Appendix H

Selection and Implementation of Alternatives Report for Borough of East Newark

Selection and Implementation of Alternatives Report

Township of East Newark

September 2020

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SECTION A - INTRODUCTION

The Borough of East Newark is a densely populated town in Hudson County, New Jersey. The town comprises an area of approximately 0.1 square miles and is boarded by the Town of Kearny in the north and Harrison in the south. It is located by the Passaic River and has one CSO regulator that discharges CSO to the river through an outfall as shown in Figure A-1. All combined sewer flows within the regulators capacity is conveyed to the PVSC wastewater treatment plant through PVSC interceptor. The Borough's combined sewer system is permitted under NJPDES Permit No. NJ0117846

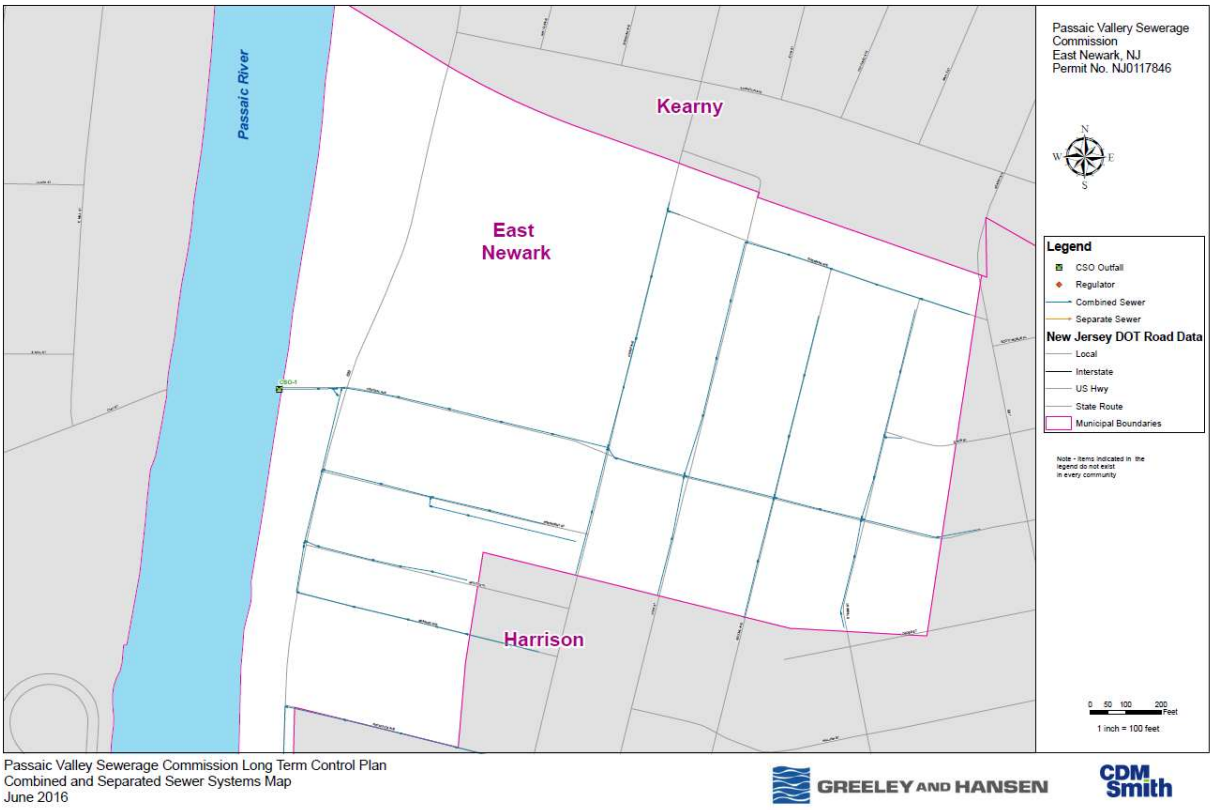

Figure A-1: East Newark Drainage Area

In consistency with the 1994 USEPA's CSO Control Policy, the NJPDES permit requires implementation of CSO controls through development of a Long-Term Control Plan (LTCP). The permit includes requirements to cooperatively develop the LTCP with PVSC and its hydraulically

connected CSO permittees. Each permittee is required to develop all necessary information for the portion of the hydraulically connected system they own.

Section D.3.b.v of the NJPDES permit indicates that, as part of the LTCP requirements, a Development and Evaluation of CSO Control Alternatives Report be submitted to the NJDEP within 48 months from the effective date (July 1, 2015) of the permit. To meet this regulatory requirement, the Borough of East Newark prepared the report for the development and evaluation of CSO control measures. Various alternatives evaluated for the Borough of East Newark CSO LTCP including source control technologies, collection system technologies, storage and treatment technologies. This report was included with the PVSC report https://www.nj.gov/dep/dwq/pdf/CSO_DEAR_PVSCRegional_2019-06-28%20Final.pdf.

Establishing baseline condition is an important step in the CSO LTCP alternatives analysis. The Baseline condition is used to compare the effectiveness of different CSO control alternatives and to estimate the magnitude of the CSO volume and frequency reductions. A 25 to 35 year planning horizon is being assumed for implementation of the CSO LTCP. The Borough of East Newark's population was 2,406 counted in the 2010 United States Census. Based on the North Jersey Transportation Authority (NJTPA) report, the 2045 population is projected to be 2,993.

The planned projects in the Borough of East Newark is the remediation of the 7 acre BASF property and the redevelopment of the site of the former 13 acre Clark Thread Mill. Plant shown in Figure A-2. Plans for these private properties are still evolving however it is believed that both properties will be redeveloped as separately sewers areas. The BASF property is to be remediated and redeveloped for ecological purposes with no residences. The Clark Thread Mill site is to be redeveloped as a residential development with separate sewers. For now we are assuming that storm water and wastewater will be separately sewered. This will reduce the CSO drainage area from 62 acres to 42 acres, a reduction of 20 acres. It will also results in a new storm water outfall.

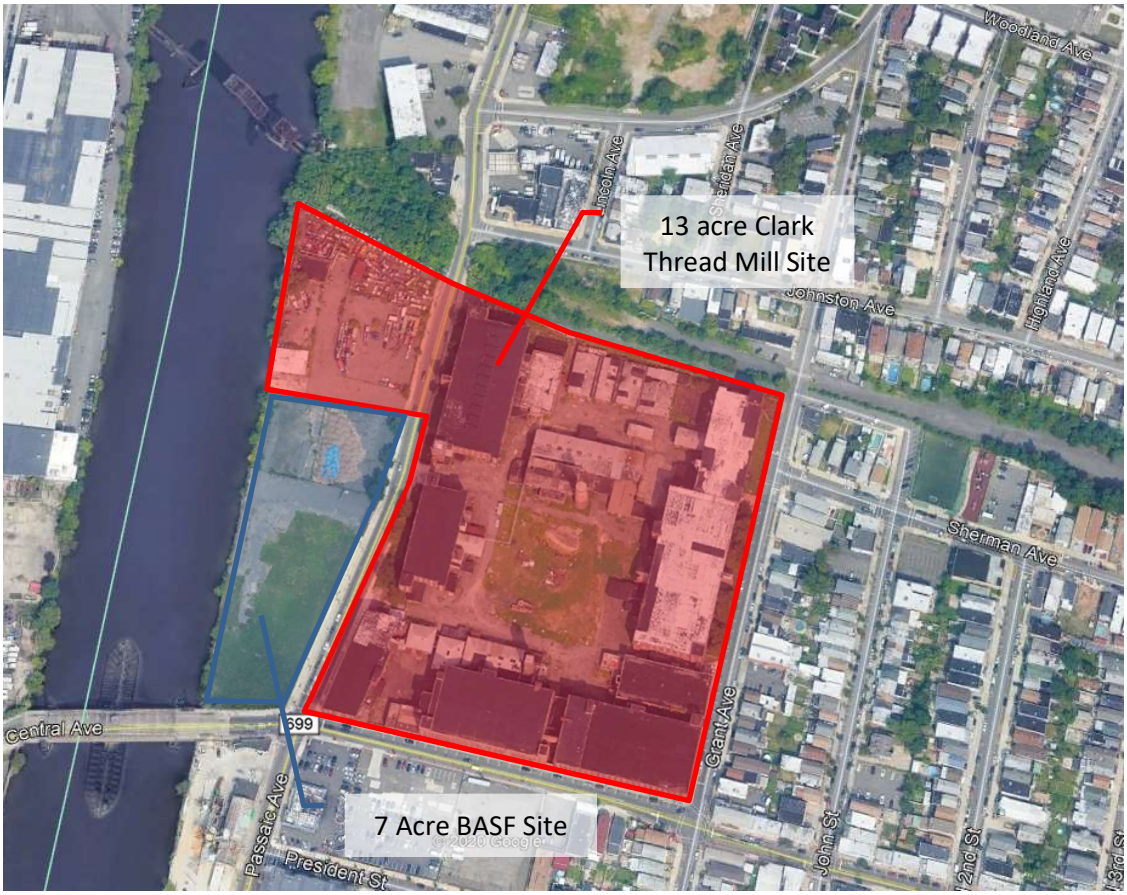

Figure A-2: Planned Projects in East Newark

SECTION B - SCREENING OF CSO CONTROL TECHNOLOGIES

A wide variety of CSO control alternatives were reviewed as part of the technology screening process to identify the options that have the greatest potential in the Borough of East Newark to achieve the CSO control goals. Options identified during this screening process were subsequently evaluated for effectiveness and costs, as described in Section D of the "Development and Evaluation Of Alternative Report – East Newark" (DEAR).

As part of the screening process, each CSO control technology was evaluated for its effectiveness to achieve two goals: bacteria reduction and volume reduction. The other considerations included the ambient receiving water quality goals, the characteristics of the existing sewer system, the characteristics of the wet weather flow (peak flow rate, volume, frequency, and duration), hydraulic and pollutant loading, implementation requirements (land, neighborhood, noise, disruption), and the operational factors.

CSO control technologies can be grouped generally as Source Control, Collection System Control and Storage or Treatment technologies. Technologies under each group were also reviewed with respect to their potential program-role categories as shown below. These categories provide an indication of how a given technology could fit into the overall LTCP program:

- Primary Technology – High potential of meeting water-quality and CSO control goals,
- Complementary Technology – Some potential to bring positive impacts, but may be limited in effectiveness,
- Program Enhancement Technology – Generally good practices, but likely to have limited impact on water-quality and CSO control goals,
- In place/In-progress Technology – Already implemented or included in near-term plans; and
- Not Recommended Technology – Removed from consideration for various reasons (cost, maintenance, public acceptance, constructability, etc.).

The assessment presented in the DEAR involved high-level screening and was limited to the consideration of the general capabilities of CSO control technologies. Sections of the DEAR report present the technologies that were deemed viable in terms of effectiveness, cost, feasibility, and public acceptance. Section C.9 of the DEAR report presents details of the screening process and lists technologies retained for further evaluation in the alternative analysis.

A number of alternatives were identified for consideration. Technologies considered in this LTCP were sewer separation, CSO storage tanks, satellite treatment, green infrastructure and outfall relocation.

SECTION C - EVALUATION OF ALTERNATIVES

C.1 INTRODUCTION

Siting of CSO control alternatives is commonly a subject of most public debate on CSO control projects. Therefore, one of the key considerations in assessing the overall feasibility of a CSO control alternative is the identification of appropriate sites for new facilities. The Borough of East Newark is fully developed with not much available open space. Land availability can be an issue as most of the controls are preferred to be located near the waterfront, which is expensive and privately owned in the borough. It is recognized that issues involving facility location, land takings, and easements in both public and private lands can lead to disagreements among various stakeholders. Therefore, this alternative evaluation focuses on the use of the city-owned available sites which have minimal impact on sensitive stakeholders and are less likely controversial. The environmental, political, socioeconomic, and regulatory impacts of locating a facility at a

designated site will need to be evaluated in detail during the facilities planning and design phase. For private property to be remediated or redeveloped (BASF and Clark Thread Mill Sites) sewer separation will be considered.

An estimate was made of the CSO from each outfall in the DEAR report. The annual CSO overflows for the 2004 typical year for the outfalls is summarized in Table C-1. The selection of 2004 incorporates climate change. A total of 17.2 MG of CSO would be discharged in 32 events for the typical year. This represents 76.3% CSO capture in the East Newark drainage area. Alternatives were first considered that could reduce overflows to 0, 4, 8, 12 and 20 overflows per year presuming that these frequencies would capture 85% of the CSO. After the system was modeled it was realized that a lower level of control (greater than 20 CSO overflows per year) would be needed to comply with EPAs CSO Policy, therefore, additional models runs were performed in preparation of this report with the objective of capturing 85% of the CSO.

Table C-1: East Newark Baseline CSO Results

Regulator	CSO Frequency	CSO Volume (MG)	Percent CSO Capture
EN001	32	17.2	76.3%

Facility siting in this evaluation is preliminary in nature and it is based on the space requirements and available property. A buffer for roadways and access, potential conflicts with existing utilities at the site, highways, and local streets are also part of the preliminary facility siting considerations. The CSO control alternatives considered for East Newark are discussed in detail in the "Development and Evaluation Of Alternative Report – Township of East Newark" (DEAR).

C.2 DEVELOPMENT AND EVALUATION OF ALTERNTAIVES

Section C of the DEAR described the CSO control technology screening performed to identify the preliminary CSO control measures. The screened control measures were further evaluated and described in the following sections. The following section presents overview of various control alternatives developed for the Borough of East Newark. The preliminary alternatives with detailed evaluations are:

- Regulator modifications
- Partial sewer separation
- Green infrastructure (GI)
- Storage tank
- Treatment

As the selection process proceeded it became apparent that Treatment with PAA Disinfection was not a viable alternative for satellite facilities that are not staffed or operated. This would be a candidate technology for central facilities that are staffed during wet weather, such as a wastewater treatment plant, however, as it currently exists it was removed from consideration because it is not demonstrated at satellite facilities.

They alternatives considered are summarized as follows:

1) Inflow/Infiltration (I&I) Reduction

   The reduction of Inflow and Infiltration (I&I) was evaluated as one of the source control solutions. Two scenarios were evaluated - 10% and 50% of I&I reduction. Model results are presented in Table C-2. A 10% reduction in I/I will increase CSO capture to 76.5% and a 50% reduction will increase CSO capture to 76.85%.These are only marginal reductions of CSO volume and demonstrate that a more robust alternative is needed. This control strategy will not be considered further.

Table C-2. CSO Overflow Volumes and Frequencies at NE001 with I/I Reductions

	Baseline		10% Reduction			50% Reduction		
Regulator	CSO Volume (MG)	CSO Frequency	CSO Volume (MG)	CSO Frequency	Percent Capture	CSO Volume (MG)	CSO Frequency	Volume Reduction
EN001	17.2	32	17.1	32	76.5%	16.9	32	76.85%

2) Regulator Modifications

   In the Borough of East Newark, regulator R38 limits the amount of flow to the PVSC main interceptor and diverts excess flow to the outfall during wet weather events. Modification of the regulator, such as decreasing the weir length or increasing the weir height will retain flows back in the system. By raising the existing overflow weir elevation 6 inches, the annual overflow volume was decreased from 17.2 MG to 15.7 MG per year, and increase CSO Capture to 78.5%. But overflow frequencies did not drop at all. Table C-3 is the summary of CSO volume and number of overflows for this alternative. It is noted that HGL downstream of the regulator in the main interceptor was increased by about 0.04 inches, which was less than 0.05 inches. It is uncertain if this alternative would cause street or basement flooding or not. More investigation would be needed if this alternative is considered.

Table C-3. CSO Reduction of Regulator Modification For NE001

	Baseline		Consolidate Outfalls		
Regulator	CSO Volume (MG)	CSO Frequency	CSO Volume (MG)	CSO Frequency	Volume Reduction
EN001	17.2	32	15.7	32	78.5%

3) Partial Sewer Separation

In the northwest part of the Borough of East Newark, there is a 13 acre former Clark Thread Mill manufacturing site which has been shut down. This area could be separated from the combined sewer area and inflows produced from this manufacturing industry could be removed from the combined sewer. The implementation of sewer separation includes the construction of a new storm water pipe a new storm water outfall. Once it is separated, it will require a MS4 permit for the new storm water outfall.

From modeling results, the annual CSO volume was reduced from 17.2 MG to 12.6 MG, a CSOI capture increase to 82.7% per year. Overflow frequencies were reduced from 32 to 31. Although CSO events did not have a significant decrease, this alternative will provide significant benefits for the CSO volume reduction and will be reflected in the reduced size of CSO storage facility as well as the costs. Table C-4 shows the results before and after sewer separation. Volume reductions with sewer separation and GI will be discussed in the subsequent section.

Table C-4: Overflow Volumes and Frequencies with Partial Sewer Separation Alternative

	Baseline		13 Acre Sewer Separation		
Regulator	CSO Volume (MG)	CSO Frequency	CSO Volume (MG)	CSO Frequency	Volume Reduction
EN001	17.2	32	12.6	31	82.7%

4) Green Infrastructure (GI)

GI can be used as a complementary CSO control technology in combination with other alternatives. This alternative was evaluated alone to find out if GI could have a significant impact on CSO volume and frequency reduction. Two different target levels of GI control were evaluated. One of them was to manage 1" of storm water runoff generated from 5% of impervious surfaces, another target level was to manage 1" of storm water runoff generated from 10% of impervious surfaces. In the Borough of East Newark, the combined sewer area is about 62 acres, the impervious surface make up about 84% of the total area,

which is about 52 acres. Table C-5 shows the CSO volume and frequency before and after the implementation of GI within partial sewer separation area (BASF property). Sewer separation only reduces the CSO volume by 27% to 12.6 MG. When GI is added to sewer separation the CSO volume reduction is increased to 83.1% with 5% GI control and 83.6% with 10% GI. This says that GI will only increase CSO reduction by 0.4 to 0.9%. Only one CSO event was eliminated for both scenarios. Because of the relatively small impact achievable with GI, HDR decided to evaluate all alternatives conservatively, without GI, with the assumption that any additional impact of GI, however minor, would be considered in the development of the final selected alternatives.

Table C-5: CSO Reduction by Sewer Separation and Green Infrastructure

	Baseline		5% Impervious Area			10% Impervious Area		
Regulator	CSO Volume (MG)	CSO Frequency	CSO Volume (MG)	CSO Frequency	CSO Reduction	CSO Volume (MG)	CSO Frequency	CSO Reduction
All	17.2	32	12.3	31	83.1%	12.0	31	83.6%

5) Storage Tanks

A conceptual evaluation of the storage tank for CSO reduction was performed. It is assumed that a storage tank would be located near the existing outfall and it would be below the ground. Only one storage tank is needed in the Borough of East Newark. CSO is stored in the tank during wet weather events. The stored CSO is pumped back to the interceptor for conveyance to the PVSC treatment plant during dry weather and when the system capacity is available. Five scenarios were analyzed to size the storage tank in order to achieve CSO frequencies of 0, 4, 8, 12, and 20 overflows per year. For example, in order to achieve 4 CSO events control target citywide per year, the sizing criteria for the storage tank is to capture the 5th biggest rainfall event during the typical year of 2004. Tank dewatering pump back rate is no more than 75% of the total average dry weather flows and the tank can be dewatered within 72 hours except for zero CSO control target. Overflows from the tank are the same as those listed in the January 7, 2019 Tech Memo "top 20 storm table" for each target. This alternative combined with partial sewer separation at the BASF Clark Thread Mill site described earlier and with 5% and 10% GI were analyzed. Table C-5 shows the size of the tank required at each CSO frequency target. Table C-6 also summarizes the CSO volume for each frequency target and the CSO achieved. Storage tank alternative is considered as a primary solution for the CSO control because it is able to reach the overflow event control target of 85% which would allow more frequent overflows.

Table C-6: CSO Storage Tank Projected Overflow Frequencies and Volumes for the 2004 Rain Year

CSO Event Target/yr	Storage Tank Size (MG)	5% GI With CSO Tank		10% GI With CSOTank	
		CSO Volume	CSO Capture	CSO Volume	CSO Capture
Baseline	-	17.2	76.3%	17.2	76.3%
0	1.8	0	100%	0	100%
4	0.9	0.55	99.3%	0.53	99.3%
8	0.6	1.30	98.2%	1.44	98.0%
12	0.4	2.22	97%	2.39	96.7%
20	0.2	3.98	94.5%	4.21	94.2%

6) Treatment - PAA Disinfection

Solids removal and disinfection of combined sewer overflows is another option for the Borough of East Newark. The WWEDCO FlexFilter and disinfection by Peracetic Acid (PAA) serves as the basis in the evaluation. Total suspended solids and pathogens represent the primary pollutant of concern for CSO discharges. Disinfection facilities are sized based on the maximum CSO discharge flow rate for each event to fully treat all but 4, 8, 12, and 20 CSO discharges per year. For the target of 4 CSO events per year, the 5th largest storm in the typical year will be captured and disinfected. For the storm events larger than the 5th event, CSO discharges will be partially treated, full treatment is achieved only during times that CSO discharges are less than the maximum discharge rate. Where full treatment is achieved, disinfection is assumed to remove 99.9% of pathogens (a "3-log kill."). This degree of performance would reduce an influent of 500,000 CFU/100 mL to 500 CFU/100 mL in the effluent at the design flow rate. Performance would improve at lower flow rates. This preliminary disinfection alternative assumes that PAA disinfection will be implemented at locations between the existing regulators and the existing outfalls. Similar to the storage tank control, this alternative was assessed based on partial sewer separation. Table C-7 presents the peak flow rates at each CSO control target and Table C-7 summarizes the volume of partially treated overflows at different control level.

The Flex Filter was included with PAA disinfection to provide the equivalent of primary treatment. The WWEDCO website describes the technology and its performance (http://www.westech-inc.com/en-usa/products/combined-sewer-overflow-cso-and-tertiary-treatment-wwetco-flexfilter). In the 2004 Report To Congress average CSO was reported to contain 215,000 CFU/100 mL and in PeroxyChem's 2016 presentation titled Trends In Wastewater Disinfection Peracetic Acid (PAA), a Ct value (disinfectant dose in mg/L times

the contact time in minutes) of 45 mg/L-min was reported to reduce Fecal Coliform in a secondary effluent to 200 CFU/100 mL. This Ct value is equivalent to a PAA dosage of 9 mg/L at a contact time of 5 minutes. This is an indication that PAA will disinfect CSO but testing is required to understand the site specific variables such as suspended solids concentration, PAA demand of the CSO and the Fecal Coliform concentration of the CSO. Although PAA disinfection could potentially provide the degree of treatment required, the process has not been well developed for satellite treatment of CSOs. At this point it will not be considered for East Newark's CSO. Although PAA disinfection could potentially provide the degree of treatment required, the process has not been well developed for satellite treatment of CSOs. At this point it will not be considered for East Newark's CSO.

Table C-7: Peak CSO Flow Rates (MGD) for Each Control Target

CSO Event Target/yr	5% GI With PAA	10% GI With PAA
	EN001	EN001
0	65.3	67
4	37.1	35.5
8	19.9	20.3
12	19.9	20.3
20	9.85	9.8

Table C-8: Partially Treated CSO Volumes (MG) For Each Control Target

CSO Event Target/yr	5% GI With PAA		10% GI With PAA	
	EN001	CSO Control	EN001	CSO Control
Baseline	17.2	76.3%	17.2	76.3%
0	0	100%	0	100%
4	1.12	98.5%	1.39	98.1%
8	2.88	96.1%	3.00	95.9%
12	2.88	96.1%	3.00	95.9%
20	4.70	93.6%	4.86	93.3%

Cost analysis was performed for GI, storage tank, and PAA disinfection in the Borough of East Newark. Assumptions used to estimate capital and O&M costs are described as follows.

1. Sewer Separation Costs
    a. Capital cost for partial sewer separation is based on a normalized cost of $235,233 per acre (2006, HMM). To convert to 2018 costs, a ratio of 10817:7630 was applied herein, based on the Engineering News Record (ENR) Construction Cost Index (CCI) values for 2018 and 2006, respectively. Table D-10
    b. O&M costs are estimated based on 2% of the capital cost (2019c, G&H).Table D-10
2. Treatment Costs
    a. Capital and O&M costs for PAA disinfection are based on the latest available guidance for permittees (2018, G&H) and are in Table D-10.
3. Storage Tank Costs
    a. Capital costs for tank-storage solutions are based on the latest available guidance for permittees (2018, G&H) and are in Table D-10.
    b. O&M costs for tanks are based on operational costs at $235,000 and maintenance costs at 3% of the construction cost, in accordance with the latest available guidance for permittees (2019c, G&H) and are in Table D-10.
4. Green Infrastructure Costs
    a. Capital costs for various GI solutions are based on the latest available guidance for permittees (2018, G&H) and are in Table D-11.
    b. O&M costs for Bioretention GI solutions were provided as $8,000 per managed acre (2019c, G&H) and are in Table D-11.
    c. O&M costs for Porous Pavement GI solutions were assumed to be $1,250 per managed acre (2018, DEP) and are in Table D-11.
5. Additional Cost Factors
    a. Present-value (PV) of life-cycle costs based on a 20-year period and an interest rate of 2.75% in accordance with the latest available guidance for permittees (2019a, G&H).
    b. Based on experiences on other similar CSO LTCP projects, HDR applied a capital-cost factor of 2.5 to calculate the probable total project cost (PTPC) of implementing each technology. The PTPC accounts for installation, non-component (electrical, piping, etc.), and indirect costs (freight, permits, etc.) for all

storage and disinfection. A breakdown of how this factor was calculated is shown below.

- Installation was estimated at 20% of equipment costs based on historic data experienced by HDR and industry standards for typical plants of similar size and complexity.
- Non-component costs including: electrical (10%), piping (10%), instrumentation and controls ($15,000), and civil site work (25%) were estimated based on factors or percentages of equipment costs. These factors account for standard installation commodities, accessories, steal supports and standard testing support.
- Freight was estimated at a lump sum of $20,000.
- Sales tax was estimates at 8%
- Permits were estimated at $20,000
- Start up, performance testing, operator training and O&M manual were estimated at $50,000
- Contract overhead and profit includes 29% for the following:
    - Part time - Project management support, project controls, procurement, quality and safety support.
    - Full time - Site construction manager (CM), site administration, standard CM travel pack.
- Engineering, administration and legal fees were estimated at 10%
- A contingency of 10% is included for the remaining equipment items and non-component costs

The cost for each technology are presented in Table D-10 of the DEAR report and they are summarized in Figure C-1. The low cost alternative is satellite treatment, however, this alternative will not be considered further because it has not been demonstrated as a satellite technology. This leave sewer separation, CSO storage tanks and green infrastructure as viable alternatives for consideration. 85% CSO reduction will be the control target.

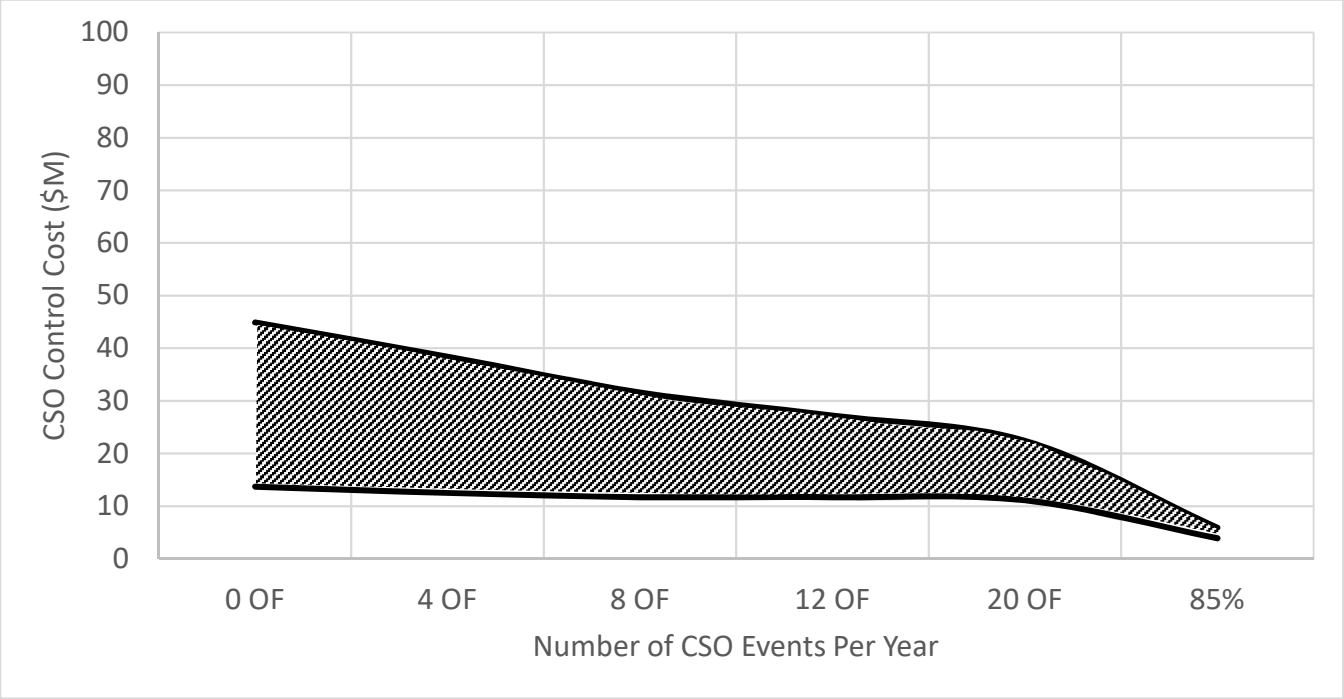

Figure C-1: East Newark Knee of the Curve for CSO Control

SECTION D - SELECTION OF RECOMMENDED LTCP

D.1 LTCP SELECTION PROCESS

East Newark has selected the Presumptive Approach for their CSO LTCP program. CSO storage tanks, sewer separation, GI were selected for consideration and sewer separation was selected as the preferred technology. Since the DEAR report was submitted it became known that the BASF property is 7 acres and the Clark Thread Mill property is 13 acres. Separating sewers on the BASF and Clark Thread Mill property could be done by the property owners and O&M costs are low.

D.2 SELECTION OF ALTERNATIVES

Sewer Separation of the BASF and Clark Thread Mill properties will increase CSO capture from 76.6% to 85%. However these sites are privately owned and a firm schedule has not been determined yet for the redevelopment. Also, the final land area has been corrected to 7 acres for the BASF property and 13 acres for the Clark Thread Mill, 20 acres in total.

D.2.1 Description

Sewer separation is a disruptive technology, however, the separation would be done as the sited are developed (thread mill) or remediated (BASF). Therefore, disruption to the public should be minimal. Both properties boarder the Passaic River and a new stormwater outfall could be constructed on the property. The construction schedule, however, is not known at this time. It is assumed that both projects will be constructed within 10 years however a firm schedule is not known at this time.

D.2.2 Remaining Overflows

After the sewers are separated the remaining overflows will be discharged from EN001. New stormwater outfalls will need to be constructed for the separated stormwater. This could be done on BASF or the Thread Mill properties as the border the Passaic River.

D.2.3 Ability to Meet Water Quality Standards

CSO load reduction will be proportional to the flow reduction. Loads to the Passaic River will be reduced by 8.7% of the current loads, or 85% of the total CSO loads.

D.2.4 Non-Monetary Factors

The advantage of selecting sewer separation over other technologies is that the cost of separating the sewers could be paid for in full or in part by the developer. Plans have been approved for the remediation (BASF) and property development (Thread Mill). East Newark will now negotiate

with the developers for the sewer separation work. If satisfactory terms with the developer cannot be reached or the project is not constructed for any reason, East Newark will separate the sewers, however, a longer period will be required.

D.2.5 Cost Opinion

The planning cost of sewer separation is based on $300,000 per acre separated as discussed in the Regional Report. This has been an updated cost from the DEAR report. The cost for the two properties is as follows:

Clark Thread Mill	13	$3,900,000
BASF	7	$2,100,000
Total	20	$6,000,000

The actual cost will likely be less than this because they are undeveloped (BASF) and vacant (Tread Mill).

D.2.6 Selection of Recommended Alternative

The percent CSO capture will increase from 76.6% to 82.5% when the thread mill development is built. It will then increase to 85.2% with remediation of the BASF property. Table D-1 presents CSO reductions.

Table D-1: East Newark's LTCP

Alternatives	(Acres)	Frequency	CSO (MG/yr)	% Capture
Baseline	-	32	17.2	76.3%
Sewer Separation Thread Mill	13	31	12.8	82.5%
Sewer Separation Thread Mill + BASF	13+7	31	10.9	85.2%

SECTION E - Financial Capability

E.1 Introduction

This section of the Borough of East Newark's Selection and Implementation of Alternatives Report (SIAR) quantifies the projected affordability impacts of East Newark's proposed long term CSO controls for its combined sewer system (CSS) and updates the 2019 preliminary FCA memo that was intended to guide the development and selection of long term controls. This section is excerpted from a memorandum prepared by the Passaic Valley Sewerage Commission (PVSC) which is incorporated as Appendix P of PVSC's SELECTION AND IMPLEMENTATION OF ALTERNATIVES FOR LONG TERM CONTROL PLANNING FOR COMBINED SEWER SYSTEMS - REGIONAL REPORT (Regional Report).

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

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

Detailed discussion of the FCA for the PVSC service area and Permittees can be found in the Regional Report and a detailed analysis of East Newark's FCA can be found in the FCA Memorandum specifically written for the Borough and attached as part of Appendix P of the Regional Report.

E.2 BASELINE CONDITIONS (WITHOUT CSO CONTROLS)

The estimated annual cost for wastewater services for a typical single-family residential user for 2019 is $436. This estimate is based on typical residential potable water usage is 4,500 gallons monthly. Based on the estimated MHI of $61,400 the Residential Indicator was approximately 0.7% in 2019, or approaching the border between what the EPA guidance defines as a low burden and a medium burden. By definition the current residential indicator for one half of the households is greater than the 0.7%.

In East Newark, 13% of the population was living below the poverty line. The total Census households are broken out by income brackets on Table E-1 below, along with the respective current Residential Indicators by income bracket. The RI for each bracket was calculated from the mid-point income within the bracket. At the lowest income levels, the current RI is already between 2.2% and 8.7%.

Table E-1. Analysis of the Current Residential Indicator

Income Bracket	Households		Bracket Average Income	Bracket RI at Typical Cost per Household
	Number	Cumulative		
Less than $10,000	28	28	$5,000	8.7%
$10,000 to $14,999	44	72	$12,500	3.5%
$15,000 to $24,999	56	128	$20,000	2.2%
$25,000 to $34,999	86	214	$30,000	1.5%
$35,000 to $49,999	133	347	$42,500	1.0%
$50,000 to $74,999	156	503	$62,500	0.7%
$75,000 to $99,999	104	607	$87,500	0.50%
$100,000 to $149,999	140	747	$125,000	0.4%
$150,000 to $199,999	53	800	$175,000	0.3%
$200,000 or more	30	830	$200,000	0.2%
Total	830			

PVSC has developed a time-based model that calculates annual costs and revenue requirements based on assumed program costs, schedules and economic variables such as interest and inflation rates. The residential indicator is calculated for each year based upon the costs per typical residential users which changes annually based on the annual system revenue requirements. The estimated inflationary impacts on wastewater costs per typical single family residential user without additional CSO control costs are shown on Table E-2. The costs are projected to the year 2031 based on an assumed the LTCP implementation schedule with construction of CSO controls extending through 2030. Assuming inflation, the projected cost per typical single family residential user are projected to increase from $436 in 2019 to $595_ in 2031.

Table E-2 – East Newark Projected Residential Indicator in 2031 Without CSO Controls

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2031
RI	0.7%	0.8%
Annual $	$436	$595

E.3 SUMMARY & CONCLUSION

E.3.1 Affordability Impacts of the Proposed CSO Controls

East Newark has identified a long term CSO control strategy that will achieve 85% capture of wet weather flows during the typical year. These controls are summarized on Table E-3.

Table E-3 – East Newark's Selected CSO Controls

Wet Weather Control Types	Capital Costs ($ millions)	Identified Incremental Annual O&M Costs ($ millions)
Thread Mill Sewer Separation	$3.9	$0.0
Waterfront Sewer Separation	$2.1	$0.0
Total	$6.0	$0.0

Implementation of the $6.0 million Municipal Control Alternative results in projected costs per typical single family user of $901 (without inflation) and a residential indicator of 1.5% in 2031. Accounting for inflation, annual costs would grow to $1,191 with a residential indicator of 1.6% as shown in Table E-4.

Table E-4 – East Newark's Projected Residential Indicator Upon Full Implementation of the CSO Control Program

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2031			
		No LTCP		LTCP Implementation Completed in 2030	
		With Inflation	Without Inflation	With Inflation	Without Inflation
RI	0.7%	0.8%	0.7%	1.6%	1.5%
Annual $	$436	$595	$436	$1,191	$901

E.3.2 Financial Capability Assessment

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

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

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

As shown on Table E-5, the overall score for the financial indicators is 2.4 yielding an EPA Qualitative Score of "midrange". As each of the financial indicators are generally based upon publicly available data from 20197 or earlier, this analysis does not reflect the current and lingering impacts of the COVID -19 pandemic and should be revisited upon memorializing the LTCP implementation schedule in the City's next NJPDES Permit.

Table E-5 – Permittee Financial Capability Indicator Benchmarks

Indicator	Rating	Numeric Score
Bond Rating	Not Applicable	
Overall Net Debt as a Percent of Full Market Property Value	Strong	3
Unemployment Rate	Strong	3
Median Household Income	Midrange	2
Property Tax as a Percent of Full Market Property Value	Midrange	2
Property Tax Collection Rate	Midrange	2
Total		12
Overall Indicator Score: (numeric score / number of applicable indicators)		2.4
EPA Qualitative Score		Midrange

E.3.3 Implementation Feasibility Implications

The 1997 EPA guidance indicates that ratepayers and permittees who are highly burdened future expenditures added to their current wastewater treatment, conveyance, and collection costs can be allowed 15 years to complete capital projects to handle CSOs. In extreme cases, the guidance suggested a 20-year compliance schedule might be negotiated.[1]

The affordability analysis detailed above has documented that the selected $6.0 million (current dollars) in capital expenditures under East Newark's Municipal Control Alternative would result in a Residential Indicator of 1.6%, slightly below the EPA "high burden" trigger in 2031.

Additional economic factors are presented in the East Newark FCA Memorandum presented in Appendix P of the SELECTION AND IMPLEMENTATION OF ALTERNATIVES FOR LONG TERM CONTROL PLANNING FOR COMBINED SEWER SYSTEMS - REGIONAL REPORT enforcing the limits to the affordability of CSO controls and the City's financial capability.

While the affordability analysis detailed above has documented that the selected $6.0 million (current dollars) capital expenditures improvement program along with related operation and maintenance costs would result in a Residential Indicator of "medium impact" under EPA's

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

criteria; the reality of low effective household incomes compared nationally and the high costs of living in East Newark argue strongly that the EPA metric understates the impacts of the CSO control costs on the residents of the Borough. East Newark is and is likely to remain financially distressed due to structural economic factors beyond its direct control and its ability to afford and finance future CSO control facilities is restricted. As evidenced by its New Jersey Municipal Revitalization Index score in the top 88th percentile, East Newark's capacity for additional CSO controls, beyond those proposed in the SIAR, is limited.

E.3.4 Potential Impacts of the COVID-19 Pandemic in Affordability

The projections and conclusions concerning the affordability of the Municipal Control Alternative proposed in this SIAR by the East Newark and East Newark financial capability to finance the CSO control program are premised on the baseline financial conditions of East Newark as well as the economic conditions in New Jersey and the United States generally at the time that work on this SIAR commenced. While the impacts of the pandemic on the long-term affordability of the CSO LTCP are obviously still unknown, it is reasonable to expect that there will be potentially significant impacts. There are several dimensions to these potential impacts, including reduced utility revenues and household incomes.

Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, East Newark will be reticent to commit to long term capital expenditures for CSO controls without the incorporation of adaptive management provisions, including provisions to revise and reschedule the long term CSO controls proposed in this SIAR based on emergent economic conditions beyond the permittees' control. These provisions could include scheduling the implementation of specific CSO control measures to occur during the five year NJPDES permit cycles. A revised affordability assessment should be performed during review of the next NJPDES permit to identify controls that are financially feasible during that next permit period.