APPENDIX A
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PUBLIC PARTICIPATION WORK PLAN

SYNOPSIS:
In developing a Long-term Control Plan, the permittee is required to employ a public participation process that actively involves the affected public in the decision-making process of developing, evaluating and selecting the Long-term CSO controls. The affected public includes ratepayers, industrial users of the sewer system, persons who reside downstream from the CSOs, persons who use and enjoy these downstream waters, and any other interested persons.

Public participation is that part of the decision-making process through which responsible officials become aware of public attitudes by providing ample opportunity for interested and affected parties to communicate their views. Public participation includes providing access to the decision-making process, seeking input from and conducting dialogue with the public, assimilating public viewpoints and preferences, and demonstrating that those viewpoints and preferences have been considered by the decision-making official. Disagreement on significant issues is likely among government agencies and the diverse groups interested in and affected by public policy decisions. Public agencies should encourage full presentation of issues at an early stage so that they can be resolved and timely decisions can be made. In the course of this process, responsible officials should make special efforts to encourage and assist participation by citizens representing themselves and by others whose resources and access to decision-making may be relatively limited.

A well-designed public participation program should involve the public in the decision-making process as it proceeds. Citizen advisory committees can serve as liaisons between municipal officials, the general public and the NJDEP. Public meetings, public hearings, workshops, and discussion panels provide effective forums to explain the alternatives and to obtain input from as many neighborhood, business, environmental, and civic organizations as possible. These meetings should be well advertised in local papers and on local radio stations. Interested parties should be encouraged to provide verbal and written comments and input. The public participation program should include activities designed to educate the public about the CSO program, informational material distributed through general mailing lists or inserted into monthly utility bills, and media briefings concerning specific projects or issues.

Public Participation during the Development and Evaluation of Alternatives
During the development and evaluation of alternatives, the goal of the public participation program shall be to involve citizens in the process of the development of alternative solutions that protect the waters of the State and consider the financial impacts to the community as a whole. During development and evaluation of CSO control alternatives, the following key information shall be presented to the public as it is developed:

- Water quality goals for each receiving water segment;
- CSO control goals for each receiving water segment as developed under the presumption and/or demonstration approach options
- Types of control alternatives available to meet CSO control goals;
- CSO control alternatives identified to meet the control goals; and
- The process of evaluating and comparing various alternatives for CSO control.

These issues can be technically complex and require effort and imagination to present in a manner that will be understandable to the public. Technical jargon and complex charts and figures may be useful to and understandable by engineers but may not be clear or understandable to the lay person. Public confusion or lack of understanding can lead to skepticism, hostility, and the inability or unwillingness to participate. These reactions can be avoided by understanding the audience and taking the time to arrange and present the information in an appropriate format.

REQUIREMENTS:

This document serves as a general guidance for the minimum elements that shall be included in a Public Participation Work Plan (PPWP). The scope of each PPWP must be developed in consideration of the scope of the planning effort, the complexity of the water quality issues, and the size and make-up of the affected public. The Public Participation Program Work Plan shall include the following elements:

- A description of the work required by the permit and the reason for its proposal.
- A list of issues on which public comment/opinion by the public is specifically solicited.
- A list of segments of the public to be targeted by the public participation program. This list shall include government representatives, private citizens, public interest groups, people with economic interest in the proposed project, ratepayer, industrial users of the sewer system, persons who reside downstream from the CSOs, persons who use and enjoy the downstream waters, and any other interested persons. The target public must include people who reflect the character and the make-up of the community in the study area.
- A list of information dissemination mechanisms proposed to be used in the program. Information dissemination mechanisms include, but not limited to notices, field trips, pamphlets, brochures, newsletters, radio and TV announcements, new releases, sound track announcements, posters, fliers, lectures, etc. – anything which informs and educates the public.
- A list of consultative mechanisms proposed to be employed in the public participation program. The list of consultative mechanisms may include, but is not limited to, Citizen Advisory Committees (CACs), meeting workshops, questionnaires, interviews, telephone polls, meetings, hearings, responsive summaries, etc.
- A description of staff resources assigned to the public participation program and the name and telephone number of a contact person.
- A budget, detailed by category, for public participation activities, (Activities include but are not limited to, public meetings, public hearings, CAC meetings, CAC training,

newsletters, mailing, etc. – any of the items listed under consultative and informal mechanisms).

- A month-by-month schedule of activities showing which mechanisms will be used at which points in the technical planning process.

The permittee shall, as a minimum, hold at least one public meeting. The permittee must summarize in the Public Participation Report how the permittee complied with provisions of the permit, including:

- Informing the affected public of the requirements of the permit and the public participation work required by the permit.
- The methodology used in developing, evaluating CSO Control Alternatives including:
- The identification and the development of control alternatives including a list and description of the alternatives selected as representative technologies or alternative control measures selected for further consideration.
- The basis for the preliminary sizing of the control alternatives.
- The alternatives considered, but rejected, and the basis for the rejection.
- The development of preliminary construction/implementation cost estimates, operation, and maintenance costs that have been evaluated.
- The basis for the projected decreases in pollutant loadings, frequencies of CSO events or increased conveyance capacities projected for each control alternative, as appropriate.

Upon conclusion of the development and evaluation of alternatives and as a joint submission with the Control Cost/Performance Analysis, the permittee shall submit a Public Participation Report. The Public Participation Report shall identify the public participation activity conducted; describe the matters on which the public was consulted; summarize the public's views, significant comments, criticisms and suggestions; and set forth the Permittee’s specific responses in terms of modifications of the proposed action or an explanation for rejection of proposals made by the public.

APPENDIX B
DISINFECTION TECHNOLOGIES

SYNOPSIS:
The National Combined Sewer Overflow Control Policy requires CSO permittees to undertake a process to develop CSO-LTCPs which includes the evaluation of alternatives for attaining compliance with the CWA, including compliance with water quality standards and protection of designated uses. The most significant water quality concern directly associated with CSOs is pathogens. Under this general permit, permittees are required to demonstrate cost and performance relationships of various pathogen control alternatives for a broad range of CSO Control Objectives.

REQUIREMENTS:
Permittee shall develop and evaluate a range of CSO control alternatives that will achieve incremental reductions in the loading affecting receiving water bacteria quality in terms of fecal Coliform and Enterococci and report the cost and performance relationships demonstrated by these analysis in both narrative and graphical form. **These studies are intended to be feasibility studies and not intended to be facility planning level analysis.**

To develop a cost and performance curve the range of alternatives shall span between the "no action" alternative (The current condition without application of pathogen controls.) to those controls necessary to meet Surface Water Quality Standards for bacterial quality criteria. At a minimum, the Permittee shall, for each CSO Point, develop and evaluate control alternatives that will provide continuous year round disinfection prior to discharge into surface waters for each pathogen control performance objective specified in a through g, below, that is applicable to each CSO Point depending upon the surface water classification to which the CSO Point discharges.

The pathogen control performance objectives applicable to each CSO Point are as follows:

- For all CSO Points that discharge into Classification FW2 waters the permittee shall develop and evaluate pathogen control measures that can meet the pathogen control performance objectives a, e, f & g.
- For all CSO Points that discharge into Classification SE1 waters the permittee shall develop and evaluate pathogen control measures that can meet the pathogen control performance objectives b, e, f & g.
- For all CSO Points that discharge into Classification SE2 waters the permittee shall develop and evaluate pathogen control measures that can meet the pathogen control performance objectives b, c, e, f & g.
- For all CSO Points that discharge into Classification SE3 waters the permittee shall develop and evaluate pathogen control measures that can meet the pathogen control performance objectives b, d, e, f & g.

The pathogen control performance objectives are as specified below:

a. Fecal coliform levels shall not exceed a geometric average of 200/100 ml nor should more than 10 percent of the total samples taken during any 30-day period exceed 400/100 ml., and,
   Enterococci levels shall not exceed a geometric mean of 33/100 ml, nor shall any single sample exceed 61/100 ml.
b. Fecal coliform levels shall not exceed a geometric average of 200/100 ml nor should more than 10 percent of the total samples taken during any 30-day period exceed 400/100 ml., and,
   Enterococci levels shall not exceed a geometric mean of 35/100 ml, nor shall any single sample exceed 104/100 ml.
c. Fecal coliform levels shall not exceed a geometric average of 770/100 ml.
d. Fecal coliform levels shall not exceed a geometric average of 1500/100ml.
e. 50-percent reduction of fecal Coliform loadings from the current conditions,
f. 85-percent reduction of fecal Coliform loadings from the current conditions, and
g. 95-percent reduction of fecal Coliform loadings from the current conditions.

Permittees shall develop control alternatives for loadings reduction potential in terms of fecal coliform and enterococci, for a and b, above, and based upon fecal coliform, only, for c through g. However, permittees are to report loading reductions for each specific range, listed above, in terms of both fecal Coliform and Enterococci. The loadings reduction anticipated for other parameters such as nutrients and oxygen-demanding substances, incidental to the application of controls for fecal Coliform and Enterococci, shall also be determined and reported for each specific range listed above. For the purposes of this permit, oxygen-demanding substances shall be reported using the parameters CBOD5 and Total Kjeldahl Nitrogen (TKN), while for nutrients the parameters Total Phosphorous and Total Nitrogen shall be used.

CSOs are intermittent in nature and are characterized by short duration and relatively large flow rates relative to base sewage flow, bacterial and organic loadings from the collection system may vary greatly, both within and between storm events. Therefore, CSO disinfection systems must be able to handle variable pollutant loadings and large fluctuations in flow.

An additional baseline consideration for the successful design of an effective CSO disinfection process is solids reduction. Bacteria embedded in particulate matter can be shielded from exposure to disinfectants. Often, particular matter (solids) must be removed from the CSO to ensure effective disinfection.

The applicability or suitability of any particular control process/technology depends upon a number of considerations and is likely to vary from location to location. The following are minimum requirements. The permittee is encouraged to explore other control process and technologies and levels of control not specifically mentioned in the permit. The permittee, as a minimum, shall, evaluate the implementation of each of the disinfection technologies listed below.

- Chlorination (Chlorine Dioxide, Sodium Hypochlorite, and Calcium hypochlorite)
- Ozonation, and
- Ultraviolet Radiation

Permittees shall consider alternative control strategies that consolidate groups of CSO Points for centralized treatment and discharge.

In the development of cost estimates all process configurations must include costs associated with Solids/Floatables Control and dechlorination facilities, if needed. All discharges from CSO Points remaining after application of control measures must conform to the current Solids/Floatable Control requirement and the State Water Quality Standard for chlorine produced oxidants.

As a minimum, permittees with Combined Sewer Overflow Points are required to develop and evaluate high-rate disinfection processes utilizing the three disinfecting technologies, listed below, with each of the following rapid primary treatment processes:

1. **Screening Technology and High-rate Disinfection**
   Screening ⇒ High-rate Disinfection ⇒ Discharge

2. **Vortex/Swirl Separation Technology and High-rate Disinfection**
   Vortex/Swirl Separation ⇒ High-rate Disinfection ⇒ Discharge

3. **Ballasted Flocculation Technology and High-rate Disinfection**
   Ballasted Flocculation ⇒ High-rate Disinfection ⇒ Discharge

APPENDIX C
MINIMUM CONTROL MEASURES FOR COMBINED SEWER COLLECTION AND CONVEYANCE SYSTEMS

SYNOPSIS:

The Permittee shall develop and evaluate controls that will result in the reduction of the frequency of CSO discharge events based on an average hydrologic year to each the frequencies of occurrence listed below. For the purposes of developing cost and performance relationships permittees are directed to use the 1988 recorded rainfall at JFK Airport as the average hydrologic year. **(The precipitation data set is available at the Division of Water Quality's website for permitting and technical information at http://www.state.nj.us/dep/dwq/gps.htm.)** The Permittee shall develop alternatives that achieve each of the targeted frequencies of discharge events per year without increasing the peak volumetric flow rate of wastewater conveyed to the Domestic Treatment Works (DTW) for treatment. For the purposes of this section, the range of frequencies of occurrence of CSO discharges shall, as a minimum, include the following:

- zero overflow events per year,
- an average of three overflow events per year,
- an average of seven overflow events per year,
- an average of twelve overflow events per year, and
- an average of twenty overflow events per year.

The applicability or suitability of any particular control process/technology depends upon a number of considerations and is likely to vary from location to location..
The permittee is encouraged to explore other control process and technologies and incremental levels of control not specifically mentioned in the permit.
These studies are intended to be feasibility studies and not intended to be facility planning level analysis. In these feasibility studies the permittee is required to investigate control technologies and the development of control alternatives including the preliminary sizing of the control alternatives; assessing implementation feasibility; developing preliminary construction/implementation cost estimates, operation, and maintenance costs; developing Present Worth Cost of the most cost effective and practical control strategies and the associated projected pollutant loadings reductions. Permittees are not required to perform detailed environmental and archeological assessments or to select a particular control strategy.

REQUIREMENTS:

As a minimum, permittees with Combined Sewer Collection and Conveyance Systems must develop and evaluate the Collection System Controls and Storage Technologies listed below.

Collection System Controls –

Collection System Controls reduce the CSO volume and frequency of CSO events by removing or diverting runoff, maximizing the volume of flow stored in the collection system or maximizing the capacity of the system to convey flow to the DTW. Collection System Controls that must be evaluated include, but are not limited to, the following:

Sewer Separation – Sewer Separation is the conversion of a Combined Sewer System (CSS) into separate storm water and sanitary sewage collection systems.

Infiltration/Inflow Control - Excessive infiltration and inflow (I/I) can increase operations and maintenance costs and can consume hydraulic capacity, both in the collection system and at the treatment plant. In CSSs, surface drainage is by design the primary source of inflow. Other sources of inflow in CSSs that might be appropriate to control include tidal inflow through leaking or missing tide gates and surface runoff from open spaces. Infiltration is ground water that enters the collection system through defective pipe joints, cracked or broken pipes manholes, footing drains, and other similar sources. Elimination of excessive Infiltration and Inflow in separate sanitary sewer systems tributary to a downstream combined sewer system can provide additional storage, conveyance and treatment capacity.

Storage technologies –

Storage technologies store flow for subsequent treatment at the DTW after downstream conveyance and treatment capacities are restored. Storage technologies that must be evaluated include, but are not limited to, In-line and Off-line storage controls.

In-line Storage - In-line storage is storage in series with the sewer. In-line storage can be developed in two ways: (1) construction of new tanks or oversized conduits to provide storage capacity or (2) construction of a flow regulator to optimize storage capacity in existing conduits. The new tanks or oversized conduits are designed to allow dry weather flow to pass through, while flows above a design peak are restricted, causing the tank or oversized conduit to fill. A flow regulator on an existing conduit functions under the same principle, with the existing conduit providing the storage volume.

Off-Line Storage-This technology reduces overflow quantity and frequency by diverting all or a portion of diverted wet weather combined flows and storing them in off-line storage tanks. The storage arrangement is considered to be parallel with the sewer. Stored flows are returned to the interceptor for conveyance to the treatment plant once system capacity is available. In some cases, flows are conveyed to a CSO treatment facility.

APPENDIX D
MINIMUM CONTROL MEASURES FOR COMBINED SEWER COLLECTION AND CONVEYANCE SYSTEMS AND COMBINED SEWER OVERFLOW CONTROL FACILITIES

SYNOPSIS:

Permittees of Combined Sewer Collection and Conveyance Systems and Combined Sewer Overflow Control Facilities shall develop and evaluate Control Measures that shall result in an increase in the conveyance of wastewater from CSO Control Facilities to the DTW for treatment. The permittee shall develop and evaluate control measures that will achieve the performance objective for each of the increments listed below based upon current average dry weather flow tributary to each CSO Control Facility. At a minimum, Permittees must develop and evaluate each of the control measures listed below.

a. Two times the average dry weather peak volumetric flow rate of the CSS area,

b. Four times the average dry weather peak volumetric flow rate of the CSS area,

c. Six times the average dry weather peak volumetric flow rate of the CSS area, and

d. Eight times the average dry weather peak volumetric flow rate of the CSS area.

The applicability or suitability of any particular control process/technology depends upon a number of considerations and is likely to vary from location to location. The following are minimum requirements. The permittee is encouraged to explore other control process and technologies and levels of control not specifically mentioned in the permit**.**
These studies are intended to be feasibility studies and not intended to be facility planning level analysis. In these feasibility studies the permittee is required to investigate control technologies and the development of control alternatives including the preliminary sizing of the control alternatives; assessing implementation feasibility; developing preliminary construction/implementation cost estimates, operation, and maintenance costs; developing Present Worth Cost of the most cost effective and practical control strategies and the associated projected pollutant loadings reductions. Permittees are not required to perform detailed environmental and archeological assessments or to select a particular control strategy.

REQUIREMENTS:

At a minimum, permittees with Combined Sewer Collection and Conveyance Systems must develop and evaluate the Collection System Controls and Storage Technologies listed below.

Real Time Controls –

Real-Time Control (RTC) programs can provide integrated control of regulators, outfall gates, and pump station operations based on anticipated flows from individual rainfall events, with feedback control adjustments based on actual flow conditions within the

system. Computer models associated with the RTC system allow an evaluation of expected system response to control commands before execution. Localized RTC may also be provided to individual dynamic regulators, based on feedback control from upstream and/or downstream flow monitoring equipment.

Collection System Controls –
Collection System Controls reduce the CSO volume and frequency of CSO events by removing or diverting runoff, maximizing the volume of flow stored in the collection system or maximizing the capacity of the system to convey flow to the DTW. Collection System Controls that must be evaluated include, but are not limited to, the following: Sewer Separation – Sewer Separation is the conversion of a Combined Sewer System (CSS) into separate storm water and sanitary sewage collection systems.

Infiltration/Inflow Control –
Excessive infiltration and inflow (I/I) can increase operations and maintenance costs and can consume hydraulic capacity, both in the collection system and at the treatment plant. In CSSs, surface drainage is by design the primary source of inflow. Other sources of inflow in CSSs that may be appropriate to control, including tidal inflow through leaking or missing tide gates and surface runoff from open spaces. Infiltration is ground water that enters the collection system through defective pipe joints, cracked or broken pipes manholes, footing drains, and other similar sources. Elimination of excessive Infiltration and Inflow in separate sanitary sewer systems tributary to a downstream combined sewer system can provide additional storage, conveyance and treatment capacity.

CSO Control Facility Modifications
Permittees shall develop and evaluate Control Measures, which shall result in an increase in the conveyance of wastewater from CSO Control Facilities to the DTW for treatment. The permittee shall develop and evaluate modifying CSO Control Facilities (regulators) and increasing the interceptor conveyance capacity between the combined sewer collection system and the DTW for each of the increments listed below based upon current average dry weather flow tributary to each CSO Point.

a. Two times the average Dry Weather Flow of the CSS area;

b. Four times the average Dry Weather Flow of the CSS area;

c. Six times the average Dry Weather Flow of the CSS area; and

d. Eight times the average Dry Weather Flow of the CSS area.

APPENDIX E
COST AND PERFORMANCE ANALYSIS REPORT

SYNOPSIS:

Permittees are required to develop control alternatives based on the ability to achieve loading reduction in terms of fecal Coliform and Enterococci, reductions in the frequency of CSO events, and incremental increases in the conveyance of wastewater from CSO Control Facilities to DTW for treatment. Permittee shall determine and report loading reductions for fecal Coliform, Enterococci and for nutrients and oxygen-demanding substances that may result incidental to the application of the control measures. Oxygen-demanding substances shall be reported using the parameters CBOD5 and Total Kjeldahl Nitrogen (TKN). Phosphorous and Total Nitrogen shall be used for nutrient parameters.

The Permittee shall develop and submit a Cost and Performance Analysis Report that demonstrates the relationships among the set of CSO control alternatives in terms of a specified performance objective and the projected construction/implementation costs for each of the Permittee's CSO Points and/or conveyance facilities as applicable.

REQUIREMENTS:

The CSO Control Cost and Performance Analysis Report shall include:

- A report summarizing the permittees compliance with provisions of Sections O.3.b. through O.3.e
- Documentation of the methodology used in developing and evaluating CSO Control Alternatives including:
  - Documentation of the identification and the development of control alternatives including a list and description of the alternatives selected as representative technologies and/or alternative control measures selected for further consideration.
  - Documentation of the basis for the preliminary sizing of the control alternatives.
  - A summary of the alternatives considered, but determined infeasible, and the basis for the rejection.
  - Documentation of the development of preliminary construction/implementation cost estimates, operation, and maintenance costs.
  - Documentation of the basis for the anticipated decrease in pollutant loadings projected for each control alternative.
- CSO Controls Alternatives Cost and Performance Curves for the CSO Controls Alternatives that were evaluated.
  - Cost and Performance Curves for the evaluation of Disinfection Control Measures shall consist of narrative and graphical presentations of the relationship between the specified CSO Control Objectives and the Present Worth Cost of the most cost effective and practical control strategies. Cost and Performance Curves shall demonstrate the loadings reduction potential in terms of Fecal Coliform and Enterococci, CBOD5, Total Kjeldahl Nitrogen (TKN), Total Phosphorous and Total Nitrogen.

- Cost and Performance Curves for the evaluation of control measures that reduce the frequency of CSO events shall consist of narrative and graphical presentations of the relationship between each of the specified CSO control objectives (frequencies of occurrence) and the Present Worth Costs of the most cost effective and practical control strategies.
- Cost and Performance Curves for the evaluation of control measures that increase the peak volumetric flow rate of wastewater conveyed from a CSO Control Facility to the DTW for treatment shall consist of narrative and graphical presentations of the relationship between the specified CSO control objectives and the Present Worth Costs of the most cost effective and practical control strategies.

Present Worth Costs Analysis

Calculate total present worth costs (TPW) for each selected alternative or control strategy assuming a design-life of 20-years in order to make a fair and equitable comparison of total project costs in terms of capital and operation and maintenance (O&M) costs. Present worth is the sum, which, if invested now at a given rate, would provide exactly the funds, required to make all futures payments.

Project costs include capital costs, annual O&M costs and life-cycle costs. Capital cost, the cost to build a particular project, includes construction cost, engineering costs for design and services during construction, legal and administrative costs, and typically a contingency. The contingency is usually developed as a percentage of the construction cost, and the engineering, legal, and administrative costs are usually combined as a percentage of the construction plus contingency. Annual O&M costs reflect the annual costs for labor, utilities, chemicals, spare parts, and other supplies required to operate and maintain the facilities proposed as part of the project.

Cost curves should also be indexed to account for inflation using the Engineering News Record Cost Correction Index (ENR CCI). Life-cycle costs refer to the total capital and O&M costs projected to be incurred over the design life of the project. Life-cycle costs can be conveniently expressed in terms of total present worth (TPW), which is the sum of money that, if invested now, would provide the funds necessary to cover all present and future costs of a project over the design-life of the project.

The TPW of a project is calculated by adding the initial capital cost to the present worth of annual O&M costs and then subtracting the present worth of the salvage value of the project (i.e., the depreciated value of the project at the end of its design life). The present worth of annual O&M costs is computed by multiplying the average annual O&M cost by the appropriate uniform series present worth factor, based on the given discount rate and design life. The discount rate to be used in the TPW analysis for facilities planning is set each year by EPA. The uniform series present worth factor can be obtained from tables in standard engineering economics textbooks. The present worth of the salvage value is computed by multiplying the salvage value by the appropriate single payment present worth factor, based on the given discount rate and design life. The value of land generally should not be depreciated and might even be assumed to increase in value over

the course of the project design life. The value of the land should then be added to the depreciated value of the facility to obtain the total salvage value.

Continuous Simulation Modeling Analysis

For the purposes of developing cost and performance relationships permittees are directed to use the 1988 recorded rainfall at JFK Airport for continuous simulation modeling. An analysis of recorded rainfall at JFK Airport determined 1988 to be representative of overall long-term average conditions in terms of total volume of rainfall and storm duration. **The precipitation data set is available at the Division of Water Quality's website for permitting and technical information at http://www.state.nj.us/dep/dwq/gps.htm.**