmith.com>
Subject: RE: August 2nd NJDEP meeting

Scott,

In response to your email, we feel we can clean the system within the next year or so. We have jetted most of the city's mains and have had removal of debris along King Street as well. We will be able to continue on jetting the system. The cost is approx. $700/mile, 18-21 hrs/mile and debris cost would depend on volume removed.
b. The condition of the outfalls along the River vary, and there is debris in front of 2 that would require a floating barge with and excavator as there are trees/logs and other things that come from the River.
c. The regulators and net chambers are cleaned and inspected regularly and nets are changed as needed.

2. Green Infrastructure – There are proposed rain gardens as well as porous asphalt/sidewalks to be installed to help mitigate flooding.
3. The City is proactive in replacing water/sewer mains each year and will continue to do so.

If you think we need to discuss prior to tomorrow let me know.

Thank you.

Donna Domico, Supt,
Gloucester City Dept. of Utilities
100 North Johnson Blvd.
Gloucester, NJ 08030

856-456-0169
609-221-4845

From: Scott Schreiber
Sent: Wednesday, July 19, 2023 3:01 PM
To: Brian Morrell; Donna Domico
Cc: Howard Long; Holly Cass; Michael Watson; Schevtchuk, Thomas; Huang, Xin (Cindy)
Subject: August 2nd NJDEP meeting

Hi Brian and Donna,

I thought it would be helpful to give some suggested talking points in preparation for the upcoming meeting with NJDEP regarding the CSO LTCP.

1. DEP is clearly focusing on the Nine Minimum Controls as a first order of business - https://www.nj.gov/dep/dwq/cso-nine.htm
    a. Using quantitative measures, be able to discuss a timeline for cleaning the entire system within the next few years. Those quantitative measures should include cost per mile, time needed per mile, qty of debris per mile, etc.
    b. Condition of the outfalls in the receiving waters. I have been told that the outfalls are silted over in the rivers. If this is accurate, not only is it a cleaning issue but also a flooding issue. If they are silted over, be able to discuss with NJDEP a plan about dredging them clear. This has a remarkable impact on flooding as the system is able to relieve itself into the river.
    c. Examining the setting of the regulators.

2. Green Infrastructure
    a. Explain Gloucester's commitment to pushing forward with green infrastructure, especially while the cleaning of the system continues, while acknowledging that green infrastructure alone will not get Gloucester into compliance with the CSO policy.
    b. Putting in low cost, low maintenance green infrastructure during other projects. So, repaving a road provides an opportunity for tree pits. Or de-paving small areas of open space that are not conducive to redevelopment.

3. Grey Infrastructure
    a. It would be ill advised to plan grey infrastructure until the system is clean and the system can be better characterized and modeled. So, acknowledge that grey infrastructure will be needed but that more flow monitoring and modeling will be needed and which will be completed as soon as the system is cleaned.

4. Affordability
    a. Gloucester is already approaching the EPA affordability indicator of 2% of median household income going towards water/wastewater bill. I believe those affordability calculations were completed before Gloucester had to tackle PFAS/lead service line pipes and other regulatory

requirements. CDM/CCMUA will work to update these indicators in the near future but that work won't be completed before August 2nd. I don't think the affordability argument will change the trajectory of this first permit, especially with regard to the Nine Minimum Controls but it will be helpful in negotiating the length of the plan.

Tom Schevtchuk (CDM), Dr. Cindy Huang (CDM) and I are available if you would like to discuss these suggestions, or any other topic, before the call with NJDEP on August 2nd. The only idea in this email and that pre-call would to put Gloucester in a position to address some of items I am 99% certain will come up.

Thanks,
Scott

Scott Schreiber
Executive Director
Camden County MUA
Office – 856-583-1261
Cell – 609-330-6880
sschreiber@ccmua.org

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NJDEP Letter of 8/09/23 & CCMUA / Camden / Gloucester City Responses of 9/08/23

Appendix D

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

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

SHAWN M. LATOURETTE
Commissioner

Via E-mail
August 9, 2023

Scott Schreiber, Executive Director
Camden County Municipal Utilities Authority
1645 Ferry Avenue
Camden, NJ 08104

Donna Domico, Superintendent
City of Gloucester
100 North Johnson Boulevard
Gloucester, NJ 08030

Orion Joyner, City Engineer
City of Camden
520 Market Street, Suite 325
Camden, NJ 08101

Re: Review of Selection and Implementation of Alternatives Report (SIAR)
City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847
Camden County Municipal Utilities Authority (CCMUA), NJPDES Permit No. NJ0026182

Dear Permittees:

Thank you for meeting with the New Jersey Department of Environmental Protection (the Department) on August 2, 2023 to discuss the pending issuance of the draft New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) renewal permits. These permits will incorporate elements of the CSO Long Term Control Plan (LTCP) submitted by all three permittees and will include an implementation schedule in each permit. Prior to this meeting, the Department submitted a request for information dated June 13, 2023 to all three permittees which concerned the proposed implementation schedule, with responses dated June 15, 2023 (Gloucester only) and July 12, 2023 (all three permittees). A separate letter was issued to the City of Gloucester on June 28, 2023. This subject letter is prepared in response to the July 12, 2023 submission to the Department. In addition, this letter serves to summarize the Department's follow-up questions as a result of information provided in the August 2, 2023 meeting on specific projects. Finally, this letter serves to request additional information on infiltration / inflow (I/I) and to provide guidance on a revised LTCP.

Project Information

As an initial matter, the Department acknowledges information included in the July 12, 2023 submission with respect to ongoing projects to improve the operation of the collection system. As supplemental detail to the July 12, 2023 submission, completion dates of projects were provided in the meeting. Specifically, a date of October 31, 2024 was provided for the completion of the initial cleaning of the Camden collection system. Additionally, a date of December 31, 2023 was provided for the completion of the initial cleaning of the Gloucester collection system. These dates will be incorporated as requirements in the draft NJPDES CSO permits.

A primary focus of the NJPDES CSO permit renewal process is to establish a defined implementation schedule for CSO control measures. Updated information was provided in the meeting by the City of Camden and the City of Gloucester with respect to ongoing operation and maintenance of the collection system through system cleaning as well as maximization of flow to the treatment plant. Updated information was also provided regarding changes to the operation of pump stations as a result of the wet weather expansion of CCMUA. This letter serves to formalize additional detail requested in that meeting.

Additional information is requested for CCMUA:

- Completion date of full expansion of wet weather expansion of CCMUA; and
- Flow data at the headworks to show increases in diversion of combined sewage flows for treatment at CCMUA.

Additional information is requested for the City of Camden:

- A map depicting those portions of the collection system already cleaned and those portions remaining to be cleaned; and
- Information to document the average amount of times per year the Arch Street Pump Station (owned/operated by Camden) shut down pre-expansion and post-expansion of CCMUA to document any increase in wet weather flow for treatment at CCMUA. This can be coupled with the above headworks flow data.

Additional information is requested for the City of Gloucester:

- A map depicting those portions of the collection system already cleaned and those portions remaining to be cleaned;
- The amount of linear feet of the collection system cleaned and remaining to be cleaned. Any information regarding amount cleaned per year over the previous years and tonnage removed;
- Inspection and documentation of the operating condition and functionality of each CSO outfall (i.e., need for dredging);
- Documentation of the operating condition and functionality of each regulator within the collection system; and
- Flow records documenting the average flow from the North King Street Pump Station (owned/operated by Gloucester) to the Gloucester City Pump Station (owned/operated by

CCMUA). This information is needed to document any increase in wet weather flow for treatment at CCMUA. This can be coupled with the above headworks flow data.

Once this information is provided, the Department will consider the June 13, 2023 request to be satisfied for all three permittees. Please provide this information to the Department no later than 30 days from the date of this letter.

Request for Information Regarding I/I

The LTCP provided an analysis of the CSO control strategies including green infrastructure, increased storage capacity, STP expansion, CSO related bypass, treatment of the CSO discharge, sewer separation and infiltration and inflow (I/I) reduction. In addition, Part IV.F.1.h.1.ii of the NJPDES permits states permittees must "identify I/I and reduce it to meet the definition of non-excessive infiltration (in combined and separately sewered areas) and non-excessive inflow (in separately sewered areas) where both terms are defined in N.J.A.C. 7:14A-1.2."

The Department hereby requests additional detail on the CSO control strategy of I/I. On page 6-18 of the October 2020 LTCP, it is stated that "CCMUA has the option at its sole discretion but not the obligation to address inflow and infiltration on a regional basis where cost-effective." As stated on page 4-9 of the June 2019 Development and Evaluation of Alternatives Report (DEAR):

> "Inflow and infiltration reduction will not play a major role in long term CSO control due to the high volumes of wet weather flow generated in the combined sewered areas relative to the volume of I/I contributed from the hydraulically connected sanitary sewered areas. There are approximately 101 square miles of sanitary sewered areas contributing flow to CCMUA's WPCF #1. If a 50% reduction in I/I from the sanitary sewered area is assumed, the total annual CSO discharge volume would be reduced by approximately 12% from 628 million gallons / year to 550 MGY."

Provide additional information in a revised LTCP (see below) as to why I/I will not play a major role in long term CSO control. Include any supporting documentation as to why addressing I/I controls in sanitary sewered areas outside of Camden and Gloucester City has not been pursued.

Long Term Control Plan Revisions

Given that the Department is moving forward with the NJPDES Permit, an updated LTCP is needed to amend the Administrative Record. The Department issued technical comments dated May 7, 2021 on the October 2020 LTCP where a response was provided by the permittees on July 21, 2021. Please provide a revised LTCP with information incorporated therein from all relevant submissions (since the October 2020 LTCP) in both a clean and red lined version. In addition, the revised LTCP shall include any subsequent submissions to the Department as an attachment in that report such as the July 12, 2023 submission. The revised LTCP is due within sixty (60) days of the date of this letter. Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Assistant Director
Water Pollution Management Element

C: Dwayne Kobesky, Bureau of Surface Water and Pretreatment Permitting
Joseph Mannick, Bureau of Surface Water and Pretreatment Permitting
Molly Jacoby, Bureau of Surface Water and Pretreatment Permitting
Andrew Koske, Division of Water Quality
Charles Jenkins, Municipal Finance and Construction Element

From: Scott Schreiber <sschreiber@ccmua.org>
Sent: Friday, September 8, 2023 11:22 AM
To: Rosenwinkel, Susan [DEP]; Donna Domico; Orion Joyner (OrionJ@ci.camden.nj.us)
Cc: Mannick, Joe [DEP]; Jacoby, Molly [DEP]; Dwayne.kobesky; Koske, Andrew [DEP]; Jenkins, Charles [DEP]; mayorbaile@cityofgloucester.org; Howard Long; Holly Cass; vanessa@cityofgloucester.org; Kim Michelini; Michael Watson; Schevtchuk, Thomas; Brian Morrell; Timothy J. Cunningham; Stephanie Madden; Oleg Zonis
Subject: RE: Request for Information on the LTCP
Attachments: 30 Day Info Request Joint Response 09-09-23.pdf

Good Afternoon, Susan:

Please find the joint response to the below request attached. Please let us know if the NJDEP requires additional information to satisfy the 30-Day Information Request.

Regarding the request for a revised LTCP, including updates to the schedules, I can report that the CCMUA and CDM Smith will be providing information to Camden and Gloucester next week in order to advance this issue. It is the permittees' intention to have a draft of the revised LTCP to the NJDEP within the 60-Day timeframe. However, because the revised LTCP will require action from each permittees' governing body, it is likely that a final revised LTCP will not be provided within the 60-day timeframe. I have had discussions with Tim Cunningham and Brian Morrell and we have agreed that we will ask each of our entity's respective governing bodies to act immediately after the creation of the revised LTCP so that the deliverable can be provided as soon as possible.

Please let this group know if you have any questions or concerns about this path forward. Thank you.

Best Regards,
Scott Schreiber

From: Rosenwinkel, Susan [DEP] <Susan.Rosenwinkel@dep.nj.gov>
Sent: Wednesday, August 9, 2023 2:04 PM
To: Scott Schreiber <sschreiber@ccmua.org>; Donna Domico <donna.domico@cityofgloucester.org>; Orion Joyner (OrionJ@ci.camden.nj.us) <orionj@ci.camden.nj.us>
Cc: Mannick, Joe [DEP] <Joe.Mannick@dep.nj.gov>; Jacoby, Molly [DEP] <Molly.Jacoby@dep.nj.gov>; Kobesky, Dwayne [DEP] <Dwayne.Kobesky@dep.nj.gov>; Koske, Andrew [DEP] <Andrew.Koske@dep.nj.gov>; Jenkins, Charles [DEP] <Charles.Jenkins@dep.nj.gov>; mayorbaile@cityofgloucester.org; Howard Long <hlong@wlwklaw.net>; Holly Cass <Holly.Cass@camdencounty.com>; vanessa@cityofgloucester.org; Kim Michelini <kim@ccmua.org>; Michael Watson <mwatson@brownconnery.com>; Schevtchuk, Thomas <SchevtchukTA@cdmsmith.com>; Brian Morrell <bmorrell@gloucesterpolice.com>; Timothy J. Cunningham <TiCunnin@ci.camden.nj.us>
Subject: Request for Information on the LTCP

Thank you for meeting with the Department on August 2, 2023. Please see the Department's response as a follow-up to that meeting.

Thank you for your continued cooperation.

Susan Rosenwinkel
Assistant Director
Water Pollution Management Element
NJDEP-Division of Water Quality
401 E. State St, P.O. Box 420
Mail Code 401-02B
Trenton, NJ 08625-0420
Tel: (609) 292-4860
Susan.rosenwinkel@dep.nj.gov

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request*

Item	
CCMUA	
1	Completion date of full expansion of wet weather expansion of CCMUA
	May 1, 2020.
2	Flow data at the headworks to show increases in diversion of combined sewage flows for treatment at CCMUA.
	Please see Attachment A (pdf page 3): • Table 1 – *Overall Comparison of Flow Rates* shows average total daily and peak daily flow rates from January 2016 through April 2020, and from May 1, 2020 through August 30, 2023. It also shows the peak flow rates for these periods. • Table 2 – *Peak Daily Flow Rate by Month* shows the peak daily flow rate for each month from 2016 through August 2023. • Table 3 – *Frequency Distribution of Days With Peak Flows* in 25 MGD increments from 100 MGD to 250 MGD.
City of Camden	
1	A map depicting those portions of the collection system already cleaned and those portions remaining to be cleaned
	• PDF maps of the areas where cleaning has been completed is provided as Attachment B (pdf page 7) • A GIS map is accessible through the following link: https://arcg.is/1yOme53
2	Information to document the average amount of times per year the Arch Street Pump Station (owned/operated by Camden) shut down pre-expansion and post-expansion of CCMUA to document any increase in wet weather flow for treatment at CCMUA. This can be coupled with the above headworks flow data.
	The data are summarized on Attachment C. (pdf page 11)
Gloucester City	
1	A map depicting those portions of the collection system already cleaned and those portions remaining to be cleaned
	Please see Attachment D (pdf page 13)
2	The amount of linear feet of the collection system cleaned and remaining to be cleaned. Any information regarding amount cleaned per year over the previous years and tonnage removed

	Item
	Annual cleaning is as follows: 2021. 20,000 l.f. 2022. 48,092 l.f. 2023. 26,210 l.f 94,302 76% Remaining 30,000 l.f. 24% (approximate) Total 124,302 Cleaning data are reported to NJDEP quarterly.
3	Inspection and documentation of the operating condition and functionality of each CSO outfall (i.e., need for dredging.)
	CCMUA is assisting Gloucester City with outfall inspections. Please see Attachment E (pdf page 15)
4	Documentation of the operating condition and functionality of each regulator within the collection system
	• Regulators are cleaned regularly. All seven regulators were cleaned and inspected in February 2023. A confined Space Entry was made. NJDEP Inspection on CSO system was conducted on 2/21/23. An inspection log from February is provided as Attachment F. (pdf page 45) • On May 23, 2023 Regulator G-1 on Charles Street was cleaned and inspected and was found to have debris in it. The chamber was cleared and has been functioning properly.
5	Flow records documenting the average flow from the North King Street Pump Station (owned/operated by Gloucester) to the Gloucester City Pump Station
	The King Street Pump Station is not equipped with a flow meter. Average estimated pumping from King Street PS is 4,500 gallons per day based on calculations.

* A copy of the August 9, 2023 NJDEP letter is provided as Attachment G (pdf page 55).

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request

Attachment A – CCMUA Wastewater Treatment Facility # 1

Headworks Flow Data

Attachment A - Table 1

Overall Comparison of Flow Rates

Time Period	Average		Peak Flow Rate (MGD)
	Total Daily Flow (MGD)	Peak Daily Flow Rate (MGD)	
Jan 2016 - April 2020	54.9	75.7	157.4
Plant Expansion (May 2020 forward)	51.8	84.6	237.8

Attachment A - Table 2

Peak Daily Flow Rate by Month (MGD)

Month	2016	2017	2018	2019	2020	2021	2022	2023	Average 2016-2019	2022	% Change (2016 - 2019 .v. 2022)
January	112.2	120.6	109.6	141.1	124.7	166.3	186.3	123.5	120.9	186.3	54%
February	139.8	122.7	154.7	131.1		181.5	177.7	180.3	137.1	177.7	30%
March	146.1	136.1	140.0	140.0		173.6	130.0	166.9	140.6	130.0	-8%
April	113.3	141.0	152.8	134.7	125.4	187.1	177.6	178.2	135.5	177.6	31%
May	145.7	131.4	90.7	155.3	158.2	138.0	237.8	127.1	130.8	237.8	82%
June	115.1	105.6	140.9	157.4		200.1	177.9	179.2	129.8	177.9	37%
July	144.1	130.7	101.3	136.6	176.0	175.3	176.1	160.2	128.2	176.1	37%
August	101.5	127.6	123.9	132.0	174.9	140.1	120.3	168.9	121.3	120.3	-1%
September	110.1	101.4	130.3	104.2	183.0	179.8	174.7		111.5	174.7	57%
October	125.0	151.0	123.0	131.7	176.0	214.0	203.4		132.7	203.4	53%
November	136.8	103.7	156.4	57.2	181.2	156.6	107.5		113.5	107.5	-5%
December	151.8	120.0	154.1	127.9	181.7	126.6	201.8		138.5	201.8	46%
Average	**128.5**	**124.3**	**131.5**	**129.1**	**164.6**	**169.9**	**172.6**	**160.5**	**128.3**	**172.6**	**34%**
Maximum	**151.8**	**151.0**	**156.4**	**157.4**	**183.0**	**214.0**	**237.8**	**180.3**	**140.6**	**237.8**	

Plant Expansion (May 2020 forward)

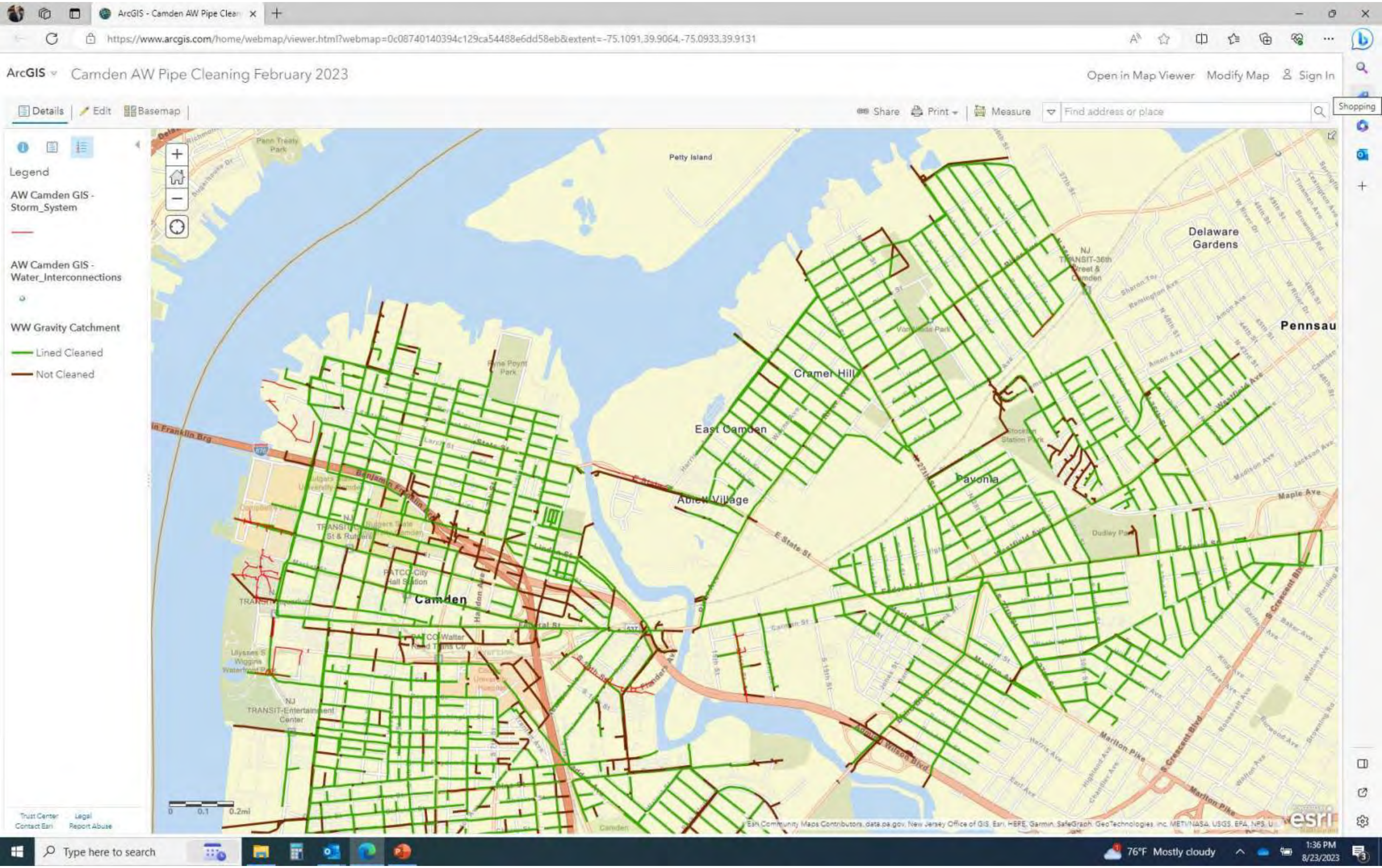
Attachment A - Table 3

Frequency Distribution of Days with Peak Flows to Plant from 100 MGD - 250 MGD

Days With Peak Rates (MGD) Between:	100	126	151	176	201	226	Number of Days
	125	150	175	200	225	250	
Prior to Plant Capacity Expansion	171	39	13	0	0	0	223
	77%	17%	6%	0%	0%	0%	
cumulative	77%	94%	100%	100%	100%	100%	
Plant Expansion (May 2020 forward)	212	79	45	23	5	1	365
	58%	22%	12%	6%	1%	0%	
cumulative	58%	80%	92%	98%	100%	100%	

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request

Attachment B – City of Camden Sewer Cleaning Map (PDF)



ArcGIS - Camden AW Pipe Clean

https://www.arcgis.com/home/webmap/viewer.html?webmap=0c08740140394c129ca54488e6dd58eb&extent=-75.1091,39.9064,-75.0933,39.9131

ArcGIS Camden AW Pipe Cleaning February 2023

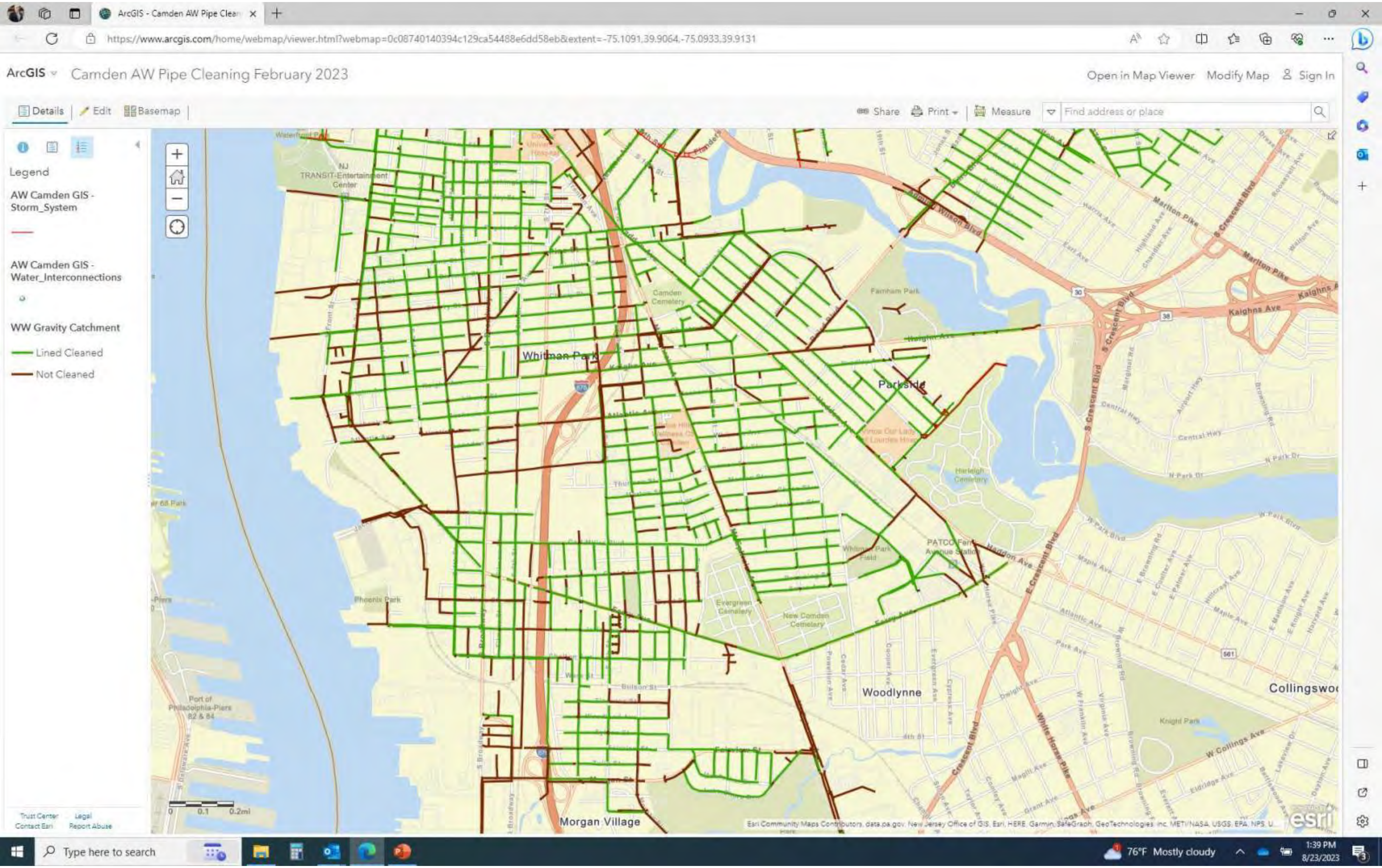
Legend

AW Camden GIS - Storm_System

AW Camden GIS - Water_Interconnections

WW Gravity Catchment

- 🟩 Lined Cleaned
- 🟫 Not Cleaned



Camden AW Pipe Cleaning February 2023

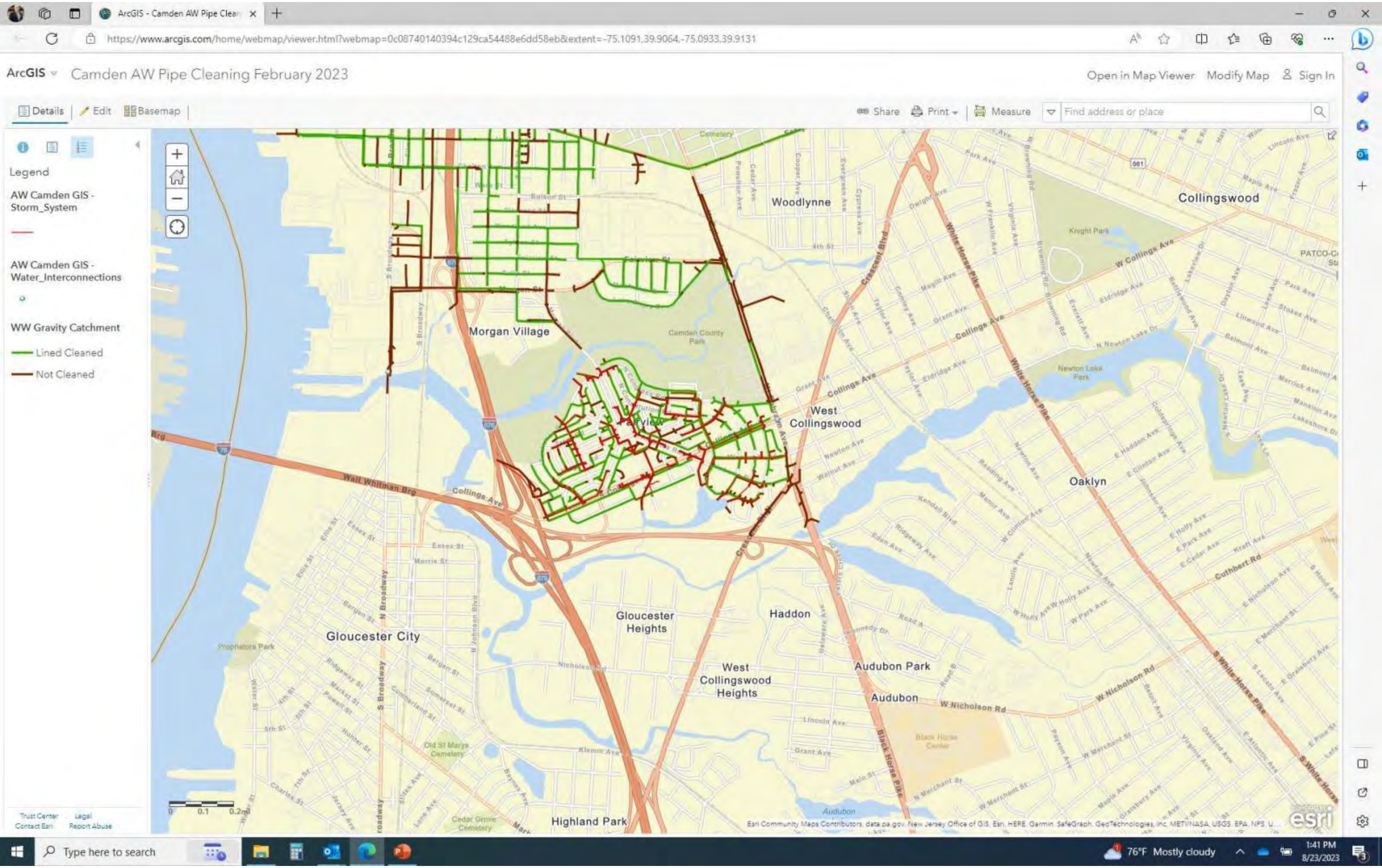
Legend

AW Camden GIS - Storm_System

AW Camden GIS - Water_Interconnections

WW Gravity Catchment

- 🟩 Lined Cleaned
- 🟥 Not Cleaned



https://www.arcgis.com/home/webmap/viewer.html?webmap=0c08740140394c129ca54488e6dd58eb&extent=-75.1091,39.9064,-75.0933,39.9131

ArcGIS Camden AW Pipe Cleaning February 2023

Legend

AW Camden GIS - Storm_System

🟥

AW Camden GIS - Water_Interconnections

●

WW Gravity Catchment

🟩 Lined Cleaned

🟫 Not Cleaned

Esri Community Maps Contributors, data.pa.gov, New Jersey Office of GIS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, U...

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request

Attachment C – City of Camden Arch Street Pump Station Operating Data

Attachment C

Frequency of City of Camden Arch Street Pump Station Shut-Downs During Wet Weather

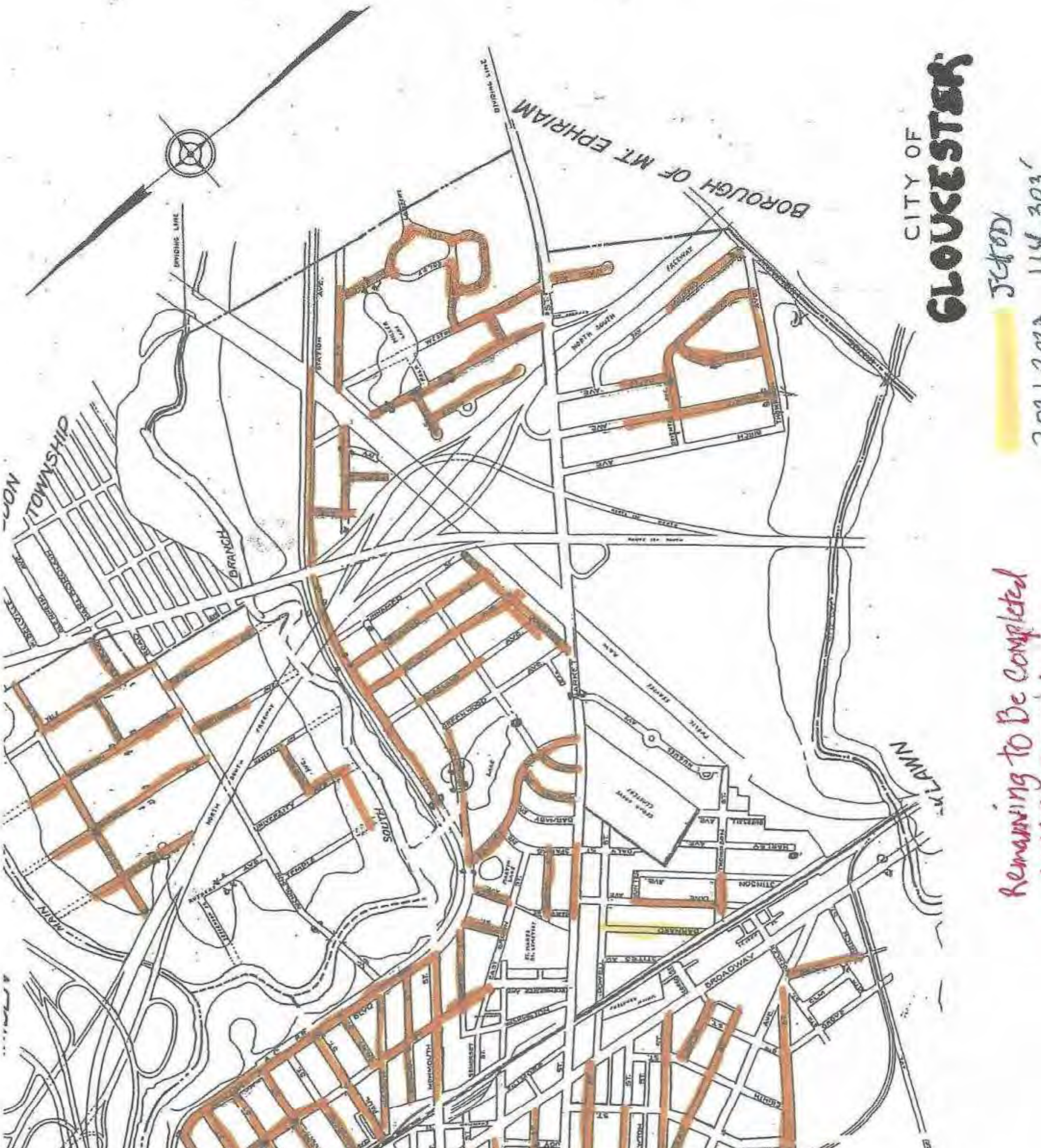
Month	Contract Year 3 (2018)			Contract Year 4 (2019)			Contract Year 5 (2020)		
	Rainfall	Arch St. Shut-Downs	C10 CSO Events	Rainfall	Arch St. Shut-Downs	C10 CSO Events	Rainfall	Arch St. Shut-Downs	C10 CSO Events
February	5.23	4	10	3.36	1	6	2.28	0	3
March	4.12	1	6	4.57	3	6	4.38	3	6
April	3.16	1	6	4.07	2	6	4.41	2	6
May	3.42	0	7	5.24	2	7	2.74	0	4
June	5.40	2	11	10.65	4	10	2.49	1	5
July	5.23	0	11	5.57	4	9	6.03	3	6
August	6.28	1	13	4.81	3	5	4.81	1	8
September	9.57	1	11	2.09	1	6	4.01	1	4
October	4.59	2	10	3.96	4	6	4.52	1	6
November	10.55	5	12	1.53	0	2	5.35	1	6
December	7.07	2	8	5.54	3	7	4.24	1	4
January	4.50	3	7	2.63	1	3	1.34	0	1
Totals:	**69.12**	**22**	**112**	**54.02**	**28**	**73**	**46.60**	**14**	**59**

Month	Contract Year 6 (2021)			Contract Year 7 (2022)			Contract Year 8 (2023)		
	Rainfall	Arch St. Shut-Downs	C10 CSO Events	Rainfall	Arch St. Shut-Downs	C10 CSO Events	Rainfall	Arch St. Shut-Downs	C10 CSO Events
February	4.08	0	4	2.95	0	4	1.68	0	4
March	3.59	2	4	2.33	0	5	1.70	0	4
April	2.68	0	3	4.99	0	8	5.38	0	7
May	3.66	1	5	4.84	1	8	0.37	0	1
June	5.06	0	7	5.18	1	7	1.89	0	3
July	6.68	0	9	1.35	0	4	8.19	0	10
August	3.80	0	6	2.63	0	6	X	X	X
September	4.96	0	3	1.89	0	3	X	X	X
October	4.51	0	5	6.85	0	8	X	X	X
November	0.48	0	1	2.85	0	6	X	X	X
December	1.17	0	3	4.68	0	6	X	X	X
January	2.37	0	4	3.16	0	6	X	X	X
Totals:	**43.04**	**3**	**54**	**43.70**	**2**	**71**	**19.21**	**0**	**29**

Year	Rainfall	Arch St. Shut-Downs	C10 CSO Events
2018	69.12	22	112
2019	54.02	28	73
2020	46.60	14	59
2021	43.04	3	54
2022	43.70	2	71
2023 (through July)	19.21	0	29

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request

Attachment D – Gloucester Sewer Cleaning Map (PDF)


CITY OF
GLOUCESTER
Jetted
2021-2023 114,303'
Remaining to be Completed
APPROX 30000'
BOROUGH OF MT. EPHRAIM
TOWNSHIP
BRANCH
CREEK
BROADWAY
KING
LAWN

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23
30 Day Information Request

Attachment E – Gloucester City CSO Outfall Inspection Report

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
CAMDEN, NEW JERSEY

INSPECTION REPORT

GLOUCESTER CITY – INSPECTION OF OUTFALLS AND REGULATORS

DELAWARE NO. 1 WATER POLLUTION CONTROL FACILITY

Prepared for:
Camden County Municipal Utilities Authority
1645 Ferry Avenue
Camden, NJ

Prepared by:
D&B/Guarino Engineers LLC
8 Neshaminy Interplex, Suite 219
Trevose, PA

DRAFT

AUGUST 2023

CCMUA DELAWARE NO.1 WATER POLLUTION CONTROL FACILITY

INSPECTION REPORT

GLOUCESTER CITY – INPECTION OF OUTFALLS AND REGULATORS

TABLE OF CONTENTS

List of Tables

S.0 INTRODUCTION AND SUMMARY

An August 2, 2023, meeting with the New Jersey Department of Environmental Protection (NJDEP) and pemittees, CCMUA, City of Camden and City of Gloucester, New Jersey was held to discuss the pending issuance of the New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) renewal permits. The permits will incorporate elements of the CSO Long Term Control Plan (LTCP) submitted by all three permittees and will include an implementation schedule in each permit.

An August 9, 2023, letter from the NJDEP provides a follow up to formalize additional details requested at that meeting. The letter requests that the City of Gloucester provide additional information including but not limited to:

- Inspection and documentation of the operating condition and functionality of each CSO outfall (i.e., need for dredging); and,
- Documentation of the operating condition and functionality of each regulator within the collection system.

In an August 17, 2023, meeting with CCMUA and D&B/Guarino, CCMUA stated that they agreed to assist the City of Gloucester with the requirements of the NJPDES CSO permit renewal process specifically with the inspection of the City of Gloucester outfalls and regulators. During the meeting, CCMUA requested and D&B/Guarino agreed to conduct the inspections within two (2) weeks and submit a report to the CCMUA.

On August 23, 2023, D&B/Guarino conducted an inspection of the City of Gloucester's outfalls and regulators. The City of Gloucester representatives, Ray Bennent and Donna Domico, City Utilities, were present during the inspection.

Summary of Observations and Recommendations:

G1 – The regulator, net chamber and tide gate are clear. The outfall is 50% full at low tide.

Recommend clearing ROW and outfall from the land side. Clean, CCTV and assess the condition of the 48-inch brick outfall. Build a stone and gravel road with headwall and debris grille.

G2 – The regulator is blocked. The tide gate, net chamber and outfall are flooded at low tide. The outfall is blocked. Recommend clearing ROW and outfall from the land side. Clean, CCTV the sewer and assess the condition of the 21-inch PVC pipe outfall. Build a stone and gravel road with headwall and debris grille.

G3 – The outfall is 50% full with silt at low tide. The outfall pipe needs to be mapped and catch basin and manhole in the park need to be identified.

G4 – The regulator, net chamber, tide gate clear and outfall are clear at low tide. The outfall is 20% silted in at low tide - needs to be dredged. Clean, CCTV and assess condition. Pipe is listed as 42-inch Brick and RCP pipe but needs to be confirmed. The discharge is RCP.

G5 – The regulator, net chamber, tide gate outlet are clear at low tide. Dredging is not required. The outfall pipe needs to be mapped and catch basin and manhole need to be identified. The outlet locations need to be marked on the pier. Pipe is listed as 36-inch Brick and RCP - needs to be confirmed.

G6 – The regulator, net chamber, tide gate outlet are clear at low tide. Dredging is not required. The outfall pipe needs to be mapped and catch basin and manhole need to be identified. The outlet locations need to be marked on the pier. Pipe is listed as 30-inch Brick and RCP pipe - needs to be confirmed.

G7 – There is minor standing water in the outfall. The outfall is about 1,300 feet in length and discharges into Newton Creek with a duckbill tide gate attached. The outlet is marked with a sign. Dredging is not required. Recommend CCTV and mapping. Identify manholes and catch basins and any other connections to the outfall.

Overall, the operations planning should consider the outfalls as critical infrastructure. Consider adding annual maintenance to their budget.

1.0 INSPECTION AND OBSERVATIONS

The table below provides a summary of the Observations, Immediate Actions Recommended, and Additional Comments/Recommendations.

TABLE 1.0 Gloucester City: August 23, 2023, Inspection of Outfalls and Regulators

CSO	Observations recorded during low tide	Immediate Actions Recommended	Additional Comments/Recommendations
G1 Charles Street west of Walnut St.	Outfall is impacted by deposits of floating river trash and trees that were pushed ashore during storms and high tides. The Brown & Brown (B&B) regulator is working. The net chamber is clear with no standing water. The tide gate is sealed and the outfall is 50% full of water indicating outfall blockage.	Use heavy equipment to dredge and clear outfall from the land side during low tide.	Clean and CCTV the outfall with a condition evaluation as plans indicate that the outfall is a 48-inch brick sewer. Clear the vegetation within the outfall ROW. Construct a headwall with a debris grille along with grading and building a stone and gravel driveway to access the outlet.
G2 6th Street west of Water Street.	Outfall is impacted by deposits of floating river trash and trees that were pushed ashore during storms and high tides. The B&B regulator is blocked with no flow to the dry weather return sewer. The net chamber is flooded. The tide gate is flooded and the outfall is 100% full of water indicating outfall blockage.	Use heavy equipment to dredge and clear outfall from the land side during low tide.	Clean and CCTV the outfall to confirm sewer condition. Plans available indicate the outfall is 21-inch PVC and a swale to the shoreline. Clear the vegetation within the outfall ROW. Construct a headwall with a debris grille along with grading and building a stone and gravel driveway to access the outlet.
G3 New Jersey Ave and King Street.	Outfall exposed at low tide with 50% silt at the outlet. The vortex regulator is working. The net chamber is clear with no standing water. The tide gate is clear and the outfall is clear with the outlet 50% full of silt.	Requires dredging	Clean and CCTV the outfall with a condition evaluation. Use dye tests to confirm connections with manhole and catch basin in the park. Map the outfall through the park to the 36-inch RCP outfall and mark the discharge location on the headwall.
G4 Market Street west of King Street.	The outfall is exposed at low tide with 20% silt at the outlet. The regulator is working. The net chamber is clear with no standing water. The tide gate is clear. The outfall is clear with the outlet 20% full of silt. Second outfall for catch basin in Market Street with 10% silt at the outlet.	Requires dredging	Dye test to confirm connections and catch basins. Map the outfall and mark the discharge location at the headwall. The outfall shown on the plans is constructed as 42-inch brick and RCP. Clean and CCTV the outfall with a condition evaluation.

CSO	Observations recorded during low tide	Immediate Actions Recommended	Additional Comments/Recommendations
G5 Hudson Street and Ellis Street with the Net Chamber in Holt Terminal	The regulator is working and located in Ellis St. The net chambers, tide gates and outfalls are clear and within the Holt Gloucester City Terminal. Drone images made available by the City show the outfall discharge located under the Holt dock above the low tide elevations.	NO ACTION RECOMMENDED	Dye test to confirm connection to manholes and catch basins. Map the outfall and mark the discharge location on the pier. The outfall shown on the plans is constructed as 30-inch brick and RCP. Clean and CCTV the outfall with a condition evaluation.
G6 Regulator Mercer St. and Ellis Street with the Net Chamber in the Holt Terminal	Regulator is working and located in Ellis St. The net chambers, tide gates and outfalls are clear and within the Holt Gloucester City Terminal. Drone images made available by the City show the outfall discharge located under the Holt dock above the low tide elevations.	NO ACTION RECOMMENDED	Dye test to confirm connection to manholes and catch basins. Map the outfall and mark the discharge location on the pier. The outfall shown on the plans is constructed as 37 by 40-inch brick and 36-inch RCP. Clean and CCTV the outfall with a condition evaluation.
G7 Broadway at #453	The regulator is in Broadway with an outlet in Newton Creek approximately 1,300 feet away. The outlet with the duckbill tide gate is above the silt on the east side of the Broadway Bridge over the Newton Creek. The B&B regulator is working and the net chamber is clear with no standing water. The tide gate had standing water and needs some cleaning.	Requires dredging.	Clean and CCTV the 15-inch outfall with a condition evaluation. Plans show a parallel 24-inch concrete storm water outfall from King St. and Broadway. Confirm the stormwater sewer has a separate discharge to Newton Creek.

2.0 PHOTOGRAPHS

GLOUCESTER CITY – INSPECTION PHOTOGRAPHS

R&V's Drone Inspection, July 2022

R&V's Drone Inspection, July 2022

R&V's Drone Inspection, July 2022

D&B/Guarino Inspection, August 23, 2023 - **G3 Outlet – low tide**

R&V's Drone Inspection, July 2022

D&B/Guarino Inspection, August 23, 2023 - **G4 Outlet – low tide**

D&B/Guarino Inspection, August 23, 2023 - **G5 tide gate chamber/outfall**

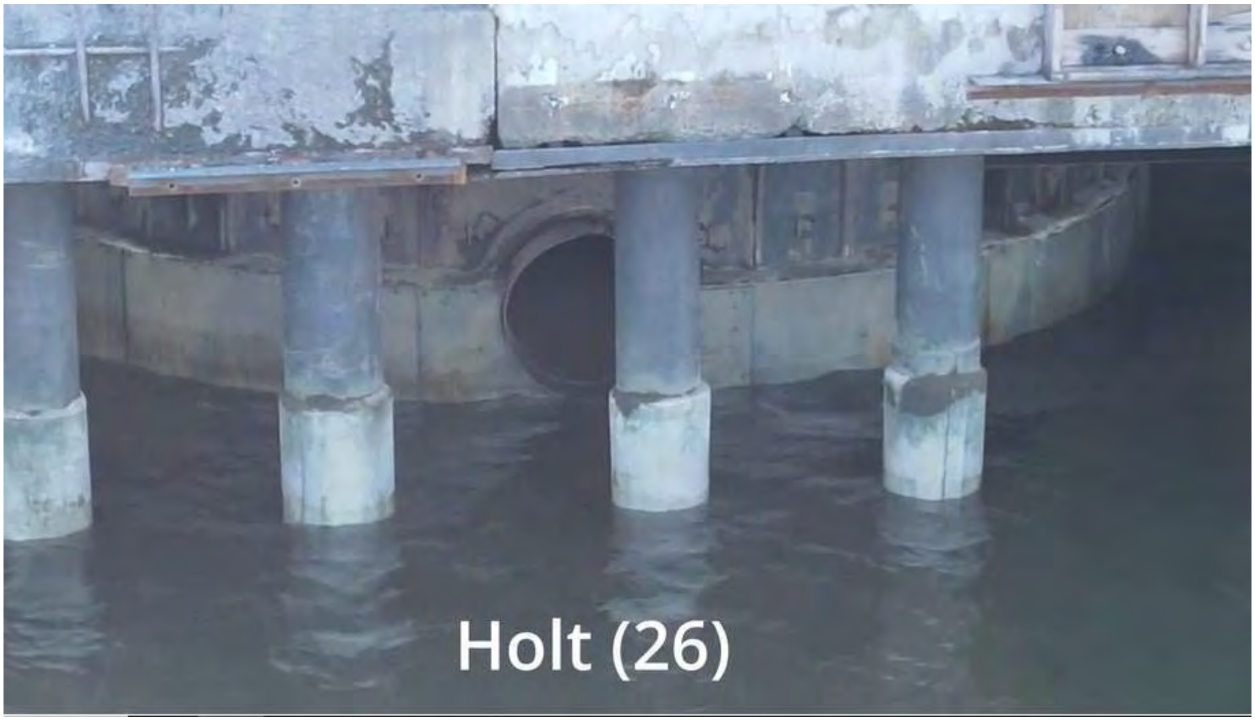
D&B/Guarino Inspection, August 23, 2023 - **G6 tide gate**

D&B/Guarino Inspection, August 23, 2023 - **G6 tide gate chamber/outfall**

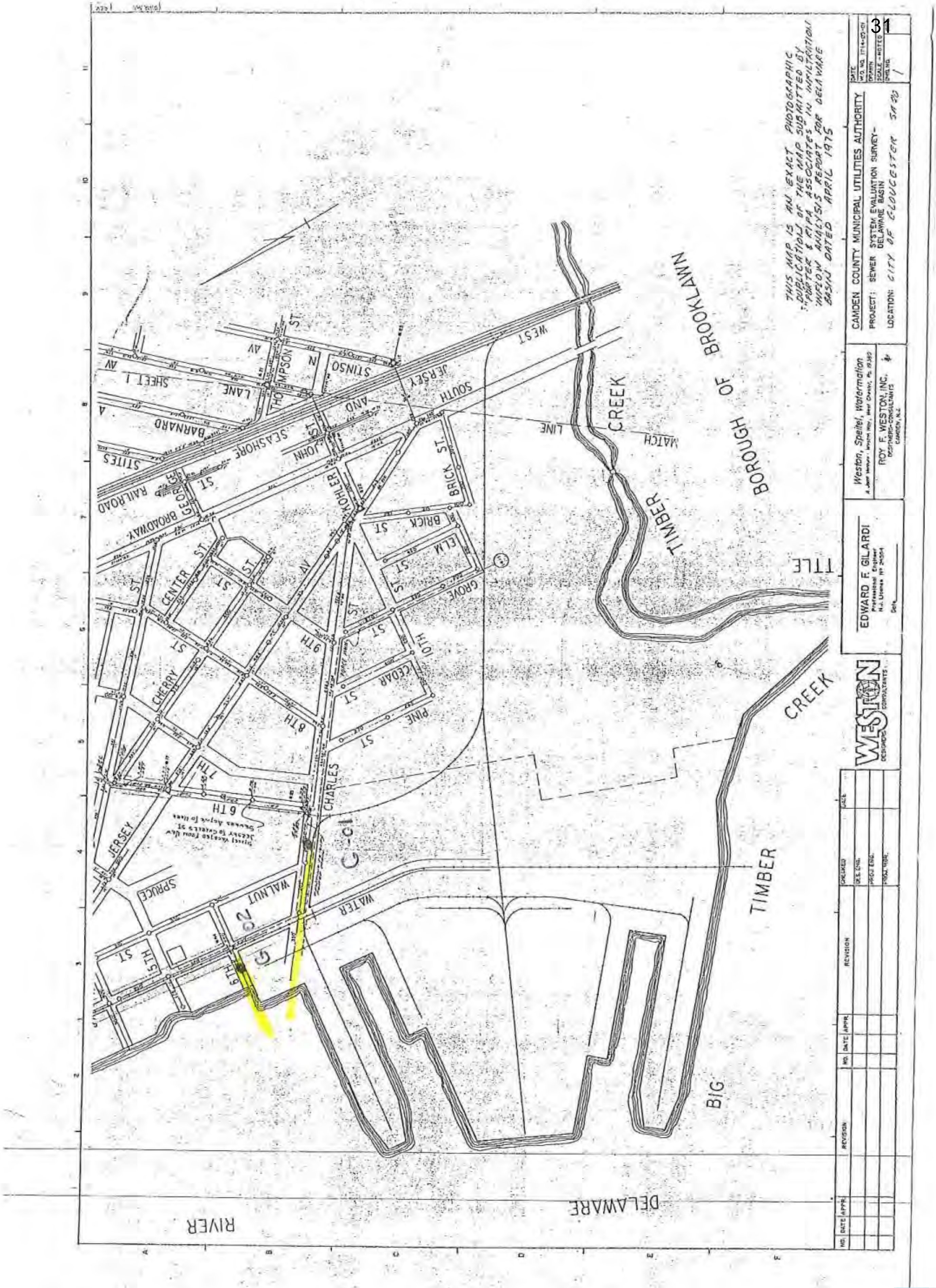
D&B/Guarino Inspection, August 23, 2023 - **G7 Outfall sign**

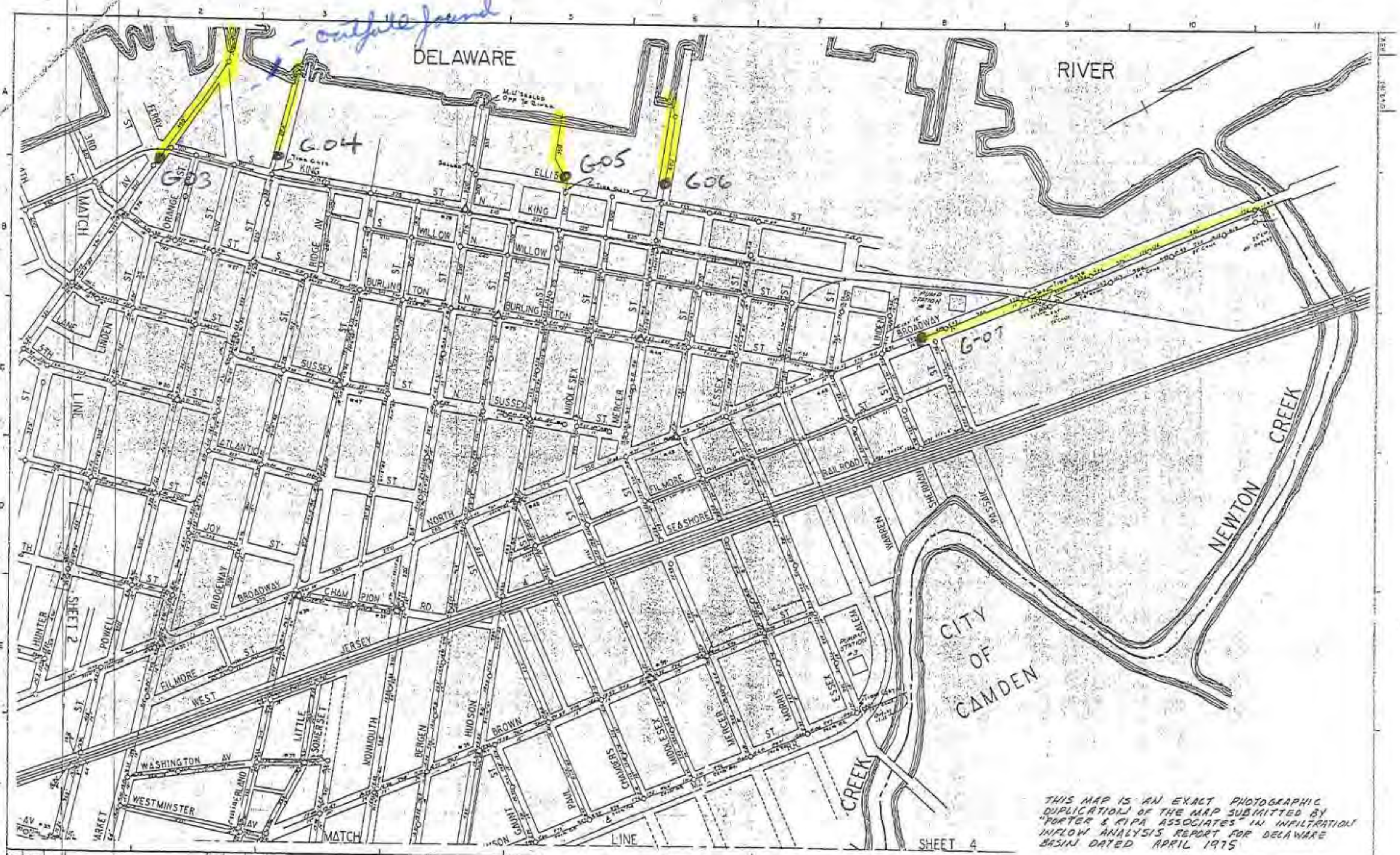
D&B/Guarino Inspection, August 23, 2023 - **G07 Outfall with Duckbill**

R&V's Drone Inspection, July 2022



R&V's Drone Inspection, July 2022


THIS MAP IS AN EXACT PHOTOGRAPHIC DUPLICATION OF THE MAP SUBMITTED BY PORTER & RIPA ASSOCIATES IN INFILTRATION/INFLOW ANALYSIS REPORT FOR DELAWARE BASIN DATED APRIL 1975
CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
PROJECT: SEWER SYSTEM EVALUATION SURVEY- DELAWARE BASIN
LOCATION: CITY OF GLOUCESTER
Weston, Speitel, Watermation
ROY F. WESTON, INC.
EDWARD F. GILARDI
WESTON DESIGNERS CONSULTANTS
TITLE
DELAWARE
RIVER
BIG
TIMBER
CREEK
BOROUGH OF BROOKLAWN
MATCH LINE
WEST JERSEY AND SEASHORE RAILROAD
SOUTH
WATER
WALNUT
SPRUCE
JERSEY
CHERRY
CENTER ST.
BROADWAY
GEORGE ST.
STILES
BARNARD
SHEET I AV
LANE
THOMPSON ST.
STINSON
JOHN ST.
KOHLER
BRICK ST.
ELM
GROVE
10TH
CEDAR
PINE
9TH
8TH
7TH
6TH
5TH
CHARLES
AV
ST
G-01
G-02



THIS MAP IS AN EXACT PHOTOGRAPHIC DUPLICATION OF THE MAP SUBMITTED BY "PORTER & RIPA ASSOCIATES" IN INFILTRATION INFLOW ANALYSIS REPORT FOR DELAWARE BASIN DATED APRIL 1975

WESTON
DESIGNERS CONSULTANTS

EDWARD F. GILARDI
Professional Engineer
N.J. License Nº 24554
Date

Weston, Speitel, Watermation
A Joint Venture · Weston Way, West Chester, Pa. 19380
ROY F. WESTON, INC.
DESIGNERS-CONSULTANTS
CAMDEN, N.J.

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
PROJECT: SEWER SYSTEM EVALUATION SURVEY-DELAWARE BASIN
LOCATION: CITY OF GLOUCESTER SA 20

DATE
W.O. NO. 1744-03-01
DRAWN
SCALE - NOTED
DWG. NO. 3

4.0 Record Drawings for CSO Net and Tide Gate Upgrades

See following pages for *Final Plans for CCMUA Gloucester City CSO Upgrades*

FINAL
PLANS FOR

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY
GLOUCESTER CITY CSO UPGRADES

GLOUCESTER CITY
CAMDEN COUNTY, NEW JERSEY

PUBLIC UTILITIES

ELECTRIC
PUBLIC SERVICE ELECTRIC & GAS
ELECTRICAL ENGINEERING
300 NEW ALBANY ROAD
MOORESTOWN, NJ 08057
ATTN: MR. JIM RIGLER, MANAGER
TEL: 856-778-6759
EMAIL: james.rigler@pseg.com

GAS
PUBLIC SERVICE ELECTRIC & GAS
GAS ENGINEERING
535 WEST NICHOLSON ROAD
AUDUBON, NJ 08106
ATTN: MR. GREG KYRIACOS, MANAGER
TEL: 856-573-2003, 856-573-2006
EMAIL: gregory.kyriacos@pseg.com

WATER
CITY OF GLOUCESTER CITY ENVIRONMENTAL UTILITIES
512 MONMOUTH STREET
GLOUCESTER CITY, NJ 08030

TELEPHONE
VERIZON
713 MARSHA AVENUE
WILLIAMSTOWN, NJ 08094
ATTN: MR. JOHN PAPP

AT&T
50 PATRICIA DRIVE
FLANDERS, NJ 07836
ATTN: MR. LOU MARELLO
TEL: 914-397-3744
EMAIL: LMarello@att.com

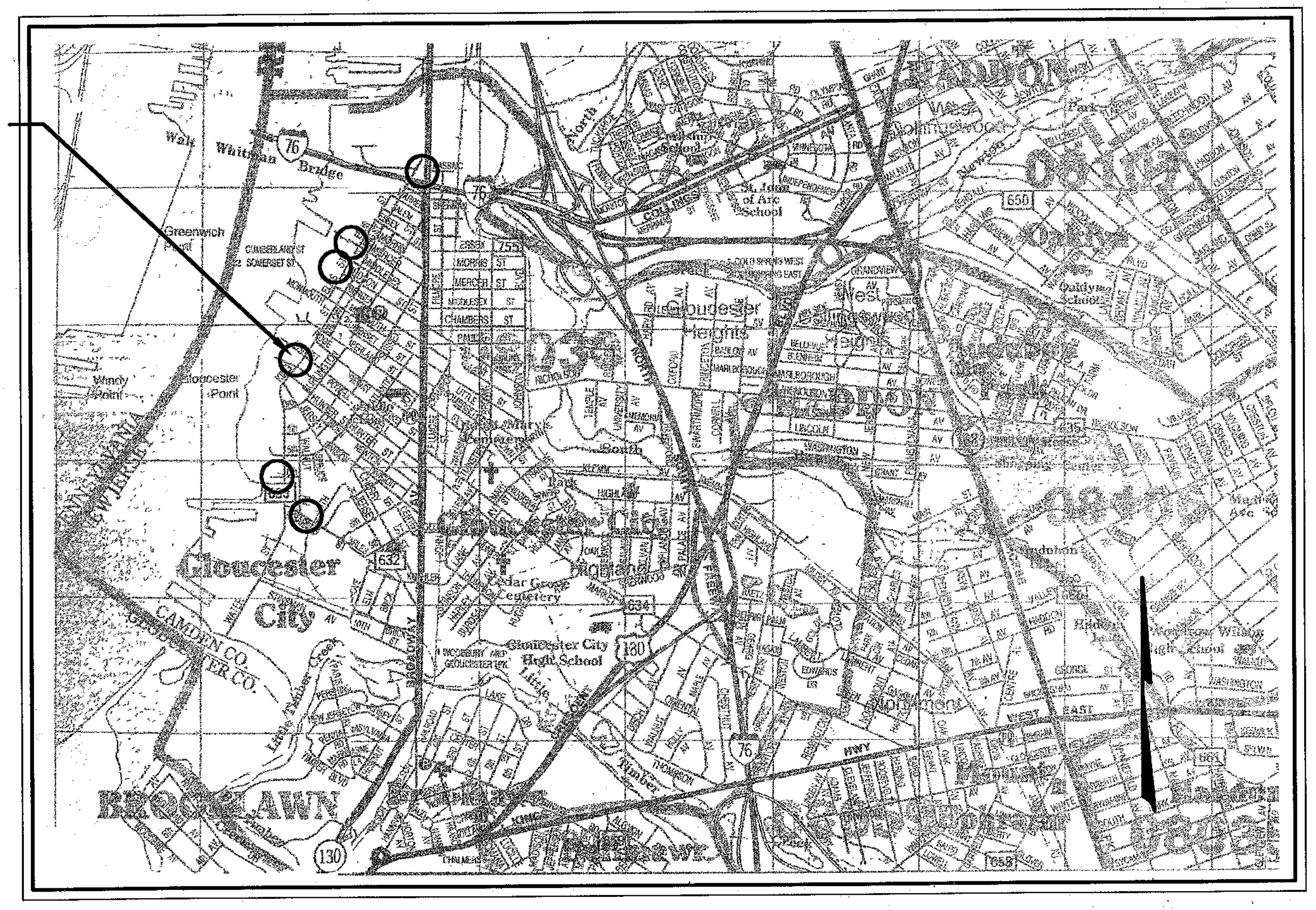
CABLE
COMCAST COMMUNICATIONS
1250 HADDONFIELD-BERLIN ROAD
CHERRY HILL, NJ 08034
ATTN: MR. ALEX PEIDLE

SEWER
CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

CITY OF GLOUCESTER CITY ENVIRONMENTAL UTILITIES
512 MONMOUTH STREET
GLOUCESTER CITY, NJ 08030

LOCATION OF UTILITIES SHOWN ON THE PLANS ARE PLOTTED FROM AVAILABLE DATA ON FILE WITH THE UTILITY COMPANIES AND ARE NOT WARRANTED AS TO EXACTNESS. CONTRACTOR IS TO DETERMINE EXACT LOCATION AND DEPTH OF UTILITIES AT ALL CROSSINGS PRIOR TO CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

PROJECT SITES



KEY MAP
NOT TO SCALE

PREPARED BY

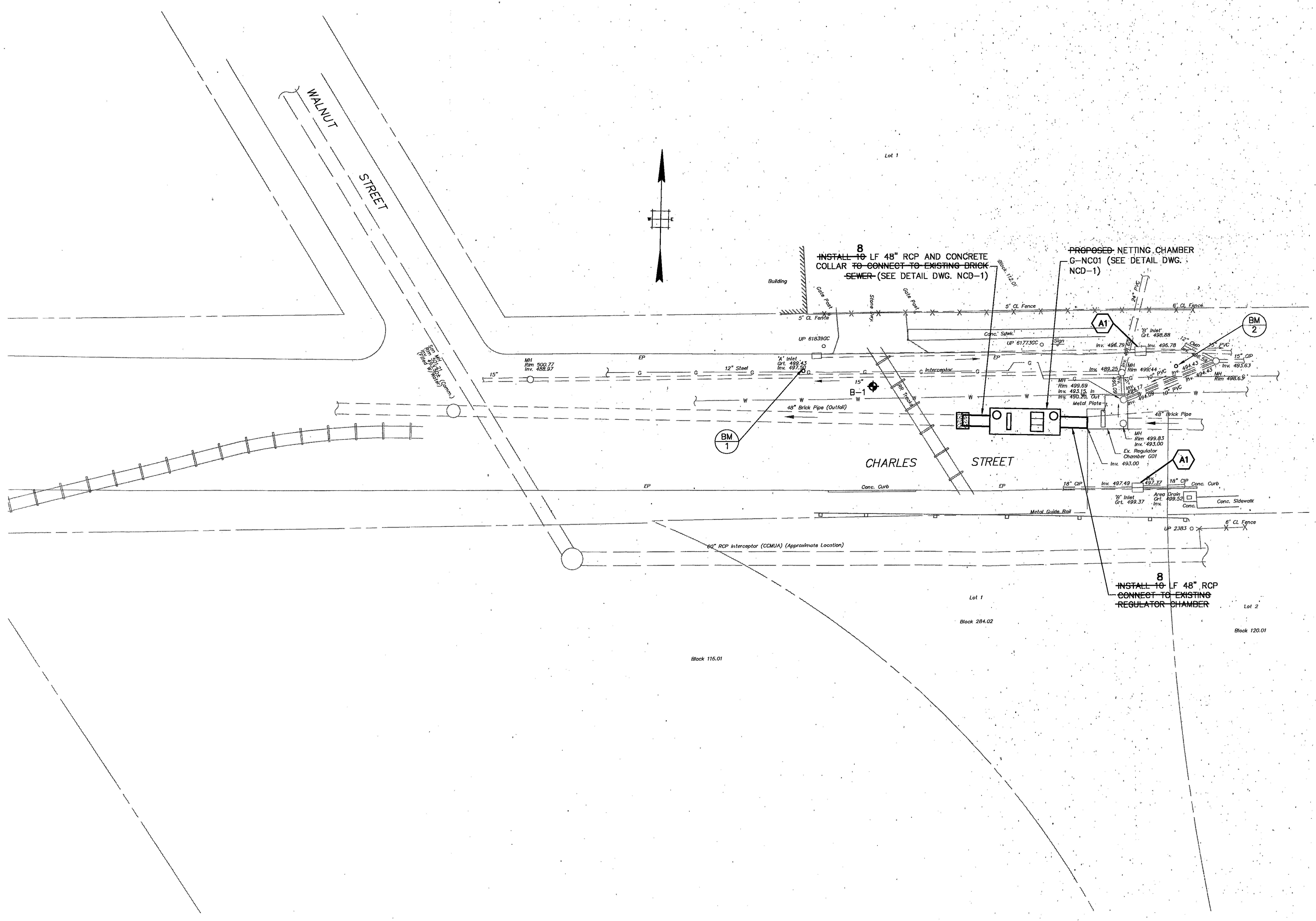
KEITH W. HENDERSON, P.E., P.P.

CONSULTING ENGINEER

T&M ASSOCIATES
CONSULTING AND MUNICIPAL ENGINEERS

ELEVEN TINDALL ROAD
MIDDLETOWN, NEW JERSEY 07748
TEL (732) 671-6400 FAX (732) 671-7365

RECORD DRAWING



An Archaeologist must be present during all excavation activity at this location to identify, photograph, and document significant archaeological features in this location. This may require work stoppages. Accommodations must be made for the Archaeologist to access the excavations. The Contractor must contact the Owner and/or Engineer at least two (2) weeks prior to construction in this location so that necessary arrangements may be made with the Archaeologist. The Contractor may not begin construction in this area without written permission from the owner. Please refer to Section SC-27 & 28 of the project specifications for further information.

CONSTRUCTION NOTES:

1. CONTRACTOR IS ADVISED IT MAY ENCOUNTER ABANDONED BURIED RAILROAD TRACKS ON CHARLES STREET. CONTRACTOR SHALL REMOVE AND DISPOSE OF AS REQUIRED FOR CHAMBER AND PIPE INSTALLATION. COSTS FOR THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE CHAMBER.

2. CONTRACTOR SHALL CLEAN REGULATOR CHAMBER AND CLEAN AND TELEVISE EXISTING OUTFALL SEWER FROM REGULATOR CHAMBER TO A POINT 10' BEYOND PROPOSED POINT OF CONNECTION OF NEW PIPE TO EXISTING PIPE. COSTS FOR CLEANING REGULATOR CHAMBER SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLEANING AND TV INSPECTION OF SEWERS.

3. CONTRACTOR IS ADVISED IT MUST CONTACT CONRAIL TO OBTAIN A RIGHT-OF-ENTRY PERMIT FOR CONSTRUCTION WITHIN THE RAILROAD R.O.W. CONTRACTOR TO INCLUDE IN ITS BID PRICE FOR NETTING CHAMBER G-NC01 ALL ASSOCIATED CONRAIL FEES.

RECORD DRAWING

BENCH MARKS

NO.	ELEV.	DESCRIPTION
1	500.00*	PK SET IN NORTHERLY SIDE OF CHARLES STREET.
2	498.97	PK SET IN NORTHERLY SIDE OF CHARLES STREET.

*ELEVATIONS ARE ASSUMED

GRAPHIC SCALE
20 0 10 20 40
(IN FEET)
1 inch = 20 ft.

NO.	DATE	REVISIONS	BY	CHECKED
1	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

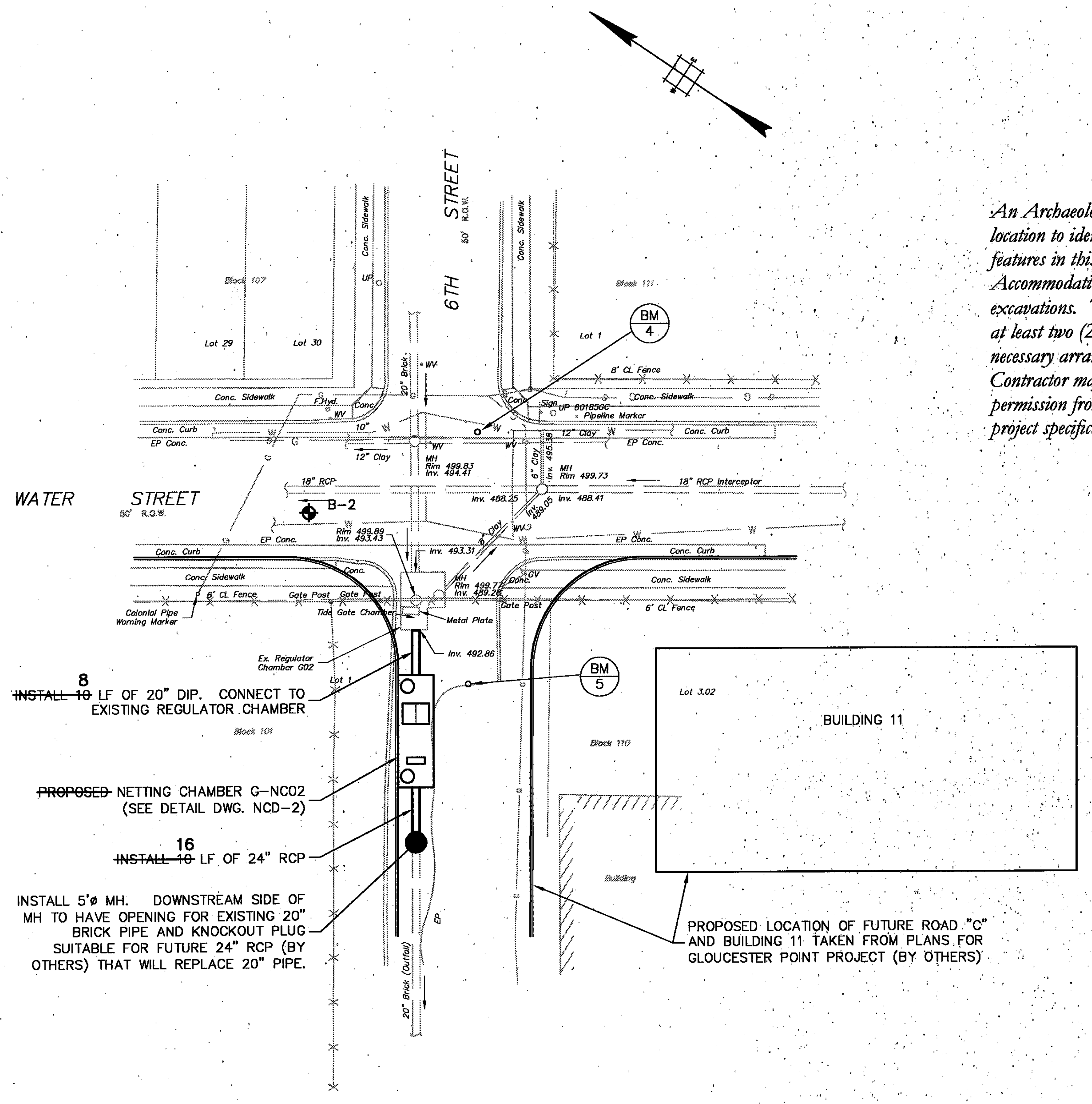
SITE PLAN
NETTING CHAMBER G-NC01
CHARLES STREET

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365
NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER
DATE
LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

DESIGNED BY EAE
DRAWN BY MWC
CHECKED BY JJM
PROJECT NO. CCUA.00013
CADD FILE CCUA10_G1-G2-AB
FIELD BK. # N/A

DRAWING SP-1
SHEET 3 OF 15



~~INSTALL 10~~ 8 LF OF 20" DIP. CONNECT TO EXISTING REGULATOR CHAMBER

~~PROPOSED~~ NETTING CHAMBER G-NC02 (SEE DETAIL DWG. NCD-2)

~~INSTALL 10~~ 16 LF OF 24" RCP

INSTALL 5'ø MH. DOWNSTREAM SIDE OF MH TO HAVE OPENING FOR EXISTING 20" BRICK PIPE AND KNOCKOUT PLUG SUITABLE FOR FUTURE 24" RCP (BY OTHERS) THAT WILL REPLACE 20" PIPE.

PROPOSED LOCATION OF FUTURE ROAD "C" AND BUILDING 11 TAKEN FROM PLANS FOR GLOUCESTER POINT PROJECT (BY OTHERS)

An Archaeologist must be present during all excavation activity at this location to identify, photograph, and document significant archaeological features in this location. This may require work stoppages. Accommodations must be made for the Archaeologist to access the excavations. The Contractor must contact the Owner and/or Engineer at least two (2) weeks prior to construction in this location so that necessary arrangements may be made with the Archaeologist. The Contractor may not begin construction in this area without written permission from the owner. Please refer to Section SC-27 & 28 of the project specifications for further information.

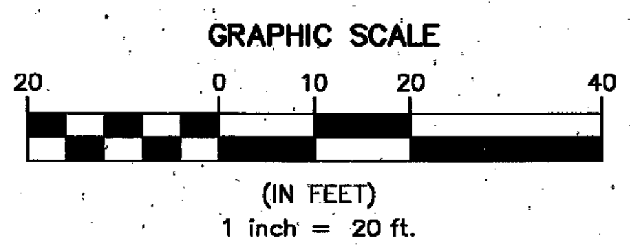
BENCH MARKS		
NO.	ELEV.	DESCRIPTION
4	499.81*	PK SET IN NORTH EAST SIDE OF WATER STREET AT THE INTERSECTION WITH 6TH STREET.
5	499.67	PK SET WITHIN LOT 1, BLOCK 110. 18.81' FROM THE FENCE FRONTING ON WATER STREET AND 30' FROM THE FENCE RUNNING THROUGH LOT 1 AS SHOWN.

*ELEVATIONS ARE ASSUMED

RECORD DRAWING

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CLEAN REGULATOR CHAMBER AND CLEAN AND TELEVISE EXISTING OUTFALL SEWER FROM REGULATOR CHAMBER TO A POINT 10' BEYOND PROPOSED POINT OF CONNECTION OF NEW PIPE TO EXISTING PIPE. CONTRACTOR SHALL USE CAUTION WHEN PERFORMING THIS WORK TO PREVENT DAMAGE OF EXISTING OUTFALL PIPE. COST FOR CLEANING REGULATOR CHAMBER SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLEANING AND TV INSPECTION OF SEWERS.



1	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM
NO.	DATE	REVISIONS	BY	CHECKED

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

SITE PLAN
NETTING CHAMBER G-NC02
SIXTH STREET

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
CERTIFICATE OF AUTHORIZATION GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

DATE

LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

DESIGNED BY EAE
DRAWN BY MWC
CHECKED BY JJM
PROJECT NO. CCUA.00013
CADD FILE CCUA10_G1-G2-AB
FIELD BK. # N/A

DRAWING SP-2
SHEET 4 OF 15

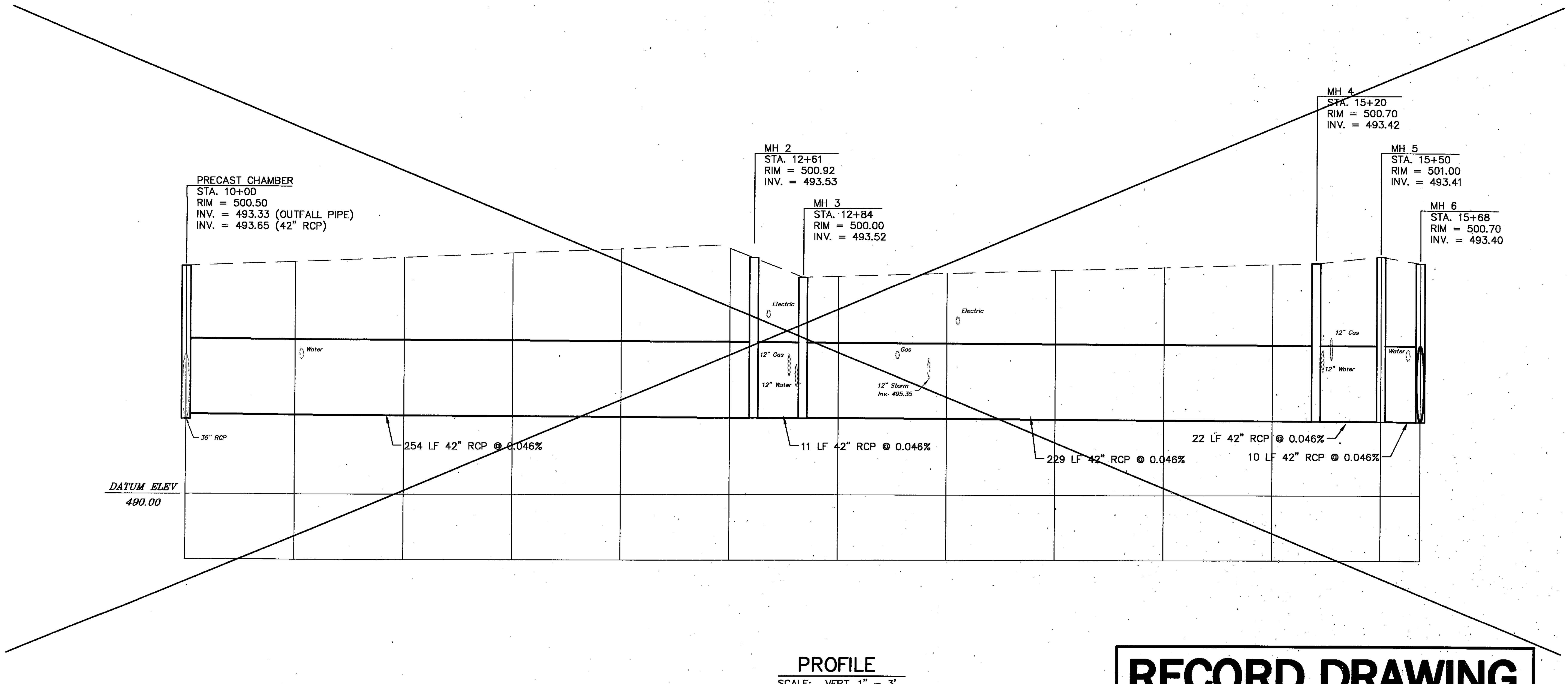
An Archaeologist must be present during all excavation activity at this location to identify, photograph, and document significant archaeological features in this location. This may require work stoppages. Accommodations must be made for the Archaeologist to access the excavations. The Contractor must contact the Owner and/or Engineer at least two (2) weeks prior to construction in this location so that necessary arrangements may be made with the Archaeologist. The Contractor may not begin construction in this area without written permission from the owner. Please refer to Section SC-27 & 28 of the project specifications for further information.

BENCH MARKS		
NO.	ELEV.	DESCRIPTION
1	500.00*	PK SET IN SIDEWALK NORTH WEST SIDE OF KINGS STREET OPPOSITE INTERSECTION WITH NEW JERSEY AVENUE.
2	500.01	PK SET IN CURB ON NORTH WEST SIDE OF KINGS STREET OPPOSITE HOUSE NO. 228 KINGS STREET.
3	501.26	PK SET IN CURB ON NORTH EAST SIDE OF KINGS STREET AT INTERSECTION WITH MARKET STREET.

*ELEVATION IS ASSUMED. ACTUAL ELEVATION IN THIS AREA BASED ON USGS MAPPING ARE BELOW ELEVATION 10.00.

PLAN

SCALE: 1" = 20'



PROFILE

SCALE: VERT. 1" = 3'
HORZ. 1" = 30'

RECORD DRAWING

CONSTRUCTION NOTES:

~~1. CONTRACTOR SHALL SUPPORT UTILITY POLES ALONG KING STREET, AS NECESSARY, DURING INSTALLATION OF 42 INCH RCP. SUPPORT EFFORT SHALL BE COORDINATED WITH THE UTILITY COMPANY AND COSTS FOR THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE 42 INCH PIPE.~~

~~2. CONTRACTOR SHALL REMOVE AND REPLACE SIGNS, LAMP POSTS, TREES, ETC. AS SHOWN OR WHERE NECESSARY. COSTS FOR THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE 42 INCH PIPE.~~

~~3. MANHOLES 2 AND 3 SHALL BE 7 FEET I.D. MANHOLES 4, 5 AND 6 SHALL BE 8. FEET I.D~~

4. CONTRACTOR SHALL CLEAN REGULATOR CHAMBERS ~~G03 AND~~ G04. CONTRACTOR SHALL ALSO CLEAN AND TELEVISE EXISTING OUTFALL SEWERS TO A POINT 10' BEYOND PROPOSED CHAMBER EXTENSION AND THE PROPOSED POINT OF CONNECTION OF NEW PIPE TO EXISTING PIPE DOWNSTREAM OF REGULATOR CHAMBER G04. CONTRACTOR SHALL USE CAUTION WHEN PERFORMING THIS WORK TO PREVENT DAMAGE TO EXISTING OUTFALL PIPE. COSTS FOR CLEANING REGULATOR CHAMBER SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLEANING AND TV INSPECTION OF SEWERS.

~~5. HOLE FOR CONNECTION OF 12" CIP TO 42" RCP SHALL BE NEATLY CORED AND SPACE AROUND 12" CIP SHALL BE SEALED WITH NON-SHRINK GROUT. COST FOR THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE 42" PIPE.~~

~~6. CONTRACTOR SHALL REMOVE AND REPLACE INLET IF NECESSARY FOR INSTALLATION OF 42" RCP AND MANHOLES 5 AND 6. COST SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE 42" PIPE AND MANHOLES.~~

~~7. CONTRACTOR SHALL PROVIDE A MINIMUM OF 72 HOURS NOTICE TO PSE&G PRIOR TO ANY EXCAVATION (TEST PITS AND PIPE CONSTRUCTION) ALONG THE 12" GAS MAIN. CONTRACTOR SHALL COORDINATE WITH PSE&G (DAVE SUTTER 856-573-2018) AND TAKE ALL REQUIRED PRECAUTIONS NECESSARY DURING INSTALLATION OF MANHOLES AND PIPE ADJACENT TO THE GAS MAIN.~~

~~8. UTILITY RELOCATIONS REQUIRED DUE TO THE PIPE AND CHAMBER INSTALLATION SHALL BE COORDINATED WITH THE RESPECTIVE UTILITY OWNER AND ALL COSTS FOR RELOCATION SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THE 42" PIPE AND MANHOLES.~~

~~9. CHAMBER TO BE SECURED TO EXISTING REGULATOR CHAMBER WITH S.S. PLATES OR ANGLES AND S.S. ANCHOR BOLTS. NEW CHAMBER TO INCLUDE CAMPBELL WATERTIGHT FRAME AND COVER, PATTERN 1739 OR EQUAL AND CONTRACTOR TO CONSTRUCT BENCH AND CHANNEL FOR SMOOTH TRANSITION OF FLOW INTO 42" PIPE.~~

CHANGE IN PLAN NO. 1 (THIS SHEET REPLACES SHEET 5 OF 15)

NO.	DATE	REVISIONS	BY	CHECKED
4	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM
3	7/10/09	REVISED PER NJDEP COMMENTS	BP	JJM
2	1/5/09	ELIMINATED 42" RCP AND 7'x6' CONCRETE CHAMBER	BP	JJM
1	12/13/06	REVISED SEWER LAYOUT TO SIDEWALK	EAE	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

SITE PLAN
NETTING CHAMBER G-NC03 & G-NC04
KING STREET / MARKET STREET

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

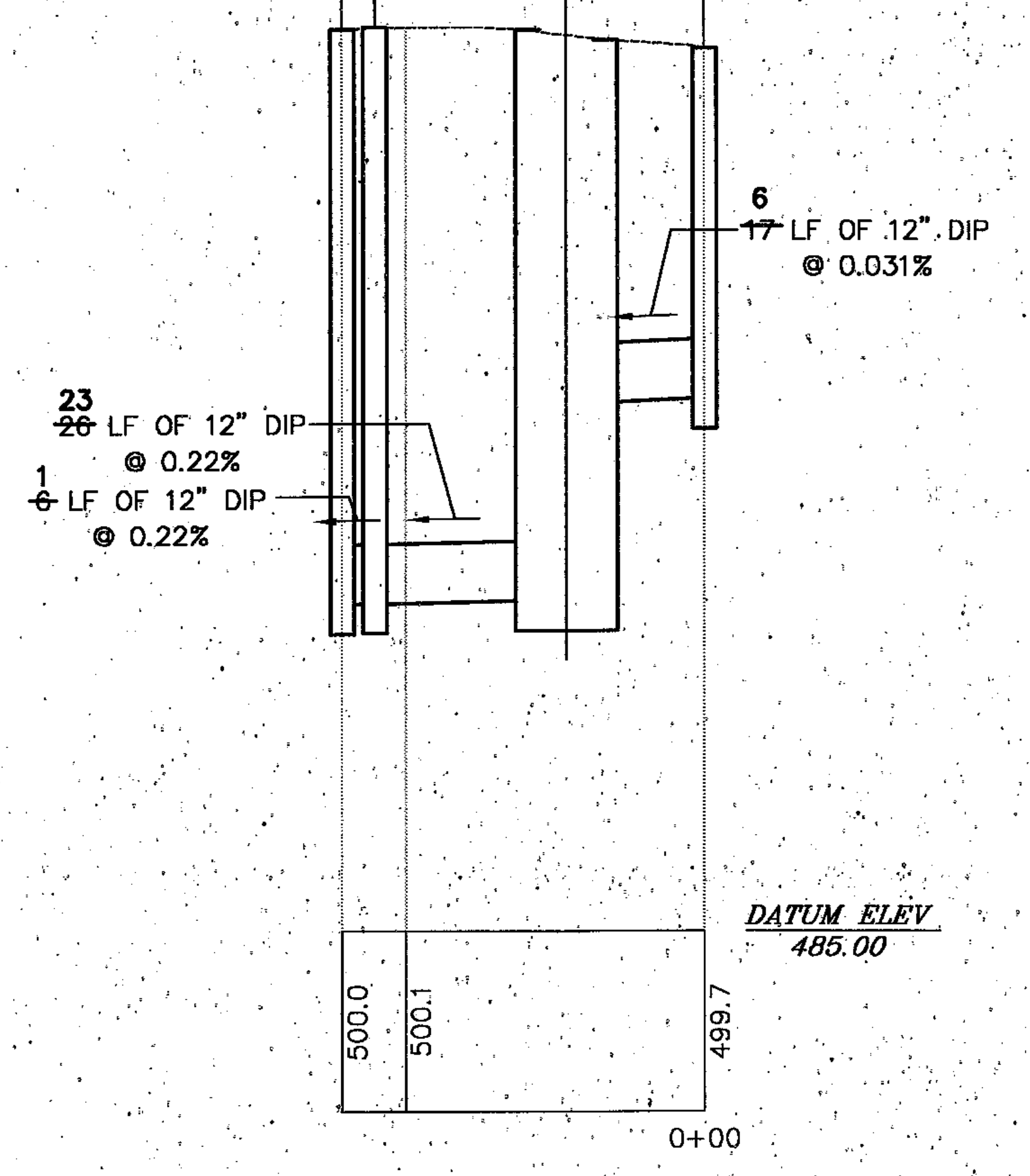
LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804
DATE

DESIGNED BY	DRAWN BY	CHECKED BY
AAV,EAE	MWC	JJM
PROJECT NO. CCUA.00013	CADD FILE CCUA11 G3-G4 A-AB	FIELD BK. # N/A

DRAWING SP-3

SHEET 5A OF 15

An Archaeologist must be present during all excavation activity at this location to identify, photograph, and document significant archaeological features in this location. This may require work stoppages. Accommodations must be made for the Archaeologist to access the excavations. The Contractor must contact the Owner and/or Engineer at least two (2) weeks prior to construction in this location so that necessary arrangements may be made with the Archaeologist. The Contractor may not begin construction in this area without written permission from the owner. Please refer to Section SC-27 & 28 of the project specifications for further information.



SEWER PROFILE

SCALE:
HORIZONTAL: 1" = 30'
VERTICAL: 1" = 3'

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CLEAN AND TELEVISE EXISTING OUTFALL SEWER FROM REGULATOR CHAMBER TO A POINT 10' BEYOND PROPOSED POINT OF CONNECTION OF NEW PIPE TO EXISTING PIPE. CONTRACTOR SHALL USE CAUTION WHEN PERFORMING THIS WORK TO PREVENT DAMAGE OF EXISTING OUTFALL PIPE.

2. UTILITY RELOCATIONS REQUIRED DUE TO THE PIPE AND CHAMBER INSTALLATION SHALL BE CONSTRUCTED IN ACCORDANCE W/OWNER'S REQUIREMENTS AND COORDINATED WITH THE RESPECTIVE UTILITY OWNER. CONTRACTOR SHALL SUBMIT UTILITY RELOCATION COST ESTIMATE FOR REVIEW PRIOR TO PROCEEDING WITH THE RELOCATION WORK.

3. COST OF REMOVAL OF EXISTING REGULATOR CHAMBER G03 AND ADJACENT MANHOLE SHALL BE INCLUDED IN THE COST OF NETTING CHAMBER G-NC03.

4. CONTRACTOR IS ADVISED CHAMBERS WILL BE INSTALLED IN CLOSE PROXIMITY TO EXISTING 30" INTERCEPTOR. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT THE INTERCEPTOR FROM DAMAGE DURING CONSTRUCTION. AREA BETWEEN CHAMBERS SHALL BE BACKFILLED WITH THOROUGHLY COMPACTED 3/4" CRUSHED STONE UP TO SPRINGLINE OF NEW 36" PIPE.

5. CONTRACTOR TO MODIFY BENCH AND CHANNEL IN EXISTING MANHOLE TO REDIRECT FLOW TO NEW MANHOLE. CONNECT EXISTING MANHOLE TO NEW MANHOLE WITH 1 LF OF 12" DIP. CONTRACTOR TO RECONNECT 12" CIP FROM INLET TO EAST SIDE OF NEW MANHOLE AT INVERT 495.00 ±.

BENCH MARKS		
NO.	ELEV.	DESCRIPTION
1	500.00*	PK SET IN SIDEWALK NORTH WEST SIDE OF KINGS STREET OPPOSITE INTERSECTION WITH NEW JERSEY AVENUE.
2	500.01	PK SET IN CURB ON NORTH WEST SIDE OF KINGS STREET OPPOSITE HOUSE NO. 228 KINGS STREET.

*ELEVATION IS ASSUMED. ACTUAL ELEVATION IN THIS AREA BASED ON USGS MAPPING ARE BELOW ELEVATION 10.00.

RECORD DRAWING

GRAPHIC SCALE
10 0 5 10 20
(IN FEET)
1 inch = 10 ft.

NO.	DATE	REVISIONS	BY	CHECKED
1	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES
CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

SITE PLAN
REGULATOR CHAMBER G03 & NETTING CHAMBER G-NC03

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804
DATE

DESIGNED BY: BP
DRAWN BY:
CHECKED BY: JJM
PROJECT NO.: CCUA.00013
CADD FILE: CCUA11 G3-G4 B-AB
FIELD BK. #: N/A

DRAWING: SP-3A
SHEET: 5B OF 15

An Archaeologist must be present during all excavation activity at G-NCO5 to identify, photograph, and document significant archaeological features in this location. This may require work stoppages. Accommodations must be made for the Archaeologist to access the excavations. The Contractor must contact the Owner and/ or Engineer at least two (2) weeks prior to construction in this location so that necessary arrangements may be made with the Archaeologist. The Contractor may not begin construction in this area without written permission from the owner. Please refer to Section SC-27 & 28 of the project specifications for further information.

BENCH MARKS		
NO.	ELEV.	DESCRIPTION
1	500.00*	PK SET IN SOUTHEAST CORNER OF INTERSECTION OF ELLIS STREET WITH HUDSON STREET. APPROX. 7.63' FROM CENTER OF CURB RADIUS
2	500.82	PK SET IN NORTHEAST CORNER OF INTERSECTION OF ELLIS STREET WITH MERCER STREET.
3	501.07	PK SET WITHIN BLOCK 26, LOT 1 APPROXIMATELY 135.60' NORTHWESTWARDLY FROM BENCHMARK #1.
4	502.49	PK SET WITHIN BLOCK 26, LOT 1 APPROXIMATELY 111.15' WEST FROM BENCHMARK #1.

*ELEVATIONS ARE ASSUMED

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CLEAN REGULATOR CHAMBERS AND CLEAN AND TELEVISE EXISTING OUTFALL SEWERS FROM REGULATOR CHAMBERS TO A POINT 10' BEYOND PROPOSED POINT OF CONNECTION OF NEW PIPE TO EXISTING PIPE. CONTRACTOR SHALL USE CAUTION WHEN PERFORMING THIS WORK TO PREVENT DAMAGE OF EXISTING OUTFALL PIPE. COSTS FOR CLEANING REGULATOR CHAMBER SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLEANING AND TV INSPECTION OF SEWERS.

2. PAVEMENT REPAIR AND NEW PAVEMENT FOR SITES G-NC05 AND G-NC06 SHALL BE PER DETAIL (SEE SHEET CD-2).

3. CONTRACTOR IS ADVISED THAT THESE SITES ARE LOCATED ON PROPERTY WITHIN THE WELSBACH/GENERAL GAS MANTLE SUPERFUND SITE, AN AREA WITH ELEVATED RADIOLOGICAL CONTAMINATION. THE ENVIRONMENTAL PROTECTION AGENCY (EPA) IS PERFORMING INVESTIGATION TO CONFIRM EXTENT. AN EPA CONTRACTOR WILL DEWATER THE SITES AND EXCAVATE AND REMOVE CONTAMINATED SOILS TO ALLOW INSTALLATION OF THE PIPING AND CHAMBERS.

4. CONTRACTOR SHALL INSTALL CHAMBERS G-NC05 & G-NC06 AFTER ALL OTHER CHAMBERS HAVE BEEN COMPLETED TO ALLOW TIME FOR EPA TO COMPLETE NECESSARY INVESTIGATIONS AND REMEDIATION DESIGN. CONTRACTOR SHALL MAKE NO CLAIM FOR DELAYS RESULTING FROM EPA WORK OR FOR LOST REVENUE OR PROFIT SHOULD THESE CHAMBERS BE ELIMINATED FROM THE PROJECT DUE TO SITE CONDITIONS.

RECORD DRAWING

GRAPHIC SCALE
20 0 10 20 40
(IN FEET)
1 inch = 20 ft.

NO.	DATE	REVISIONS	BY	CHECKED
1	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM
1	8/2/07	ELIMINATE FENCE AND ACCESS DRIVES	BR	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

SITE PLAN

NETTING CHAMBERS G-NC05 & G-NC06
ELLIS ST./HUDSON ST. & ELLIS ST./MERCER ST.

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

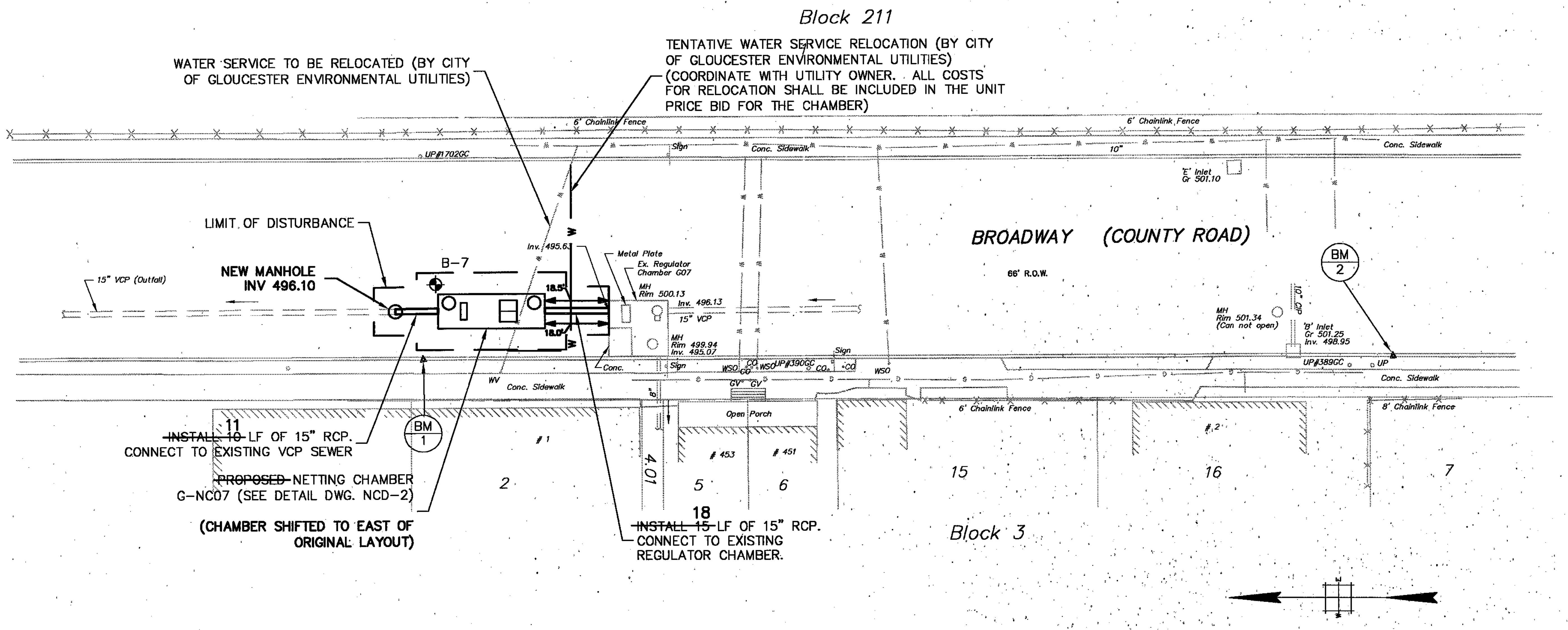
KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

DATE

LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

DESIGNED BY EAE
DRAWN BY MWC
CHECKED BY JJM
PROJECT NO. CCUA.00013
CADD FILE CCUA10-ELLIS-SP-AB
FIELD BK. # N/A

DRAWING SP-4
SHEET 6 OF 15



WATER SERVICE TO BE RELOCATED (BY CITY OF GLOUCESTER ENVIRONMENTAL UTILITIES)

TENTATIVE WATER SERVICE RELOCATION (BY CITY OF GLOUCESTER ENVIRONMENTAL UTILITIES) (COORDINATE WITH UTILITY OWNER. ALL COSTS FOR RELOCATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE CHAMBER)

LIMIT OF DISTURBANCE

NEW MANHOLE INV 496.10

~~INSTALL 10~~ 11 LF OF 15" RCP. CONNECT TO EXISTING VCP SEWER

~~PROPOSED~~ NETTING CHAMBER G-NC07 (SEE DETAIL DWG. NCD-2)

(CHAMBER SHIFTED TO EAST OF ORIGINAL LAYOUT)

~~INSTALL 15~~ 18 LF OF 15" RCP. CONNECT TO EXISTING REGULATOR CHAMBER.

BENCH MARKS		
NO.	ELEV.	DESCRIPTION
1	500.00*	PK SET ALONG CURBLINE ON THE WESTERLY SIDE OF BROADWAY.
2	502.13	PK SET ALONG CURBLINE ON THE WESTERLY SIDE OF BROADWAY.

*ELEVATIONS ARE ASSUMED

RECORD DRAWING

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL CLEAN REGULATOR CHAMBER AND CLEAN AND TELEVISE EXISTING OUTFALL SEWER FROM REGULATOR CHAMBER TO A POINT 10' BEYOND PROPOSED POINT OF CONNECTION OF NEW PIPE TO EXISTING PIPE. CONTRACTOR SHALL USE CAUTION WHEN PERFORMING THIS WORK TO PREVENT DAMAGE OF EXISTING OUTFALL PIPE. COSTS FOR CLEANING REGULATOR CHAMBER SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLEANING AND TV INSPECTION OF SEWERS.

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

NO.	DATE	REVISIONS	BY	CHECKED
1	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

SITE PLAN
NETTING CHAMBER G-NC07
BROADWAY

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

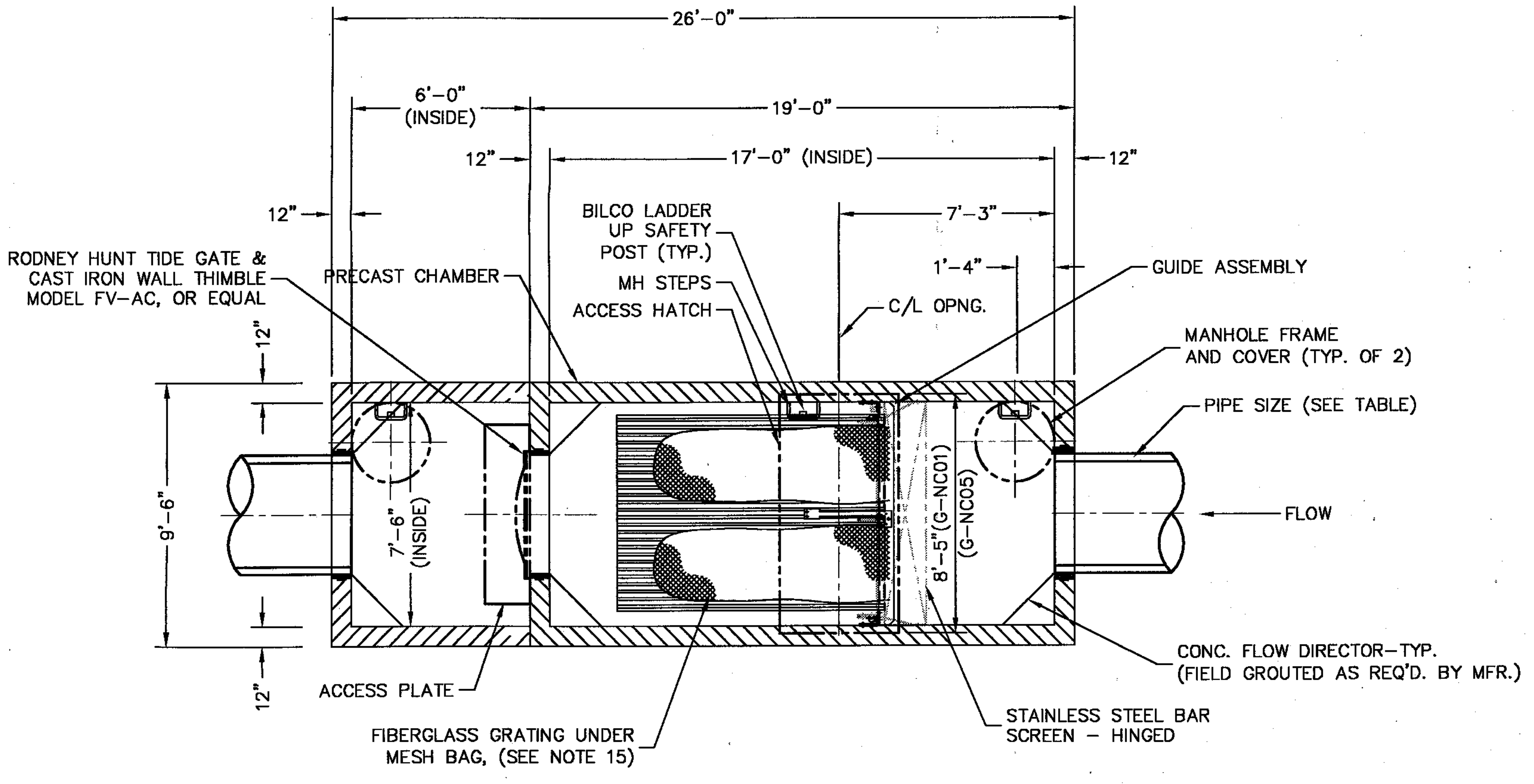
DATE

LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

DESIGNED BY	DRAWN BY	CHECKED BY
EAE	MWC	JJM
PROJECT NO. CCUA.00013	CADD FILE CCUA10-BRDWY-SP-AB	FIELD BK. # N/A

DRAWING SP-5

SHEET 7 OF 15



PLAN SECTION
NOT TO SCALE

NOTES AND SPECIFICATIONS:

1. THE NETTING FACILITY SHALL BE CONSTRUCTED SUCH THAT ALL BAR SPACING, GRATING, HINGED JOINTS AND CONNECTION POINTS OF FRAME WORK UPSTREAM OF THE NET OPENING SHALL NOT EXCEED 1/2 INCH. NO OPENINGS SHALL BE ALLOWED WHICH PROVIDE A MEANS OF BYPASSING OR SHORT CIRCUITING MATERIAL GREATER THAN 1/2 INCH.

2. GUIDE ASSEMBLY, LADDER ASSEMBLY, BAR SCREENS, STATIC SCREENS AND ALL ASSOCIATED HARDWARE TO BE TYPE 316 STAINLESS STEEL. HARDWARE TO BE FASTENED TO CONCRETE WITH "HILTI" KWIK BOLT ANCHORS OR EQUAL, EXCEPT AS NOTED, PER MANUFACTURER'S DIRECTIONS.

3. EXTERIOR OF CHAMBER TO BE COATED WITH 2 COATS OF BITUMASTIC, 8 MILS/COAT OR EQUAL.

4. INTERIOR OF CHAMBER TO BE COATED WITH "Hydrozo" ENVIROSEAL 20, OR EQUAL.

5. ACTUAL ELEVATIONS AND DIMENSIONS TO BE FIELD VERIFIED BY CONTRACTOR PRIOR TO ORDERING NETTING CHAMBER SYSTEM.

6. GENERAL CONTRACTOR TO FIELD SEAL SPECIFIED PIPE TO PRECAST CHAMBER.

7. PRECAST CONCRETE CHAMBER: CONFORM WITH TECHNICAL SPECIFICATIONS AND DRAWING "GPE".

8. "CONSEAL" #CS102 BUTYL RUBBER GASKET MATERIAL @ JOINTS OF PRECAST CHAMBER SECTIONS, AND TOP SLAB.

9. SEE DRAWING "GPE" FOR ADDITIONAL CHAMBER DETAILS.

10. LIFTING BRIDLES SHALL BE SECURED TO TOP OF CHAMBER WALL FOR ACCESS FROM SURFACE.

11. MANHOLE FRAME & COVER: "CAMPBELL FOUNDRY" PATTERN NO. 1739, WATERTIGHT 32" DIA. OR EQUAL.

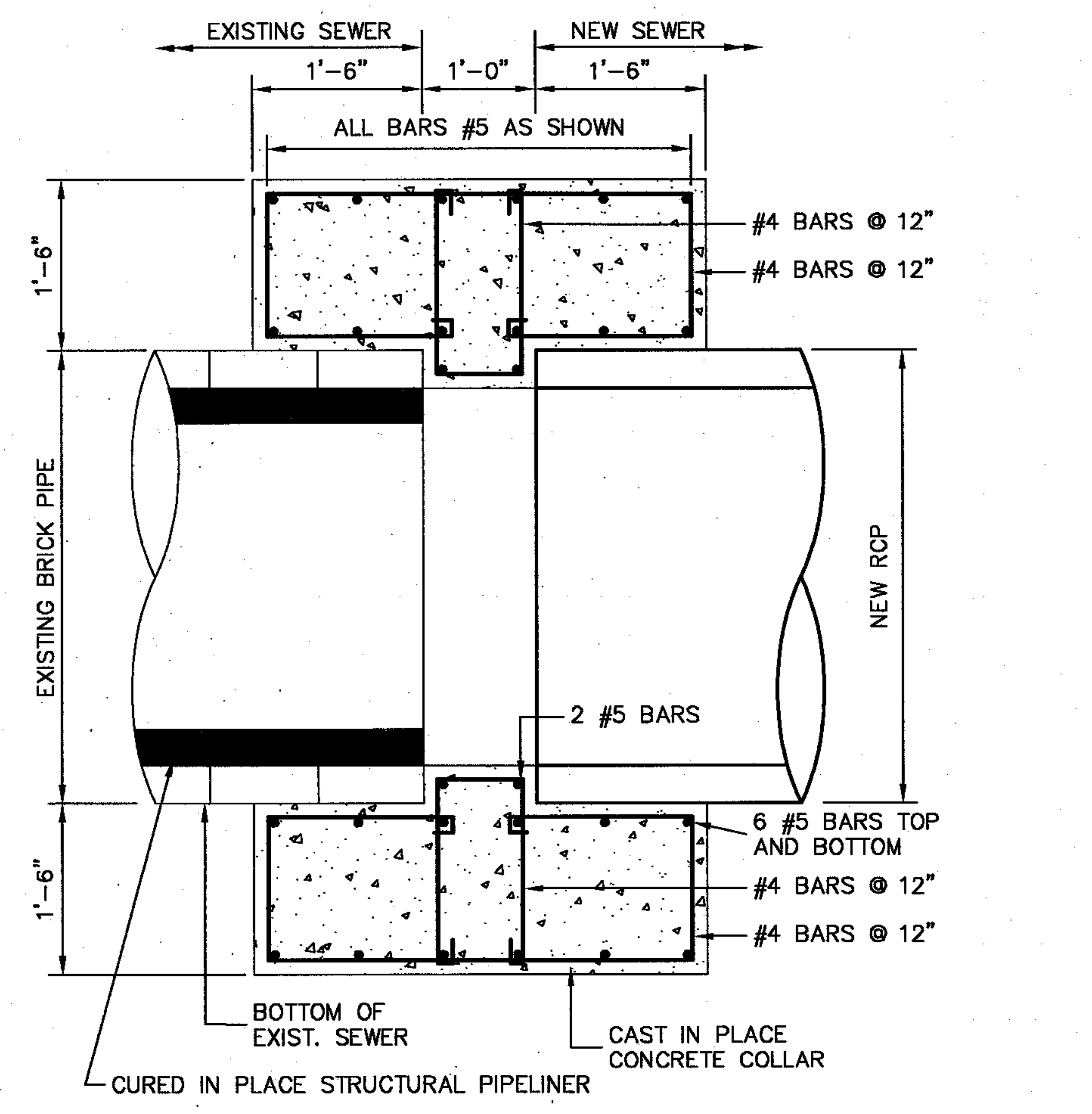
12. ACCESS HATCH ASSEMBLY: "CAMPBELL FOUNDRY" PATTERN NO. 3009-48, OR EQUAL.

13. MANHOLE STEP: POLYPROPYLENE, OR EQUAL (SEE CONSTRUCTION DETAILS).

14. TOP OF CONCRETE CHAMBER SHALL MATCH EXISTING GRADE.

15. DISPOSABLE MESH BAGS SHALL HAVE 30"x30" FRAMES AND SHALL BE APPROXIMATELY 8' LONG. FIBERGLASS GRATING SHALL BE 42" WIDE PER BAG AND 8' LONG.

16. STAINLESS STEEL BAR SCREEN HINGES SHALL BE PINNED TO SECURE AGAINST OPENING.



NOTES:

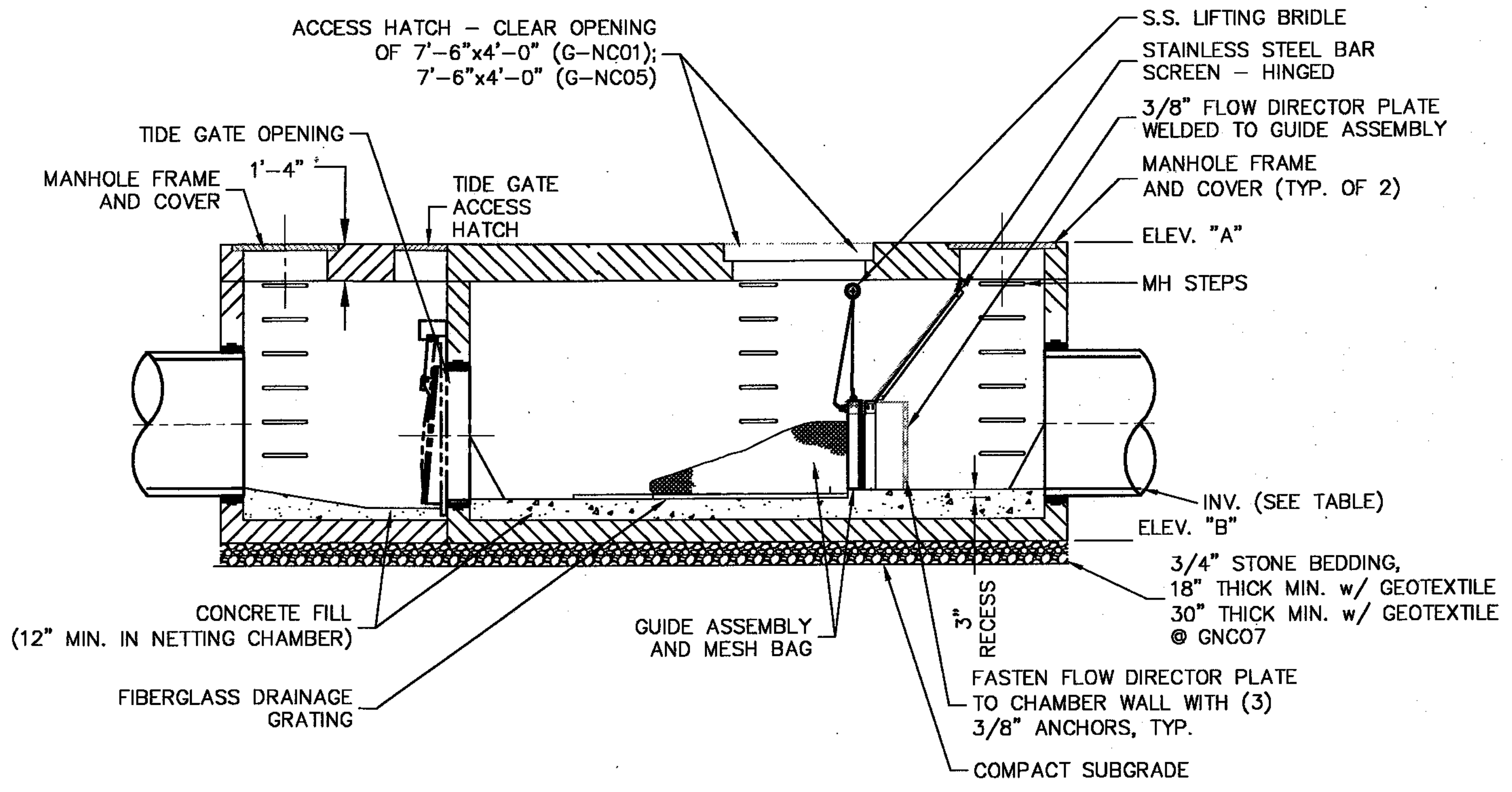
1. LINE PIPE USING CURED IN PLACE LINING SYSTEM IN AREA OF PROPOSED CONNECTION. LENGTH OF LINER SHALL BE 5 FEET. MINIMUM THICKNESS SHALL BE 12mm OR AS RECOMMENDED BY MANUFACTURER BASED ON DEPTH AND PIPE CONDITION.

2. CUT EXISTING PIPE AT LOCATION INDICATED ON PLANS, LEAVING AT LEAST A THREE FOOT LINED SECTION DOWNSTREAM OF THE CONNECTION. THE EDGE OF THE LINER SHALL BE FILED DOWN TO PROVIDE SMOOTH TRANSITION INTO DOWNSTREAM PIPE.

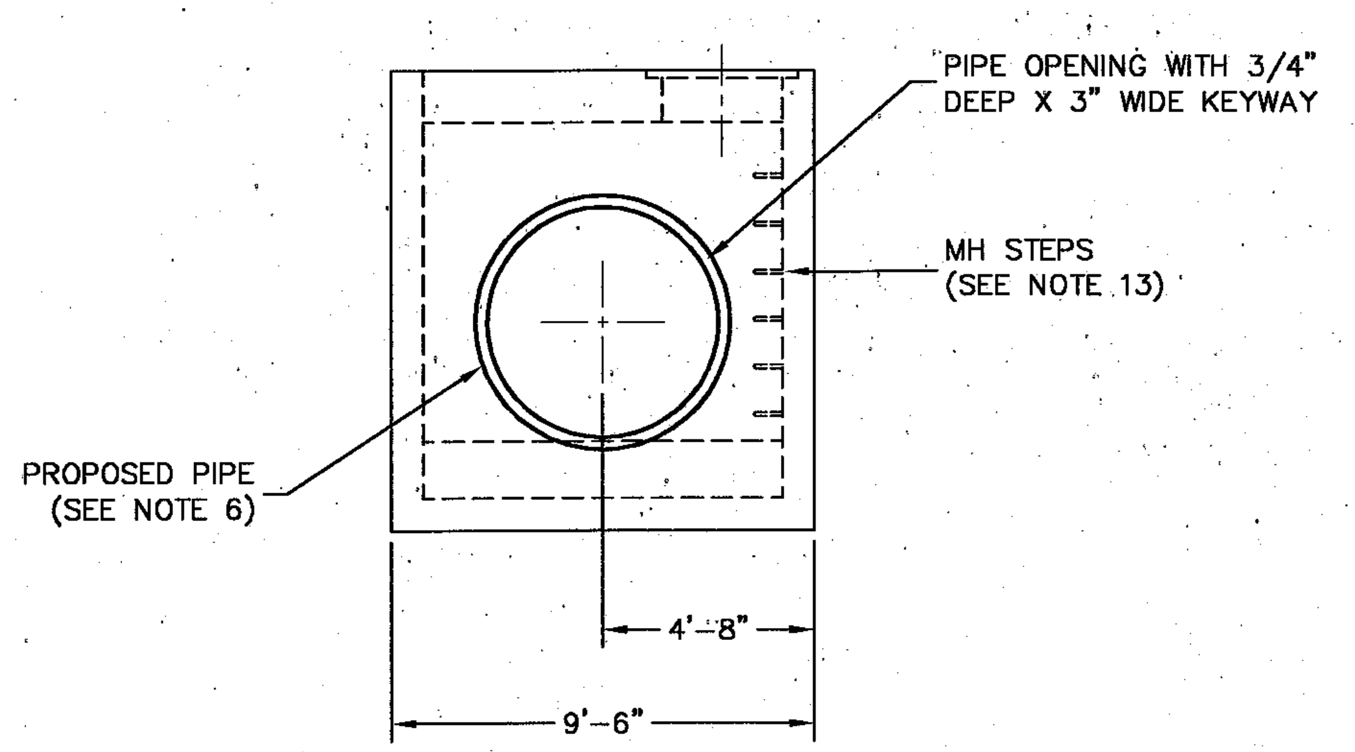
3. CONTRACTOR IS ADVISED EXISTING PIPE MAY BE DETERIORATED AND/OR OUT OF ROUND. CONTRACTOR SHALL SMOOTHLY TRANSITION CONCRETE COLLAR FROM EXISTING PIPE TO NEW PIPE MAINTAINING A MINIMUM COLLAR THICKNESS OF 18".

4. ALL COSTS FOR CONCRETE COLLAR, LINER, CONNECTION TO EXISTING CHAMBER AND EXISTING PIPING SHALL BE INCLUDED IN UNIT PRICE BID FOR VARIOUS PIPE ITEMS.

CONCRETE COLLAR DETAIL (TYPICAL FOR ALL CHAMBERS EXCEPT G-NC07)
NOT TO SCALE



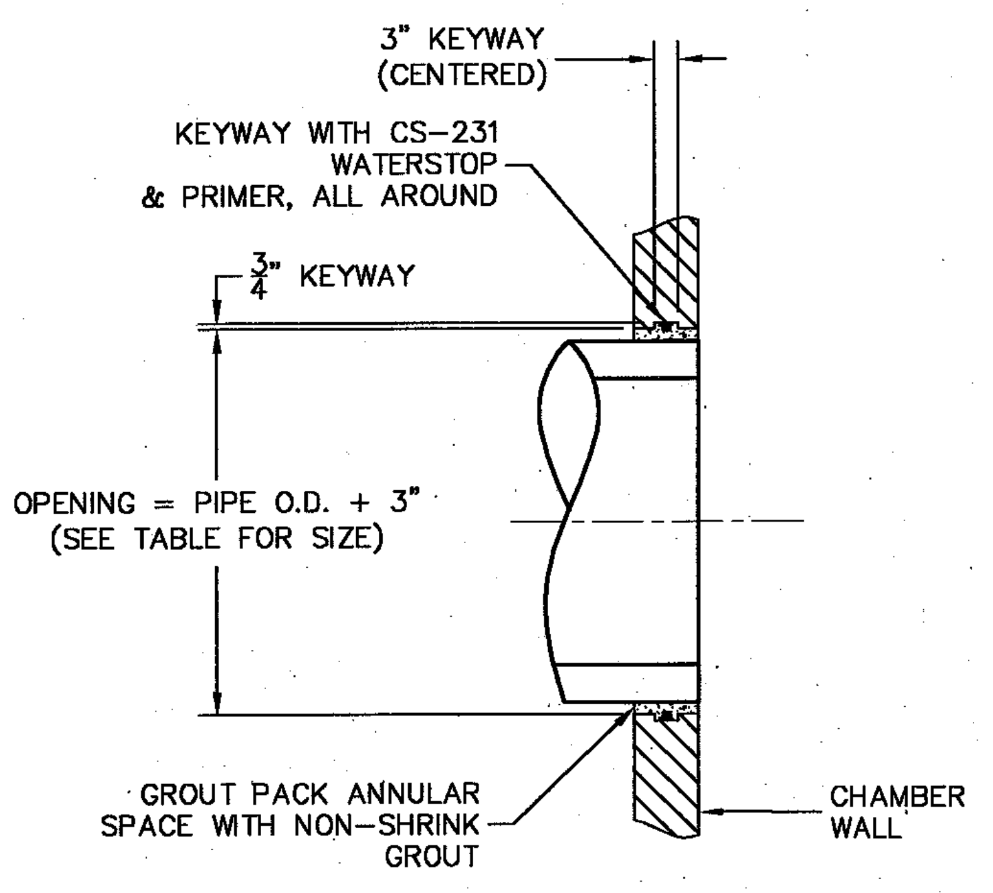
ELEVATION SECTION
NOT TO SCALE



TYPICAL PARTIAL END VIEW
NOT TO SCALE

RECORD DRAWING

CHAMBER	OUTFALL PIPE SIZE AND TYPE	TOP OF CHAMBER "A"	BOTTOM OF CHAMBER "B"	INLET INV.	OUTLET INV.	TIDE GATE OPENING INV.	TIDE GATE CHAMBER ELEV.	TIDE GATE SIZE	ACCESS PLATE SIZE
G-NC01	48" BRICK	~~499.90~~ 500.36	~~490.75~~ 490.93	~~493.00~~ 492.74	~~493.00~~ 492.74	~~492.75~~ 492.62	492.10	48"	24"x72"
G-NC05	34"x40" BRICK	~~500.00~~ 502.02-502.14 (VARIES)	~~490.25~~ 490.28-490.40 (VARIES)	492.50	~~492.50~~ 492.44	~~492.25~~ 492.36	491.60	36"	24"x60"



PIPE CONN. DETAIL (INLET & OUTLET) (TYPICAL FOR ALL CHAMBERS)
NOT TO SCALE

NO.	DATE	REVISIONS	BY	CHECKED
2	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM
1	8/2/07	REVISE G-NC05 HATCH	BR	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

NETTING CHAMBER DETAILS G-NC01 & G-NC05

T&M
ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

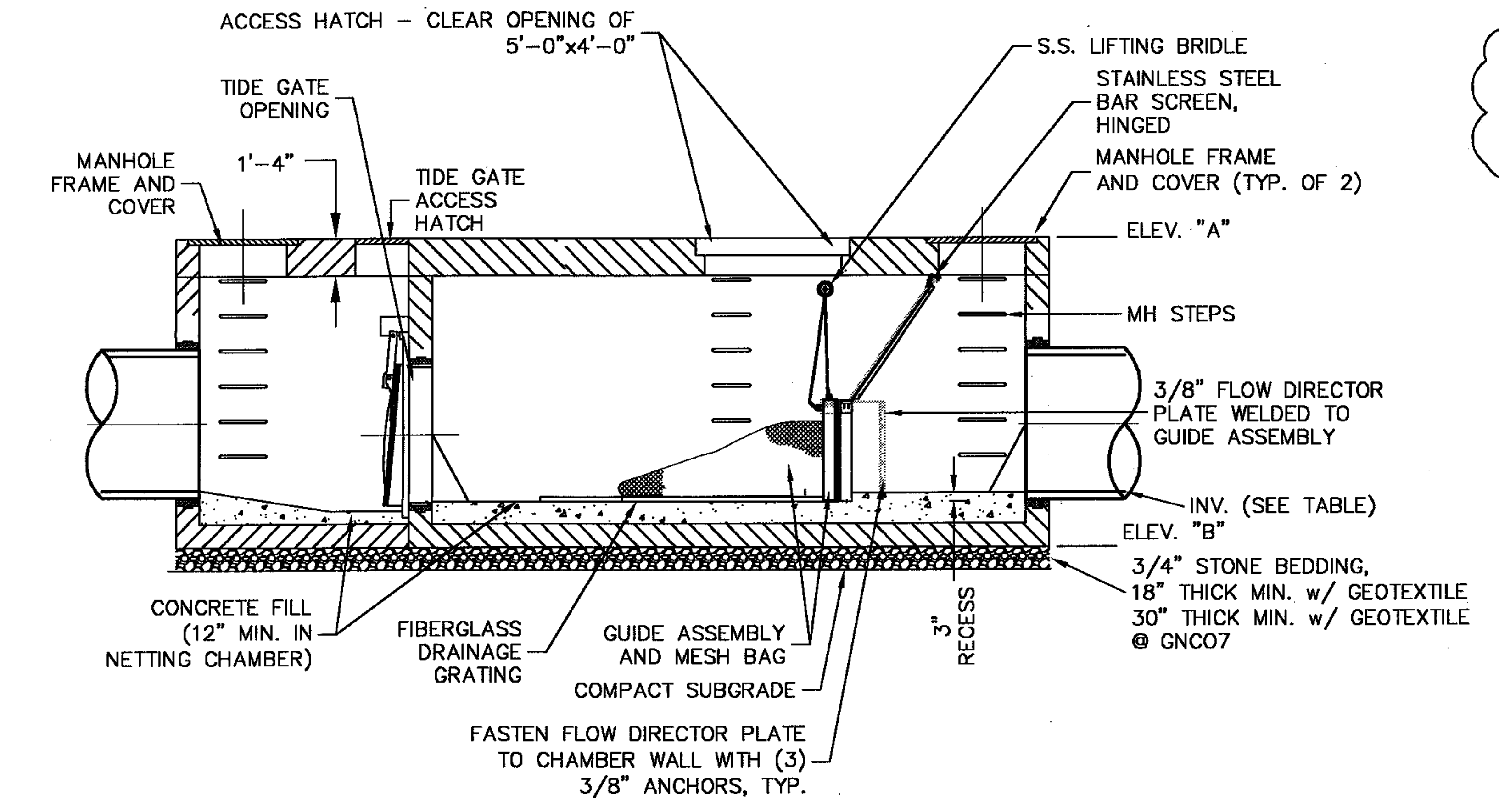
KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

DATE

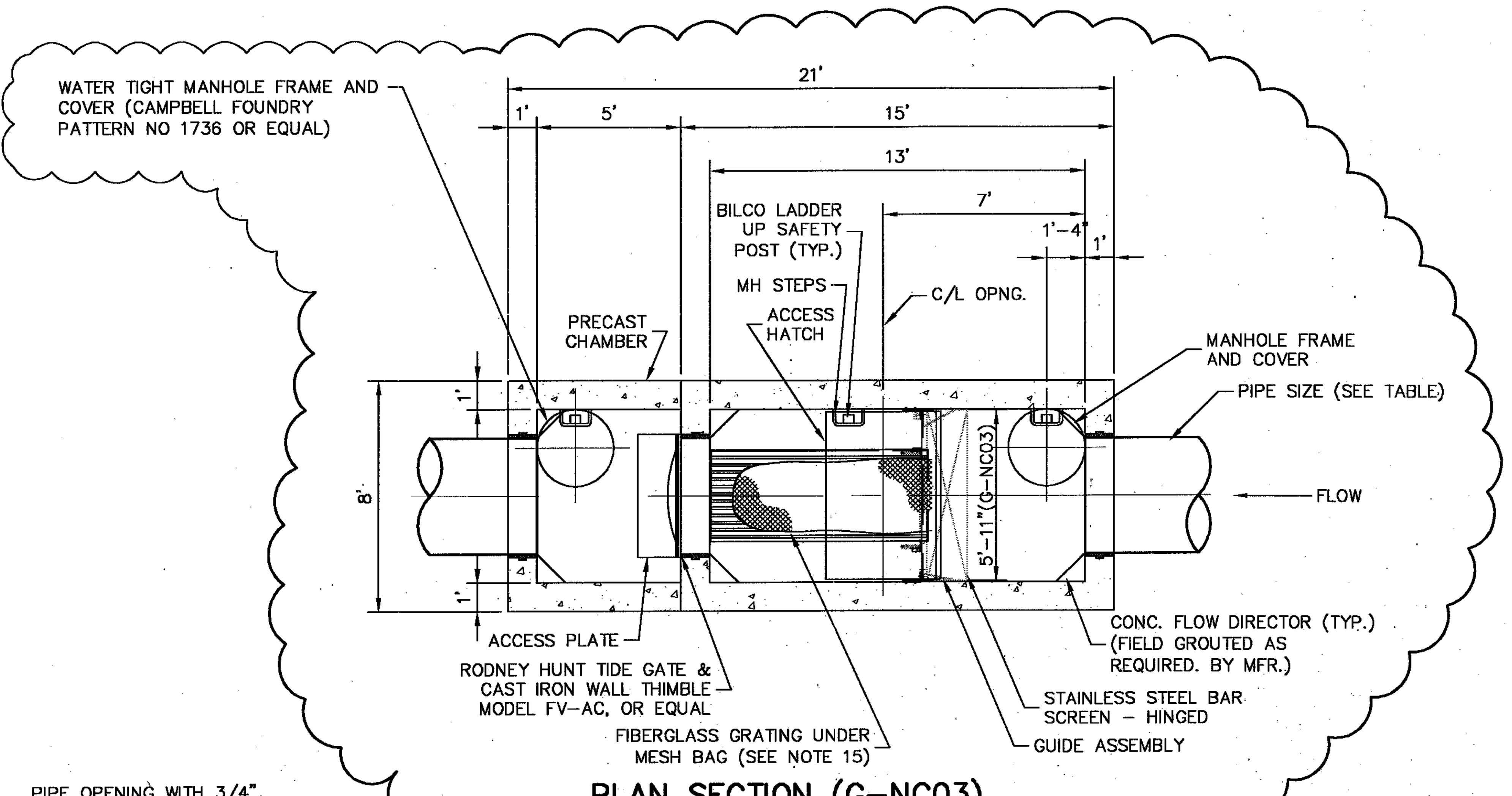
LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

DESIGNED BY AAV/EAE
DRAWN BY MWC
CHECKED BY JJM
PROJECT NO. CCUA.00013
CADD FILE CCUA10-NCD1-AB
FIELD BK. # N/A

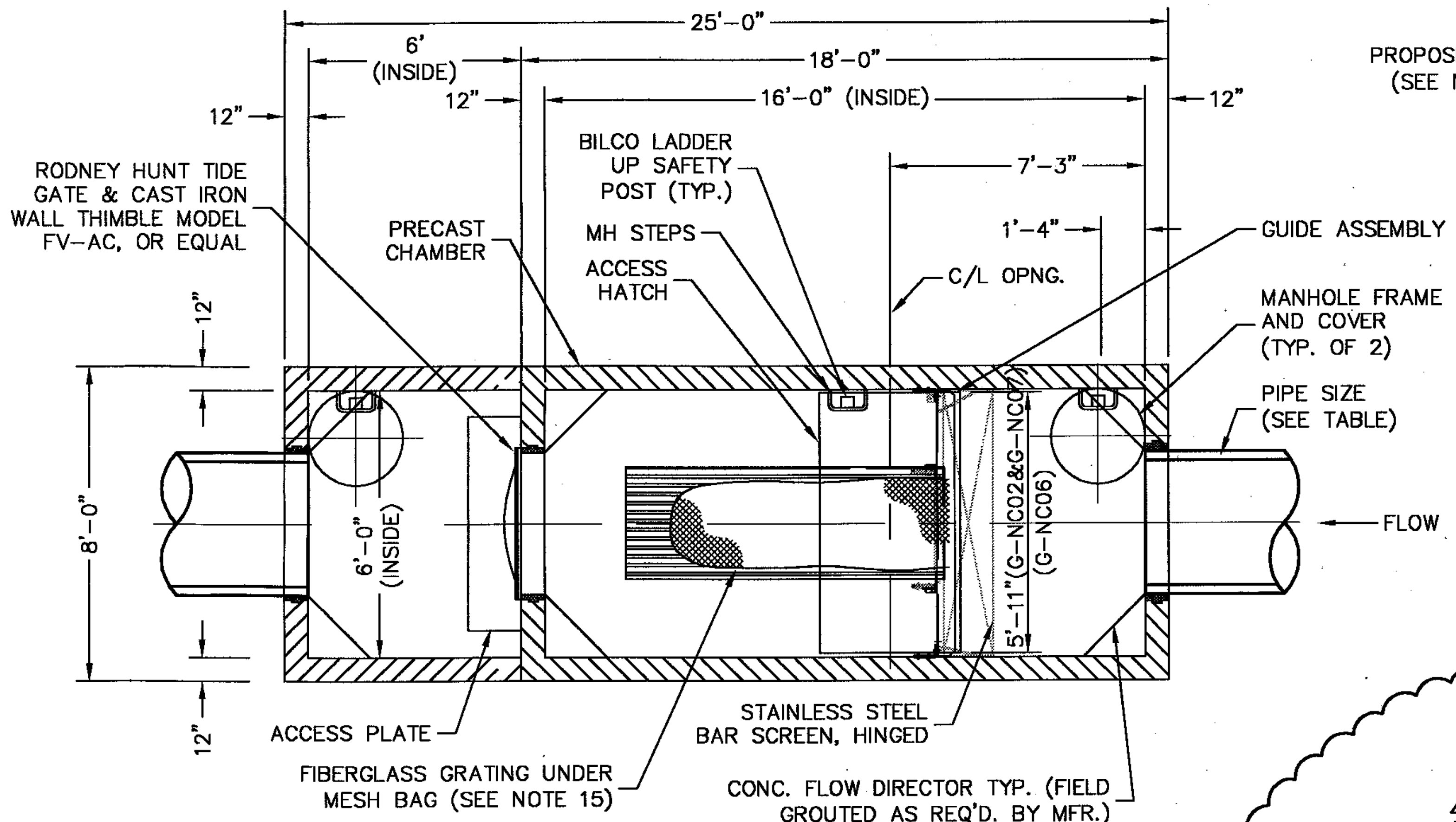
DRAWING NCD-1
SHEET 8 OF 15



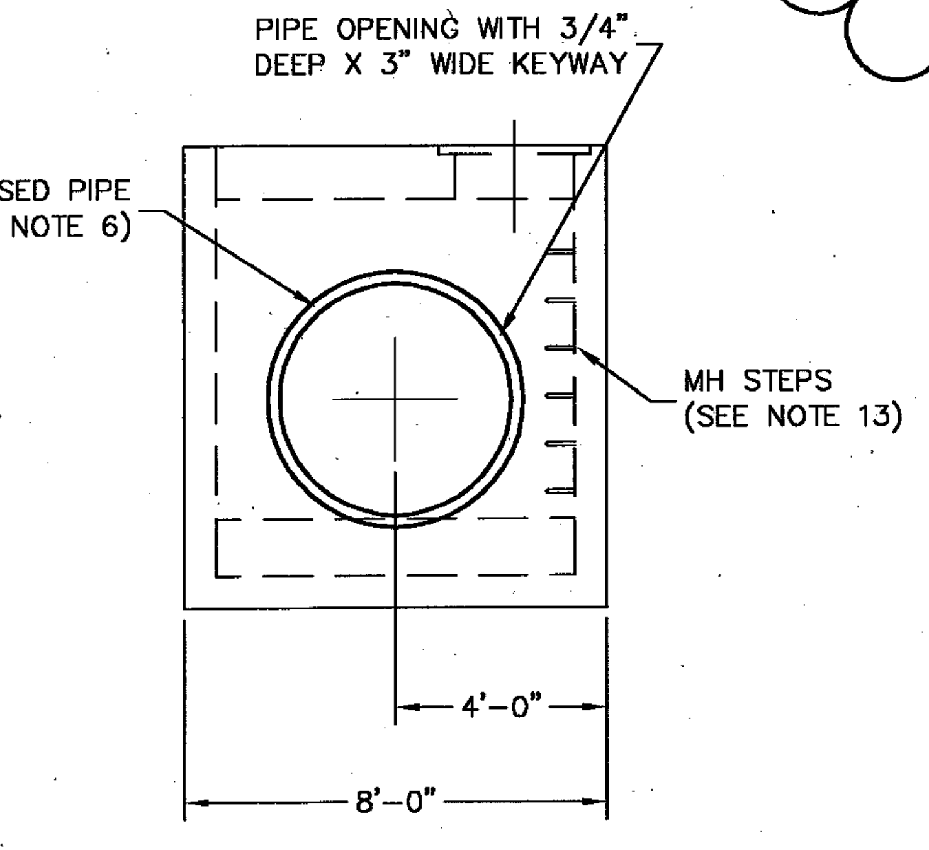
ELEVATION SECTION
NOT TO SCALE



PLAN SECTION (G-NC03)
NOT TO SCALE



PLAN SECTION
NOT TO SCALE



TYPICAL PARTIAL END VIEW
NOT TO SCALE

NOTES AND SPECIFICATIONS:

1. THE NETTING FACILITY SHALL BE CONSTRUCTED SUCH THAT ALL BAR SPACING, GRATING, HINGED JOINTS AND CONNECTION POINTS OF FRAME WORK UPSTREAM OF THE NET OPENING SHALL NOT EXCEED 1/2 INCH. NO OPENINGS OR SPACES AROUND BARS SHALL BE ALLOWED WHICH PROVIDE A MEANS OF BYPASSING OR SHORT CIRCUITING MATERIAL GREATER THAN 1/2 INCH.

2. GUIDE ASSEMBLY, LADDER ASSEMBLY, BAR SCREENS, STATIC SCREENS AND ALL ASSOCIATED HARDWARE TO BE TYPE 316 STAINLESS STEEL. HARDWARE TO BE FASTENED TO CONCRETE WITH "HILTI" KWIK BOLT ANCHORS OR EQUAL, EXCEPT AS NOTED, PER MANUFACTURER'S DIRECTIONS.

3. EXTERIOR OF CHAMBER TO BE COATED WITH 2 COATS OF BITUMASTIC, 8 MILS/COAT OR EQUAL.

4. INTERIOR OF CHAMBER TO BE COATED WITH "Hydrozo" ENVIROSEAL 20, OR EQUAL.

5. ACTUAL ELEVATIONS AND DIMENSIONS TO BE FIELD VERIFIED BY CONTRACTOR PRIOR TO ORDERING NETTING CHAMBER SYSTEM.

6. GENERAL CONTRACTOR TO FIELD SEAL SPECIFIED PIPE TO PRECAST CHAMBER.

7. PRECAST CONCRETE CHAMBER: CONFORM WITH TECHNICAL SPECIFICATIONS AND DRAWING "GPE".

8. "CONSEAL" #CS102 BUTYL RUBBER GASKET MATERIAL @ JOINTS OF PRECAST CHAMBER SECTIONS, AND TOP SLAB.

9. SEE DRAWING "GPE" FOR ADDITIONAL CHAMBER DETAILS.

10. LIFTING BRIDLES SHALL BE SECURED TO TOP OF CHAMBER WALL FOR ACCESS FROM SURFACE.

11. MANHOLE FRAME & COVER: "CAMPBELL FOUNDRY" PATTERN NO. 1739, WATERTIGHT 32" DIA. OR EQUAL, UNLESS OTHERWISE NOTED.

12. ACCESS HATCH ASSEMBLY: "CAMPBELL FOUNDRY" PATTERN NO. 3009-48, OR EQUAL.

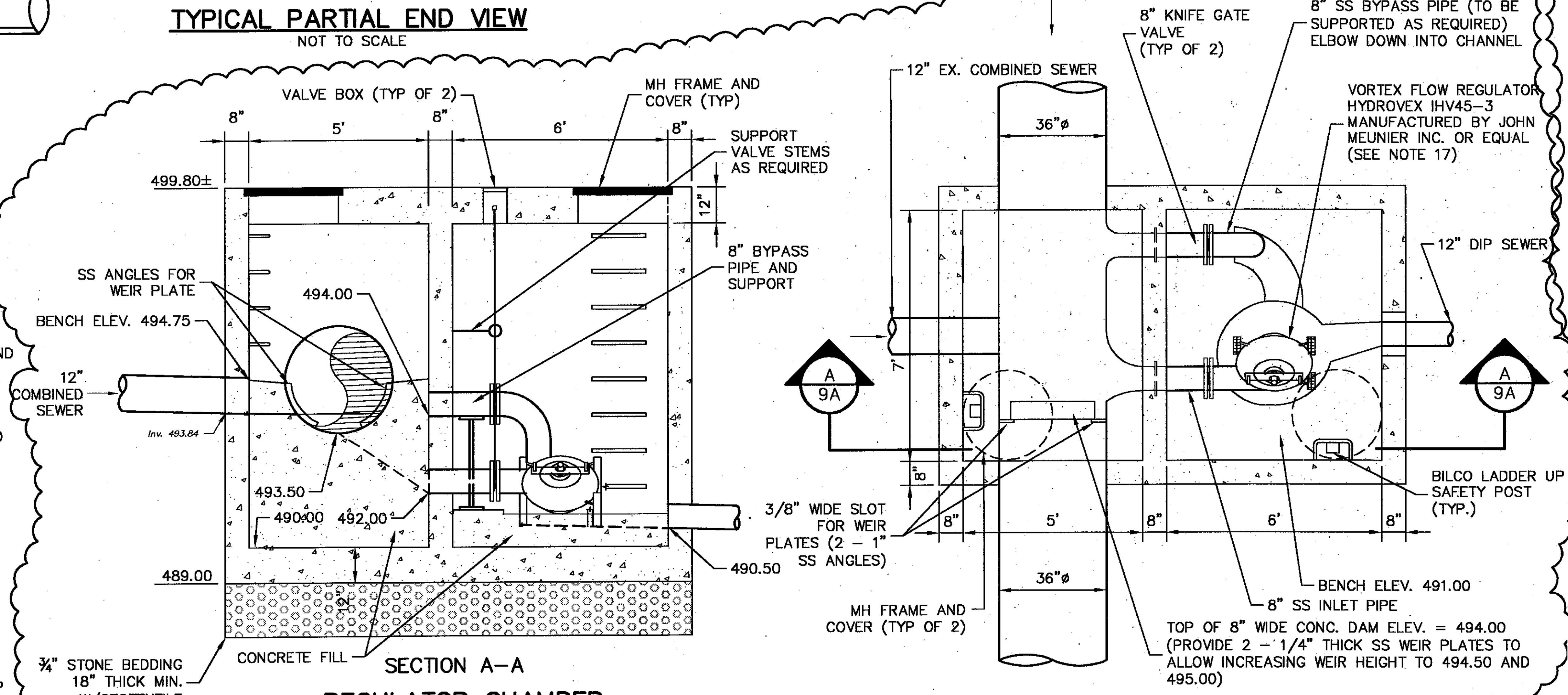
13. MANHOLE STEP: POLYPROPYLENE, OR EQUAL (SEE CONSTRUCTION DETAILS).

14. TOP OF CONCRETE CHAMBER SHALL MATCH EXISTING GRADE.

15. DISPOSABLE MESH BAGS SHALL HAVE 30"x30" FRAMES AND SHALL BE APPROXIMATELY 8' LONG. FIBERGLASS GRATING SHALL BE 42" WIDE PER BAG AND 8' LONG.

16. STAINLESS STEEL BAR SCREEN HINGES SHALL BE PINNED TO SECURE AGAINST OPENING. NO FLOW SHALL BYPASS SCREEN AT ANY TIME.

17. VORTEX FLOW REGULATOR TO BE SUPPORTED ON STAINLESS STEEL CHANNEL SUPPORTS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. ALL HARDWARE AND ANCHOR BOLTS TO BE STAINLESS STEEL.



SECTION A-A

PLAN

REGULATOR CHAMBER
NOT TO SCALE

CHAMBER	OUTFALL PIPE SIZE AND TYPE	TOP OF CHAMBER "A"	BOTTOM OF CHAMBER "B"	INLET INV.	OUTLET INV.	TIDE GATE OPENING INV.	TIDE GATE CHAMBER ELEV.	TIDE GATE SIZE	ACCESS PLATE SIZE
G-NC02	~~20" BRICK~~ 24" PVC	~~499.90~~ 499.98	~~490.61~~ 492.25	~~492.86~~ 494.11	~~492.86~~ 494.11	~~492.61~~ 494.01	492.11	20"	24"x48"
G-NC06	28"x30" BRICK	~~500.65~~ 501.42-501.44 (VARIES)	~~489.80~~ 490.59	~~492.05~~ 493.00	492.05	~~491.80~~ 492.82	491.30	30"	24"x48"
G-NC07	15" VCP	~~500.10~~ 499.75-500.10 (VARIES)	~~493.10~~ 494.30	495.60	495.60	~~495.35~~ 495.75	494.85	16"	24"x48"
G-NC03	36" RCP	499.80 499.75-500.10 (VARIES)	490.05* 492.42-492.54 (VARIES)	~~493.30~~ 493.25	~~493.30~~ 493.23	493.05	492.55	36"	24"x48"

* NOTE: BOTTOM OF G-NC03 CHAMBER SET TO BE BELOW SPRINGLINE OF EXISTING 30" PIPE.

VORTEX FLOW REGULATOR NOTES

The Contractor shall supply One (1) HYDROVEX ® *IHV Vortex Flow Regulator(s)* as supplied and manufactured by John Meunier Inc. Montreal, Quebec, Canada, Tel.: (514) 334-7230, Fax: (514) 334-5070 or equal.

1.1 OPERATION DESCRIPTION
The vortex flow regulator shall be of the static type using the vortex principle. The vortex unit shall have no moving parts and the flow shall be regulated over the entire head using only the hydraulic properties of the unit and the fluid flowing through it. Fluid enters the regulator housing through the horizontal inlet connected tangentially to the housing. The invert elevation of the chamber's discharge pipe shall be at an elevation lower than the invert of the vortex unit inlet pipe.

1.2 OPERATING CONDITIONS

Model	HYDROVEX 200 IHV45-3 CCW
Designed flow rate (Qb)	1 MGD
Designed water head (hb)	3.00 feet
Inlet pipe diameter (DN)	8 inch
Housing diameter (DH)	24 inch
Cover diameter (DC)	18 inch
Removable orifice	(X) yes ( ) no
Installation angle	45 °
Maximum spherical diameter to pass	8 inch
Upstream pipe diameter and slope	36 inch, 0.22 %
Downstream pipe diameter and slope	12 inch, 0.22 %
Elevation drop unit inlet to chamber outlet pipe	1.00 feet

1.3 STANDARDS
The equipment included in this specification will comply with the latest edition of the applicable North American codes and regulations.

1.4 DOCUMENTS, APPROBATION AND WARRANTY
After receiving the order, the manufacturer shall submit the following documents:

Overall dimension drawing;
Discharge curve, certified by the manufacturer.

In addition, before or at the delivery date, the manufacturer shall provide six (6) copies of the installation, operation and maintenance manual. The manufacturer shall warrant its equipment for a 5-year period, starting from delivery date, against workmanship and material defects and failure when installed and used in the conditions described here.
The manufacturer shall adjust the *Vortex Flow Regulator* to its design conditions by supplying a removable outlet orifice to be installed in the unit. The manufacturer shall warrant that the actual flow as measured in the original installation conditions will not exceed plus or minus 5% of the flow shown on the certified curve provided with the vortex flow regulator.

Should the unit fail to satisfy any of the above conditions, then the manufacturer shall be responsible to repair and/or replace the equipment. All labor must be undertaken by the manufacturer 's personnel or an authorized representative.

1.5 INSTALLATION
The flow regulators shall be installed according to the manufacturer's recommendations.
Manufacturers shall provide 8 hours of training to owner and operator on operation and maintenance of vortex flow regulator.

2.0 REMOVABLE OUTLET ORIFICE
The removable outlet orifice defines the final adjustment of the regulator's flow curve. It is installed in the body of the regulator through the cover opening once the cover plate and vent are removed. Generally, the removal of the orifice doesn't require modifications or pipe dismount.

The removable outlet orifice modification can adjust the flow discharge of the unit from 75% to 185% of the nominal discharge. The nominal discharge is the flow discharge obtained when the orifice opening diameter is equal to the inlet diameter of the regulator.

3.0 CONSTRUCTION

Dished heads :	304 Stainless steel
Adjustment Belt :	304 Stainless steel
Inlet pipe :	304 Stainless steel
Inlet flange :	ANSI Flange std. 125 lb. hot dip galvanized
Inspection cover :	304 Stainless steel
Removable orifice :	304 Stainless steel
Supports :	304 Stainless steel
Hardware :	304 Stainless steel
Anchors :	304 Stainless steel
Welds :	All welds continuous
Knife gates :	CMO Series A/AR, diameter 8"
Wall thimble :	304 Stainless steel
By-pass pipe :	304 Stainless steel
Flanges :	ANSI Flange std. 125 lb. hot galvanized
Hardware :	304 Stainless steel
Seals :	Buna-N, 50 Duro

Note: The steel products listed above will comply with the provisions of the Steel Products Procurement Act (73 P.S. § 1881 et seq, as amended).

RECORD DRAWING

CHANGE IN PLAN NO. 1 (THIS SHEET REPLACES SHEET 9 OF 15)

NO.	DATE	REVISIONS	BY	CHECKED
4	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM
3	7/10/09	REVISED PER NJDEP COMMENTS	BP	JJM
2	1/5/09	ADDED DETAILS FOR NETTING CHAMBER G-NC03 AND REGULATOR CHAMBER G03	BP	JJM
1	8/2/07	REVISE G-NC06 HATCH	BR	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

NETTING CHAMBER & REGULATOR CHAMBER DETAILS
G-NC02, G-NC06, G-NC07, G-NC03 AND G03

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

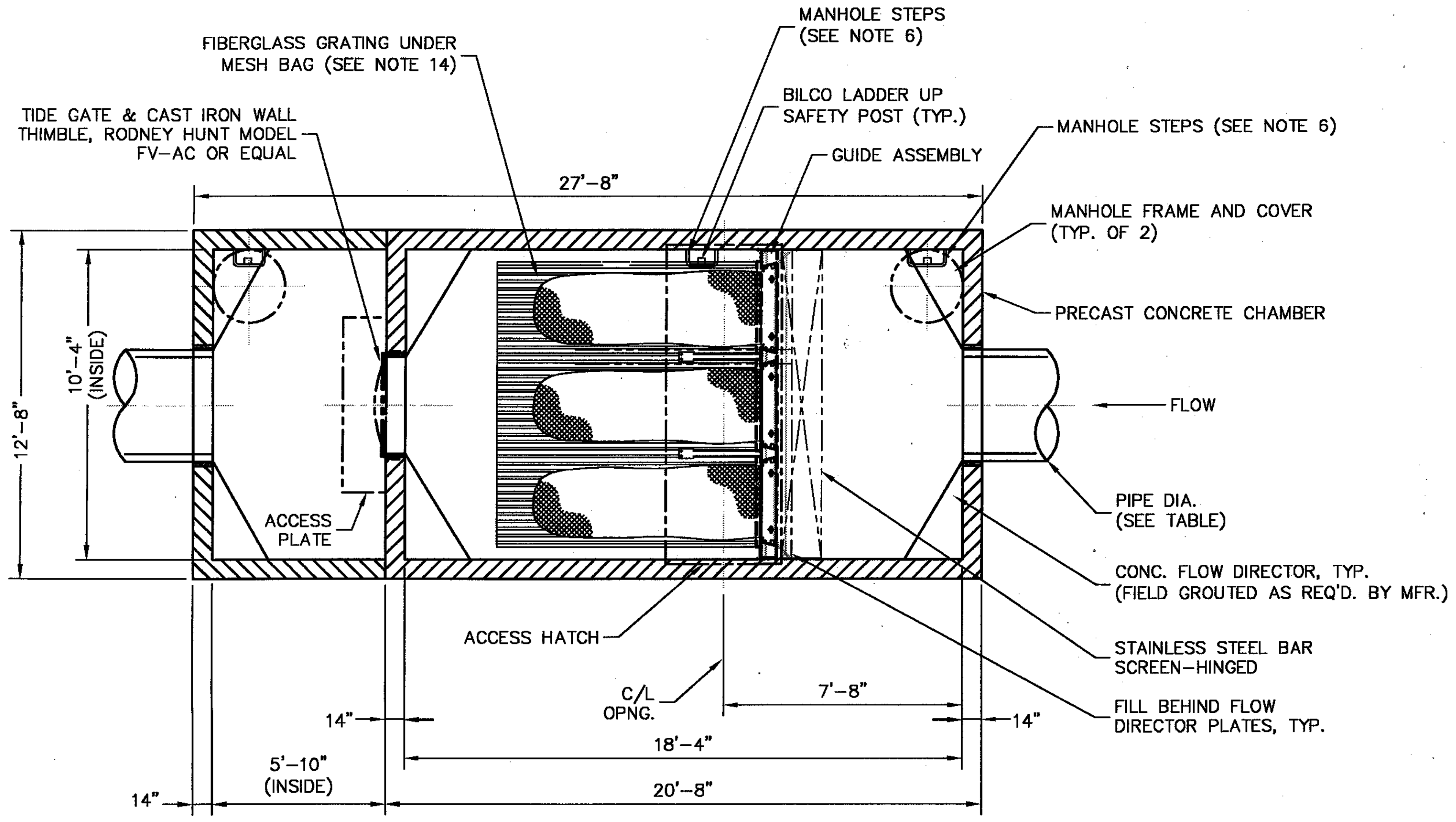
KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

DATE

LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

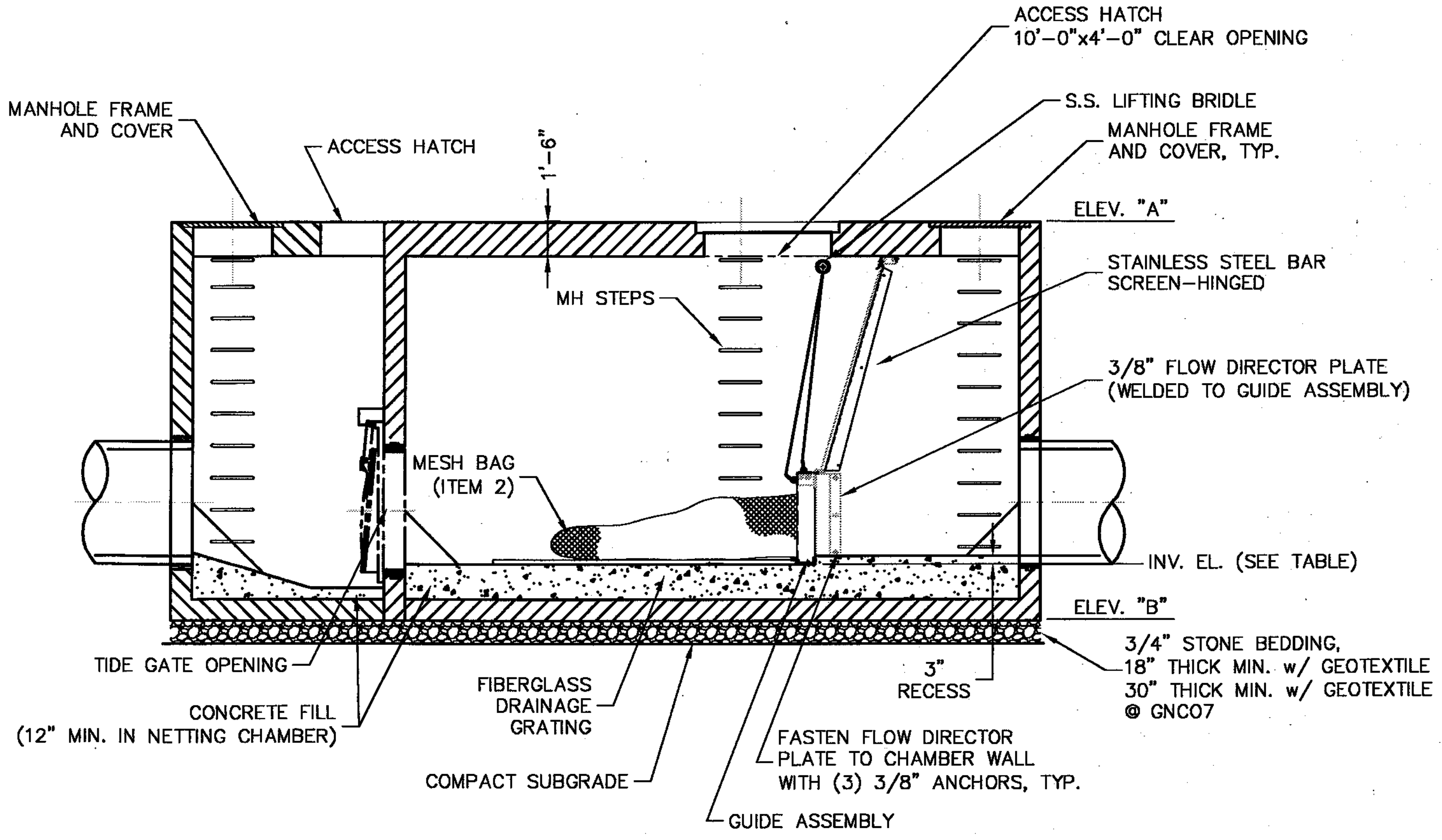
DESIGNED BY AAV/EAE
DRAWN BY
CHECKED BY JJM
PROJECT NO. CCUA.00013
CADD FILE CCUA11-NCD2-AB
FIELD BK. # N/A

DRAWING NCD-2
SHEET 9A OF 15



PLAN SECTION

NOT TO SCALE



ELEVATION SECTION

NOT TO SCALE

CHAMBER	OUTFALL PIPE SIZE AND TYPE	TOP OF CHAMBER "A"	BOTTOM OF CHAMBER "B"	INLET INV.	OUTLET INV.	TIDE GATE OPENING INV.	TIDE GATE CHAMBER ELEV.	TIDE GATE SIZE	ACCESS PLATE SIZE
G-~~NC03~~/04	~~40~~" BRICK 42"	~~500.50~~ 500.92–501.02 (VARIES)	~~491.15~~ 491.32–491.42 (VARIES)	~~493.40~~ 494.09	~~493.40~~ 493.97	493.15	492.65	42"	24"x72"

NOTES AND SPECIFICATIONS:

1. NET BAG SUPPORT FRAME, BAR SCREENS, STATIC SCREENS AND ALL ASSOCIATED HARDWARE TO BE TYPE 316 STAINLESS STEEL. HARDWARE TO BE FASTENED TO CONCRETE WITH "HILTI" KWIK BOLT ANCHORS OR EQUAL, EXCEPT AS NOTED, PER MANUFACTURER'S DIRECTIONS.

2. THE NETTING FACILITY SHALL BE CONSTRUCTED SUCH THAT ALL BAR SPACINGS, GRATING, HINGED JOINTS AND CONNECTION POINTS OF FRAME WORK UPSTREAM OF THE NET OPENING SHALL NOT EXCEED 1/2 INCHES. NO OPENINGS SHALL BE ALLOWED WHICH PROVIDE A MEANS OF BYPASSING OR SHORT CIRCUITING MATERIAL GREATER THAN 1/2 INCHES.

3. GENERAL CONTRACTOR TO FIELD VERIFY DIMENSIONS AND ELEVATIONS PRIOR TO APPROVAL OF SUBMITTAL DOCUMENTATION.

4. GENERAL CONTRACTOR TO FIELD SEAL SPECIFIED PIPE TO PRECAST CONCRETE CHAMBER.

5. LIFTING BRIDLES SHALL BE SECURED TO TOP OF CHAMBER WALL FOR ACCESS FROM SURFACE.

6. MANHOLE STEPS: POLYPROPYLENE OR EQUAL (SEE CONSTRUCTION DETAILS).

7. PRECAST CONCRETE CHAMBER: CONFORM WITH TECHNICAL SPECIFICATIONS AND DRAWING "GPE".
8. ACCESS HATCH ASSEMBLY: CAMPBELL FOUNDRY PATTERN NO. 3009–48 OR EQUAL.

9. "CONSEAL" #CS102 BUTYL RUBBER GASKET MATERIAL @ JOINTS OF PRECAST CHAMBER SECTIONS AND TOP SLAB.

10. TOP OF CONCRETE CHAMBER SHALL MATCH EXISTING GRADE.

11. MANHOLE FRAME AND COVER, "CAMPBELL FOUNDRY" PATTERN NO. 1739, WATERTIGHT 32" DIA. OR EQUAL.

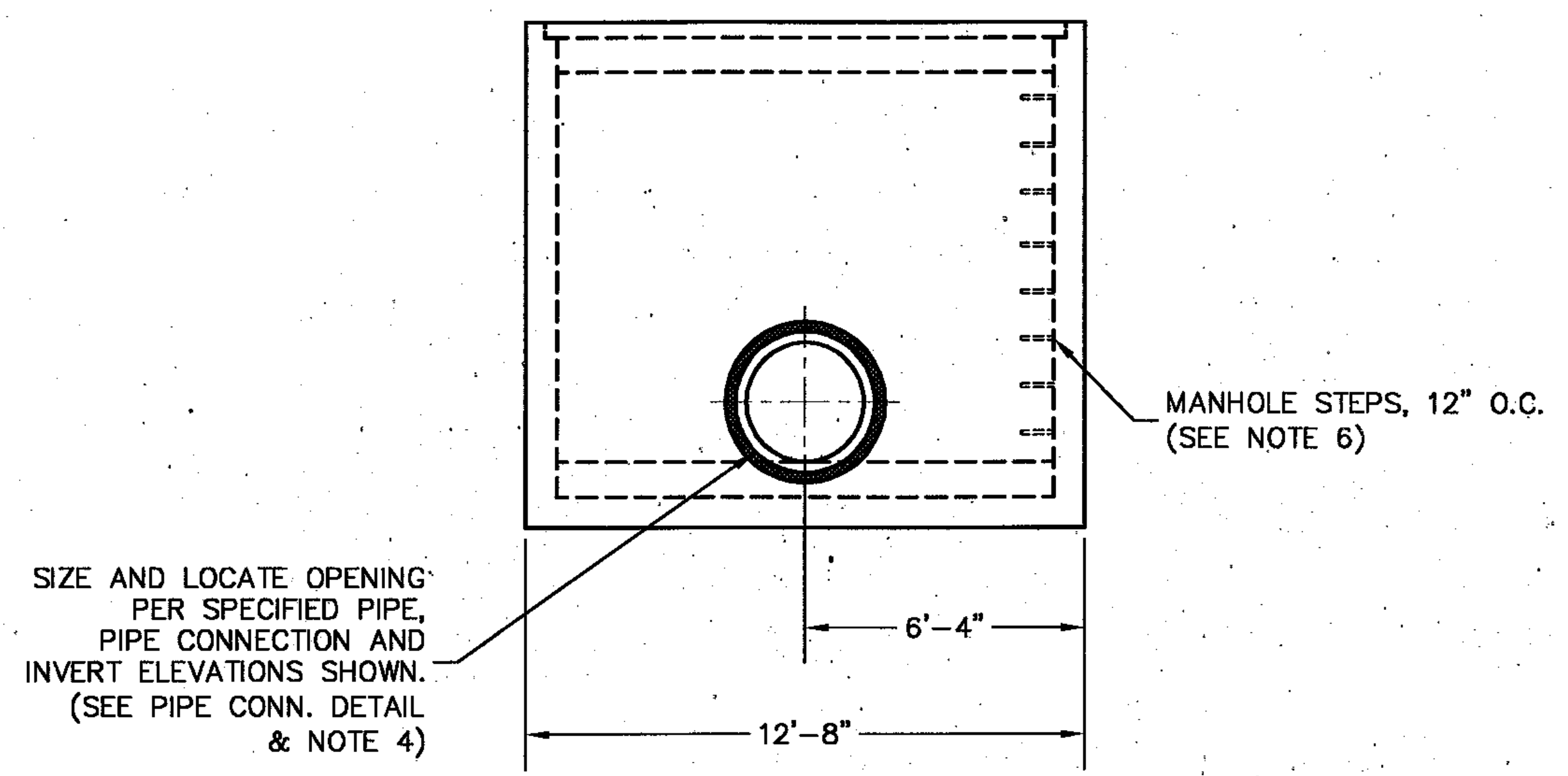
12. EXTERIOR OF CHAMBER TO BE COATED WITH 2 COATS OF BITUMASTIC, 8 MILS/COAT, OR EQUAL.

13. INTERIOR OF CHAMBER TO BE COATED WITH "HYDROZO" ENVIROSEAL 20, OR EQUAL.

14. DISPOSABLE MESH BAGS SHALL HAVE 30"x30" FRAMES AND SHALL BE APPROXIMATELY 8' LONG. FIBERGLASS GRATING SHALL BE 42" WIDE PER BAG AND 8' LONG.

15. SEE DRAWING "GPE" FOR ADDITIONAL CHAMBER DETAILS.

16. STAINLESS STEEL BAR SCREEN HINGES SHALL BE PINNED TO SECURE AGAINST OPENING.



TYPICAL PARTIAL END VIEW

SCALE: 1/4" = 1'-0"

RECORD DRAWING

1	7/1/10	ADDED RECORD DRAWING INFORMATION	JBC	JJM
NO.	DATE	REVISIONS	BY	CHECKED

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES
CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

NETTING CHAMBER DETAILS
G–NC03/04

T&M ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732–671–6400
FAX 732–671–7365

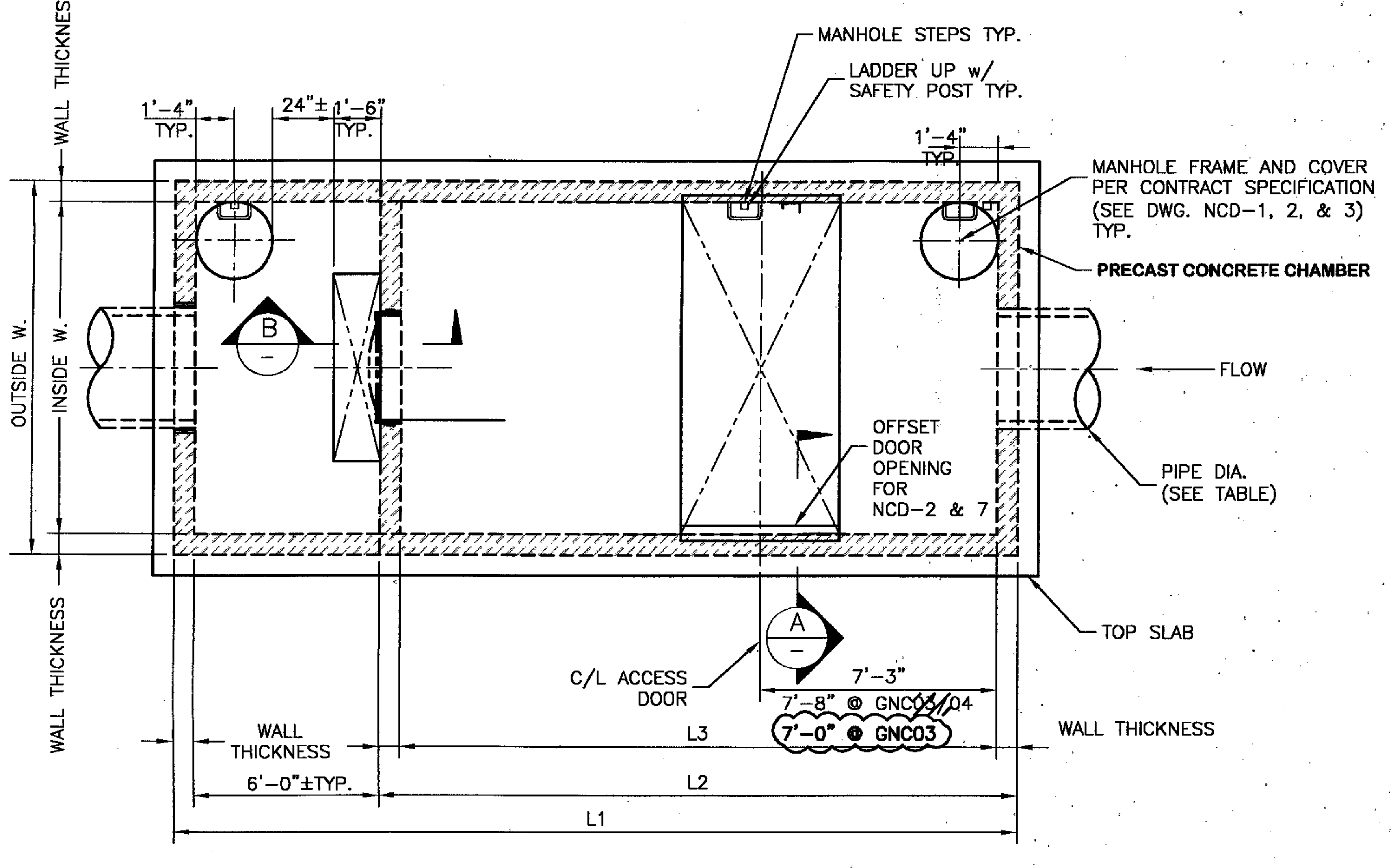
NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS CERTIFICATE OF AUTHORIZATION GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

DATE
LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

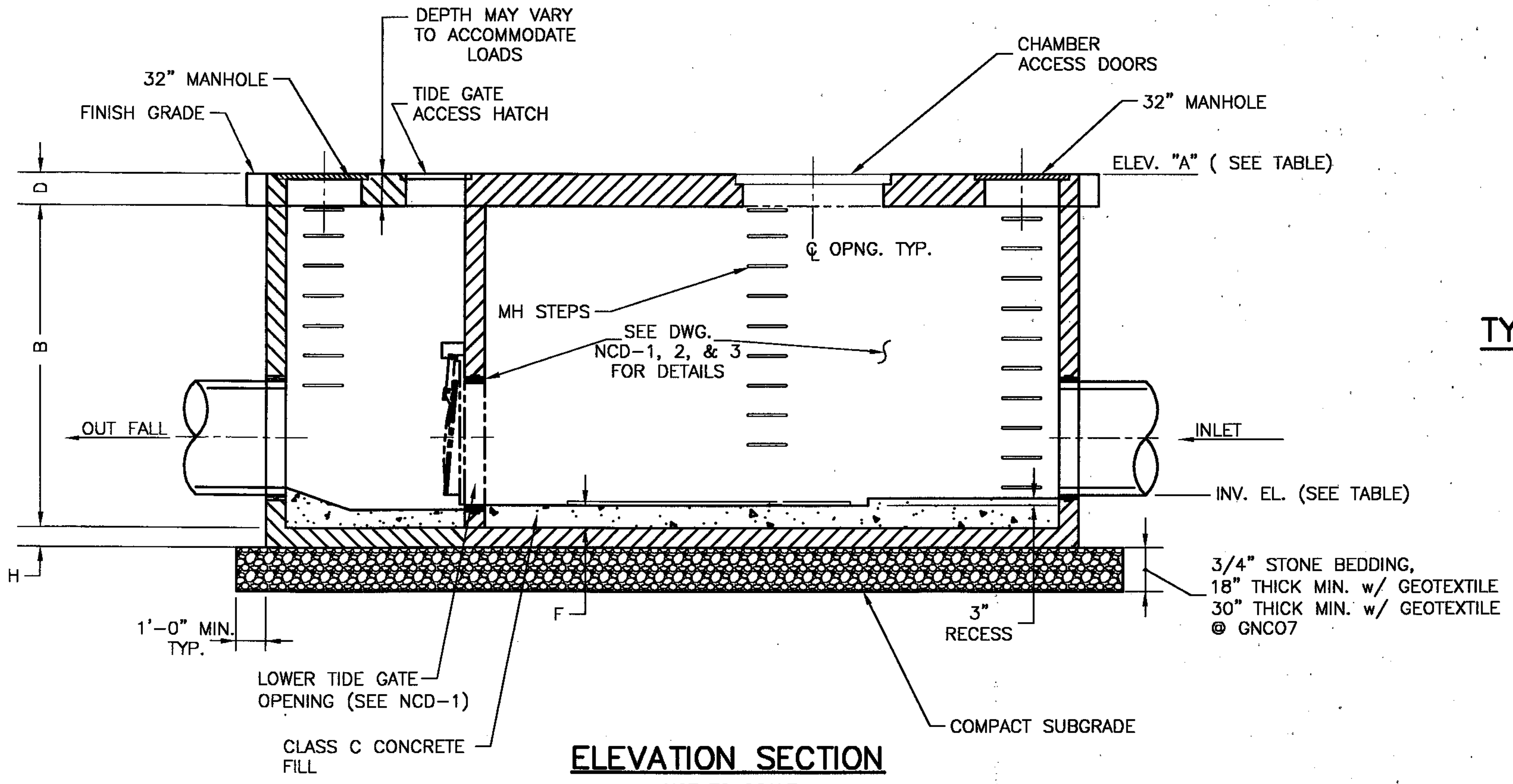
DESIGNED BY: EAE
DRAWN BY: MWC
CHECKED BY: JJM
PROJECT NO.: CCUA.00013
CADD FILE: CCUA10–NCD3–AB
FIELD BK. #: N/A

DRAWING: NCD–3
SHEET: 10 OF 15



PLAN

NOT TO SCALE

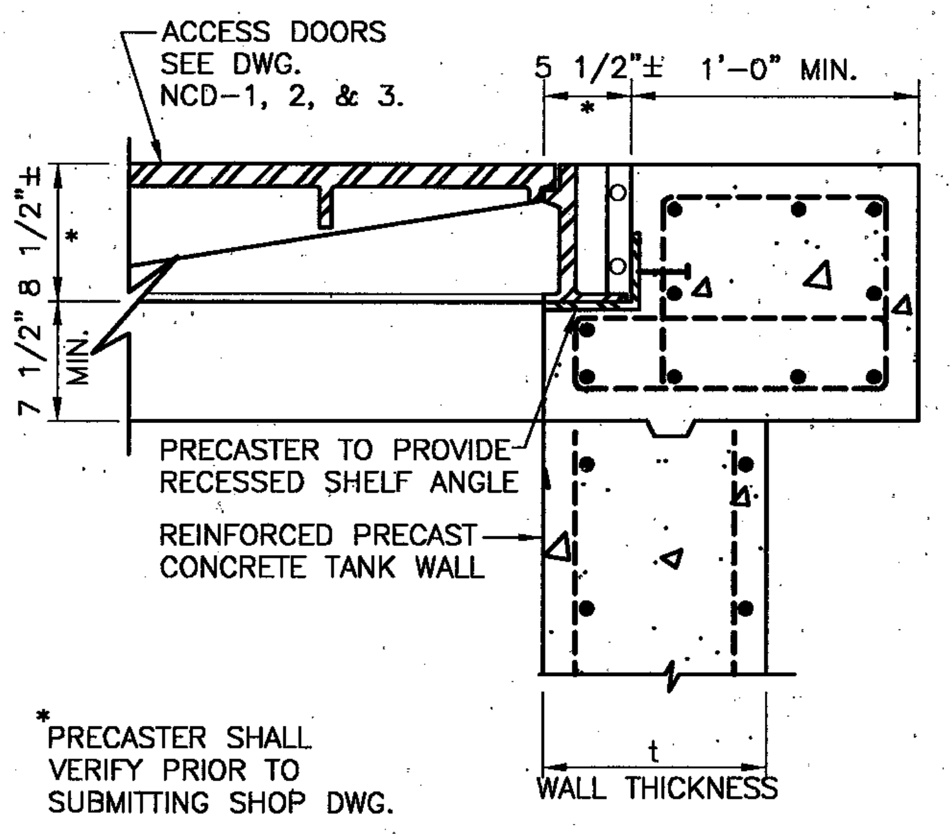


ELEVATION SECTION

NOT TO SCALE

PLAN DIMENSIONS					
CHAMBER	OUTSIDE W	L1	L2	L3	WALL THICKNESS (t)
G-NC01	9'-6"	26'-0"	19'-0"	17'-0"	1'-0"
G-NC02	8'-0"	25'-0"	18'-0"	16'-0"	1'-0"
G-NC~~03~~/04	12'-8"	27'-8"	20'-8"	18'-4"	1'-2"
G-NC05	9'-6"	26'-0"	19'-0"	17'-0"	1'-0"
G-NC06	8'-0"	25'-0"	18'-0"	16'-0"	1'-0"
G-NC07	8'-0"	25'-0"	18'-0"	16'-0"	1'-0"
G-NC03	**8'-0"**	**21'-0"**	**15'-0"**	**13'-0"**	**1'-0"**

NOTE: PRECASTER TO MAINTAIN INSIDE CLEAR DIMENSIONS OF CHAMBERS. WALL THICKNESS SHOWN IS A MINIMUM. THICKNESS MAY BE INCREASED AT THE PRECASTER'S DISCRETION.



*PRECASTER SHALL VERIFY PRIOR TO SUBMITTING SHOP DWG.

TYPICAL TOP OF SLAB OPENING SECTION (A)

SCALE: 1"=1'-0"

GENERAL NOTES

1. DESIGN SPECIFICATIONS
   2002 (17th EDITION) AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES WITH INTERIMS AS MODIFIED BY SECTION 3A OF THE NJDOT DESIGN MANUAL FOR BRIDGES AND STRUCTURES.

2. CONSTRUCTION SPECIFICATIONS
   2001 NJDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION WITH CURRENT SUPPLEMENTAL SPECIFICATIONS AS MODIFIED BY THE PROJECT SPECIFICATION.

3. LIVE LOAD
   AASHTO HS 20 + 25% (HS25) OR TANDEM 24 KIP AXLES AT 4 FOOT CENTERS, WHICHEVER GOVERNS.

4. DEAD LOAD
   WEIGHT OF CONCRETE CHAMBERS.

5. CONCRETE DESIGN STRESSES
   a) SPECIFIED DESIGN COMPRESSIVE STRENGTH (f'c) (IN ACCORDANCE WITH THE RETEST LIMIT AS SPECIFIED IN TABLE 914-4 OF THE NJDOT STANDARD SPECIFICATIONS AND AS MAY BE MODIFIED BY THE BRIDGE SPECIAL PROVISIONS.
      CLASS P (PRECAST)..5,000 PSI
      CLASS A..4,000 PSI
      CLASS B..3,000 PSI

      THE RETEST LIMIT FOR NON PAY ADJUSTMENT ITEMS SHALL BE AS SPECIFIED ON THE LAST LINE OF TABLE 914-4 OF THE NJDOT STANDARD SPECIFICATIONS AND AS MAY BE MODIFIED BY THE BRIDGE SUPPLEMENTARY SPECIFICATIONS.

   b) CLASS DESIGN STRENGTHS (IN ACCORDANCE WITH SECTION 914-3 OF THE NJDOT STANDARD SPECIFICATIONS)
      CLASS P (PRECAST)..5,500 PSI
      CLASS A..4,600 PSI
      CLASS B..3,700 PSI

   c) ALLOWABLE STRESSES, EXTREME FIBER IN COMPRESSION (fc)
      CLASS P (PRECAST)..2,000 PSI
      CLASS A..1,600 PSI
      CLASS B..1,200 PSI

   d) CONCRETE PROVIDED FOR FOOTINGS AND RETAINING WALLS SHALL BE CLASS B. CONCRETE IN PRECAST STRUCTURES SHALL BE CLASS P. ALL OTHER CONCRETE ITEMS SHALL BE CLASS C.

6. REINFORCEMENT STEEL
   a) ASTM A615 (GRADE 60) (fs)=24,000 psi
   b) ALL REINFORCEMENT STEEL TO BE GALVANIZED ASTM A767.
   c) MIN. 2" COVER

7. FOUNDATION DESIGN CRITERIA
   TYP. MAX. ALLOWABLE BEARING CAPACITY 2000 PSF, 1500 PSF @ GNC07 LOCATION. REFERENCE GEOTECHNICAL REPORT PREPARED BY T&M ASSOCIATES, DEC. 2005.
   TEMPORARY SHEETING AND COFFERDAMS SHALL BE DESIGNED FOR AN EQUIVALENT FLUID PRESSURE AS DETERMINED FROM THE GEOTECHICAL REPORT. FOR ADDITIONAL FOUNDATION INFORMATION SEE BORINGS IN SUPPLEMENTARY SPECIFICATIONS. CONTRACTOR TO SUBMIT SIGNED AND SEALED PLANS & CALCULATIONS BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY.

8. SEISMIC DESIGN
   a) SEISMIC PERFORMANCE CATEGORY – B. SITE CLASS E.
   b) ACCELERATION COEFFICIENT A=0.15
   c) SITE COEFFICIENT S=1.5
   REFERENCE GEOTECHNICAL REPORT BY T&M ASSOCIATES.

9. REINFORCED CONCRETE SRUCTURES, PRECAST
   PRECAST UNITS SECTIONS SHALL BE DESIGNED BY THE CONTRACTOR IN ACCORDANCE WITH SECTION 16.7 OF THE 2002 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, WITH MODIFICATIONS BY SECTION 30 OF THE NJDOT DESIGN MANUAL FOR BRIDGES AND STRUCTURES. ALL REINFORCEMENT CONSTRUCTION DETAILS AND PLANS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE ENGINEER AND THE OWNER. SERVICE LOAD DESIGN METHOD (ALLOWABLE STRESS DESIGN) SHALL BE USED FOR THE DESIGN.

   THE MANUFACTURING PLANT SHALL BE CERTIFIED BY EITHER THE NATIONAL PRECAST CONCRETE ASSOCIATION OR BY THE PRECAST/PRESTRESSED CONCRETE INSTITUTE PLANT CERTIFICATION PROGRAM. CERTIFICATIONS SHALL LIST THE PROPER PRODUCT BEING SUPPLIED. WRITTEN PLANT CERTIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO FINAL APPROVAL. THE FABRICATOR CHOSEN TO SUPPLY THE PRECAST STRUCTURES IS REQUIRED TO SUPPLY SIX (6) COPIES OF STRUCTURAL CALCULATIONS AND DETAILED SHOP DRAWINGS FOR REVIEW AND APPROVAL OF THE ENGINEER. CALCULATIONS AND DRAWINGS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY.

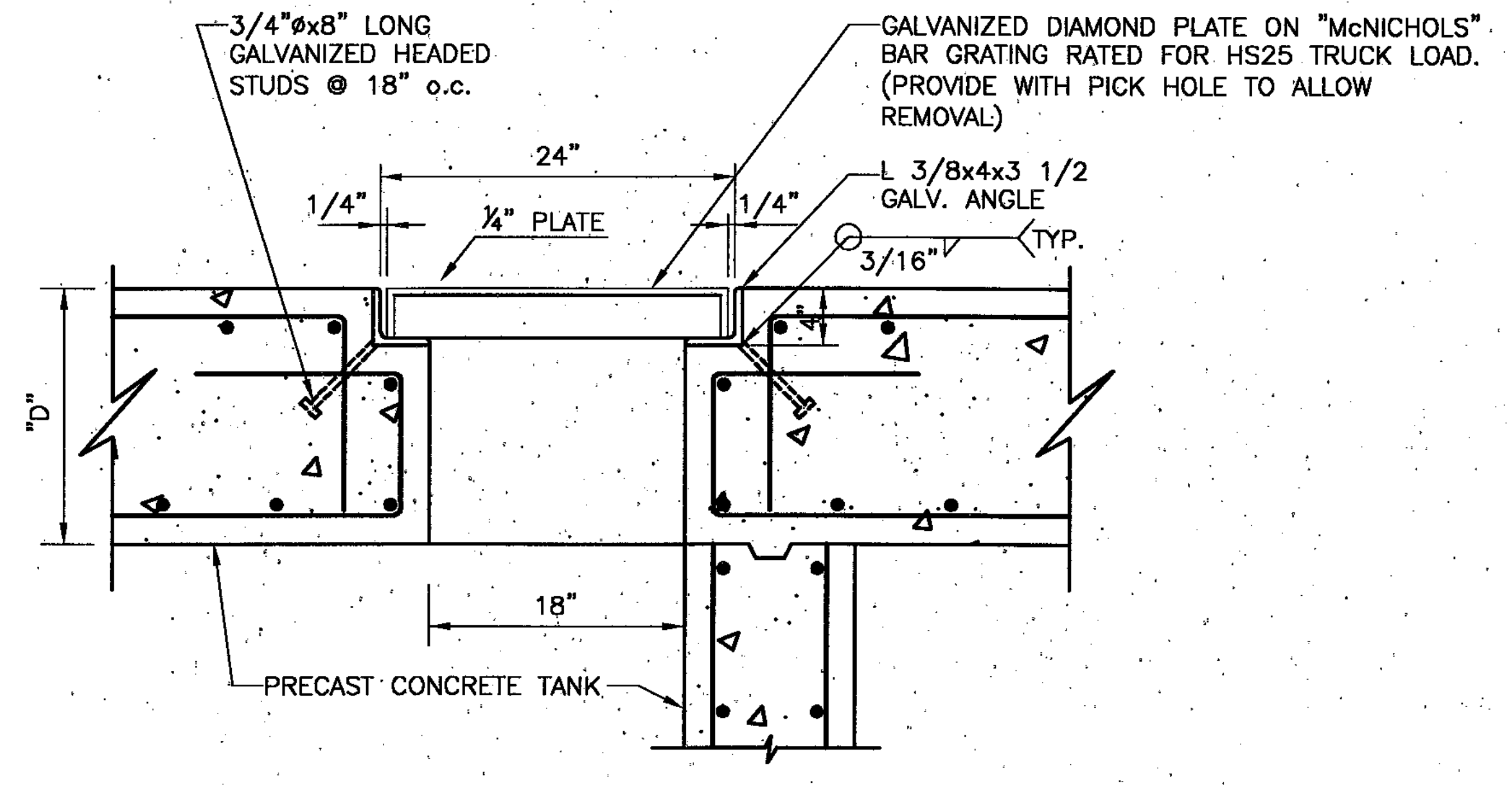
   CHAMFER ALL EXPOSED CONCRETE EDGES 3/4" x 3/4" UNLESS OTHERWISE NOTED.

10. LONGITUDINAL TIE RODS 3/4" DIA. HIGH TENSILE STRENGTH STEEL BAR CONFORMING TO ASSHTO M 275M (ASTM A 722). INSTALL LONGITUDINAL TIE RODS IN PRECAST SECTIONS. EACH TIE ROD SHALL BE STRESSED TO A TENSION OF 30,000 LBS. OVER THE CROSS SECTION OF ANY SECTION. STRANDS WILL NOT BE PERMITTED. A FLEXIBLE WATER TIGHT RUBBER GASKET SHALL BE PROVIDED AT THE JOINT BETWEEN THE PRECAST UNITS. THE GASKET SHALL BE CONTINUOUS AROUND THE CIRCUMFERENCE OF THE JOINTS. DETAILS OF THE TRANSVERSE JOINT BETWEEN THE STRUCTURE SECTIONS SHALL BE PROVIDED ON THE STRUCTURE SHOP DRAWING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TESTING THE CHAMBER FOR WATER TIGHTNESS.

11. THE CONTRACTOR SHALL EXAMINE AND VERIFY IN THE FIELD ALL EXISTING CONDITIONS AND DIMENSIONS WITH THOSE SHOWN ON THE PLANS. IF FIELD CONDITIONS AND DIMENSIONS DIFFER FROM THOSE SHOWN ON THE PLANS, THE CONTRACTOR SHALL USE THE FIELD CONDITIONS AND DIMENSIONS AND MAKE THE APPROPRIATE CHANGES TO THOSE SHOWN ON THE PLANS AS APPROVED BY THE ENGINEER. THE RESULTS OF THIS CHECK OF CONDITIONS AND DIMENSIONS SHALL BE SO NOTED ON THE DRAWINGS SUBMITTED FOR APPROVAL.

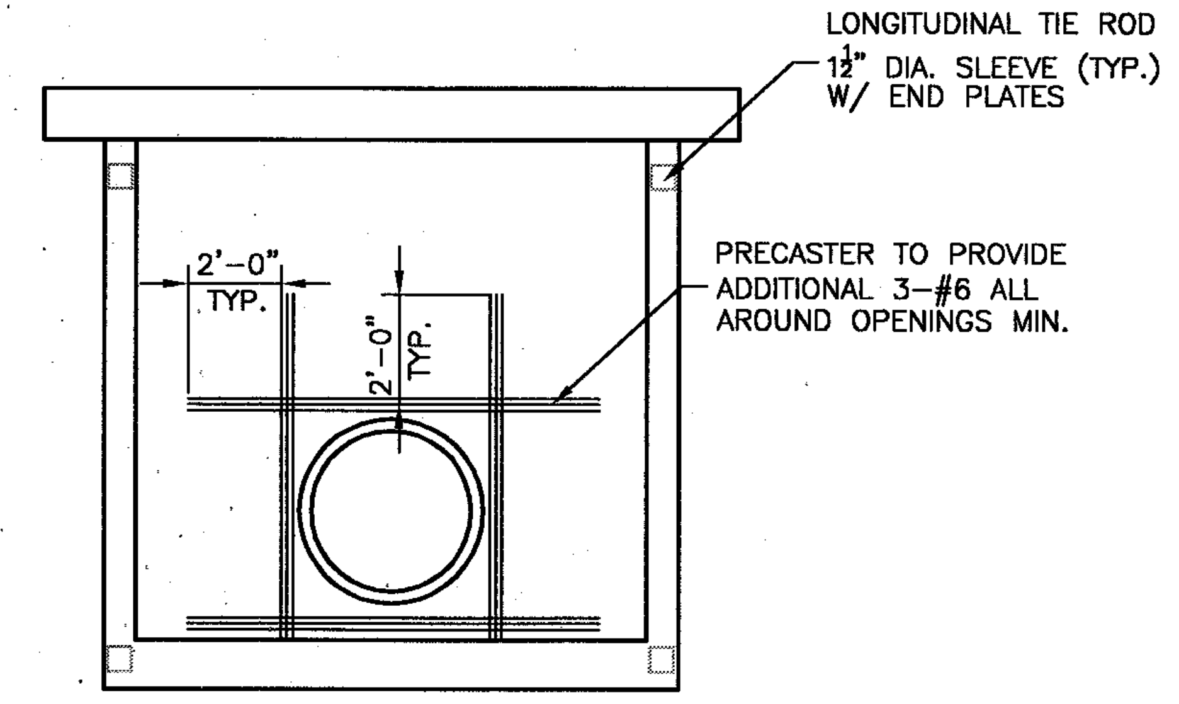
12. THE COST OF THE PRECAST CHAMBER SHALL INCLUDE BUT NOT BE LIMITED TO MANHOLES, HATCHES, DOORS, GATES, AND ALL OTHER NECESSARY ITEMS AS SHOWN ON THIS DWG. AND DWGS. NCD-1, 2, & 3.

13. REGULATOR GO3 CHAMBER DESIGN SHALL CONFORM TO THE ABOVE GENERAL NOTES. SEE SHEET 9A OF 15 FOR REGULATOR CHAMBER DIMENSION DETAILS.



TIDE GATE ACCESS HATCH TYPICAL SECTION (B)

SCALE: 1"=1'-0"



END SECTION SUPPLIMENTAL REINFORCING DETAIL

NOT TO SCALE

SECTION ELEVATIONS/DIMENSIONS									REFER. DWG. NCD-1, 2, & 3			
CHAMBER	OUTFALL PIPE SIZE AND TYPE	BOTTOM OF CHAMBER	TOP OF CHAMBER "A"	INLET INV.	OUTLET INV.	CHAMBER ACCESS DOOR	TIDE GATE ACCESS HATCH SIZE	INSIDE W	D	B	H	F
G-NC01	48" BRICK	490.75	499.90	493.00	493.00	7.5'x4'	18"x72"	7'-6"	1.33'	6.57'	1.25'	1.0' MIN.
G-NC02	20" BRICK	490.57	499.90	492.86	492.86	5'x4'	18"x48"	6'-0"	1.33'	6.71'	1.25'	1.0' MIN.
G-NC~~03~~/04	48" BRICK	491.15	500.50	493.40	493.40	10'x4'	18"x72"	10'-4"	1.50'	6.60'	1.25'	1.0' MIN.
G-NC05	34" x 40" BRICK	490.25	500.00	492.50	492.50	7.5'x4'	18"x60"	7'-6"	1.33'	7.17'	1.25'	1.0' MIN.
G-NC06	28" x 30" BRICK	489.8	500.65	492.05	492.05	5'x4'	18"x48"	6'-0"	1.33'	8.27'	1.25'	1.0' MIN.
G-NC07	15" VCP	493.35	500.10	495.60	495.60	5'x4'	18"x48"	6'-0"	1.33'	4.42'	1.25'	1.0' MIN.
G-NC03	36" RCP	490.05	499.80	493.30	493.30	5'x4'	18"x48"	6'-0"	1.17'	7.33'	1.25'	1.0' MIN.

SEE SHEETS NCD-1, NCD-2, & NCD-3
FOR RECORD ELEVATIONS AND INVERTS

CHANGE IN PLAN NO. 1 (THIS SHEET REPLACES SHEET 11 OF 15)

NO.	DATE	REVISIONS	BY	CHECKED
1	1/5/09	ADDED DETAILS FOR NETTING CHAMBER G-NC03	BP	JJM

CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

GLOUCESTER CITY CSO UPGRADES

CITY OF GLOUCESTER, CAMDEN COUNTY, NEW JERSEY

CHAMBER GENERAL PLAN AND ELEVATION

T&M
ASSOCIATES
11 TINDALL ROAD
MIDDLETOWN, NJ 07748
TEL 732-671-6400
FAX 732-671-7365

NEW JERSEY BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
CERTIFICATE OF AUTHORIZATION
GA 276807

KEITH W. HENDERSON, P.E., P.P.
CONSULTING ENGINEER

DATE

LICENSED PROFESSIONAL ENGINEER
STATE OF NEW JERSEY LICENSE No. GE 30804

DESIGNED BY T.N.
DRAWN BY DDF
CHECKED BY FP/JJM
PROJECT NO. CCUA.00013
CADD FILE CCUA11-GPE A-AB
FIELD BK. # N/A

DRAWING GPE

SHEET 11A OF 15

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request

Attachment F – Gloucester City Regulators Inspection & Preventive Maintenance February 2023

ACCOUNT ID: ____________

GLOUCESTER CITY
ENVIRONMENTAL UTILITIES DEPARTMENT

SERVICE REQUEST FORM

DATE SCHEDULED: 2-15, 2-16, 2-21 2023 TIME ON: ________ OFF: ________

NAME: ____________ ADDRESS: CSO CHAMBERS - PHONE # ____________

RECEIVED BY: DH ASSIGNED TO: RW | ZC | KP | ML | ECONS

METER INFO:

NEW SN: ________ MXU ________ ID ________ READ ________

OLD SN: ________ MXU ________ ID ________ READ ________

____ METER SIZE ____ REPLACE METER ____ LEAK

____ METER TEST ____ REPLACED MXU ____ METER SEALED

____ METER READ ____ FINAL READ ____ WATER QUALITY

____ HIGH USAGE ____ TURN ON ____ TURN OFF

WATER BOX ____ OK ____ NEEDS REPAIR

WER VENT ____ OK ____ NEEDS REPAIR

____ BLOCKAGE ____ CAVE IN ____ SURVEY

NOTES: PERFORMED ANNUAL CLEANING & INSPECTION OF TIDE GATES.
ENTRY MADE IN ALL REGULATORS. FITTINGS GREASED PHOTOS TAKEN
NETS CHANGED IN ALL CHAMBERS EXCEPT G-1
ISSUE WITH DEBRIS AT OUTFALL FOR G1 & G-2.
DEP INSPECTION MADE ON 2-21-23
G2- 1 NET
G3- 1 NET
G4- 3 NETS
G5- 2 NETS
G6- 1 NET
G-7- 1 NET
CONFINED ENTRY PERMITS & INSPECTION SHEETS ARE ATTACHED

TOTAL DEBRIS -22 yds

RESIDENT SIGNATURE ____ DATE ____ EMPLOYEE SIGNATURE ____ DATE 2-22-23

FAXED TO BILLING (456-5817) ____________
DATE & TIME

GLOUCESTER CITY
ENVIRONMENTAL UTILITIES DEPARTMENT

ANNUAL CONFINED SPACE ENTRY PERMIT

This permit is Valid for Daily Maintenance and Inspection of Dry Well & Meter Pits

Date Issued: 2-21-23 Valid Until: 2-21-23

Authorized By: DH Location: 6-1 CHARLES ST

DATE	ENTRANT	PERSON IN CHARGE	GAS DETECTOR SERIAL #	DATE CALIBRATED	02 LEVEL	COMB	TOXIC	CO
2-21-23	ZC	DH	ARNM-0069	10-26-22	20.9	0	0	6

1. All entrants must wear full body harness attached to anti-fall retrieval system. If an anti-fall retrieval system is not available the entrant at a minimum must wear a full body harness connected to a lifeline.
2. Attendant must standby and monitor for hazardous atmosphere prior to allowing entrance and at all times the space is occupied.

TIDE GATE
INSPECTION

TIDEGATE: 6-1

TIME IN: 1:15 Pm DATE: 2-21-23

OPERATORS:

TEMP. 55°F WEATHER: CLEAR INCHES —

TIDE CONDITION: HIGH

STREET CONDITION: Normal LIDS ok

SEWER FLOW: Normal

FLOAT: OK BEARINGS: ok SHAFTS: OK

GATE: CLOSED

PASS: NONE

NOTES: CLEAN & GREASE REGULATOR

SIGNATURE OPERATOR

SIGNATURE SUPERVISOR

DATE:

DATE: 2-21-23

REGULATOR SERVICE FORM

TIDEGATE: G-1 OUT FALL: ____________

REGULATOR # G-1 DATE: ~~[illegible]~~ 2-21-23 TEMP.: 55°F PRECIPITATION: ________

SERVICE BEGINS WITH OBSERVING AND NOTING CONDITIONS. USE ARRANGEMENT DRAWING.

ACCESS & COVERS	OK	ANY BINDING?	NO
DEBRIS IN CHAMBERS?	CLEAN	OBVIOUS MISALIGNMENT	NO
IS REGULATOR FLOWING?	YES	DIRTY WHEEL TRACKS?	CLEAN
CORRECT WEIR SETTING?	YES	SLUDGE ON COMPONENTS?	CLEAN
SHUTTERWEIGHTS CORRECT?	YES	COUNTERWEIGHTS CORRECT	YES

FOUR GREASE FITTINGS, ONE ON EACH BEARING HOUSING AND ONE ON EACH PILLOW BLOCK REQUIRE LUBRICATION WITH SERVICING. FREQUENCY OF SERVICE FOR THIS REGULATOR IS Annually.

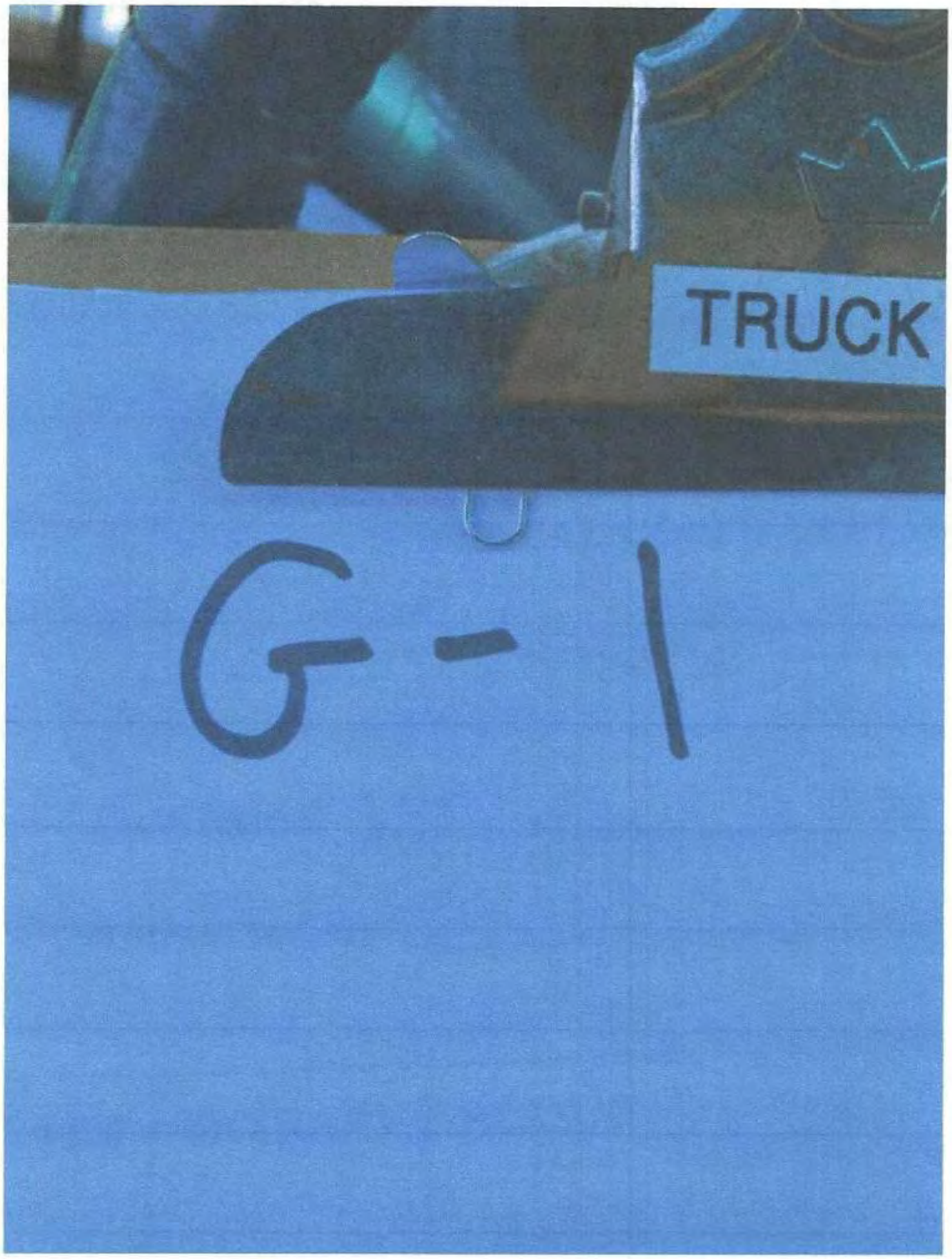
CHECKLIST OF SERVICE PROCEDURES (TO BE PERFORMED IN THIS ORDER):

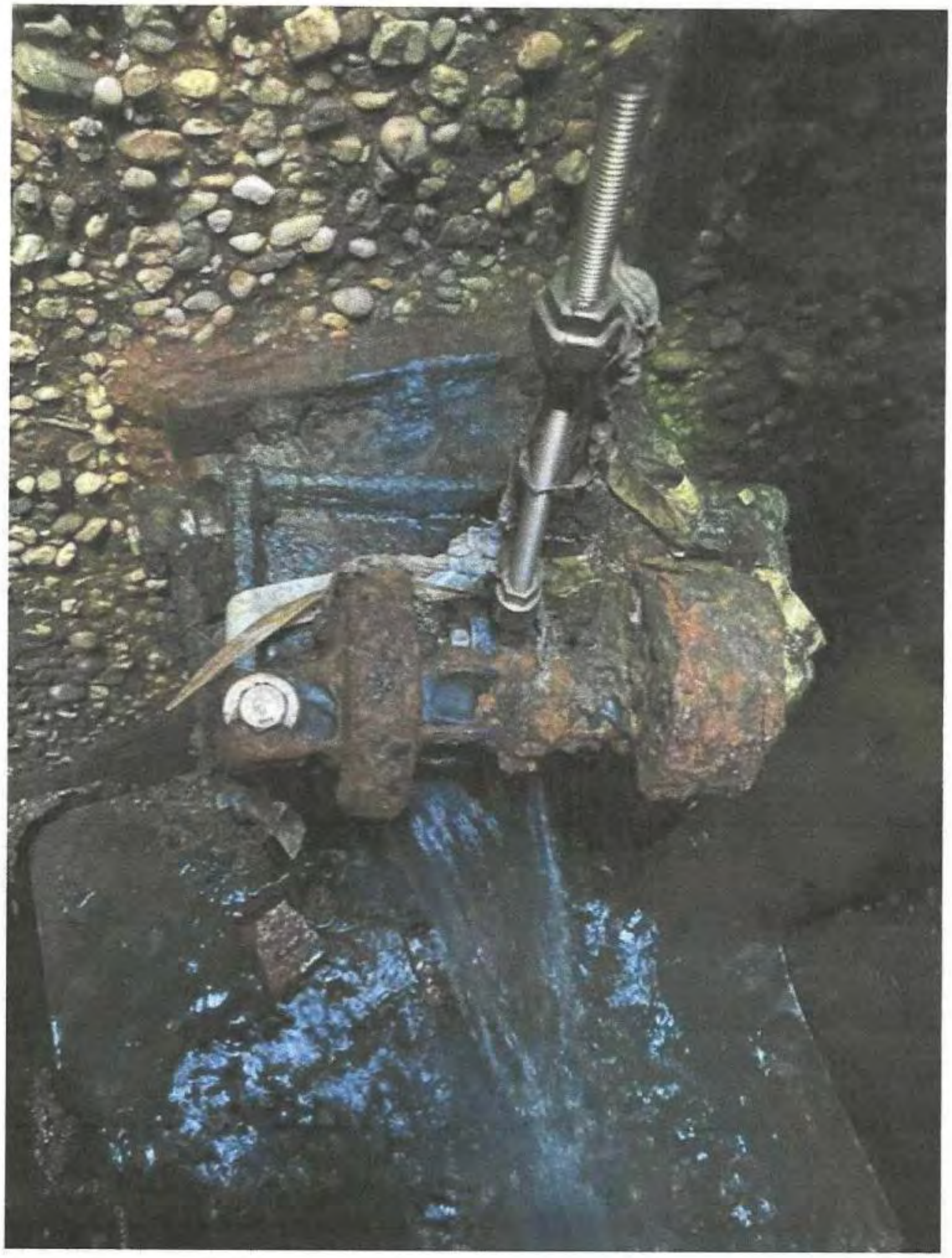
DEBRIS REMOVED 0.2 yds
ALL COMPONENTS CLEANED ✓
WEIR POSITION CORRECT. OPENING IS ________.
SHUTTERWEIGHTS CORRECT
COUNTERWEIGHTS CORRECT
GATE NOT BINDING (OR WAS BINDING AND HAS BEEN CORRECTED).
WITH SHUTTERGATE IN HALF-OPEN POSITION, GATE LINKAGE IS DEAD PERPENDICULAR.
LINKAGE IS CORRECTLY ADJUSTED.
WEIGHTS ON THE GATE LINKAGE ARE IN PLACE (IF REQUIRED ON DRAWING)
GATE WHEEL TRACKS ARE CLEAN
CHAIN IS CORRECTLY POSITIONED IN THE GATE WHEEL TRACK
THE TRANSMISSION SHAFT IS DEAD LEVEL
THE FLOAT WHEEL TRACKS ARE CLEAN
THE CHAIN IS CORRECTLY POSITIONED ON THE FLOAT WHEEL.
THE FLOAT LINKAGE HAS THE CORRECT WEIGHTS (IF REQUIRED ON DRAWING)
FLOAT LINKAGE IS DEAD PERPENDICULAR
THE FLOAT IS CLEAN
FLOAT SUBMERGENCE IS CORRECT PER DRAWING
THE FLOAT GUIDES ARE CLEAN
FOUR GREASE FITTINGS HAVE BEEN LUBRICATED
REGULATOR HAS BEEN EXERCISED
THERE IS NO BINDING, GATE DOES NOT STICK CLOSED, MOVES EVENLY

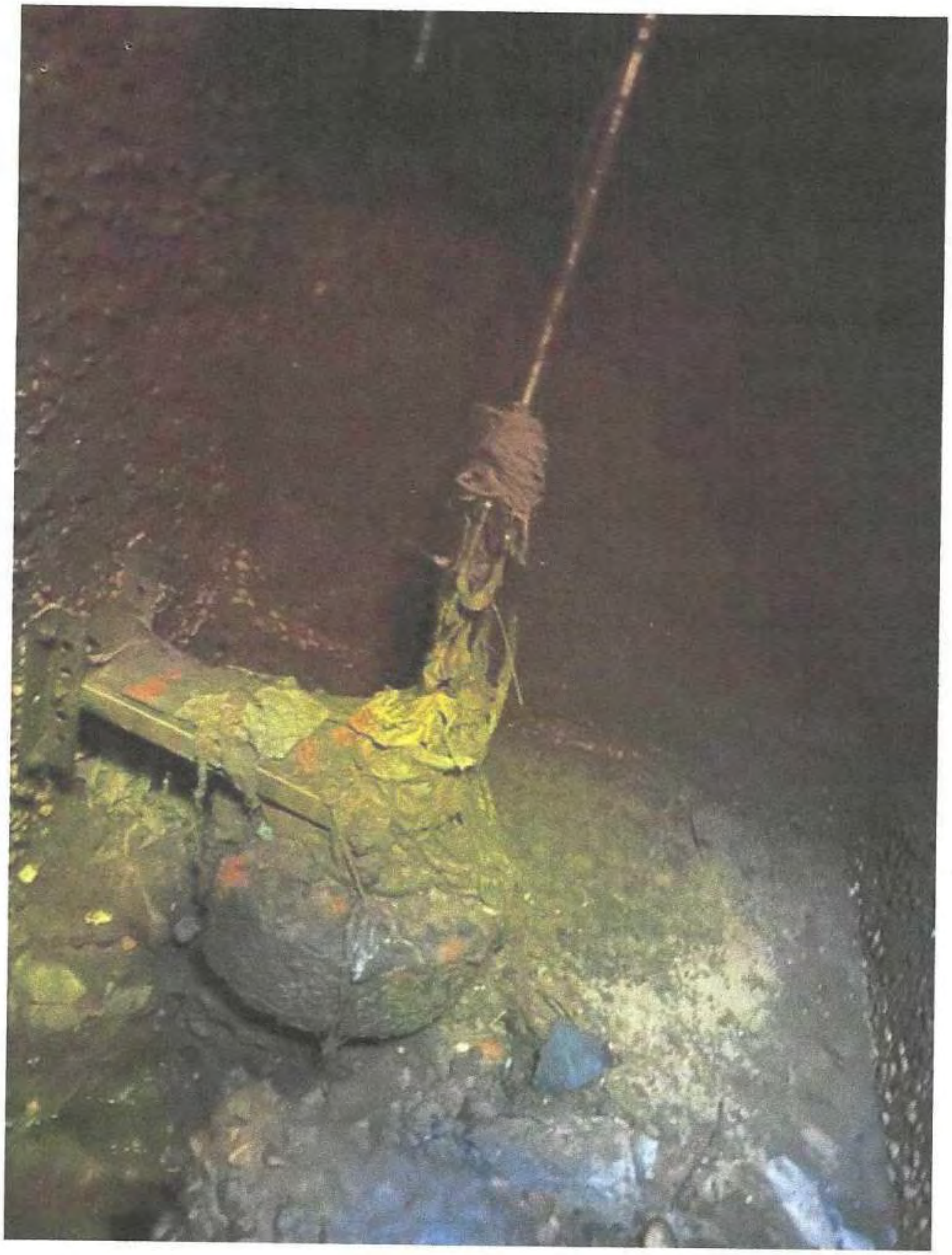
CERTIFICATION: I PERFORMED THE ABOVE SERVICE. ____________ 2-21-23
SIGNATURE DATE

G1

Dan Harkins <Dharkins@cityofgloucester.org>
Wed 2/22/2023 9:42 AM
To: Dan Harkins <Dharkins@cityofgloucester.org>







Sent from my iPhone

CCMUA / Camden / Gloucester City Reponses to NJDEP 8/9/23 30 Day Information Request

Attachment G – NJDEP Letter to CCMUA,

State of New Jersey

PHIL MURPHY
Governor

SHEILA OLIVER
Lt. Governor

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

SHAWN M. LATOURETTE
Commissioner

Via E-mail
August 9, 2023

Scott Schreiber, Executive Director
Camden County Municipal Utilities Authority
1645 Ferry Avenue
Camden, NJ 08104

Donna Domico, Superintendent
City of Gloucester
100 North Johnson Boulevard
Gloucester, NJ 08030

Orion Joyner, City Engineer
City of Camden
520 Market Street, Suite 325
Camden, NJ 08101

Re: Review of Selection and Implementation of Alternatives Report (SIAR)
City of Camden, NJPDES Permit No. NJ0108812
City of Gloucester, NJPDES Permit No. NJ0108847
Camden County Municipal Utilities Authority (CCMUA), NJPDES Permit No. NJ0026182

Dear Permittees:

Thank you for meeting with the New Jersey Department of Environmental Protection (the Department) on August 2, 2023 to discuss the pending issuance of the draft New Jersey Pollutant Discharge Elimination System (NJPDES) Combined Sewer Overflow (CSO) renewal permits. These permits will incorporate elements of the CSO Long Term Control Plan (LTCP) submitted by all three permittees and will include an implementation schedule in each permit. Prior to this meeting, the Department submitted a request for information dated June 13, 2023 to all three permittees which concerned the proposed implementation schedule, with responses dated June 15, 2023 (Gloucester only) and July 12, 2023 (all three permittees). A separate letter was issued to the City of Gloucester on June 28, 2023. This subject letter is prepared in response to the July 12, 2023 submission to the Department. In addition, this letter serves to summarize the Department's follow-up questions as a result of information provided in the August 2, 2023 meeting on specific projects. Finally, this letter serves to request additional information on infiltration / inflow (I/I) and to provide guidance on a revised LTCP.

Project Information

As an initial matter, the Department acknowledges information included in the July 12, 2023 submission with respect to ongoing projects to improve the operation of the collection system. As supplemental detail to the July 12, 2023 submission, completion dates of projects were provided in the meeting. Specifically, a date of October 31, 2024 was provided for the completion of the initial cleaning of the Camden collection system. Additionally, a date of December 31, 2023 was provided for the completion of the initial cleaning of the Gloucester collection system. These dates will be incorporated as requirements in the draft NJPDES CSO permits.

A primary focus of the NJPDES CSO permit renewal process is to establish a defined implementation schedule for CSO control measures. Updated information was provided in the meeting by the City of Camden and the City of Gloucester with respect to ongoing operation and maintenance of the collection system through system cleaning as well as maximization of flow to the treatment plant. Updated information was also provided regarding changes to the operation of pump stations as a result of the wet weather expansion of CCMUA. This letter serves to formalize additional detail requested in that meeting.

Additional information is requested for CCMUA:

- Completion date of full expansion of wet weather expansion of CCMUA; and
- Flow data at the headworks to show increases in diversion of combined sewage flows for treatment at CCMUA.

Additional information is requested for the City of Camden:

- A map depicting those portions of the collection system already cleaned and those portions remaining to be cleaned; and
- Information to document the average amount of times per year the Arch Street Pump Station (owned/operated by Camden) shut down pre-expansion and post-expansion of CCMUA to document any increase in wet weather flow for treatment at CCMUA. This can be coupled with the above headworks flow data.

Additional information is requested for the City of Gloucester:

- A map depicting those portions of the collection system already cleaned and those portions remaining to be cleaned;
- The amount of linear feet of the collection system cleaned and remaining to be cleaned. Any information regarding amount cleaned per year over the previous years and tonnage removed;
- Inspection and documentation of the operating condition and functionality of each CSO outfall (i.e., need for dredging);
- Documentation of the operating condition and functionality of each regulator within the collection system; and
- Flow records documenting the average flow from the North King Street Pump Station (owned/operated by Gloucester) to the Gloucester City Pump Station (owned/operated by

CCMUA). This information is needed to document any increase in wet weather flow for treatment at CCMUA. This can be coupled with the above headworks flow data.

Once this information is provided, the Department will consider the June 13, 2023 request to be satisfied for all three permittees. Please provide this information to the Department no later than 30 days from the date of this letter.

Request for Information Regarding I/I

The LTCP provided an analysis of the CSO control strategies including green infrastructure, increased storage capacity, STP expansion, CSO related bypass, treatment of the CSO discharge, sewer separation and infiltration and inflow (I/I) reduction. In addition, Part IV.F.1.h.1.ii of the NJPDES permits states permittees must "identify I/I and reduce it to meet the definition of non-excessive infiltration (in combined and separately sewered areas) and non-excessive inflow (in separately sewered areas) where both terms are defined in N.J.A.C. 7:14A-1.2."

The Department hereby requests additional detail on the CSO control strategy of I/I. On page 6-18 of the October 2020 LTCP, it is stated that "CCMUA has the option at its sole discretion but not the obligation to address inflow and infiltration on a regional basis where cost-effective." As stated on page 4-9 of the June 2019 Development and Evaluation of Alternatives Report (DEAR):

> "Inflow and infiltration reduction will not play a major role in long term CSO control due to the high volumes of wet weather flow generated in the combined sewered areas relative to the volume of I/I contributed from the hydraulically connected sanitary sewered areas. There are approximately 101 square miles of sanitary sewered areas contributing flow to CCMUA's WPCF #1. If a 50% reduction in I/I from the sanitary sewered area is assumed, the total annual CSO discharge volume would be reduced by approximately 12% from 628 million gallons / year to 550 MGY."

Provide additional information in a revised LTCP (see below) as to why I/I will not play a major role in long term CSO control. Include any supporting documentation as to why addressing I/I controls in sanitary sewered areas outside of Camden and Gloucester City has not been pursued.

Long Term Control Plan Revisions

Given that the Department is moving forward with the NJPDES Permit, an updated LTCP is needed to amend the Administrative Record. The Department issued technical comments dated May 7, 2021 on the October 2020 LTCP where a response was provided by the permittees on July 21, 2021. Please provide a revised LTCP with information incorporated therein from all relevant submissions (since the October 2020 LTCP) in both a clean and red lined version. In addition, the revised LTCP shall include any subsequent submissions to the Department as an attachment in that report such as the July 12, 2023 submission. The revised LTCP is due within sixty (60) days of the date of this letter. Thank you for your continued cooperation.

Sincerely,

Susan Rosenwinkel

Susan Rosenwinkel
Assistant Director
Water Pollution Management Element

C: Dwayne Kobesky, Bureau of Surface Water and Pretreatment Permitting
Joseph Mannick, Bureau of Surface Water and Pretreatment Permitting
Molly Jacoby, Bureau of Surface Water and Pretreatment Permitting
Andrew Koske, Division of Water Quality
Charles Jenkins, Municipal Finance and Construction Element