Appendix B

Selection and Implementation of Alternatives Report for
Town of Guttenberg

TOWN OF GUTTENBERG
NJPDES CSO PERMIT NO. NJ0108715

SELECTION AND IMPLEMENTATION OF ALTERNATIVES REPORT

PREPARED FOR

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The Town of Guttenberg is located in Hudson County, New Jersey. It is bounded by The Township of North Bergen to the north and west, the Town of West New York to the south, and the Hudson River and New York City to the east. The Town has a population of approximately 11,700; with total area of approximately 124 acres, it is the most densely populated municipality in the United States.

The majority of the town (approximately 111 acres) is served by combined sewer system (see Figure A-1 for a system map). The combined sewer collection system conveys flow to the Woodcliff STP (owned by the North Bergen Municipal Utilities Authority, or NBMUA) for further treatment, and allows extreme wet weather flows discharging through a single combined sewer overflow (CSO) outfall located at the Hudson River. There is a small (approximately 13 acres) portion of the Town (to the east beneath the Palisades bluffs) that has separated sewers, with sanitary sewage flowing directly to the Woodcliff STP, and collected stormwater flow discharging into the river via Hudson County lines. Some separated storm water flow (from the Galaxy Towers residential high-rise) is pumped into the CSO line downstream of the regulator; a project is currently underway to relocate this flow to the County system, reducing discharge volume from the CSO during wet weather discharge (see Section C.2.3 of this Report).

The Town's combined flow to the Woodcliff plant is controlled by a single regulator chamber (known as Regulator G-1) located at the intersection of 71st Street and JFK Boulevard East. The regulator is currently set to allow wet weather flow of up to 3.4 MGD (42% of the current plant capacity, based upon existing split of dry weather flow) before bypassing flow to the CSO line. However, other factors at the STP (usually dependent on the intensity and duration of a precipitation event) can cause flow from Guttenberg to be throttled or suspended entirely, resulting in an overflow event at less than 3.4 MGD flow.

Guttenberg's combined sewer system operates under New Jersey Pollution Discharge Elimination System (NJPDES) Permit No. NJ0108715 (last renewed in 2015) allowing one combined sewer regulator to overflow to the Hudson River.

Guttenberg is considered part of the Passaic Valley Sewerage Commission (PVSC) regional CSO group, despite the fact that Guttenberg discharges no flow to the PVSC treatment facility. This is due to its relationship with the NBMUA, as flow from the western portion of North Bergen is tributary to the PVSC system. As such, this Report has been prepared and formatted in accordance with PVSC guidance for inclusion in the Guttenberg / North Bergen – Woodcliff Selection and Implementation of Alternatives Report (SIAR).

It should be noted that while the Woodcliff facility treats flow from both North Bergen and Guttenberg, the two municipal systems are being considered as hydraulically separate systems for purposes of this Report. This separation can be justified by the fact that Guttenberg's flow enters the Woodcliff plant via a separate, dedicated regulator, and the CSO outfall from that regulator conveys flow from Guttenberg only. As such, CSO controls enacted by one municipality do not impact the overflows from the other (with the exception of treatment plant expansion, which will be discussed later in this Report).

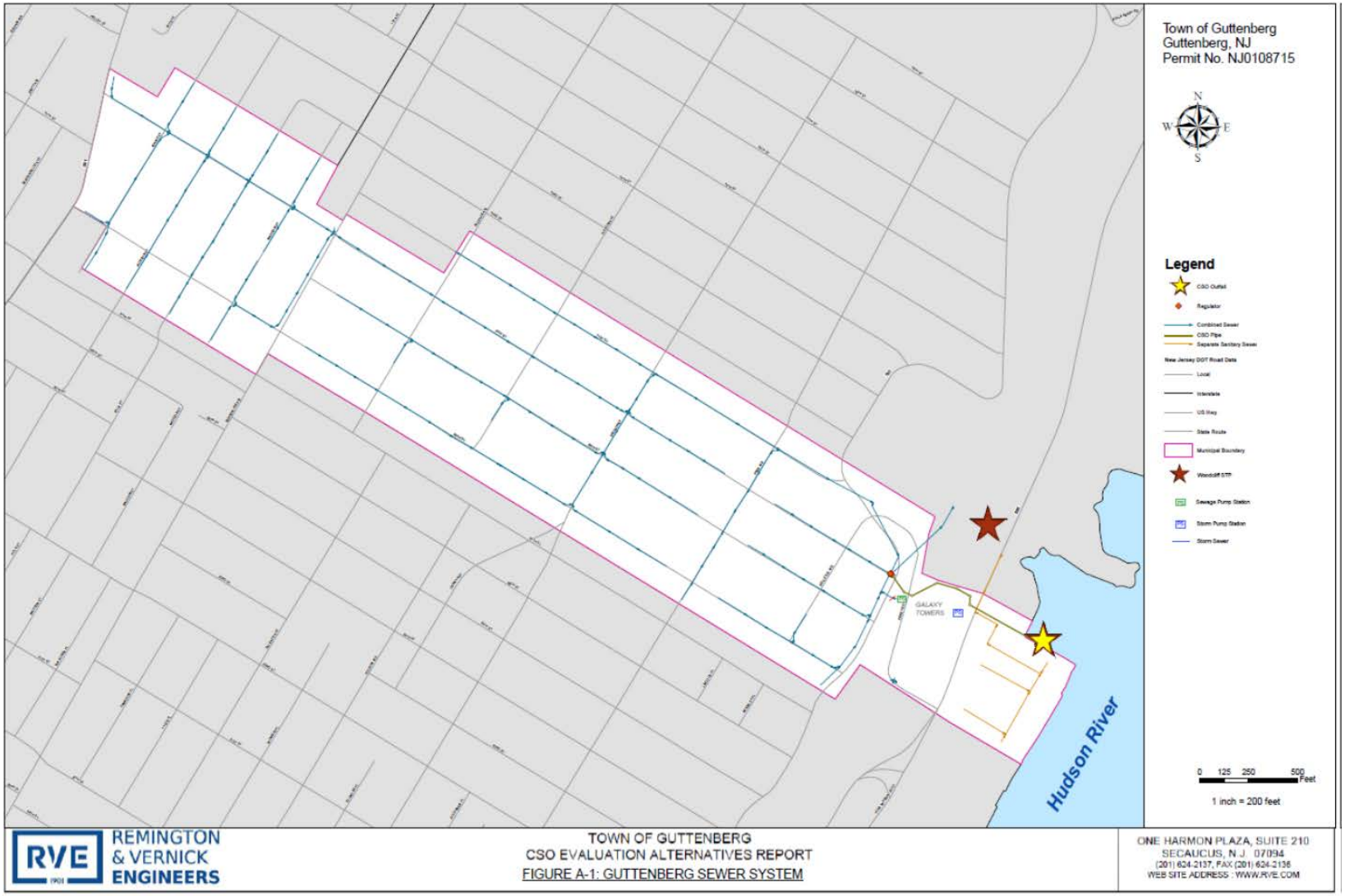

Figure A-1: Guttenberg CSO System Map

SECTION B - SCREENING OF CSO CONTROL TECHNOLOGIES

B.1 INITIAL SCREENING OF ALTERNATIVES

As part of the CSO Long-Term Control Plan process, the Town of Guttenberg prepared and submitted a Development and Evaluation of Alternatives Report (DEAR) dated June 2019 (later revised in October 2019 in response to NJDEP comments). The DEAR included a standardized methodology for screening various CSO control technologies as developed by PVSC and their consultants and applied to the local circumstances in Guttenberg. The control alternatives considered were as follows:

1. Source Control
    a. Storm Water Management
        i. Catch Basin Control
        ii. Floatables Control
        iii. Catch Basin Leaching
    b. Public Outreach and Education
        i. Water Conservation
        ii. Catch Basin Stenciling
        iii. Community Cleanup Programs
        iv. Public Outreach Programs
        v. FOG Program
        vi. Garbage Disposal Restrictions
        vii. Pet Waste Management
        viii. Lawn and Garden Maintenance
        ix. Hazardous Waste Collection
    c. Ordinance Enforcement
        i. Soil Erosion and Sediment Control
        ii. Illegal Dumping Control
        iii. Pet Waste Control
        iv. Litter Control
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            2. Galaxy Towers Sanitary Flow
            3. New High-Rise Storm Flow
            4. Partial or Total System Separation
    c. Sewer System Optimization
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        ii. Regulator Modifications
        iii. Outfall Consolidation / Relocation
        iv. Real Time Control

3. Storage and Treatment Options
    a. Linear Storage (Increased Capacity in the Collection System)
        i. Pipeline Storage
        ii. Tunnel Storage
    b. Point Storage
        i. Above or Below Grade Tanks
        ii. Industrial Discharge Detention
    c. Treatment of CSO Discharge
        i. Vortex Separators
        ii. Screens and Trash Racks
        iii. Netting
        iv. Containment Booms
        v. Baffles
        vi. Disinfection and Satellite Treatment
        vii. High-Rate Physical/Chemical Treatment
        viii. High-Rate Filters

d. STP Expansion or Storage at the Treatment Facility
    i. Additional Treatment Capacity
    ii. Wet Weather Blending

e. Treatment of Industrial Dischargers
    i. Industrial Pretreatment Program

Many of these alternatives were not applicable to Guttenberg (e.g., Leaf Collection, Industrial Pretreatment); others were already implemented (e.g., Catch Basin Cleaning, Netting). The screening spreadsheets are attached at the end of this Section as Tables B-1 through B-3.

As a result of the screening, the following were selected for further consideration as part of the LTCP:

1. I/I Reduction
2. Expansion of the Woodcliff Sewage Treatment Plant
3. Separation of Galaxy Towers Flow (Storm and Sanitary)
4. ~~Separation of New High-Rise Storm Flow~~
5. ~~Pipeline Storage (Pumped)~~
6. ~~Partial System Separation~~
7. Green Infrastructure
    a. Green Roofs
    b. Planter Boxes
    c. Rain Barrels

Note: Alternatives 4, 5, and 6 were later eliminated in the DEAR due to technical, operational or cost concerns.

B.2 CHANGES TO ALTERNATIVES LIST

In the months since the DEAR was approved by NJDEP, several decisions have occurred that impact the list of alternatives in the report:

B.2.1 Separation of Galaxy Sanitary Flow

As described in the June 2019 DEAR Report, sanitary flow from the Galaxy Towers complex is currently pumped up the cliff to the regulator influent line, where it then flows either to the Woodcliff STP or the CSO line as circumstances dictate. Recent discussions between the Town of Guttenberg, NBMUA and Galaxy management have resulted in Galaxy agreeing to relocate the sanitary flow to a recently-constructed sanitary line in River Road, which serves the waterfront Bulls Ferry / Jacobs Ferry development and flows directly to the treatment plant separate from the combined sewer flow. The existing sanitary line would be replaced with a larger main to incorporate the approximately 0.25 MGD of flow.

While this project will have some beneficial impact to the combined sewer system, because it is being privately funded and constructed, the Town cannot be held responsible for its progress or completion. Therefore, Guttenberg is including it in their LTCP for informational purposes only, with $0 cost commitment from the Town.

B.2.2 Upgrades at Netting Chamber

Aside from the regular CSO discharges from their outfall, Guttenberg has experienced flooding issues at the Galaxy complex, just upstream of the Netting Chamber. This is thought to be at least partially caused by the Netting Chamber overflow screen clogging with debris in high-intensity rain events and backing up to a manhole on the Galaxy property.

Recent discussions with the Netting Chamber manufacturer have presented the Town with an opportunity to increase the rated capacity of the nets within the Netting Chamber, reducing overflow potential and reducing (or possibly eliminating) the backups at Galaxy. The equipment change can be made within the dimensions of the existing Netting Chamber, with an estimated project cost of approximately $125,000.

The project will not reduce the number or volume of CSO discharges; however, per NJDEP and PVSC guidance, projects that ameliorate local CS flooding concerns may be considered for and included in a municipality's LTCP. Therefore, this project will be added to the list above for evaluation.

Table B-1 (cont'd)
Source Control Technologies

Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Stormwater Management	Street/Parking Lot Storage (Catch Basin Control)	Low	Low	Flow restrictions to the CSS can cause flooding in lots, yards and buildings; potential for freezing in lots; low operational cost. Effective at reducing peak flows during wet weather events but can cause dangerous conditions for the public if pedestrian areas freeze during flooding.	No	No	No
	Catch Basin Modification (for Floatables Control)	Low	None	Requires periodic catch basin cleaning; requires suitable catch basin configuration; potential for street flooding and increased maintenance efforts. Reduces debris and floatables that can cause operational problems with the mechanical regulators.	No	No	No
	Catch Basin Modification (Leaching)	Low	Low	Can be installed in new developments or used as replacements for existing catch basins. Require similar maintenance as traditional catch basins. Leaching catch basins have minor effects on the primary CSO control goals.	No	No	No
Public Education and Outreach	Water Conservation	None	Low	Water purveyor is responsible for the water system and all related programs in the respective City. However, water conservation is a common topic for public education programs. Water conservation can reduce CSO discharge volume, but would have little impact on peak flows.	Yes	Yes	No
	Catch Basin Stenciling	None	None	Inexpensive; easy to implement; public education. Is only as effective as the public's acceptance and understanding of the message. Public outreach programs would have a more effective result.	Yes	No	No
	Community Cleanup Programs	None	None	Inexpensive; sense of community ownership; educational BMP; aesthetic enhancement. Community cleanups are inexpensive and build ownership in the city.	Yes	No	No
	Public Outreach Programs	Low	None	Public education program is ongoing. Permittee should continue its public education program as control measures demonstrate implementation of the NMC.	Yes	No	No
	FOG Program	Low	None	Requires communication with business owners; Permitee may not have enforcement authority. Reduces buildup and maintains flow capacity. Only as effective as business owner cooperation.	Yes	No	No
	Garbage Disposal Restriction	Low	None	Permitee may not be responsible for Garbage Disposal. This requires an increased allocation of resources for enforcement while providing very little reduction to wet weather CSO events.	Yes	No	No
	Pet Waste Management	Medium	None	Low cost of implementation and little to no maintenance. This is a low cost technology that can significantly reduce bacteria loading in wet weather CSO's.	Yes	Yes	No
	Lawn and Garden Maintenance	Low	Low	Requires communication with business and homeowners. Guidelines are already established per USEPA. Educating the public on proper lawn and garden treatment protocols developed by USEPA will reduce waterway contamination. Since this information is already available to the public it is unlikely to have a significant effect on improving water quality.	Yes	No	No
	Hazardous Waste Collection	Low	None	The N.J.A.C prohibits the discharge of hazardous waste to the collection system.	Yes	Yes	No
Ordinance Enforcement	Construction Site Erosion & Sediment Control	None	None	In building code; reduces sediment and silt loads to waterways; reduces clogging of catch basins; little O&M required; contractor or owner pays for erosion control. A Soil Erosion & Sediment Control Plan Application or 14-day notification (if Permitee covered under permit-by-rule) will be required by NJDEP per the N.J.A.C.	Yes	No	No
	Illegal Dumping Control	Low	None	Enforcement of current law requires large number of code enforcement personnel; recycling sites maintained. Local ordinances already in place can be used as needed to address illegal dumping complaints.	Yes	No	No
	Pet Waste Control	Medium	None	Requires resources to enforce pet waste ordinances. Public education and outreach is a more efficient use of resources, but this may also provide an alternative to reducing bacterial loads.	Yes	No	No
	Litter Control	None	None	Aesthetic enhancement; labor intensive; City function. Litter control provides an aesthetic and water quality enhancement. It will require city resources to enforce. Public education and outreach is a more efficient use of resources.	Yes	No	No
	Illicit Connection Control	Low	Low	Site specific; more applicable to separate sanitary system; new storm sewers may be required; interaction with homeowners required. The primary goal of the LTCP is to meet the NJPDES Permit requirements relative to POCs. Illicit connection control is not particularly effective at any of these goals and is not recommended for further evaluation unless separate sewers are in place.	Yes	No	No

Table B-1 (cont'd)
Source Control Technologies

Technology Group	Practice	Primary Goals		Implementation & Operation Factors	Consider Combining w/ Other Technologies	Being Implemented	Recommendation for Alternatives Evaluation
		Bacteria Reduction	Volume Reduction				
Good Housekeeping	Street Sweeping/Flushing	Low	None	Labor intensive; specialized equipment; doesn't address flow or bacteria; City function. Street sweeping and flushing primarily addresses floatables entering the CSS while offering an aesthetic improvement.	Yes	Yes	No
	Leaf Collection	Low	None	Requires additional seasonal labor. Leaf collection maximizes flow capacity and removes nutrients from the collection system.	Yes	No	No
	Recycling Programs	None	None	Most Cities have an ongoing recycling program.	Yes	Yes	No
	Storage/Loading/Unloading Areas	None	None	Requires industrial & commercial facilities designate and use specific areas for loading/unloading operations. There may be few major commercial or industrial users upstream of CSO regulators.	Yes	No	No
	Industrial Spill Control	Low	None	PVSC has established a pretreatment program for industrial users subject to the Federal Categorical Pretreatment Standards 40 CFR 403.1.	Yes	No	No
Green Infrastructure Buildings	Green Roofs	None	Medium	Adds modest cost to new construction; not applicable to all retrofits; low operational resource demand; will require the Permitee or private owners to implement; requires regular cleaning of gutters & pipes; upkeep of roof vegetation. Portions of Cities have densely populated areas, but this technology is limited to rooftops. Can be difficult to require on private properties.	Yes	No	Yes*
	Blue Roofs	None	Medium	Adds modest cost to new construction; not applicable to all retrofits; low operational resource demand; will require the Permitees or private owners to implement; requires regular cleaning of gutters & pipes; upkeep of roof debris. Portions of the Cities have densely populated areas, but this technology is limited to rooftops. Can be difficult to require on private properties.	Yes	No	No
	Rainwater Harvesting	None	Medium	Simple to install and operate; low operational resource demand; will require the Permitees or private owners to implement; requires regular cleaning of gutters & pipes. Portions of the Cities have densely populated areas, but this technology is limited to capturing rooftop drainage. Capture is limited to available storage, which can vary on rainwater use. Can be difficult to require on private properties.	Yes	No	Yes*
Green Infrastructure Impervious Areas	Permeable Pavements	Low	Medium	Not durable and clogs in winter; oil and grease will clog; significant O&M requirements with vacuuming and replacing deteriorated surfaces; can be very effective in parking lots, lanes and sidewalks. Maintenance requirements could be reduced if located in low-traffic areas, and can utilize underground infiltration beds or detention tanks to increase storage.	Yes	No	No
	Planter Boxes	Low	Medium	Site specific; good BMP; minimal vegetation & mulch O&M requirements with regular overflow and underdrain cleaning; effective at containing, infiltrating and evapotranspirating runoff in developed areas. Flexible and can be implemented even on a small-scale to any high-priority drainage areas. Underground infiltration beds or detention tanks can be utilized to increase storage.	Yes	No	No
Green Infrastructure Pervious Areas	Bioswales	Low	Low	Site specific; good BMP; minimal vegetation & mulch O&M requirements; not as flexible or infiltrate as much stormwater as planter boxes. Technology requires open space and is primarily a surface conveyance technology with additional storage & infiltration benefits. Can be modified with check dams to slow water flow. Limited open space in most Cities means land can be utilized in more effective ways with the existing infrastructure.	Yes	No	No
	Free-Form Rain Gardens	Low	Medium	Site specific; good BMP; minimal vegetation & mulch O&M requirements with regular overflow and underdrain cleaning; effective at containing, infiltrating and evapotranspirating diverted runoff. Rain Gardens are flexible and can be modified to fit into the previous areas. Underground infiltration beds or detention tanks can be utilized to increase storage.	Yes	No	No

* Combined Technologies

Table B-2
Collection System Technologies

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

Table B-3
Storage and Treatment Technologies

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

SECTION C - EVALUATION OF ALTERNATIVES

C.1 INTRODUCTION

This Section is a summary of alternatives selected in the DEAR for further consideration, as modified in Section B above.

The modeling of base year conditions for the Town's CSO system indicate an 89% capture of wet weather flow, with 39 CSO events per year (details of the base year selection and modeling protocols can be found in the regional DEAR and SIAR). While this capture already meets the Presumptive Approach criterion of 85% capture, the Town is committed additional projects to further reduce CSO events and volume as part of their Long-Term Control Plan (LTCP).

The alternatives to be evaluated are summarized in Table C-1 below:

Table C-1
Guttenberg CSO Alternatives

Alternative	% Capture	CSO Events	Annualized Cost [1]
Baseline Conditions	89%	39	-
I/I Reduction	89%	38	$58,360
Expansion of the Woodcliff Sewage Treatment Plant	92%	31	$75,143
Separation of Galaxy Towers Storm Water Flow	89%	39	$15,635
Separation of Galaxy Towers Sanitary Flow	89%	39	$20,847
Upgrades at Netting Chamber [2]	-	-	$8,736
Green Infrastructure:			
Green Roofs	89%	39	N/A [3]
Planter Boxes	89%	39	$14,502 [3]
Rain Barrels	90-91%	36-37	$4,497 [3]

[1] Includes construction and engineering costs, and operation & maintenance costs, amortized at 2.75% over the useful life of the facilities. See DEAR for details
[2] This alternative was not modeled, as it has no impact on CSO events, but will ameliorate localized flooding issues
3 See descriptions in Section 3.2 for details on cost assumptions

C.2 DEVELOPMENT AND EVALUATION OF ALTERNATIVES

Each of the alternatives to be evaluated is briefly described below. For a more detailed description of the alternatives and their potential impact on the number and volume of CSO events, please see Section D of the 2019 DEAR.

C.2.1 Infiltration / Inflow Reduction

The Town of Guttenberg periodically inspects its sewers via closed circuit television (CCTV). Some video inspection work was in 2015; in early 2020, the Town conducted a full video survey of all combined sewers and manoles (results of the inspections are currently being reviewed). The inspections will identify sources of I/I into the system; the Town can then contract for spot repairs or line replacement to repair the leak.

For the purpose of this analysis, it is assumed that the I/I originating in the Town-owned lines will be reduced by approximately 100,000 gpd. Several lines have already been designated (through an Administrative Consent Order with the EPA) for repair and/or lining; it is anticipated that this work will be done within the next five years. Alternate and/or additional areas will be identified through the 2020 CCTV inspection program and will be utilized to modify the ACO as necessary and incorporated into a Capital Improvement Plan going forward.

The estimated cost for the already designated work is approximately $1,500,000. As determined through the modeling performed during the DEAR process, I/I reduction by itself has a minimal impact on CSO performance, with no measurable impact on capture, and only reducing the number of overflow events to 38/year. However, the projects will also decrease the dry and wet wet weather flow to the Woodcliff plant, opening up a small amount of capacity or stormwater capture

C.2.2 Expansion of Woodcliff Treatment Plant

The NBMUA is currently performing a number of improvements at the Woodcliff STP, including the expansion of wet weather hydraulic capacity of from 8 MGD to 10 MGD. For details of the expansion, please refer to the NBMUA's DEAR. For the purpose of this Report, it is sufficient to state that Guttenberg's share of the expanded treatment capacity is based upon the current dry weather flow split – 58% NBMUA, 42% Guttenberg. The projected share of flow to be allocated to Guttenberg (4.2 MGD) is a significant increase over the current value of approximately 3.4 MGD.

Per figures supplied by the NBMUA, the total projected cost of the plant expansion is approximately $23 million, of which 20% ($4.6 million) is considered for expansion work. Costs for the work will be allocated according to the flow split (42% Guttenberg, 58% North Bergen); therefore, the cost to Guttenberg is anticipated to be approximately $1.932 million. The capital cost of the expansion is being borne by the NBMUA; however, Guttenberg's share of the cost will be passed along to residents by way of increased rates in the future.

As determined through the modeling performed during the DEAR process, the Woodcliff plant expansion work (which is currently under construction and anticipated to be online in 2021) results in a significant improvement to system performance, increasing wet weather capture to 92% and reducing the number of overflow events to 31/year.

C.2.3 Separation of Galaxy Storm Water Flow

The Galaxy Towers development is located on River Road, below the bluff separating the majority of Guttenberg from the Hudson. The Town's CSO line runs through the Galaxy property; storm water from the 5-acre complex is collected and pumped into the CSO line downstream of the regulator. Under low-intensity precipitation events, this is not considered an overflow event, even though flow discharges from the outfall, as this discharge is entirely storm flow (not combined). However, when the regulator is overflowing due to heavy precipitation (or throttling by the treatment plant), the volume of flow from Galaxy is considered part of the CSO event. Therefore, while the Galaxy storm flow does not impact the number of CSO events in the system, it can increase the volume of discharge.

Design is currently under way to remove the Galaxy storm flow from the CSO line and discharge it via gravity to the County-owned storm system in River Road; the Galaxy storm flow would discharge through a stormwater-only discharge approximately 500 feet upriver (see Figure C-1). Recent test pit work has revealed a number of utility conflicts which must be addressed in order to install the storm lines; this has increased the estimated cost of the work to approximately $400,000. As determined through the modeling performed during the DEAR process, the project has no impact on the number of CSO events (as the connection to the CSO line is downstream of the regulator); because flow data from Galaxy was unavailable, any impact on the volume reduction of CSO events was not considered (although it will help resolve some localized flooding issues on the Galaxy property and River Road).

C.2.4 Separation of Galaxy Sanitary Sewer Flow

Sanitary flow from the Galaxy complex is currently pumped up the cliff to the regulator influent line, where it then flows either to the Woodcliff STP or the CSO line as circumstances dictate. Discussions have occurred between the Town of Guttenberg and Galaxy management regarding the potential of relocating the flow to a recently-constructed sanitary line in River Road, which serves the adjacent Appleview development and flows directly to the treatment plant. This would remove the flow from the regulator chamber In order to incorporate the approximately 0.25 MGD of sanitary flow, the existing sewer line would need to be replaced with a larger main, and the MUA's river Road Pump Station expanded to allow the project to proceed.

NBMUA has indicated that relocation of the Galaxy sanitary flow would reduce Guttenberg's Allocation (i.e., the amount of flow allowed from Regulator G-1) at the plant by a similar amount. There may be some marginal impacts on the regulator operation as a result of the reduction.

As presented in the DEAR, the estimated cost of the sanitary separation is approximately $500,000. Sanitary flow separation has a modest minor impact on CSO performance, increasing with no measurable impact on capture to 89% (since the sanitary flow is captured and treated in both scenarios), and reducing the number of overflow events to 37 per year. According to the NBMUA, there may be a minimal increase to the number of overflows from their outfall; however, this should be offset by the reduction in Guttenberg events. Therefore, the impact on the overall (combined) system is assumed to be negligible.

C.2.5 Upgrades at Netting Chamber

As discussed in Section B.2.2, the Town is considering replacing the existing nets within the Netting Chamber, increasing the rated capacity of the Chamber to reduce overflow potential and reduce (or possibly eliminate) periodic upstream flooding on the Galaxy property and River Road. The equipment change can be made within the dimensions of the existing Netting Chamber and will be reusable if the Chamber needs to be replaced in the future.

The overall project cost is estimated to be approximately $125,000, with the equipment having a useful life of at least 20 years. This results in an annualized cost of approximately $8,736, which is used in Table C-1. As noted earlier, the project will not reduce the number or volume of CSO discharges; it will ameliorate local CS flooding concerns. It is anticipated that the work will be done upon the completion of the Galaxy storm separation project is complete.

C.2.6 Green Infrastructure – Green Roofs

The Town of Guttenberg is currently considering zoning changes aimed at increasing the number of high-rise units in certain areas of the municipality (with a total area of approximately 6 acres). Specifically, the new zone (R-5) would encourage the consolidation of lots and the construction of new high-density (9-15 stories) developments (see Figure C-2). This presents an opportunity to pursue green roof technologies, for the following reasons:

1. The green technologies can be designed integrally into the structures, reducing the incremental costs of the features; and
2. The larger number of people residing in such development allows a wider base over which to spread costs, lowering the per-capita cost of the features.

The estimated construction cost for installing these green roofs is unknown at this time - since the green roofs would be installed on private property, the construction costs would be borne by the developers, not the Town of Guttenberg. Rather, costs to the Town would be in the form of tax credits and/or rebates that would be provided to the high-density apartment developers to incentivize the integration of green roofs. An approach to incentivize green roofs will be identified as the rezoning progresses; it is anticipated that an ordinance will be adopted over the next few years.

C.2.7 Green Infrastructure – Planter Boxes

While bioswales and rain gardens were considered and rejected in the DEAR due to open space and subsurface constraints, the use of planter boxes is being considered in certain areas to retain some rainwater, reducing flow into the combined sewer. Because the use of planter boxes requires the sacrifice of some sidewalk space that could otherwise be used for pedestrian movement, the boxes would likely be limited to the commercial areas of the Town, where wider sidewalks mean that space is available while maintaining pedestrian flow. The streets identified in these areas are Bergenline Avenue, Park Avenue and JFK Boulevard East.

Because these areas are so limited, the overall impact of the planter boxes is likely to be minimal; modeling shows a *de minimus* impact on the number and volume of CSO events. However, the boxes can also contribute to the beautification of the streetscape and are popular with some residents and business patrons.

To provide planter boxes on all appropriate streets (approximately 250 2' x 8' boxes) would cost approximately $415,000. Given the Town's other CSO projects currently underway, a more reasonable plan would be to provide about 15-20 boxes per year at an annual cost of approximately $20,000/year, until such time as all boxes are in place.

C.2.8 Green Infrastructure – Rain Barrels

The installation of rainwater harvesting systems, such as rain barrels, provides an opportunity to capture, detain, and reuse stormwater runoff despite the lack of space for most green infrastructure practices. The rain barrels can be fitted at many of the private buildings (both residential and commercial) throughout the Town. There are approximately 1,200 buildings in Guttenberg; the actual number of barrels would depend on how many property owners are receptive to the program.

The estimated construction cost for the installation of 1,200 rain barrels is approximately $370,000; actual cost would be dependent on acceptance rate of property owners. As determined through the modeling performed during the DEAR process, if all homeowners were to utilize the barrels, it would have a significant impact on performance, raising capture to 97% (it would have a much more modest impact on the number of overflows, reducing the number to 24 events/year). However, there are two major issue with the proposed program:

1. It is extremely unlikely that takeup by homeowners would be very high; a rate of 10-15% acceptance seems more likely;
2. With the barrels to be installed on private property, there are limits to what the Town can do regarding both installation, and later maintenance of the units.

Both of these issues would significantly reduce the benefits of the rain barrels. The range of CSO figures in Table C-1 are based on an assumed takeup rate of 10-15%. Additionally, the Town would need to conduct community outreach and education regarding the rain barrels to increase public acceptance and participation of the rain barrel program. Based upon our experience with other municipalities, the estimated administrative cost to implement a successful rain barrel program is approximately $12,000-15,000.

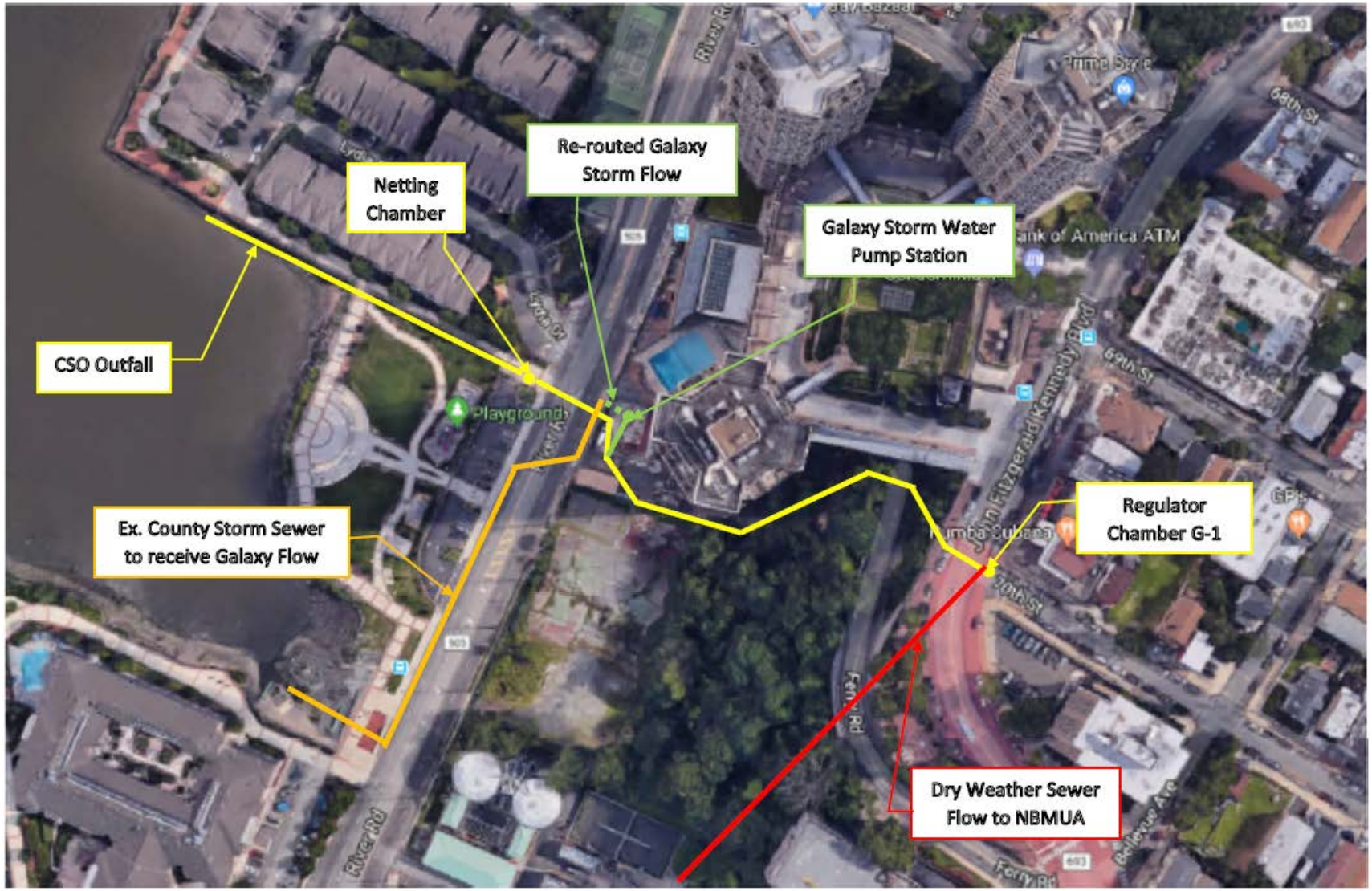
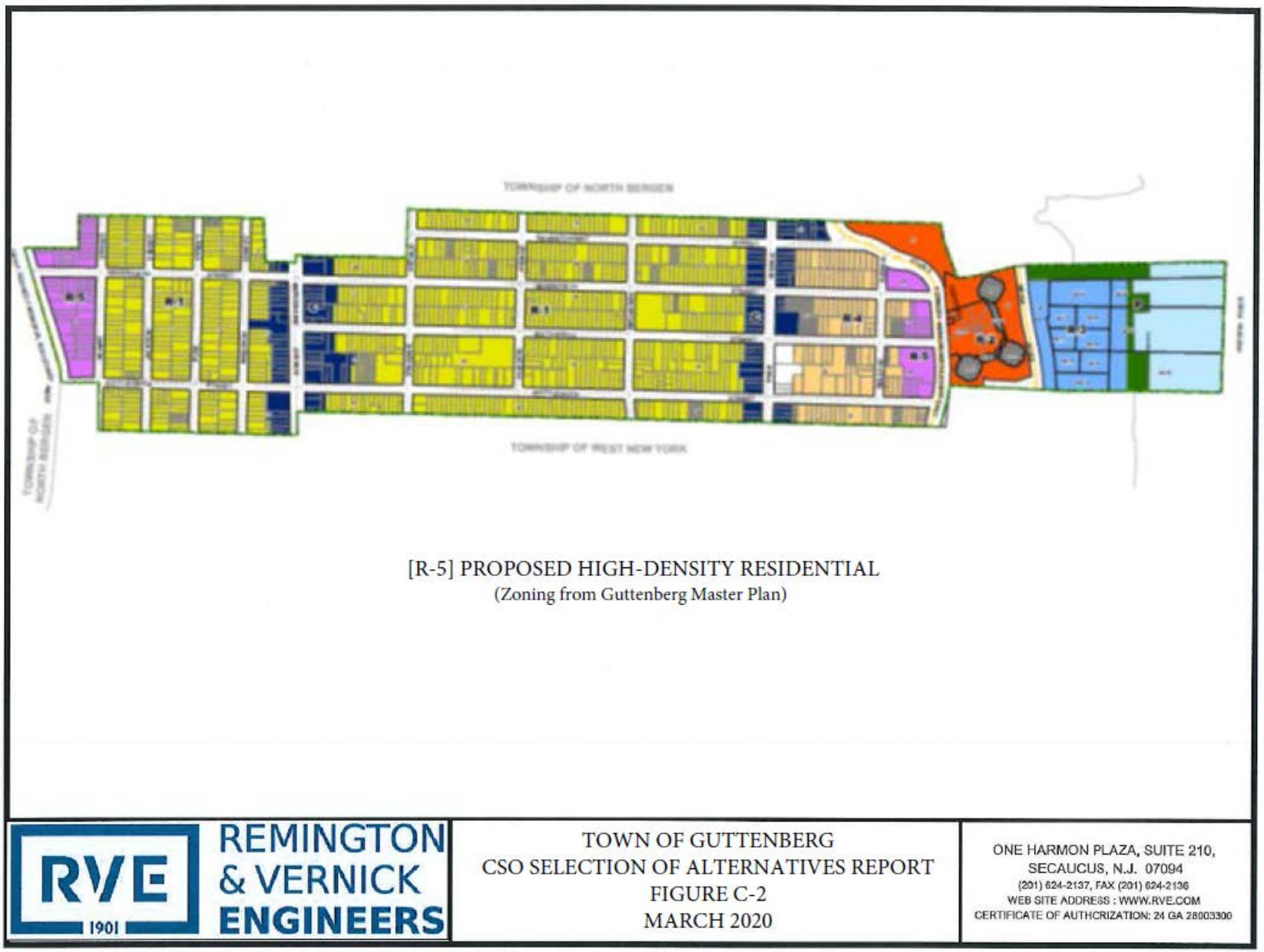


Figure C-1: Galaxy Towers Storm Flow Separation


TOWNSHIP OF NORTH BERGEN
TOWNSHIP OF WEST NEW YORK
[R-5] PROPOSED HIGH-DENSITY RESIDENTIAL
(Zoning from Guttenberg Master Plan)
RVE 1901
REMINGTON & VERNICK ENGINEERS
TOWN OF GUTTENBERG
CSO SELECTION OF ALTERNATIVES REPORT
FIGURE C-2
MARCH 2020
ONE HARMON PLAZA, SUITE 210,
SECAUCUS, N.J. 07094
(201) 624-2137, FAX (201) 624-2136
WEB SITE ADDRESS : WWW.RVE.COM
CERTIFICATE OF AUTHCRIZATION: 24 GA 28003300

SECTION D - SELECTION OF RECOMMENDED LTCP

D.1 INTRODUCTION

The Town's permit requires that permittee is "responsible for submitting a Long-Term Control Plan (LTCP) for their CSO facilities that addresses all nine elements in Part IV.G". The nine elements are listed below:

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

Items 1-3 of the above are addressed within the PVSC Regional SIAR for the Woodcliff service area. The remaining items are addressed in this Report.

Per the permit, "[t]he permittee shall evaluate a reasonable range of CSO control alternatives … that will meet the water quality-based requirements of the CWA using either the Presumption Approach or the Demonstration Approach…"

The Town of Guttenberg (as well as the NBMUA) has selected the Presumptive approach to compliance, which is defined as a program that meets any of the criteria listed below, that will be presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA:

1. No more than an average of four overflow events (see below) per year from a hydraulically connected system as the result of a precipitation event;
2. 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; or
3. The elimination or removal of no less than the mass of the pollutants, identified as causing water quality impairment through the sewer system characterization, monitoring, and modeling effort, for the volumes that would be eliminated or captured for treatment under [Item 3 above]

As with the rest of the PVSC CSO communities, Guttenberg has designed its LTCPs selection process to target compliance with Criteria 2 (85% capture). According to baseline modeling, the Guttenberg system* already meets this criterion under baseline conditions (89%); however, the goal of the LTCP, when selected, is to increase the system performance to the maximum practical level, subject to technical, operational and financial constraints.

** While Guttenberg and part of North Bergen flows are combined for treatment at the Woodcliff plant, the two systems are being considered as hydraulically separate systems for purposes of the LTCP. Because the flows from the two municipalities enter the plant separately, and system improvements in one municipality would not affect CSO events in the other (except for STP expansion, which will benefit both communities in a way that can be readily allocated between them), it is reasonable to treat each municipality's system as a separate entity.*

D.2 SELECTION OF LTCP ALTERNATIVES

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

D.2.1 Description

Several factors were used in the LTCP selection process, including impact on CSO overflows, impact on receiving water quality, non-monetary factors, and costs all factor into the selection process. This section describes each of these factors and how they impacted the selection process.

D.2.2 Remaining Overflows

The primary criteria for evaluation of alternatives is how well the technology performs at reducing the number and/or volume of overflow events. This evaluation of alternatives utilized computer models which provided theoretical outputs for different control strategies that could be implemented for the City of Guttenberg. Performance was determined using flow modeling software (Infoworks ICM version 9.0); for a further description of the protocols and procedures used in the modeling, please refer to the June 2019 DEAR.

Only two of the evaluated alternatives were found to have a significant impact on the number and/or volume of overflow events: the Woodcliff plant expansion and wet weather bypass; and the installation of rain barrels (assuming widespread adoption throughout the Town). However, many of the other elements had other benefits to the Town; as a result, these projects were not rejected solely due to minor or *de minimus* impacts on CSO events.

D.2.3 Ability to Meet Water Quality Standards

Based upon the findings of previous studies and reports submitted by PVSC and approved by NJDEP (including the System Characterization Report, the Receiving Water Quality Modeling Report and the Baseline Compliance Monitoring Program Report, among others), the Hudson River is currently in compliance with all applicable Surface Water Standards under baseline conditions.

Because of these circumstances, and since both the Town and NBMUA have selected the Presumptive Approach to compliance, impacts on receiving water quality and the ability of the receiving water to meet Water Quality Standards were not a significant factor in the selection of the LTCP elements.

D.2.4 Non-Monetary Factors

There are several non-monetary factors that were considered in selecting the elements of the LTCP:

D.2.4.1 Siting / Land Availability

In a municipality as small and as densely populated as Guttenberg, space is at a premium. There are very few large lots (except for the Galaxy Towers property, very few undeveloped lots (those that are not currently occupied are small residentially-zoned lots), and what public land there is, is primarily municipal buildings or urban parks. In addition, the Town is well over 95% impervious surfaces, drastically limiting the options for GI.

These circumstances favor smaller projects, which are deconcentrated and able to be tied into existing building or infrastructure, and away from large-scale projects like tanks and treatment plants (except for the expansion of the Woodcliff plant, which is both an existing facility and located outside the borders of Guttenberg).

D.2.4.2 Institutional Issues

As noted in the DEAR, the Town of Guttenberg does not have its own Sewer Department – operation of the sewer system is contracted to the NBMUA, while routine maintenance work is performed by Town DPW personnel. Therefore, the analysis would favor non-technical and low-maintenance installations. Operator-intensive alternatives (such as treatment or pump stations) are problematic and would require either the establishment of a Sewer Department (which is highly unlikely) or an amended (and significantly more costly) agreement between the Town and the NBMUA.

D.2.4.3 Public Receptiveness

Many of the alternatives to be evaluated as part of this Report will directly impact the public (both during and after construction); therefore, it is vital to determine if the work has the support of the affected populace. For public installations, public impact is likely to be limited to construction-phase disruption and is therefore not considered to be a significant barrier for inclusion in the LTCP.

One of the Green Infrastructure alternatives (rain barrels) would have to be installed on private property, meaning the maintenance will be the responsibility of the property owner (even if the capital cost is covered by the Town). This will likely reduce public acceptance, even though GI is broadly supported, and result in a significantly lower takeup of the program, as well as potential future issues if the equipment is not maintained or maintained poorly.

For this reason, rain barrels were eliminated as a potential element of Guttenberg’s final LTCP.

The other GI option on private property (green roofs) is unlikely to cause the same issues with private ownership, due to the following:

- The cost of the green elements would be factored into the purchase or rental cost of the units, reducing initial price-related resistance on the part of the residents (in addition, financial incentives from the Town may reduce the long-term cost of the improvements);
- The high-rise structures that would feature the green roofs have professional custodial staff to maintain the green features; and
- The green technologies can be designed integrally into non- or quasi-public areas of the structures, reducing the cost and maintenance burdens on residents.

As a result, the use of zoning power to incentivize green roofs remains an attractive option for the Town.

D.2.5 Cost Opinion

Because all of the scalable CSO strategies (including tanks, pipeline storage, outfall-based treatment) were all eliminated from consideration as part of the DEAR due to various siting, technical or operational reasons, a "knee-of-the-curve" analysis is not appropriate to the Guttenberg system. All of the options to be evaluated herein are binary choices (i.e., either the projects are done or not). Projects were selected for the LTCP based upon whether they improved the performance of the system (based upon number of overflows and percent capture) subject to the overall affordability to the Town based upon the Financial Capacity Analysis (see Section E of this Report).

The expansion of the Woodcliff plant is currently under construction, anticipated to be completed in 2021. The cost allocation for the Woodcliff plants (as discussed in Section C.2.2) will be passed along to Guttenberg consumers in the form of increased rates at a formula determined by NBMUA. Since the allocated costs will be borne by Guttenberg residents, the expansion must be considered part of the LTCP

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

D.2.6 Selection of Recommended Alternative

Based upon the factors described above, the following projects / elements were selected as part of the Town of Guttenberg's Long-Term CSO Control Plan:

TABLE D-1
SELECTED LTCP ALTERNATIVES

Alternative	% Capture	CSO Events	Cost
I/I Reduction	89%	38	$1,500,000
Expansion of the Woodcliff Sewage Treatment Plant	92%	31	$1,932,000 [1]
Separation of Galaxy Towers Storm Water Flow	89%	39	$400,000
Separation of Galaxy Towers Sanitary Sewer Flow	89%	39	$500,000 [2]
Upgrades at Netting Chamber	-	-	$125,000
Green Infrastructure:			
Green Roofs	89%	39	N/A [3]
Planter Boxes	89%	39	$100,000 [4]

[1] *To be financed by NBMUA; passed on to Guttenberg residents via rate increase*
[2] *To be financed by Galaxy*
[3] *Via ordinance incentivizing green roofs in newly zoned high-rise areas*
[4] *Implemented at $20,000 per year over five years*

D.3 DESCRIPTION OF RECOMMENDED LTCP

Guttenberg's selected LTCP consists of several elements, both gray and green.

The primary element is the expansion and wet weather blending capacity at the Woodcliff Treatment Plant. The project (which is currently under construction and expected to initiate operation in 2021) will expand the wet weather treatment capacity to 10 MGD (of which 4.2 MGD will be allocated to Guttenberg's flow. This represents a nearly 25% increase in available capacity, resulting in a 20% decrease in CSO events and a 3% increase in percent capture of wet weather flow.

The other "gray" elements of the LTCP will have a lesser impact on the number and volume of CSO events, but still provide benefits to the Town at a reasonable cost. The I/I reduction projects will reduce some flow to the Woodcliff plant, and also fulfill the mandates of the Administrative Consent Order (ACO) between the Town and USEPA. Five projects remain under the ACO, with one project annually through 2024 (the actual sewers involved may change as a result of the current video inspection work, which would increase the effectiveness of the work as the most critical lines are prioritized).

The Galaxy storm and sanitary flow separation and the Netting Chamber Improvements will address localized flooding and unpermitted discharge occurring in the CSO line near River Road (storm work will also reduce the volume but not the number of CSO events). The Galaxy storm separation work is anticipated to be completed in 2021; the Netting chamber work will likely be

performed within 12-24 months after Galaxy work is complete. The Galaxy sanitary separation work is in currently in design; however, the Town has no control over scheduling of the work.

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

Together, these elements will keep the Town in compliance with the Presumptive Approach of the CSO regulations, improving the systems performance and reducing the number and volume of CSO events at their outfall, as well as eliminating the related flooding issues at the Galaxy Towers.

SECTION E - FINANCIAL CAPABILITY

E.1 INTRODUCTION

This Financial Capability Analysis (FCA) is being submitted in support of the development and evaluation of CSO controls for the Town of Guttenberg combined sewer system (CSS) to inform PVSC and NJDEP as to the boundaries of affordability for future investments in the municipal sewer system. These investments may include implementation of CSO controls, stormwater controls, conveyance / collection system rehabilitation, and other operational, maintenance, and capital improvements required to meet public needs, protect public health and the environment and to maintain regulatory compliance.

This section of the Town of Guttenberg Selection and Implementation of Alternatives Report (SIAR) quantifies the projected affordability impacts of the Town of Guttenberg'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 the Town of Guttenberg's FCA can be found in the FCA Memorandum specifically written for Guttenberg attached as part of Appendix J 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 $535, including $526 from sewer rents and $9 in Town property taxes going towards sewer system operation, maintenance, and improvements. This estimate is based on typical residential potable water usage is 4,500 gallons monthly. Based on the estimated MHI of $59,100 the Residential Indicator was approximately 0.9% in 2019, what the EPA guidance

defines as a low burden. By definition, the current residential indicator for one half of the households is greater than the 0.9%.

In Guttenberg, approximately 16.8 percent of the population is living below the poverty line. The total Census households are broken out by income brackets in Table 3-2 below, along with the respective current Residential Indicators by income bracket. The RI for each bracket was calculated from the mid-point income within the bracket. As may be noted, the calculated 2019 RI for around 5,100 households exceeds 2.0%.

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	1,887	1,887	$5,000	8.23%
$10,000 to $14,999	1,050	2,937	$12,500	3.29%
$15,000 to $24,999	2,117	5,054	$20,000	2.06%
$25,000 to $34,999	2,004	7,058	$30,000	1.37%
$35,000 to $49,999	2,623	9,681	$42,500	0.97%
$50,000 to $74,999	4,171	13,852	$62,500	0.66%
$75,000 to $99,999	2,859	16,711	$87,500	0.47%
$100,000 to $149,999	3,290	20,001	$125,000	0.33%
$150,000 to $199,999	1,007	21,008	$175,000	0.24%
$200,000 or more	924	21,932	$200,000	0.21%
Total	21,392	*Costs per household include sewer rents and municipal taxes supporting wastewater services		

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

The estimated inflationary and non-LTCP 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 2030 based on the LTCP implementation schedule in Section F of this SIAR report which targets the completion of capital improvements through 2029. In addition, the North Bergen MUA is undertaking other improvements at the Woodcliff plant (in addition to the wet weather blending work that is part of Guttenberg's LTCP); a prorated portion of these costs (total construction cost of approximately $23 million) will be passed through to Guttenberg residents through sewer rate increases. The projected cost per typical single family residential user are projected to increase from $535 in 2019 to $1,065 in 2030 due to inflation.

Table E-2 –Projected Residential Indicator in 2030 Without CSO Controls

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2030
RI	0.90%	1.48%
Annual $	$535	$1,065

E.3 SUMMARY AND CONCLUSION

E.3.1 Affordability Impacts of the Proposed CSO Controls

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

Table E-3 – Guttenberg's Selected CSO Controls

Wet Weather Control Types	Capital Costs	Incremental Annual O&M Costs ($ millions)
I/I Reduction - Projects 1 - 5	$1,500,000	0
Woodcliff STP Expansion and Upgrades	$1,932,000	See Note 1
Galaxy Towers Storm Water Separation.	$400,000	0
Galaxy Towers Sanitary Sewer Separation	$500,000 [2]	0
Netting Chamber Upgrade	$125,000	0
GSI Planter Boxes	$100,000	$0.005
Totals (w/ Galaxy Sanitary work)	**$4,057,000**	**$0.005**

[1] O&M work to be performed by NBMUA and reflected in Guttenberg user rates
[2] To be financed by Galaxy; no cost to Town

Implementation of the $4.06 million Municipal Control Alternative results in projected annual costs per typical single family user of $832 (without inflation) and a residential indicator of 1.46% in 2030, the first year after the projected full implementation of the controls ending in 2029. Accounting for inflation, annual costs would grow to $1,118 in 2030 with an RI of 1.56% as shown in Table E-4

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

Metric	Baseline (2019)	Cost per Typical Residential Wastewater User in 2030			
		No LTCP		LTCP Implementation Completed in 2029	
		With Inflation	Without Inflation	With Inflation	Without Inflation
RI	0.90%	1.48%	1.38%	1.56%	1.46%
Annual $	$535	$1,065	$785	$1,118	$832

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

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 2.0 yielding an EPA Qualitative Score of "midrange". This calculation is based on the use of the indicators that are applicable to Guttenberg. The derivation of this score is presented in the detailed FCA memorandum presented in Appendix P of the PVSC Regional Report. As each of the financial indicators are generally based upon publicly available data from 2017 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	Strong	3
Overall Net Debt as a Percent of Full Market Property Value	Midrange	2
Unemployment Rate	Midrange	2
Median Household Income	Midrange	2
Property Tax as a Percent of Full Market Property Value	Midrange	2
Property Tax Collection Rate	Weak	1
	Total	12
Overall Indicator Score: (numeric score / number of applicable indicators)		2.0
	EPA Qualitative Score	Midrange

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.

The affordability analysis detailed above has documented that the $2.1 million (current dollars) in capital expenditures under Guttenberg's Municipal Control Alternative, along with increased charges by NBMUA due to the Woodcliff Plant Upgrades and related operation and maintenance costs would result in a Residential Indicator of 1.56%, within the EPA "medium burden" criterion.

Additional economic factors are presented in the Town of Guttenberg FCA Memorandum presented in Appendix J 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 Town's financial capability.

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

E.3.4.1 Institutional Issues

This Financial Capability Assessment cannot reflect the currently unknowable impacts on wastewater utility revenues stemming from the national economic upheaval resulting from the COVID-19 pandemic. It is however extremely likely that municipal wastewater utilities in general across the United States (including the NBMUA, which serves Guttenberg) will face significant and potentially permanent declines in revenues from households unable to pay their water and sewer bills and the sudden decline in industrial and commercial demands for potable water and wastewater treatment.

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

> *"NACWA conservatively estimates the impact to clean water utilities nationwide of lost revenues due to coronavirus at $12.5 Billion. This is a low-end estimate, assuming an average loss of revenue of 20% which is well within the range of what individual utilities are already projecting. Some utilities are anticipating closer to a 30% or 40% loss in revenue. This estimate is based on the substantial historical utility financial data NACWA has on file through its Financial Survey and recent reports from NACWA members on the decrease in usage they are observing in their systems over the last few weeks." NACWA press release: Coronavirus Impacting Clean Water Agencies; Local Utilities and Ratepayers Need Assistance March 20, 2020.*

The impact of a 20% to 40% revenue loss, along with increased costs that have been and will continue to be experienced by water and wastewater utilities such as overtime and the writing off of customer accounts receivable could have a profound impact on the affordability of the proposed CSO controls and the Town's ability to finance them.

Most of the costs of a municipal wastewater system are relatively fixed within broad operating ranges. Debt service and other capital costs are fixed once incurred. Some operating costs are somewhat variable with wastewater flows, e.g. chemical and electrical power usage but this variability is lessened by the reality that inflow, infiltration and stormwater flow in a combined system are not affected by billed water consumption. Labor costs are not directly variable, e.g. a twenty percent reduction in billed flow would not result in a need for twenty percent less labor. Maintenance costs might go down somewhat as equipment operating times may be reduced.

As costs do not decline proportionately to billed flow, it can be expected that user charge rates must be raised to generate sufficient revenue to sustain current operations. The relationship between changes in costs and revenues and the resultant changes in user charge rates is complex and has not yet been fully analyzed. At this point it can be assumed that user rate increases may be necessary to simply maintain current operations, and these rate increases will likely erode the financial capability of Guttenberg to fund the CSO LTCP.

E.3.4.2 Potential Median Household Income Impacts

The impacts of the pandemic on median household incomes of Guttenberg residents cannot be determined at this point. Historical analogies may provide some useful, albeit disturbing, context but are not presented as predictive:

- U.S. median household income fell by 6.2% from $53,000 in 2007 to $49,000 in 2010. In New Jersey, the MHI decreased by around 4.0% for the same period. Source: Fact Sheet: Income and Poverty Across the States, 2010 Joint Economic Committee, United States Congress, Senator Robert P. Casey, Jr. Chairman.
- The U.S. unemployment rates rose from 5.0% in December of 2007 to 9.9% in December of 2009 (Source: Bureau of Labor Statistics data series LNS1400000).
- Data on impacts of the Great Depression on median household income are not available. As a proxy, the personal income per capita data are available. For 1929 this was $700. By 1933 this figure bottomed out at $376, a decline of 46%. Unemployment for the same period rose from around 3.0% to 25% (Source: Federal Reserve Economic Data (FRED) data series: A792RC0A052NBEA).

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

E.3.4.3 Implications for the Long Term CSO Control Program

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

Given the current and likely continuing uncertainties as to the New Jersey and national economic conditions, Guttenberg will be reticent to commit to long term capital expenditures for CSO controls without the incorporation of adaptive management provisions, including provisions to revise and reschedule the long term CSO controls proposed in this SIAR based on emergent economic conditions beyond the permittees' control. As detailed in Section F below, 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

Building upon the selection of project elements to be included in Guttenberg's LTCP (Section D) and the financial capability of the Town to undertake such work (Section E), this Section presents the proposed implementation schedule for the LTCP that meets the requirement of NJPDES Permit No. NJ0108715.

F.2 RECOMMENDED LTCP

As noted in Section D.3.6, the following projects / elements were selected as part of the Town of Guttenberg's Long-Term CSO Control Plan:

TABLE F-1
TOWN OF GUTTENBERG
LONG-TERM CSO CONTROL PLAN

Element	% Capture	CSO Volume Reduction (MGY)	CSO Events	Cost
I/I Reduction	89%	1.95	38	$1,500,000
Expansion of the Woodcliff Sewage Treatment Plant	92%	3.12	31	$1,932,000 [1]
Separation of Galaxy Towers Storm Water Flow	89%	0.94	39	$400,000
Separation of Galaxy Towers Sanitary Sewer Flow	89%	0	39	$500,000 [2]
Upgrades at Netting Chamber	-	0	-	$125,000
Green Infrastructure:				
Green Roofs	89%	0.03	39	N/A [3]
Planter Boxes	89%	0.10	39	$100,000 [4]

[1] *To be financed by NBMUA; passed on to Guttenberg residents via rate increase*
[2] *To be financed by Galaxy; no cost to Guttenberg*
[3] *Via ordinance incentivizing green roofs in newly zoned high-rise areas*
[4] *Implemented at $20,000 per year over five years*

F.3 IMPLEMENTATION COST OPINION

The financial analyses as outlined in Section E of this Report indicates that the Town of Guttenberg' Financial Capability Rating is classified as "Mid-range", and the proposed LTCP work (in addition to other anticipated costs of improvements to the sewer system) will be of "moderate" burden to the average residential household within the municipality (lower-income households will of course suffer a greater burden with relation to MHI).

As a result of these analyses, it was determined that a standard ten-year window for the implementation of the LTCP was warranted. The proposed implementation schedule is outlined in Section F.4 below.

F.4 IMPLEMENTATION SCHEDULE

Utilizing a standard 10-year timeframe, the following Table E-2 presents the proposed schedule for implementation of the proposed LTCP. Please note that the proposed milestone is anticipated to be implemented by the end (December 31) of the associated year.

TABLE F-2
LONG-TERM CSO CONTROL PLAN SCHEDULE

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

Note 1: Costs assessed to Guttenberg residents via rate increase
Note 2: Timing is approximate; Actual schedule TBD by Galaxy, who is financing project. No cost to Guttenberg
Note 3: New zoning ordinance incentivizing green roofs in newly zoned high-rise areas

F.5 BASES FOR LTCP DEVELOPMENT AND IMPLEMENTATION SCHEDULE

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

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

The remainder of work was scheduled around these fixed dates. The work at the Netting Chamber is anticipated to follow the Galaxy work, so it was scheduled for 2022.

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

The planter box program was intended to continue the Town's investment in CSO reduction after the completion of the "gray" projects, and is designed to be flexibly implemented – the current schedule calls for about 20 large boxes to be installed each year; more or fewer may be installed in a particular year based upon available budget and currently unanticipated repairs to the system. Overall, the 100 boxes should be considered as a minimum commitment from the Town.

F.6 CSO REDUCTION VERSUS TIME

Taken together, the elements of the LTCP will reduce the volume of CSO events in Guttenberg by approximately 30%, and the number of events by approximately 25% over base year conditions. Figure F-1 below displays the cumulative impact of the Plan elements over time as they are completed.

The LTCP elements are scheduled so that the higher-impact projects come earlier in the process, maximizing the total CSO volume captured over the ten-year period.