

Appendix K

Selection and Implementation of Alternatives Report for Town of Kearny

**NEW JERSEY DEPARTMENT
OF ENVIRONMENTAL PROTECTION**

SELECTION AND IMPLEMENTATION OF ALTERNATIVES REPORT

FOR

TOWN OF KEARNY (NJPDES PERMIT No. NJ0111244)

October 1, 2020

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TABLE OF CONTENTS

SECTION A - INTRODUCTION	3
SECTION B - SCREENING OF CSO CONTROL TECHNOLOGIES	11
B.1 SOURCE CONTROL (INCLUDING GREEN INFRASTRUCTURE)	11
B.2 BASE FLOW REDUCTION	12
B.3 COMBINED SEWER OPTIMIZATION	12
B.4 STORAGE	13
B.5 WASTEWATER TREATMENT PLANT (WWTP) EXPANSION	13
B.6 SEWER SEPARATION	13
B.7 TREATMENT OF CSO DISCHARGE	13
SECTION C - EVALUATION OF ALTERNATIVES	15
C.1 INTRODUCTION	15
C.1.1 Evaluated Performance Metrics	15
C.2 DEVELOPMENT AND EVALUATION OF ALTERNATIVES	16
SECTION D - SELECTION OF RECOMMENDED LTCP	19
D.1 INTRODUCTION	19
D.2 LTCP SELECTION PROCESS	19
D.3 SELECTION OF ALTERNATIVES	21
D.3.1 Description	21
D.3.2 Remaining Overflows	21
D.3.3 Ability to Meet Water Quality Standards	22
D.3.4 Non-Monetary Factors	24
D.3.5 Cost Opinion	24
D.3.6 Selection of Recommended Alternative	25
D.4 DESCRIPTION OF RECOMMENDED LTCP	25
D.4.1 Alternative No. 1 to Achieve 85% Capture Requirement	25
D.4.2 Green Infrastructure Program	29
SECTION E - FINANCIAL CAPABILITY	30
E.1 INTRODUCTION	30
E.2 BASELINE CONDITIONS (WITHOUT CSO CONTROLS)	30
E.3 SUMMARY AND CONCLUSION	32
E.3.1 Affordability Impacts of the Proposed CSO Controls	32
E.3.2 Financial Capability Assessment	32
E.3.3 Implementation Feasibility Implications	33

E.3.4	Potential Impacts of the COVID-19 Pandemic on Affordability.....	34
SECTION F - RECOMMENDED LONG TERM CONTROL PLAN		35
F.1	INTRODUCTION	35
F.2	RECOMMENDED LTCP	35
F.3	IMPLEMENTATION COST OPINION	35
F.4	IMPLEMENTATION SCHEDULE.....	36
F.5	BASIS FOR LTCP DEVELOPMENT AND IMPLEMENTATION SCHEDULE.....	38
F.6	CSO REDUCTION VERSUS TIME.....	38

LIST OF TABLES

Table C-1: Summary of Evaluated Alternatives to Achieve Zero (0), Four (4), Eight (8), Twelve (12) and Twenty (20) Overflows per Year	16
Table D-1: Summary of Selected Alternative.....	19
Table D-2: Description of Final Alternative	21
Table D-3: Alternative No. 1 – Existing and Proposed Volume and Frequency Model Results .	21
Table D-4: Town of Kearny Water Quality Standards	22
Table D-5: Costs Summaries – Alternatives No. 1 and No. 2	24
Table D-6: Summary of Selected / Recommended Alternative.....	25
Table E-1: Analysis of the Current Residential Indicator.....	30
Table E-2: Kearny Project Residential Indicator in 2051 Without CSO Controls	31
Table E-3: Kearny’s Selected CSO Controls.....	32
Table E-4: Kearny’s Projected Residential Indicator Upon Full Implementation of the Municipal Control Alternative	32
Table E-5: Permittee Financial Capability Indicator Benchmarks	33
Table F-1: Summary of Alternative No. 1	35
Table F-2: Summary of Implementation Schedule.....	36
Table F-3: Town of Kearny CSO LTCP Implementation Schedule.....	37
Table F-4: CSO Event Frequency vs. Time.....	39
Table F-5: CSO Volume Reduction (MG) vs. Time (years after LTCP approval)	39

LIST OF FIGURES

Figure A-1: Outfall and Drainage Area Overview Map	5
Figure A-2: KE001A Outfall Aerial Location Map.....	6
Figure A-3: KE004A Outfall Aerial Location Map.....	7
Figure A-4: KE006A Outfall Aerial Location Map.....	8
Figure A-5: KE007A Outfall Aerial Location Map.....	9
Figure A-6: KE010A Outfall Aerial Location Map.....	10
Figure D-1: Receiving Waterbodies Map	23
Figure D-2: Sewer Separation within KE006A	27
Figure D-3: Sewer Separation within KE010A	28
Figure F-1: CSO Volume Reduction (MG) vs. Time (years after LTCP approval)	41

SECTION A - INTRODUCTION

The Town of Kearny is a developed urban community located in Hudson County and is bordered by North Arlington to the north, East Newark to the south, Newark to the west, across the Passaic River, and Jersey City to the east, across the Hackensack River. Overall, the Town encompasses an area of approximately 10.27 square miles. The Town owns and operates a combined sewer system (CSS) which is permitted under NJPDES Permit No. NJ0111244, Category CSM (Combined Sewer Management), with an effective date of July 1, 2015. However, it shall be noted that only a portion of the Town is serviced via a CSS. Generally, the area to the west of Schuyler Avenue within the Town is serviced via a CSS, whereas areas to the east of Schuyler Avenue are generally serviced via separate sanitary and stormwater conveyance system. While the Town owns all of the conveyance systems and discharge facilities, along with associated pumping stations, the Town does not own associated discharge facility regulators or any treatment facilities. Therefore, all combined sewer flows from the Town of Kearny are transported to the Passaic Valley Sewerage Commission (PVSC) wastewater treatment plant via gravity pipe conveyance. However, during wet-weather events, the PVSC wastewater treatment plant reaches an allowable capacity. This, along with local and regional hydraulic constraints, limits the amount of flow that can be conveyed to the treatment plant during wet-weather events. This ultimately results in excess combined sewage being discharged into receiving waters as Combined Sewer Overflows (CSOs). The Town of Kearny has five (5) permitted outfalls through which CSOs may be discharged into the receiving waters. Three (3) of these outfalls discharge along the Passaic River and the remaining two (2) outfalls discharge to a tributary of the Lower Passaic River known as Frank's Creek. Both bodies of water are classified as SE-3 (C2) or Saline Estuary 3, Category 2. This classification is an essential factor with respect to the USEPA's long term CSO control goal. The Town of Kearny's CSO outfalls and associated receiving waters are depicted in Figure A-1.

In accordance with the 1994 USEPA 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 related to portions of the system that 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 NJDEP within 48 months from the effective date of the permit. The Town of Kearny submitted this report in 2019 to ensure compliance with this regulatory requirement.

This report, the Selection and Implementation of Alternatives Report (SIAR) describes the selected alternatives from the Development and Evaluation of Alternatives Report (DEAR) for the Town of Kearny. PVSC NJDEP Permit Part IV.G Section 10 requires that permittee is *"responsible for submitting an LTCP that addresses all nine elements in Part IV.G"*. The nine elements are listed below:

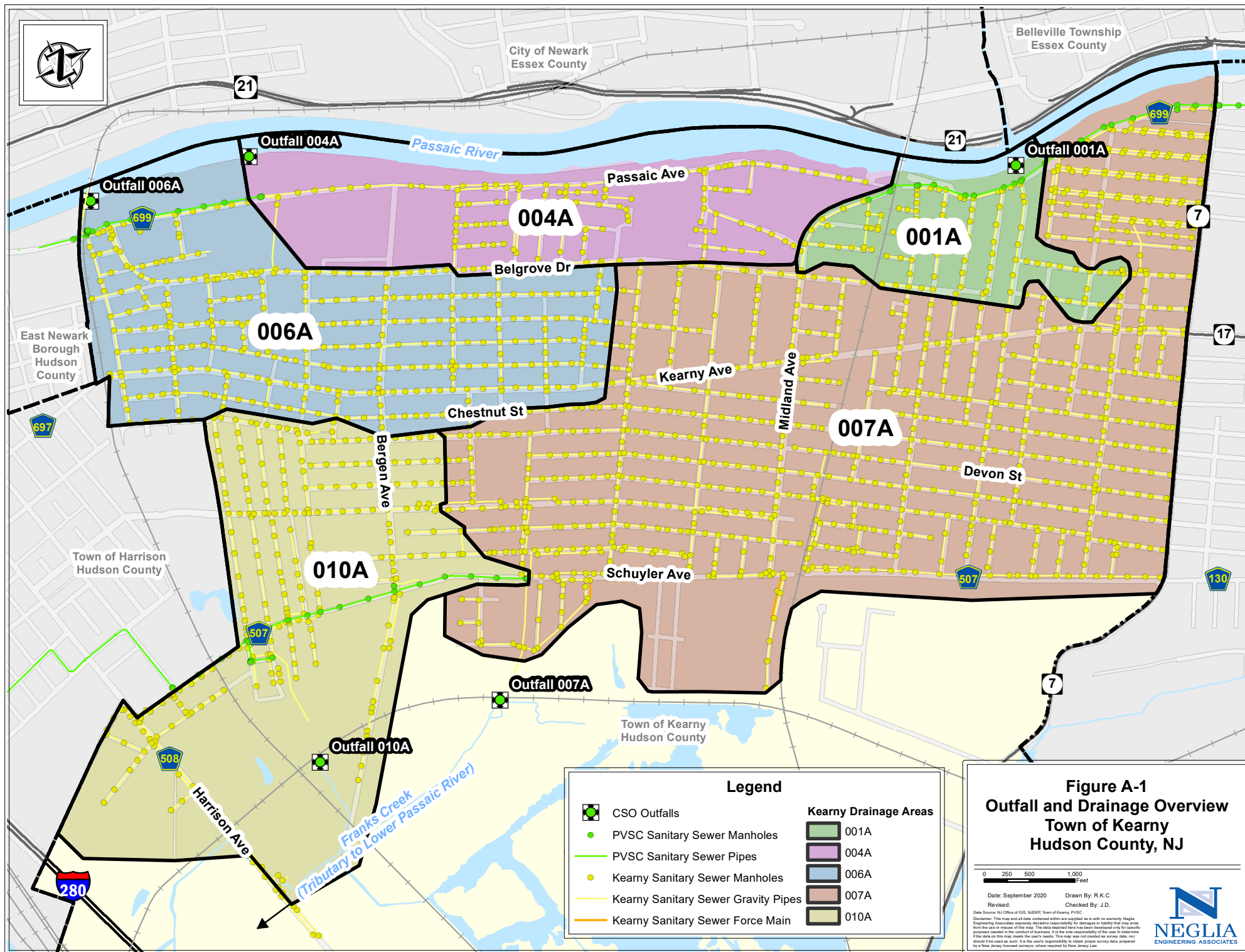
1. Characterization Monitoring and Modeling of the Combined Sewer System;
2. Public Participation Process;
3. Consideration of Sensitive Area;
4. Evaluation of Alternatives;

5. Cost/Performance Considerations;
6. Operational Plan;
7. Maximizing Treatment at the existing STP;
8. Implementation Schedule; and
9. Compliance Monitoring Program.

Items 1, 2, 3, and 9 above are addressed in the Regional SIAR. Each of the NJDEP-approved reports for items 1, 2 and 3 are included in the appendices of the regional report. The regional report also discusses the typical year selection and includes the NJDEP-approved Typical Hydrologic Period Report.

To summarize, this report describes the CSO control analysis performed and presents the rationale for the selected alternative, and the recommended LTCP for the Town of Kearny. The intent of the plan is to represent the best balance among performance, cost, affordability, water quality and public benefits, and practical and non-monetary factors.

Separately, PVSC will submit a regional report for all PVSC communities. This report pertains only to the Town of Kearny. It shall be noted that at this time, the Town of Kearny does not intend to participate in a regional solution.





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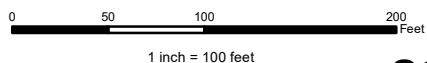


Figure A-2

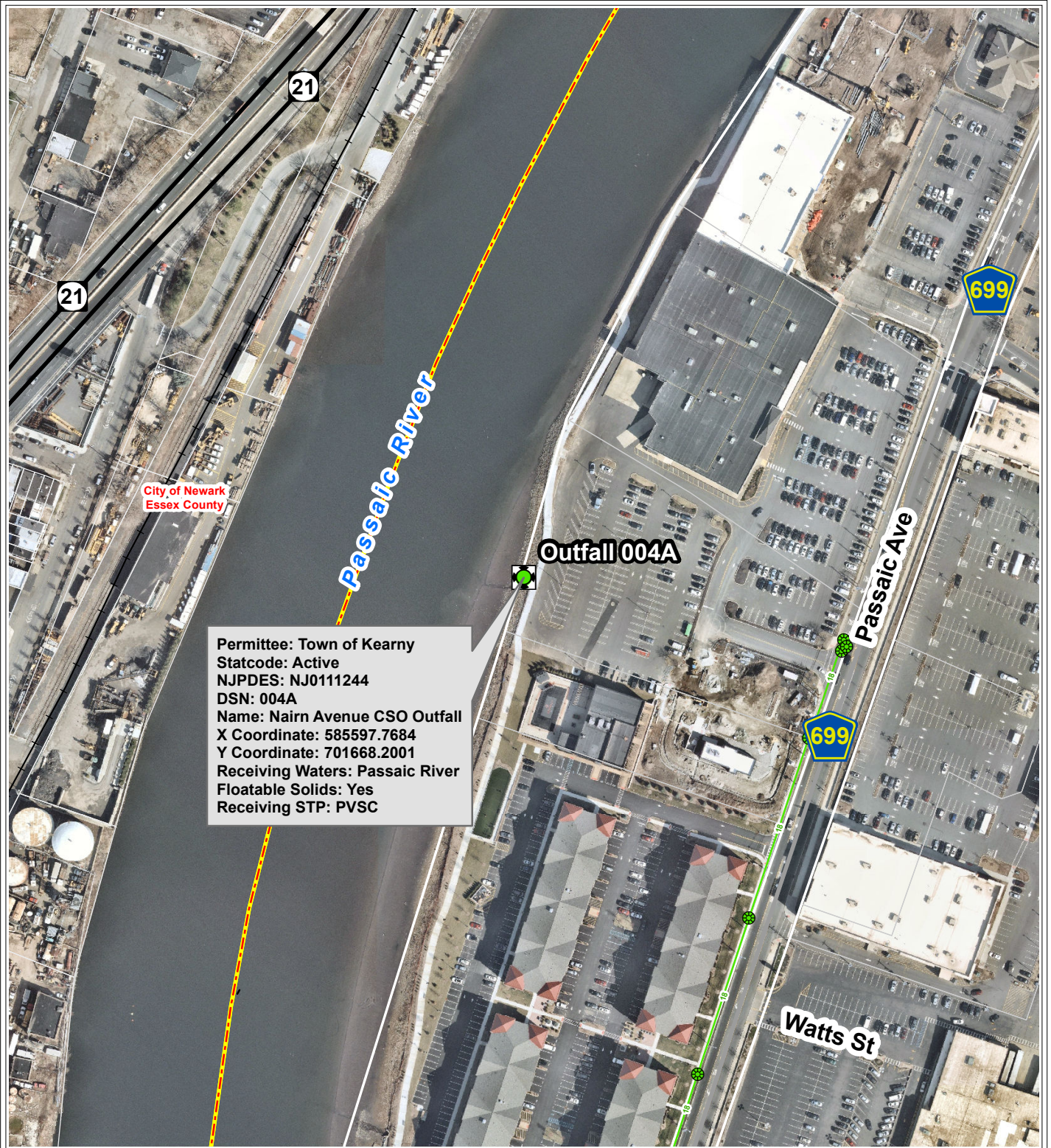
Stewart Avenue CSO Outfall 001A

Town of Kearny

County of Hudson, New Jersey

- CSO Outfalls
- PVSC Manhole
- PVSC Line
- Parcels

Drawn By: R.K.C.	Checked By: J.R.	Project No:	Sheet No:	Map References:
Designed By: R.K.C.	Page:	KEARMUN18.013	Figure A-2	NJ Office of GIS
Field Book No:	Date: September 2020			Nearmap Imagery (March 2019)



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0 100 200 400 Feet
 1 inch = 200 feet



Figure A-3 **Nairn Avenue CSO Outfall 004A** **Town of Kearny** **County of Hudson, New Jersey**

- CSO Outfalls
- PVSC Manhole
- PVSC Line
- Parcels

Drawn By: R.K.C.	Checked By: J.R.	Project No:	Sheet No:	Map References:
Designed By: R.K.C.	Page:	KEARMUN18.013	Figure A-3	NJ Office of GIS
Field Book No:	Date: September 2020			Nearmap Imagery (March 2019)



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0 75 150 300 Feet
 1 inch = 150 feet



Figure A-4 **Johnston Avenue CSO Outfall 006A** **Town of Kearny** **County of Hudson, New Jersey**

- CSO Outfalls
- PVSC Manhole
- PVSC Line
- Parcels

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Designed By: R.K.C.	Page:	KEARMUN18.013	Figure A-4	NJ Office of GIS
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0 100 200 400 Feet
 1 inch = 200 feet



Figure A-5 **Ivy Street CSO Outfall 007A** **Town of Kearny** **County of Hudson, New Jersey**

- CSO Outfalls
- PVSC Manhole
- PVSC Line
- Parcels

Drawn By: R.K.C.	Checked By: J.R.	Project No:	Sheet No:	Map References:
Designed By: R.K.C.	Page:	KEARMUN18.013	Figure A-5	NJ Office of GIS
Field Book No:	Date: September 2020			Nearmap Imagery (March 2019)



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0 100 200 400 Feet
 1 inch = 200 feet



Figure A-6 **Dukes Street CSO Outfall 010A** **Town of Kearny** **County of Hudson, New Jersey**

-  CSO Outfalls
-  PVSC Manhole
-  PVSC Line
-  Parcels

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Designed By: R.K.C.	Page:	KEARMUN18.013	Figure A-6	NJ Office of GIS
Field Book No:	Date: September 2020			Nearmap Imagery (March 2019)

SECTION B - SCREENING OF CSO CONTROL TECHNOLOGIES

Initial preliminary screening of CSO control technologies was completed as part of the Development and Evaluation of Alternatives Report (“DEAR”) prepared and submitted to NJDEP on July 1, 2019, and was revised on November 21, 2019 in accordance with NJDEP and public comments. The report was ultimately approved by NJDEP. Alternatives considered within the approved DEAR for preliminary screening included the following:

- Source Control (Including Green Infrastructure);
- Base Flow Reduction;
- Sewer System Optimization;
- Storage
- Wastewater Treatment Plant (WWTP) Expansion;
- Sewer Separation; and
- Treatment of CSO Discharge.

Preliminary screening of the above CSO control technologies was performed at a high level to determine the general capabilities and applicability as it relates to control and mitigation of CSOs, as well as the associated potential costs. The process of initially screening CSO control technologies within the DEAR included evaluation of a range of options for use when considering future alternatives selection. Alternatives that could achieve CSO control objectives were developed based upon a broad range of considerations. Such considerations included costing, technical merit, ease of implementation, and community disruption. Detailed information as it relates to preliminary CSO control technologies screening is included in the approved DEAR. However, a comprehensive summary of this effort is included below.

B.1 SOURCE CONTROL (INCLUDING GREEN INFRASTRUCTURE)

Source control can be used to reduce stormwater runoff volumes and pollutants at the source prior to entering the combined sewer system. Examples of the same are included within the approved DEAR and it is noted that, when practicable, the Town of Kearny practices source control to reduce runoff volumes and pollutants at the source. Examples of the same include installation of curb pieces and grates at inlets during municipal roadway paving projects that are designed to minimize the volume of floatables entering the combined sewer system. The Town also has ordinances and enforcement mechanisms related to garbage disposal, pet waste, lawn and garden maintenance, etc., all of which can introduce pollutants to the combined sewer system. Furthermore, The Town of Kearny requires that new developments comply with the Standards for Soil Erosion and Sediment Control. The Town also practices good housekeeping and ensures that street sweeping is conducted on a regular basis along with flushing / cleaning of sewer pipes when needed to ensure maximum operational capacity.

In addition to the above, source control also includes green infrastructure. The Town of Kearny approved DEAR evaluated several potential green infrastructure measures that could be implemented as part of the LTCP. Additionally, the Town of Kearny met with a local environmental advocacy group, Kearny AWAKE, on several occasions, during which it was noted that green infrastructure could be utilized to mitigate localized flooding and ponding issues. Green infrastructure measures that were considered and retained for further evaluation included the following:

- Rain gardens;

- Right-of-way bioswales
- Tree Pits
- Porous Paving Systems
- Rainwater Harvesting / Barrels; and
- Planter Boxes.

Preparation of the DEAR included modeling of the combined sewer system to control 5% and 10% of impervious surfaces via green infrastructure. Based upon the same, it was determined that green infrastructure would have a minimal impact on the CSO discharge volume and event frequency. However, based upon community and general public feedback, the Town of Kearny understands the desire to incorporate green infrastructure into the LTCP. Information regarding green infrastructure within the recommended LTCP is provided in Section D and Section F below.

B.2 BASE FLOW REDUCTION

Reduction in base flow (i.e. reduction in dry weather flow), can be achieved through measures such as water conservation and/or infiltration / inflow (I/I) reduction. For separated sanitary sewer systems, I/I reduction has the potential to improve the performance of the sanitary conveyance system by removing storm flows generated by roof drains and sump pumps, thus alleviating sanitary sewer overflows and back-ups, as well as excessive flows conveyed to the wastewater treatment plant. For combined systems, I/I reduction is expected to have little impact on the number and volume of CSO events, as the majority of the CSO volume is not a result of leaks in the sewer piping, but from sanitary flow and precipitation. In addition, both water conservation and I/I reduction have minimal impact on pathogen removal.

Preparation of the DEAR included modeling of the combined sewer system with a 10% reduction in base flow. Based upon the same, it was determined that base flow reduction would have a minimal impact as it relates to the CSO discharge volume and event frequency.

Based on the above and information presented in the DEAR, base flow reduction was eliminated from further consideration as a CSO control measure. However, the Town will consider water conservation programs moving forward as a means of general good stewardship, conservation of resources, etc.

B.3 COMBINED SEWER OPTIMIZATION

Combined sewer optimization refers to increasing storage and conveyance capacity in the existing sewer system. Overall, this can be achieved via several measures. Such measures include construction of additional conveyance pipe, modifications to the existing regulators, outfall consolidation / relocation, or real time control of the sewer system. The DEAR established that modifications to the existing regulators (i.e. raising the weirs) would likely exacerbate existing flooding conditions within the Town. In addition, it was noted that the regulators are owned by PVSC and cannot be modified without prior approval. Additionally, the DEAR established that real time control was not considered feasible for the Town of Kearny due to potential high costs and uncertainty as it relates to the ability to control CSOs. The DEAR further notes that additional sewer construction and outfall consolidation / relocation would be addressed as part of the combined sewer separation analysis.

B.4 STORAGE

The Town of Kearny DEAR determined that storage could serve as an effective means of controlling CSOs. However, it shall be noted that due to existing flooding conditions along portions of the Town, it was also determined that additional storage within the existing sewer system would not be feasible. Therefore, the DEAR evaluated in-line storage by way of tunnels and off-line storage by way of storage tanks. Tunnel storage would consist of a single, large diameter tunnel extending along the entirety of the Town in a north to south direction. On a conceptual level, the design intent of the tunnel was to convey overflows from CSO discharge points to the tunnel via a new pipe system. Tunnel storage was retained as a possible alternative due to its effectiveness at reducing CSO volume and event frequencies.

Storage tanks at or within the vicinity of existing CSO discharge points was also considered as a viable alternative within the DEAR. Storage tanks function by storing CSO volume during wet weather events and subsequently pumping the same to the PVSC wastewater treatment plant at a controlled rate as capacity becomes available. Like tunnel storage, storage tanks were retained as a possible alternative due to the inherent effectiveness at reducing CSO volume and event frequencies.

B.5 WASTEWATER TREATMENT PLANT (WWTP) EXPANSION

All sanitary flows from the Town of Kearny are conveyed to the PVSC wastewater treatment plant. The Town of Kearny understands the PVSC intends to construct improvements at the plant as part of the overall LTCP. This report defers to the PVSC Selection and Implementation of Alternatives Report for additional information regarding these improvements.

B.6 SEWER SEPARATION

Sewer separation includes the construction of conveyance pipes which convey stormwater runoff to new outfalls discharging stormwater runoff to receiving waterbodies. Sanitary flows would then flow to the wastewater treatment plant via separate sanitary conveyance systems. To minimize disruption to the local community, combined sewer pipes are typically left in place to allow for uninterrupted flows to the wastewater treatment plant. The approved DEAR indicates that sewer separation was retained as a viable alternative. However, since submission of the DEAR, the areas of required sewer separation to achieve LTCP goals and objectives have been modified. Additional information regarding the same is provided in Section C below.

B.7 TREATMENT OF CSO DISCHARGE

The approved DEAR included a section which outlined a variety of measures that could be utilized for treatment of CSO discharges. Based upon this initial analysis, it was ultimately determined that disinfection utilizing peracetic acid would be the most viable treatment alternative for the Town of Kearny.

In recent years, it has been determined that peracetic acid is an effective wastewater disinfectant which leaves no toxic residual, yet effectively kills pathogens in wastewater. Peracetic acid is a mixture of hydrogen peroxide, acetic acid and water. It is a clear, colorless liquid that is commercially available. The approved DEAR references case studies in which peracetic acid was used effectively as a disinfectant.

Since submission of the approved DEAR, it has also become apparent that peracetic acid disinfection facilities have a number of disadvantages. Such disadvantages include potential

extensive permitting requirements and the need to install solids removal pretreatment. Furthermore, peracetic acid disinfection would also require a comprehensive maintenance program that would require a highly trained staff, along with the need to ensure that sufficient chemical storage is provided. While these factors are strongly considered, disinfection via peracetic acid was retained as a feasible alternative.

SECTION C - EVALUATION OF ALTERNATIVES

C.1 INTRODUCTION

The Development and Evaluation of Alternatives Report (“DEAR”) for the Town of Kearny evaluated several CSO control technologies. This effort included a preliminary screening of alternatives to determine applicability and functionality as a CSO control technology. A synopsis of this effort is included in Section B above. However, to summarize, the following CSO control technologies were retained in the DEAR and were considered for further evaluation:

- Sewer Separation;
- Inline Storage (Tunnel);
- Offline Storage (Tanks);
- Disinfection with Peracetic Acid;
- Green Infrastructure.

As is described in detail in the DEAR, the Town of Kearny evaluated each of the above alternatives for compliance with the guidelines established within the U.S. EPA’s CSO policy. This effort included utilizing a hydrologic model to determine CSO volume and event frequency under a typical year of 2004, which was previously approved by NJDEP as an acceptable modeling input. Using this model, the Town evaluated the level and scope of work that would be required to implement each of the above CSO control technologies to the degree that compliance with U.S. EPA’s CSO policy is achieved. The DEAR also includes costing based upon cost curves provided within a Technical Guidance Manual (“TGM”) which was distributed by PVSC. Furthermore, this effort evaluated the practicality of implementing such alternatives. Overall, each technology was evaluated to determine which would be the most cost-effective option and practical solution for reducing or eliminating the volume and frequency of CSO events.

C.1.1 Evaluated Performance Metrics

As is described in further detail within the DEAR, the evaluation of alternatives included modeling efforts to determine the level of implementation required to achieve compliance with the performance standards established within the U.S. EPA’s CSO policy.

The DEAR mainly focused on achieving reductions in the overall frequency of CSO events (i.e. 0, 4, 8, 12 and 20, as noted below) since it would require the most substantial costs to achieve reductions in CSO frequencies. To determine an approximate range, the costs of alternatives to achieve the following number of overflow events during the typical year 2004 were established.

- Zero (0) overflow events per year;
- Four (4) overflow events per year;
- Eight (8) overflow events per year;
- Twelve (12) overflow events per year; and
- Twenty (20) overflow events per year.

The above range was determined in accordance with the U.S. EPA’s CSO policy, as well as in consultation with PVSC to maintain a degree of consistency with other hydraulically connected CSO communities.

It shall be noted that the Town of Kearny currently has sixty-one (61) overflow events during the typical year which, as specified in the DEAR, was determined via a comprehensive modeling program.

Furthermore, the Town also evaluated the 85% capture performance metric, as established within the U.S. EPA's CSO policy. The metric requires elimination or capture for treatment of no less than 85% by volume of the combined sewage collected in the combined sewer during precipitation events on a hydraulically connected system-wide annual average basis. It shall be noted that the capture within the Town of Kearny is currently 74.6%. Additional information regarding the 85% capture metric is provide in Section D below.

C.2 DEVELOPMENT AND EVALUATION OF ALTERNATIVES

Table C-1 below summarizes the alternatives that were evaluated as means to achieving the aforementioned number of CSO events on an annual basis under the typical year conditions. Costs associated with each of the same are discussed within the DEAR:

Table C-1: Summary of Evaluated Alternatives to Achieve Zero (0), Four (4), Eight (8), Twelve (12) and Twenty (20) Overflows per Year

Annual CSO Count ⁽¹⁾	Alternative ID ⁽¹⁾	Description ⁽¹⁾
0	Alt_2A_0_SewerSeparation	Sewer Separation within the entirety of the Town of Kearny to achieve zero (0) overflow events per year.
4	Alt_3A_4_PartialSS-Tank	Sewer Separation within KE010A and Tank storage and associated pumping to achieve four (4) overflow events per year
4	Alt_3B_4_PartialSS-Tunnel	Sewer Separation within KE010A and Tunnel storage and associated pumping to achieve four (4) overflow events per year
4	Alt_3C_4_PartialSS-PAA-FlexFilter	Sewer Separation within KE010A and Peracetic acid disinfection and associated pretreatment of volume equivalent required to achieve four (4) overflow events per year.
8	Alt_4A_8_PartialSS-Tank	Sewer Separation within KE010A and Tank storage and associated pumping to achieve eight (8) overflow events per year
8	Alt_4B_8_PartialSS-Tunnel	Sewer Separation within KE010A and Tunnel storage and associated pumping to achieve eight (8) overflow events per year
8	Alt_4C_8_PartialSS-PAA-FlexFilter	Sewer Separation within KE010A and Peracetic acid disinfection and associated pretreatment of volume equivalent required to achieve eight (8) overflow events per year.
12	Alt_5A_12_PartialSS-Tank	Sewer Separation within KE010A and Tank storage and associated pumping to achieve twelve (12) overflow events per year

Annual CSO Count	Alternative ID	Description
12	Alt_5B_12_PartialSS-Tunnel	Sewer Separation within KE010A and Tunnel storage and associated pumping to achieve twelve (12) overflow events per year
12	Alt_5C_12_PartialSS-PAA-FlexFilter	Sewer Separation within KE010A and Peracetic acid disinfection and associated pretreatment of volume equivalent required to achieve twelve (12) overflow events per year.
20	Alt_6A_20_PartialSS-Tank	Sewer Separation within KE010A and Tank storage and associated pumping to achieve twenty (20) overflow events per year
20	Alt_6B_20_PartialSS-Tunnel	Sewer Separation within KE010A and Tunnel storage and associated pumping to achieve twenty (20) overflow events per year
20	Alt_6C_20_PartialSS-PAA-FlexFilter	Sewer Separation within KE010A and Peracetic acid disinfection and associated pretreatment of volume equivalent required to achieve twenty (20) overflow events per year.

- (1). It shall be noted that the Town of Kearny is currently committed to separation of the existing combined sewer system within the KE010 area. As such, each of the above alternative scenarios includes separation within KE010.

Following submission of the approved DEAR, costs associated with the above were refined by way of a memorandum provided by PVSC and its consultant group (Updated Guidance on Costing for LTCP CSO Planning, dated April 10, 2020). Furthermore, it was determined that the 85% capture target would be the selected performance metric (this is discussed in further detail in Section D below). As such, the above alternative scenarios have been eliminated as potential alternatives.

Based upon the above, it was determined that in order to achieve the 85% capture target, the Town should consider moving forward with either sewer separation, storage by way of tanks, or a combination thereof. Tunnels have been eliminated due to cost considerations, as outlined in the DEAR, and anticipated disruption to the local community.

In addition to elimination of tunnels as a possible alternative, disinfection via peracetic acid and pretreatment was also eliminated as an alternative after additional evaluation was conducted following submission of the DEAR. This evaluation and further research on the topic indicated that disinfection at CSO outfalls would be subject to stringent permitting requirements. Furthermore, operation of the same requires highly trained individuals beyond what is typically undertaken by the Town DPW. While, peracetic acid disinfection was previously considered a viable alternative, it has since been removed as a possible alternative for the Town of Kearny.

Ultimately, it was determined that either tank storage, sewer separation, or a combination thereof would be best suited to meet the 85% capture target within the Town of Kearny. It is noted here and elsewhere in this report, that the Town of Kearny has committed to separation within the watershed area associated with KE010A. As such, volume reductions required to meet 85% capture, as well as the cost, include the cost of sewer separation within KE010A.

The table below summarizes Alternatives No. 1 through No. 3, all of which have been designed to meet the minimum volume capture targets to achieve 85% capture.

No.	Alternative Description ⁽¹⁾	Cost (\$M)
1	Sewer Separation within KE006A	59.7
	Sewer Separation within KE010A	10.2
Total Cost for Alternative No. 1		69.9
2	Sewer Separation within KE007A	150.0
	Sewer Separation within KE010A	10.2
Total Cost for Alternative No. 2		160.2
3	3.6 MG Tank in the Vicinity of KE006A	65.0 ⁽²⁾
	Sewer Separation within KE010A	10.2
Total Cost for Alternative No. 3		75.2

- (1). It shall be noted that the Town of Kearny is currently committed to separation of the existing combined sewer system within the KE010A area. As such, each of the above alternative scenarios includes separation within KE010A.
- (2). The above cost for tank storage includes a 20% contingency in addition to the value, as calculated using the cost guidance provided within the memorandum distributed by PVSC and its consultant group (Updated Guidance on Costing for LTCP CSO Planning, dated April 10, 2020). This contingency accounts for a multitude of unknown factors associated with tank storage construction. Most notably, it shall be noted that construction of a tank as sized above would require acquisition of 1.0-1.5 acres of land, the cost of which is not included within the cost guidance. Additionally, the area near KE006A has historically experienced high groundwater levels and flooding, which would make construction of any subsurface tank difficult.

Based upon the above costs, as well as the considerations outlined above regarding tanks, Alternatives No. 2 and No. 3 are eliminated from any further consideration. It shall be noted that each of the above alternatives meets the 85% capture target.

SECTION D - SELECTION OF RECOMMENDED LTCP

D.1 INTRODUCTION

The selection of alternatives for the Town of Kearny LTCP has been a collaborative and iterative process between the Town of Kearny, PVSC and adjacent hydraulically connected conveyance systems. By way of the regional Supplemental CSO Team and through a meeting with a local environmental group (Kearny AWAKE), the Town has acquired public input and feedback regarding this plan, as well as the overall process.

Based upon directive from PVSC, and based upon feedback from NJDEP, the 85% CSO volume capture scenario was analyzed for the Town of Kearny. Additionally, PVSC evaluated the 85% capture scenario on a regional basis, when including all hydraulically connected communities within the PVSC district. However, it shall be noted that this report includes information pertinent to Kearny only and does not consider CSO mitigation solutions on a regional basis. This plan has been designed such that the Town of Kearny achieves the 85% capture metric on an individual basis.

Table D-1 below provides an initial summary of the final alternative. The below alternative achieves the minimum target volume capture to achieve 85% capture by way of sewer separation within the Town of Kearny.

Table D-1: Summary of Selected Alternative

Alternative	Volume Captured (MG)	CSO Events	Cost (\$M)
Sewer Separation within KE006	156.1	45	59.7
Sewer Separation within KE010			10.2
Total Program Cost			69.9

In addition to the above, the DEAR considered a variety of green infrastructure alternatives designed to eliminate runoff generated by 5% and 10% of impervious areas. However, due to high cost associated with the same, as well as the relatively minimal impact as it relates to regulatory goals, green infrastructure is considered a supplementary solution. However, this report includes recommended green infrastructure measures that should be considered supplemental to Alternative No. 1. The proposed green infrastructure program which is included within the recommended and selected LTCP includes ordinance revisions, participation in the Hudson-Essex Greenway Project, and a commitment to utilize green infrastructure to address localized flooding and ponding issues, if applicable and viable as a solution to such issues.

D.2 LTCP SELECTION PROCESS

As per the Town of Kearny's NJPDES Permit ("the Permit"), which has been issued in accordance with NJAC 7:14A, the Permittee is required to evaluate a reasonable range of CSO control alternatives. In accordance with D.3.a and G.10 of the Permit, these alternatives are required to meet the water quality based standards established within the Clean Water Act (CWA) using either

the Presumptive or the Demonstration Approach. The Town of Kearny's selected approach, along with the associated rationale, is summarized below.

As per Section G.1.f of the Permit, the Presumptive Approach, in accordance with NJAC 7:14A-11, Appendix C provides a program that meets any of the criteria listed below and presumes to provide an adequate level of control to meet the water quality-based requirements of the CWA. Such presumption is subject to NJDEP review and approval as it relates to the data and analysis conducted in the characterization, monitoring, and modelling of the system and the consideration of sensitive areas. It shall be noted that requirements regarding consideration of sensitive areas are provided within the Permit. NEA defers to the Identification of Sensitive Areas Report, dated June 2018, submitted by PVSC as it relates to the identification of associated sensitive areas. However, based upon the same, there are no identified sensitive areas associated with the Town of Kearny CSO outfalls.

Combined sewer flows remaining after implementation of the nine minimum controls ("NMCs") and within the criteria specified in Section G.4.f.i. and ii of the Permit shall receive minimum treatment in accordance with the items below:

- i. Primary clarification (removal of floatables and settleable solids may be achieved by any combination of treatment technologies or methods that are shown to be equivalent to primary clarification);
- ii. Solids and floatables disposal; and
- iii. Disinfection of effluent, if necessary to meet water quality standards, protect designated uses and protect human health, including removal of harmful disinfection chemical residuals/by-products (e.g. chlorine produced oxidants), where necessary.

In addition, the permittee must demonstrate any of the following three criteria below:

- i. No more than an average of four overflow events (see below) per year from a hydraulically connected system as the result of a precipitation event that does not receive the minimum treatment specified below. The Department may allow up to two additional overflow events per year. For the purpose of this criterion, an 'event' is:
 - In a hydraulically connected system that contains only one CSO outfall, multiple periods of overflow are considered one overflow event if the time between periods of overflow is no more than 24 hours.
 - In a hydraulically connected system that contains more than one CSO outfall, multiple periods of overflow from one or more outfalls are considered one overflow event if the time between periods of overflow is no more than 24 hours without a discharge from any outfall.
- ii. The elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events on a hydraulically connected system-wide annual average basis.
- iii. The elimination or removal of no less than the mass of the pollutants, identified as causing water quality impairment through the sewer system characterization, monitoring, and modeling effort, for the volumes that would be eliminated or captured for treatment under Section G.4.f.ii.

The Town of Kearny has selected the Presumptive Approach and the alternatives selected in this plan have been designed to ensure that a minimum of 85% of the CSO volume is captured within the combined sewer system.

D.3 SELECTION OF ALTERNATIVES

D.3.1 Description

Based upon the above preliminary screening of alternatives, the final alternatives for the Town of Kearny are summarized below in Table D-2

Table D-2: Description of Final Alternative

No.	Alternative	Description
1	Sewer Separation within KE006 and KE010	Separation of the remaining combined sewer system portion of the watershed area associated with outfall KE006, which totals approximately 259 acres. Total area of required separation is 199 acres. Approximately 60 acres of this watershed area were separated in the early 2000s as part of an initial effort to reduce CSOs. Moreover, this alternative includes further separation within the watershed area associated with outfall KE010, which totals approximately 158 acres. The total area of required separation is 34 acres. Approximately 124 acres of this watershed area were previously separated in the early to mid 2000s as part of an initial effort to reduce CSOs. This project represents a continuation of this effort.

D.3.2 Remaining Overflows

The Town of Kearny completed comprehensive flow modeling as part of the selection of alternatives process. This initially included a variety of alternatives evaluated as part of the DEAR report. Flow modeling was completed for both abovementioned final alternatives. Table D-3 and D-4 below illustrates the existing and proposed volume and overflow event counts, which were generated by the completed modeling.

Table D-3: Alternative No. 1 – Existing and Proposed Volume and Frequency Model Results

Outfall	Existing		Proposed	
	Volume (MG)	Frequency	Volume (MG)	Frequency
KE001	3.9	31	3.9	31
KE004	12.4	42	12.2	42
KE006	121.8	57	0.0	0
KE007	90.0	34	82.6	32
KE010	26.6	43	0.0	0
Total	254.7	61	98.6	45

D.3.3 Ability to Meet Water Quality Standards

The Town of Kearny has five (5) existing outfalls which discharge to two (2) waterbodies located on opposite sides of the Town. Three (3) of these outfalls discharge along the Passaic River and the remaining two (2) outfalls discharge to a tributary of the Lower Passaic River known as Frank's Creek. Both bodies of water are classified as SE-3 (C2) or Saline Estuary 3, Category 2. A summary of the existing outfalls, the associated receiving waterbodies, and the associated water quality standards are provided below within Table D-5:

Table D-4: Town of Kearny Water Quality Standards

Outfall	Location	Receiving Stream	Water Quality Classification
KE001	Stewart Avenue	Passaic River	SE3
KE004	Nairn Avenue	Passaic River	
KE006	Johnston Avenue	Passaic River	
KE007	Ivy Street	Frank's Creek (Tributary to Lower Passaic River)	
KE010	Dukes Street	Frank's Creek (Tributary to Lower Passaic River)	

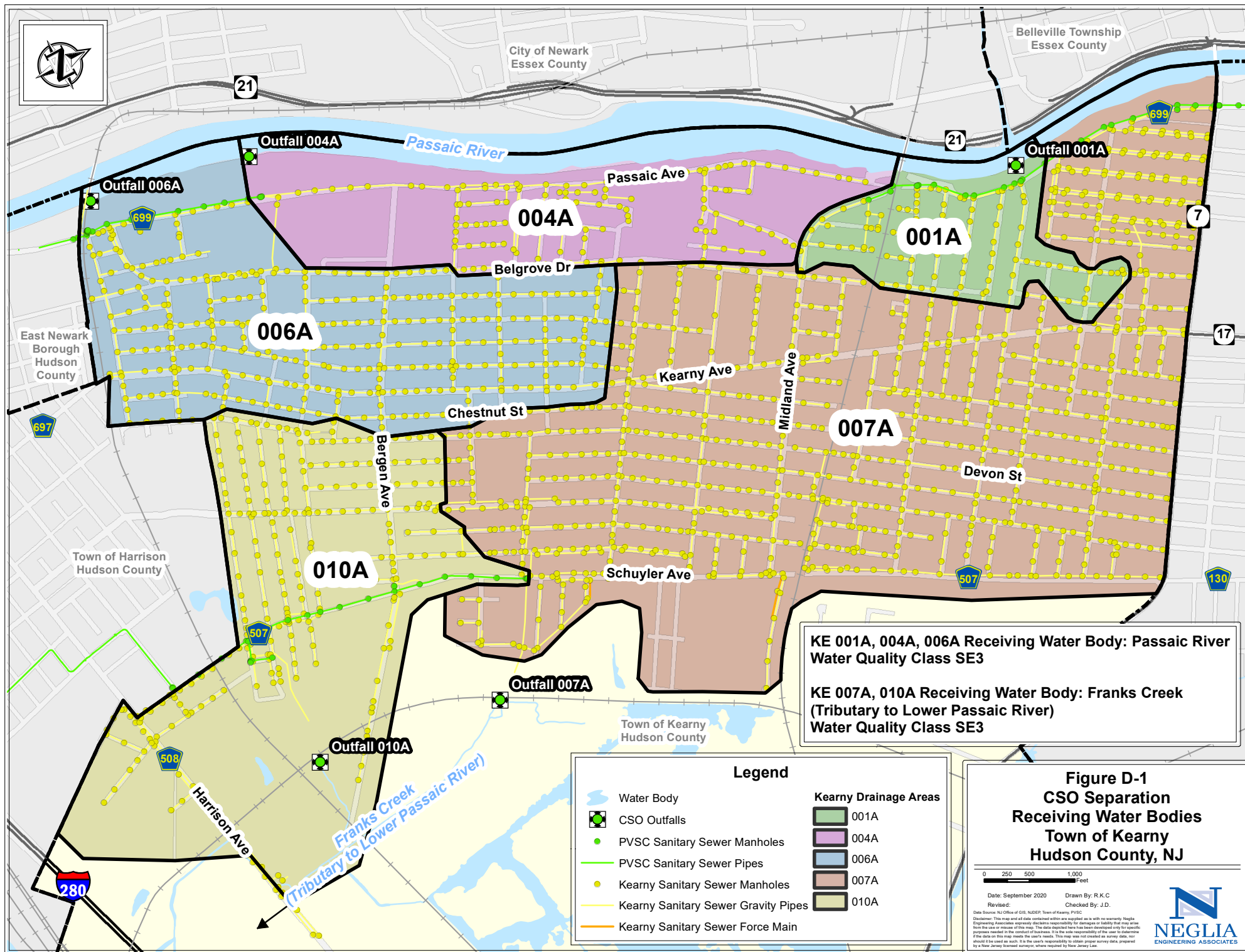
The Passaic River and Frank's Creek are classified as SE-3 (C2) or Saline Estuary, Category 2. According to N.J.A.C. 7:9B, Surface Water Quality Standards, Subsection 1.12, the uses for SE-3 (C2) bodies of water are the following:

- Secondary Contact Recreation;
- Maintenance and Mitigation of Fish Population;
- Migration of Diadromous Fish;
- Maintenance of Wildlife; and
- Any other reasonable uses.

Furthermore, it is noted that for the pollutant of concern pathogens, the criteria for fecal coliform is that said levels shall not exceed a geometric mean of 1500/100 ml.

It shall be noted that as it relates to the above, water quality modeling was conducted by PVSC and its consultants. Said modeling indicates that under the existing conditions, receiving waterbodies associated with the Town of Kearny's CSO outfalls currently meet water quality standards. Furthermore, this modeling effort indicates that CSO outfalls within the Town of Kearny do not preclude the attainment of water quality standards within associated receiving waterbodies. Refer to the Water Quality Modeling Report submitted by PVSC through its consultants for additional information regarding the completed water quality modeling.

Based upon the above, by constructing improvements which achieve the selected 85% capture metric and utilizing the Presumptive Approach, as described above, receiving waterbodies associated with the Town of Kearny's CSO outfalls will achieve current water quality standards. This is presumed since the volume and frequency of CSO events will be significantly reduced under the proposed conditions.



D.3.4 Non-Monetary Factors

The main factor which was utilized to determine the selected alternative was related mainly to monetary and financial considerations. However, the Town of Kearny has also considered compliance with requirements established within the Permit, as well as guidance documents provided by the NJDPP, EPA, and PVSC. Additionally, when determining the final selected alternative, the Town of Kearny also considered the ability to reduce flooding in areas that presently experience flooding conditions.

Furthermore, the Town of Kearny also recognizes the public's desire to include green infrastructure measures within this plan. Recognizing the same, green infrastructure is included as an ancillary measure within this plan.

D.3.5 Cost Opinion

Capital costs for the proposed final alternatives are based on the latest revised guidance provided by way of a memorandum provided by PVSC and its consultant group (Updated Guidance on Costing for LTCP CSO Planning, dated April 10, 2020). The intent of issuing the said memorandum was to establish standardized unit pricing for improved consistency and ability to evaluate short-listed alternatives, which includes sewer separation. To ensure the accuracy of said costing data, the Town of Kearny, s requested by PVSC, reviewed this memo and compared the unit costs to previously constructed sewer separation projects within the Town. It was determined that the cost guidance serves as an acceptable means of providing for planning level estimates associated with costing and budgeting of the proposed alternatives. Based upon the same, a unit cost of \$300,000.00 per acre of required sewer separation was utilized to calculate the construction cost for the proposed alternatives.

In addition to capital costs, the memorandum also provides for costs associated with operation and maintenance (O&M) of the selected alternatives. As it relates to sewer separation, it was determined that no additional costs should be incorporated for O&M of the sewer system since the system is maintained today and the cost thereof is included within yearly budgets prepared by the Town of Kearny.

Table D-6 below provides a summary of costs for both Alternative No. 1 and Alternative No. 2, both of which achieve the minimum volume capture to achieve the required 85% capture.

Table D-5: Costs Summaries – Alternatives No. 1 and No. 2

Alternative No.	Outfall ID	Total CSO Watershed Area (Ac.)	Required Separation Area (Ac.)	Capital Construction Costs (\$M)	O&M Costs (\$M)	Total Costs (\$M)
1	KE006	259	199	59.7	0.0	59.7
	KE010	158	34	10.2	0.0	10.2
Alternative No. 1 Total Cost						69.9

Based on the summary of costs provided within Table D-6, Alternative No. 1 is the least costly of the final alternatives. However, it shall be noted that Alternative No. 1 is the also the most cost-effective solution. Table D-7 below illustrates the cost for each of the alternatives, as compared to the CSO volume capture and event frequency.

D.3.6 Selection of Recommended Alternative

As is mentioned above, the recommended alternative is Alternative No. 1, which consists of separation within the watershed areas associated with KE006 and KE010. A final summary of Alternative No. 1 is provided within Table D-8 below. Additional rationale for the selection of Alternative No. 1 are provided in the upcoming sections.

Table D-6: Summary of Selected / Recommended Alternative

Alternative	% Capture	CSO Volume Reduction (MG)	CSO Events	Cost (\$M)
Sewer Separation within KE006	85%	156.1	45	59.7
Sewer Separation within KE010				10.2
Total Program Cost				69.9

In addition to the above, the Town of Kearny recognizes the importance of incorporating green infrastructure into the overall LTCP. However, it was previously observed during preparation of the DEAR, that green infrastructure measures do not efficiently reduce CSO volume and event frequency, unless implemented on a large scale beyond what is considered practicable or cost-effective. However, this report includes a recommended green infrastructure program that should be considered supplemental to Alternative No. 1. The Town of Kearny understands that installation of green infrastructure measures is critical for enhancing neighborhoods and potentially minimizing localized flooding areas. The recommended alternative includes a green infrastructure program which is described in detail below in Section D.4.2.

D.4 DESCRIPTION OF RECOMMENDED LTCP

The recommended LTCP consists of Alternative No. 1, which includes the separation of the existing combined sewer systems located within the watershed areas associated with KE006 and KE010. A comprehensive modeling scope was completed which determined that separation of the aforementioned watershed areas achieves the minimum required CSO volume capture to comply with the 85% capture metric. Alternative No.1 is described in further detail below.

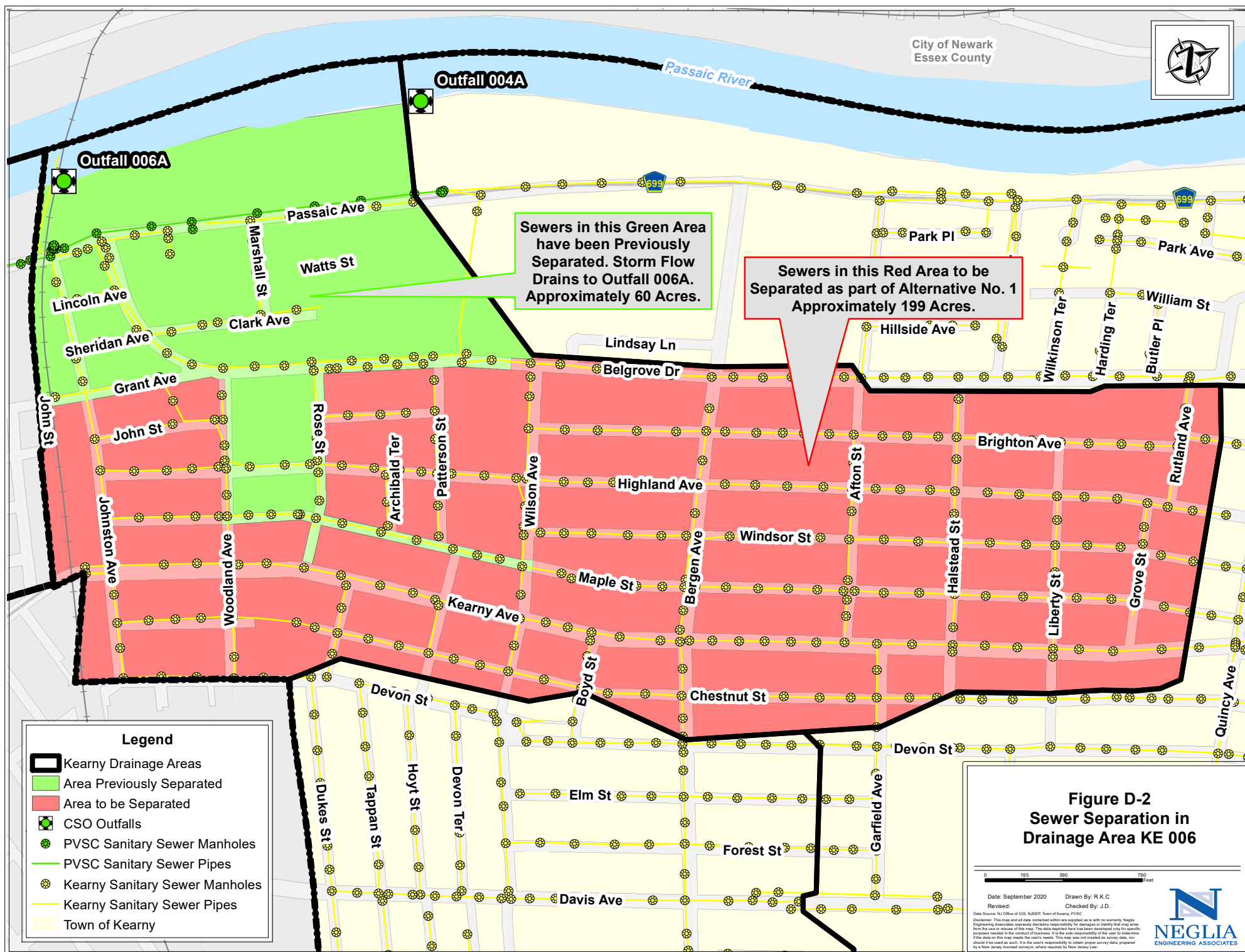
In addition, the recommended LTCP includes a green infrastructure program to supplement Alternative No. 1. The proposed program may include tree pits / bioretention planting areas, porous pavement installation, and revisions to Town of Kearny ordinances to encourage stormwater reduction on private properties by water of green infrastructure measures. Additional information regarding potential green infrastructure measures are describe below.

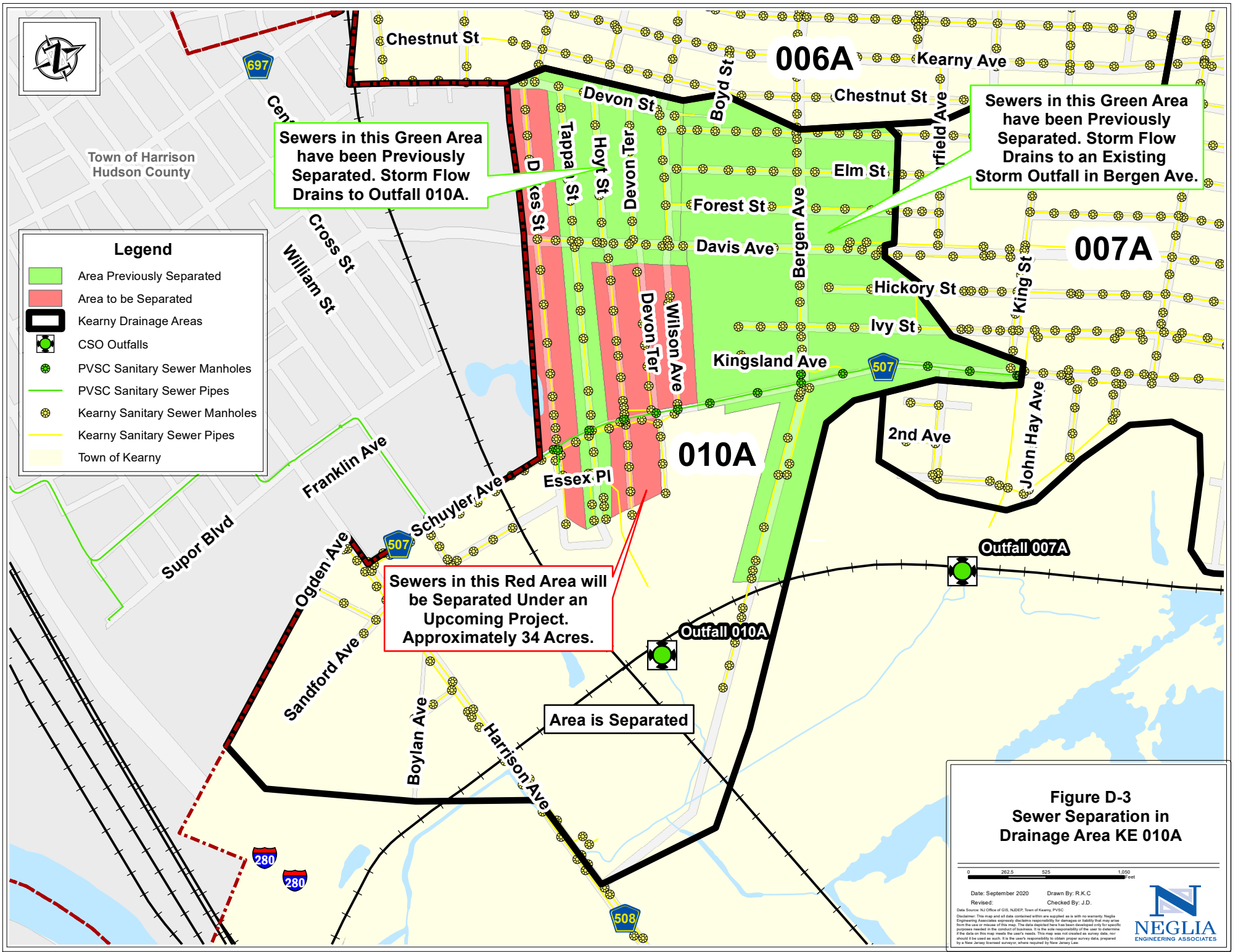
D.4.1 Alternative No. 1 to Achieve 85% Capture Requirement

During the late 1990s and through to the mid-2000s, the Town of Kearny began separating portions of existing combined sewer systems located throughout the Town. This initial effort was undertaken as a means of eliminating and/or reducing CSOs within the Town of Kearny. As a result of this effort, two (2) previously existing CSO discharge outfalls were eliminated. This effort continued until the Town constructed netting chambers at each of the existing CSO discharge outfalls in 2007 to capture solid floatables prior to discharging into receiving waterbodies. These netting systems remain today and are maintained by the Town of Kearny Department of Public

Works (“DPW”). The goal of Alternative No. 1 is to capitalize and tie into existing separated systems, while also achieving the minimum capture volume required to comply with the 85% capture metric. As is noted above, the Town of Kearny utilized comprehensive flow modeling to ensure that complete separation of KE006 and KE010 would meeting the minimum capture requirements to comply with the 85% capture metric. Moreover, it shall be noted that KE006 and KE010 both contain areas that were previously separated. Alternative No. 1 will capitalize on these previously completed projects by connecting the previously separated areas into proposed separated systems and routing the same to new and/or existing outfalls by way of new stormwater conveyance pipes. Existing sanitary systems will remain in place to maximum extent practicable to minimize impacts to local homeowners and businesses. Figures F-1 and F-2 are provided on the following sheets to illustrate the proposed sewer separation areas. It shall be noted that design for separation of KE006 has been completed.

In addition to the above, it shall be noted that areas within both KE006 and KE010 experience flooding conditions during significant rainfall events. As it relates to sewer separation within CSO area KE010, the overall intent of this project, in addition to reducing CSOs, is to eliminate flooding conditions. The design of sewer separation within KE006 includes a pumping station to eliminate flooding and the proposed stormwater conveyance system has been designed to provide for additional stormwater storage. The same design principals will be applied for sewer separation within CSO area KE010. However, at this time, it is not expected that a pumping station will be incorporated into this design.





D.4.2 Green Infrastructure Program

The recommended LTCP includes a green infrastructure program which is intended to supplement Alternative No 1. Section B above references green infrastructure measures that were considered within the DEAR and recommended for evaluation and implementation within the final LTCP. To reiterate, these measures included:

- Rain gardens;
- Right-of-way bioswales
- Tree Pits
- Porous Paving Systems
- Rainwater Harvesting / Barrels; and
- Planter Boxes.

The recommended LTCP includes green infrastructure measures which are to be implemented by way of ordinance revisions. Specifically, the Town will evaluate and provide guidance and/or requirements through new and revised ordinances that will be written to encourage utilization of green infrastructure, specifically the items listed above, to minimize stormwater runoff from private properties. In addition, such measures can be provided within streetscape areas and by way of future redevelopment plans. As it relates to encouraging green infrastructure through ordinance revisions and future redevelopment plans, the Town will evaluate measures implemented at the Hugo Neu property located at Kearny Point in South Kearny.

In addition, the Town of Kearny is actively engaged and intends to participate in the Hudson-Essex Greenway Project, which aims to convert railroad rights-of-way within the Town of Kearny, amongst other communities in Hudson and Essex Counties, to usable passive recreation open space. This project will provide green areas which will effectively collect and reduce the volume of stormwater runoff that flows to the existing combined sewer systems.

Lastly, should green infrastructure be a viable method of reducing localized flooding issues, the Town is committed to evaluating the same as a potential solution for addressing such issues.

SECTION E - FINANCIAL CAPABILITY

E.1 INTRODUCTION

This section of the Town of Kearny's Selection and Implementation of Alternatives Report (SIAR) quantifies the projected affordability impacts of Kearny'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 Kearny's FCA can be found in the FCA Memorandum specifically written for the Town 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 \$499. This estimate is based on typical residential potable water usage is 4,500 gallons monthly. Based on the estimated MHI of \$64,400 the Residential Indicator was approximately 0.8% 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 0.8%.

In Kearny, 11.7% 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 4.0% and 10%.

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	671	671	\$5,000	9.99%
\$10,000 to \$14,999	381	1,052	\$12,500	4.00%
\$15,000 to \$24,999	1,230	2,282	\$20,000	2.50%

Income Bracket	Households		Bracket Average Income	Bracket RI at Typical Cost per Household
	Number	Cumulative		
\$25,000 to \$34,999	962	3,244	\$30,000	1.66%
\$35,000 to \$49,999	2,011	5,255	\$42,500	1.18%
\$50,000 to \$74,999	2,720	7,975	\$62,500	0.80%
\$75,000 to \$99,999	1,810	9,785	\$87,500	0.57%
\$100,000 to \$149,999	2,196	11,981	\$125,000	0.40%
\$150,000 to \$199,999	1,025	13,006	\$175,000	0.29%
\$200,000 or more	467	13,473	\$200,000	0.25%
Total	13,473			

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 2051 based on an assumed the LTCP implementation schedule with construction of Kearny's Municipal Control Alternative extending through 2050. Assuming inflation, the projected cost per typical single-family residential user are projected to increase from \$499 in 2019 to \$1,258 in 2051.

A regional alternative is under consideration and would result in lowered overall costs for the control of CSOs within the PVSC Treatment District. Under this approach both the costs of the regional facilities such as a relief interceptor and the resultant savings would be allocated amongst the PVSC municipalities with combined sewer systems. As the basis of this allocation remains under discussion as of the writing of this SIAR, the FCA focuses on implementation of the Municipal Control Alternative. Should the permittees come to agreement on the cost allocation for the Regional Control Plan, the FCA will be revisited to reassess the affordability and schedule for implementation of the LTCP.

Table E-2: Kearny Project Residential Indicator in 2051 Without CSO Controls

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2051
RI	0.8%	1.1%
Annual \$	\$499	\$1,258

E.3 SUMMARY AND CONCLUSION

E.3.1 Affordability Impacts of the Proposed CSO Controls

Kearny 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: Kearny's Selected CSO Controls

Wet Weather Control Types	Capital Costs (\$ millions)	Incremental Annual O&M Costs (\$ millions)
Sewer Separation at KE010 (34 ac.)	\$10.2	\$0.0
Sewer Separation at KE006 (199 ac.)	\$59.7	\$0.0
Total	\$69.9	\$0.0

Implementation of the \$69.9 million Municipal Control Alternative results in projected annual costs per typical single-family user of \$848 (without inflation) and a projected residential indicator of 1.3% in 2051, the first year after the projected full implementation of the controls ending in 2050. Accounting for inflation, annual costs would grow to \$2,189 with a residential indicator of 2.0% in 2051 as shown in Table E-4. This is assuming that there are no incremental annual O&M costs related to the CSO control strategy.

Table E-4: Kearny's Projected Residential Indicator Upon Full Implementation of the Municipal Control Alternative

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2051			
		No LTCP		LTCP Implementation Completed in 2050	
		With Inflation	Without Inflation	With Inflation	Without Inflation
RI	0.8%	1.1%	0.8%	2.0%	1.3%
Annual \$	\$499	\$1,258	\$499	\$2,189	\$848

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

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; and
- 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 2.0 yielding an EPA Qualitative Score of “midrange”. As each of the financial indicators are generally based upon publicly available data from 2019 or earlier, this analysis does not reflect the current and lingering impacts of the COVID -19 pandemic and should be revisited upon memorializing the LTCP implementation schedule in the Town’s next NJPDES Permit.

Table E-5: Permittee Financial Capability Indicator Benchmarks

Indicator	Rating	Numeric Score
Bond Rating	Midrange	2
Overall Net Debt as a Percent of Full Market Property Value	Strong	3
Unemployment Rate	Weak	1
Median Household Income	Midrange	2
Property Tax as a Percent of Full Market Property Value	Midrange	2
Property Tax Collection Rate	Midrange	2
Total		13
Overall Indicator Score: (numeric score / number of applicable indicators)		2.0
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 Kearny is proposing a 30-year implementation schedule.

The affordability analysis detailed above has documented that the selected \$69.9 million (current dollars) Municipal Control Alternative would result in a Residential Indicator of 2.0%, which is at the EPA “high burden” trigger in 2051.

Additional economic factors are presented in the Kearny 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.

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

The affordability analysis detailed above has documented that the selected \$69.9 million (current dollars) Municipal Control Alternative along with related operation and maintenance costs would result in a Residential Indicator of “high impact” under EPA’s criteria. Moreover, the reality of low effective household incomes compared nationally and the high costs of living in Kearny argue strongly that the EPA metric understates the impacts of the CSO control costs on the residents of the Town. Kearny 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, Kearny’s capacity for additional CSO controls, beyond those proposed in the SIAR, is limited.

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

The projections and conclusions concerning the affordability of the Municipal Control Alternative proposed in this SIAR by the Kearny and Kearny financial capability to finance the CSO control program are premised on the baseline financial conditions of Kearny 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, Kearny 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.

SECTION F - RECOMMENDED LONG TERM CONTROL PLAN

F.1 INTRODUCTION

The overall process of developing alternatives included evaluating several means to achieve the goals of the LTCP. Ultimately, as describe in detail elsewhere in this report, it was determined that utilizing the presumptive approach with an 85% capture goal was the most cost-effective approach for preparing this LTCP. While the Town of Kearny combined sewer system is hydraulically connected to other communities within the PVSC system, this plan has been prepared to ensure that the Town of Kearny meets the 85% capture goal as an individual community. This section presents the final selected alternative, along with associated design, construction and financing schedules.

F.2 RECOMMENDED LTCP

The recommended alternative is Alternative No. 1, which consists of sewer separation within the watershed areas associated with CSO outfalls KE006 and KE010. A final summary of Alternative No. 1 is provided within Table F-1 below.

Table F-1: Summary of Alternative No. 1

Alternative	% Capture	CSO Volume Reduction (MG)	CSO Events	Cost (\$M)
Sewer Separation within KE006	85%	156.1	45	59.7
Sewer Separation within KE010				10.2
Total Program Cost				69.9

In addition to the above, the Town of Kearny recognizes the importance of incorporating green infrastructure into the overall LTCP. However, it was previously observed during preparation of the DEAR, that green infrastructure measures are not effective at reducing the overall CSO volume and event frequency, unless implemented on a large scale beyond what is considered practicable or cost-effective. However, this report includes recommended green infrastructure measures that should be considered supplemental to Alternative No. 1. The proposed green infrastructure program which is included within the recommended and selected LTCP includes ordinance revisions, participation in the Hudson-Essex Greenway Project, and a commitment to utilize green infrastructure to address localized flooding and ponding issues, if applicable and viable as a solution to such issues.

F.3 IMPLEMENTATION COST OPINION

As is indicated in Section E above, the proposed improvements will impose a financial burden on the Town of Kearny rate payers. Specifically, based on the performed analysis, Kearny's capacity for additional CSO controls, beyond what is proposed in this report, is limited. Therefore, an implementation schedule of thirty (30) years is being proposed. A detailed breakdown of said schedule is included below.

F.4 IMPLEMENTATION SCHEDULE

This section provides an overview of the proposed implementation schedule for the selected Town of Kearny CSO LTCP as it relates to the selected Alternative No. 1. Since, green infrastructure is considered a supplementary measure within this plan, a schedule for green infrastructure projects is not provided. Green infrastructure projects will be implemented as opportunities to do so become available, with the exception of ordinance revisions, which the Town intends to implement within the first five (5) years of the plan.

Overall, the Town of Kearny intends to implement the recommended LTCP over a thirty (30) year period. The goal of this proposed implementation period is to accommodate the fact that the proposed improvements will be a financial burden on Kearny's rate and tax payers, as is indicated in Section E above.

A summary of the proposed implementation schedule is provided below in Table F-2. It shall be noted that design for sewer separation within CSO watershed area KE010 has been completed.

Table F-2: Summary of Implementation Schedule

Project	Priority	Estimate Design Start	Estimated Construction Start	Estimated Project Completion	Total Project Cost (\$M)⁽¹⁾
Sewer Separation within KE010	1	Design Complete	2021	2024	10.2
Sewer Separation within KE006 ⁽²⁾	2	2035 ⁽²⁾	2041 ⁽²⁾	2050 ⁽²⁾	59.7

- (1). It is noted here and stated elsewhere in this report that the total project costs included herein include both design and implementation of the same. It is assumed that 5% of the project costs are attributed to engineering design, while the remaining 95% are attributed to implementation and construction.
- (2). Construction of sewer separation within CSO watershed area KE006 represents an enormous cost to the Town of Kearny. As such, the Town is seeking to complete this project over the course of 25 years with design commencing in 2025, construction commencing in 2030, and project completion in 2050. Overall, the Town intends to construct sewer separation within the KE006 area in phases spanning 2-year periods. For the purposes of this implementation schedule, design will be completed initially over a 5-year period beginning in 2025 with a completion date toward the end of 2029 / beginning of 2030. The intent is for initial phased construction for sewer separation within the KE006 area to commence toward the end of 2030. A detailed 30-year schedule is included within Table F-3. This schedule includes a yearly breakdown for the proposed implementation schedule.

Table F-3: Town of Kearny CSO LTCP Implementation Schedule

			Years After LTCP Plan Approval																													
Project Phases		Estimate Phase Cost (\$M) ⁽¹⁾	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Sewer Separation within KE010	Design Phase (Substantially Complete)	0.51 ⁽¹⁾																														
	Construction Implementation (to be completed in a single phase)	9.69																														
	Total Project Cost	10.2 ⁽¹⁾																														
Sewer Separation within KE006 ⁽²⁾	Design Phase	3.0 ⁽¹⁾																														
	Construction Implementation – Phase I	5.67																														
	Construction Implementation – Phase II	5.67																														
	Construction Implementation – Phase III	5.67																														
	Construction Implementation – Phase IV	5.67																														
	Construction Implementation – Phase V	5.67																														
	Construction Implementation – Phase VI	5.67																														
	Construction Implementation – Phase VII	5.67																														
	Construction Implementation – Phase VIII	5.67																														
	Construction Implementation – Phase IX	5.67																														
	Construction Implementation – Phase X	5.67																														
	Total Project Cost	59.7 ⁽¹⁾																														
Green Infrastructure	Ordinance Revisions to Incorporate Green Infrastructure Requirements	0.0																														
	Participation in the Hudson Essex Greenway Project	Unknown at this time																														
	Total LTCP Cost	69.9 ⁽¹⁾																														

(1). It is assumed that 5% of the project costs are attributed to engineering design, while the remaining 95% are attributed to implementation and construction.

(2). The Town is seeking to complete this project over the course of 16 years with design commencing in 15 years after approval of the LTCP, construction commencing during the year 21 after approval, and project completion 30 years after approval. Overall, the Town intends to construct sewer separation within the KE006 area in 10 phases over a 10-year period.

(3). Due to the high cost of separation within KE006A and financial impact to the Town of Kearny, years 5-14 will be utilized to plan and evaluate funding mechanisms for to complete this project.

F.5 BASIS FOR LTCP DEVELOPMENT AND IMPLEMENTATION SCHEDULE

Table F-3 above, provides a comprehensive overview of the proposed implementation schedule based upon the individual projects associated with the LTCP plan elements.

Construction of Alternative No. 1 will be broken down into multiple phases. As is indicated above, sewer separation within KE010 will be the first project completed. This project has been substantially designed and is under final review NJDEP since the project involves finding from the New Jersey Water Bank. However, upon receipt of final approval, the Town of Kearny will proceed with bidding and construction of the project. It is expected that the project will take a total of 3-4 years to complete when including the entirety of the construction process and decommissioning of the existing CSO outfall at KE010. Following completion of separation within the CSO watershed area for KE010, it is expected that design of sewer separation within the KE006 watershed area will commence. It is expected that the design process will commence during the fifth year after approval of the LTCP and will take a total of five (5) years. This project will include design of sewer separation, seeking and applying for funding (most likely by way of the New Jersey Water Bank), and allocation into phases based upon the Town's financial circumstances. Due to the large area of separation required to complete this project (approximately 199 acres), the Town is proposing to construct the proposed improvements associated with KE006 by way of ten (10) sub-phases. For the purpose of project planning, it has been assumed that approximately 20 acres will be separated during each sub-phase. The intent of phasing the project in this manner is to ensure that improvements are constructed with minimal impact to the community rate payers.

As is illustrated in Table F-3 above, as part of an initial effort to implement green infrastructure within the Town, potential ordinance revisions will be evaluated and incorporated as deemed appropriate. The intent of such ordinance revisions would require that developers incorporate green infrastructure when constructing new improvements and/or developments on private properties, while not reducing the desire for developers to invest in the Town of Kearny. This effort will be implemented over the first five (5) years of the schedule. Information regarding potential ordinance revisions are included in Section D.4.2 above.

In addition to ordinance revisions, this LTCP also recommends that green infrastructure measures be implemented through the entirety of the plan as opportunities to construct the same become available. Such measures include implementation of bioretention systems / tree pits, porous paving systems, and participation in the construction of the Essex-Hudson Greenway project, which aims to convert railroad rights-of-way within the Town of Kearny, amongst other communities, to usable passive recreation open space. Financial commitments to the LTCP through green infrastructure are not included herein. However, implementation of the same is included through the entirety of the thirty (30) year plan and as projects are identified, and costs become clearer, this plan will be modified to incorporate the cost of green infrastructure improvements. Moreover, it is noted that implementation of green infrastructure will not result in a tangible impact on the overall CSO volume and event frequency reductions.

F.6 CSO REDUCTION VERSUS TIME

Table F-4, F-5 and Figure F-1 below illustrate the approximate CSO volume reductions achieved throughout the entirety of the overall LTCP implementation schedule.

Table F-4: CSO Event Frequency vs. Time

Project / System Condition	Implementation Schedule (Number of Years after LTCP Approval)	CSO Volume (MG)	Reduction from Baseline	CSO Events	Reduction from Baseline
Baseline Condition	0	254.7	0%	61	0%
Sewer Separation within KE006	4	220.3	14%	61	0%
Sewer Separation within KE010	30	98.6	61%	45	26%

Table F-5: CSO Volume Reduction (MG) vs. Time (years after LTCP approval)

Project	Year after LTCP Approval	Project Phase	CSO Volume Reduction (MG)
Sewer Separation within KE010A	1		0.0
	2		0.0
	3		0.0
	4	Entire Project Complete - Single Phase	34.4
Sewer Separation within KE006A	5		34.4
	6		34.4
	7		34.4
	8		34.4
	9		34.4
	10		34.4
	11		34.4

Project	Year after LTCP Approval	Project Phase	CSO Volume Reduction (MG)
Sewer Separation within KE006A	12		34.4
	13		34.4
	14		34.4
	15		34.4
	16		34.4
	17		34.4
	18		34.4
	19		34.4
	20		34.4
	21	Phase I Completion	46.6
	22	Phase II Completion	58.6
	23	Phase III Completion	70.8
	24	Phase IV Completion	83.0
	25	Phase V Completion	95.2
	26	Phase VI Completion	107.4
	27	Phase VII Completion	119.6
	28	Phase VIII Completion	131.8
	29	Phase IX Completion	144.0
	30	Phase X Completion	156.1

Figure F-1: CSO Volume Reduction (MG) vs. Time (years after LTCP approval)

