

Summary and Findings

Purpose

The District of Columbia Water and Sewer Authority (WASA or Authority) provides wastewater collection and treatment for the District of Columbia, and wastewater treatment for surrounding areas including parts of suburban Virginia and Maryland at the District's Advanced Wastewater Treatment Plant at Blue Plains (Blue Plains). On April 5, 2007, the United States Environmental Protection Agency (EPA) issued a modification to WASA's National Pollutant Discharge Elimination System (NPDES) permit. The permit modification includes a total nitrogen effluent limit for Blue Plains of 4.689 million pounds per year. The total nitrogen limit was developed by EPA to achieve the goals of the Chesapeake Bay Program for nutrient reductions.

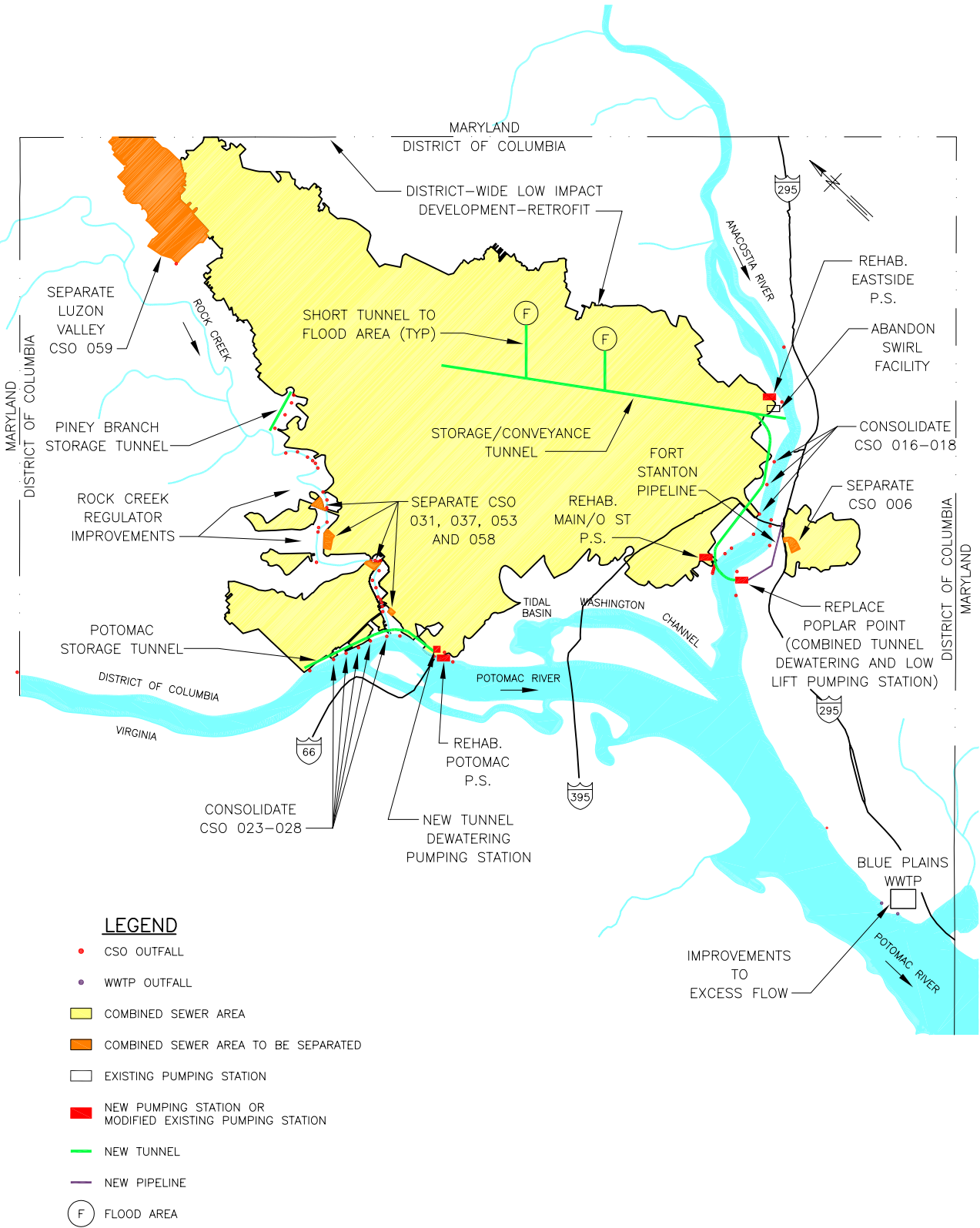
In addition to meeting the new effluent limit for total nitrogen, WASA has existing NPDES Permit requirements for treating wet weather flows at Blue Plains. The latter requirement is part of WASA's Long Term Control Plan (LTCP) for the combined sewer system. On April 13, 2007, WASA submitted a Draft Total Nitrogen Removal/Wet Weather Plan (TN/WW Plan) to EPA. The purpose of the report was to present WASA's approach to meet the new total nitrogen effluent limit and to comply with its existing permit conditions to treat wet weather flows. After submittal of the draft plan, a public participation program was conducted to solicit comments on the plan. The program included a notice in the Washington Post, making information available at public information depositories and WASA's web site, and holding an informational meeting and a public meeting. This report is WASA's Final TN/WW Plan and includes a summary of the public participation program and responses to comments in Appendix F.

Background

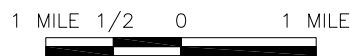
The suburban sewer systems in the Blue Plains service area consist of separate sanitary and storm sewers. In the District, the sewer system is comprised of both combined sewers and separate sanitary sewers. A combined sewer carries both sewage and runoff from storms. Modern practice is to build separate sewers for sewage and storm water, and no new combined sewers have been built in the District since the early 1900's. Approximately one-third of the District (12,478 acres) is served by combined sewers. The majority of the area served by combined sewers is in the older developed sections of the District.

In the combined sewer system, sewage from homes and businesses during dry weather conditions is conveyed to Blue Plains, which is located in the southwestern part of the District on the east bank of the Potomac River. There, the wastewater is treated to remove pollutants before being discharged to the Potomac River. When the capacity of a combined sewer is exceeded during storms, the excess flow, which is a mixture of sewage and storm water runoff, is discharged to the Anacostia and Potomac Rivers, Rock Creek and tributary waters. The excess flow is called Combined Sewer Overflow (CSO). There are a total of 53 CSO outfalls in the combined sewer system listed in WASA's NPDES Permit.

In accordance with the 1994 CSO Policy, WASA submitted a Final LTCP to EPA in 2002. The District of Columbia Department of the Environment (DOE) (formerly Department of Health) and EPA approved the Final LTCP and determined that CSOs remaining after implementation of the plan "...will not preclude the attainment of water quality standards or the receiving waters' designated uses or contribute to their impairment", subject to post construction monitoring. WASA is currently implementing the LTCP in accordance with a Consent Decree entered by the United States District Court for the District of Columbia on March 23, 2005. The existing LTCP is shown on Figure S-1.



EXISTING LONG TERM CONTROL PLAN



METCALF & EDDY
 GREELEY AND HANSEN LLC
 LIMNO-TECH, INC

D.C. WATER AND SEWER AUTHORITY
 TOTAL NITROGEN/WET WEATHER PLAN

H:\1160\BP Strategic Plan\TN_WW Plan\Report-Draft\Dwg\Fig 1-2 LTCP.DWG

Summary and Findings

When the LTCP was finalized in 2002, there was no effluent limit for total nitrogen in WASA's NPDES permit for Blue Plains and, the LTCP provided that imposition of a total nitrogen limit could require a modification of the LTCP and its implementation schedule. Evaluations have now been made to assess the impact of adding the new total nitrogen effluent limit on top of the LTCP and existing NPDES permit requirements for treating wet weather flows. Evaluations have been made to review the LTCP requirements and existing permit conditions to provide an environmentally protective, practicable, reliable and economically balanced plan for meeting the new total nitrogen effluent limit while controlling CSOs to at least the degree provided by the approved LTCP.

Blue Plains Process Evaluations

Process evaluations have been made of the existing facilities at Blue Plains to determine needs to meet the new total nitrogen effluent limit and existing NPDES Permit conditions for treating wet weather flows. The existing facilities at Blue Plains comprise the basic liquid treatment processes as follows:

- Initial Treatment Facilities, which include screening, pumping, grit removal and primary clarification.
- Complete Treatment Facilities, which are downstream of the Initial Treatment Facilities and include secondary and advanced biological treatment, filtration, chlorination and dechlorination with discharge from Outfall 002. Any flow receiving Complete Treatment receives treatment to a greater degree than required by the regulatory definition of secondary treatment.
- Excess Flow Treatment, which comprises Initial Treatment followed by chlorination and dechlorination with discharge from Outfall 001.

The general arrangement of the existing facilities is shown on Figure S-2. Under the existing NPDES Permit, the facilities shown on Figure S-2 are required to handle and treat flows received at Blue Plains as shown in Table S-1.

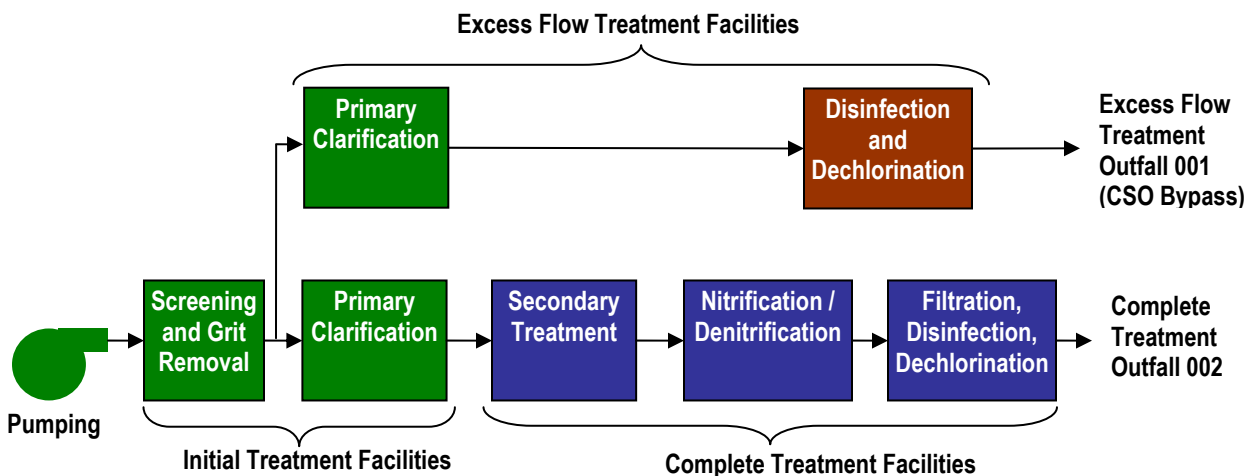


Figure S-2
Blue Plains Process Flow Diagram

Summary and Findings

**Table S-1
Flows to be Treated at Blue Plains under Existing NPDES Permit**

<i>Treatment System</i>	<i>Flows to be Treated During Conditions of:</i>	
	<i>Dry Weather</i>	<i>Wet Weather¹</i>
Initial Treatment	370 mgd, Annual Average	Up to 1076 mgd
Complete Treatment	370 mgd, Annual Average	740 mgd, first 4 hours 511 mgd, continuous ²
Excess Flow Treatment ³	-	Up to 336 mgd

Notes:

1. A wet weather event is deemed to start when plant influent is greater than a rate of 511 mgd and deemed to stop four hours after plant influent drops to a rate of 511 mgd or a period of 4 hours has elapsed since the start of a wet weather event, whichever occurs last.
2. 511 mgd is the peak dry weather flow rate (maximum day rate for the annual average rate of 370 mgd). Complete treatment facilities provide better than secondary treatment for flow rates greater than the peak dry weather flow rate. Flow rates to complete treatment are reduced after the first four hours of wet weather conditions to protect the biological processes.
3. The discharge from excess flow treatment (Outfall 001) is authorized as a CSO Bypass to protect the complete treatment system and because it is not technically feasible to provide treatment for greater wet weather flows for longer periods.

There is a project included in the LTCP to upgrade the Excess Flow Treatment facilities by the addition of four new primary clarifiers and improved hydraulic controls.

Operating experience and process evaluations have demonstrated that providing complete treatment to peak flows of 740 mgd during wet weather conditions has a detrimental effect on the treatment processes. During periods when peak flow rates in the range of 600 to 740 mgd are conveyed to primary, secondary and advanced treatment facilities, performance of clarification units deteriorates due to the severe impact of the hydraulic loadings created by peak flows. Deterioration of performance cascades from one treatment train to the next (e.g. primary to secondary to advanced) and results in a pervasive impact that continues during the wet weather condition and for as much as several weeks thereafter. While the existing facilities have the capacity to accommodate the existing permit peak flow rates, additional facilities will be required to treat the existing permit peak flow rates without any nitrogen removal and meet the new total nitrogen effluent limit.

Because the existing facilities at Blue Plains do not have capacity to simultaneously meet existing NPDES Permit conditions for wet weather flow treatment and the new total nitrogen effluent limit, alternative projects have been developed and evaluated. Projects to meet the new total nitrogen effluent limit and accommodate wet weather flow conditions have been developed based on the general treatment approaches as shown on Figure S-3 and the principal criteria as follows:

- Continue to deliver a wet weather peak flow of up to 1076 mgd to Blue Plains
- Evaluate peak flow distribution during wet weather events for conditions as follows:

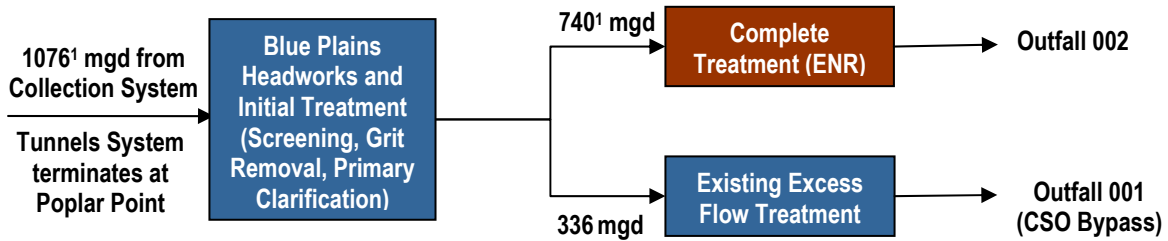
<i>Treatment Process</i>	<i>Flow Distribution - mgd</i>		
	<i>Maintain Current Peak Flow Rates</i>	<i>Reduce Peak Flow Rates</i>	<i>Reduce Peak Flow Rates and Add Storage</i>
Complete Treatment	740 ¹ , first 4 hours 511, thereafter	555 ² , first 4 hours 511, thereafter	555 ² , first 4 hours 511, thereafter
Excess Flow Treatment	Up to 336	Up to 521 mgd	Up to 225 mgd

- Notes:
1. 740 mgd provides for a peak rate of 2.0 times the annual average flow of 370 mgd
 2. 555 mgd provides for a peak rate of 1.5 times the annual average flow of 370 mgd

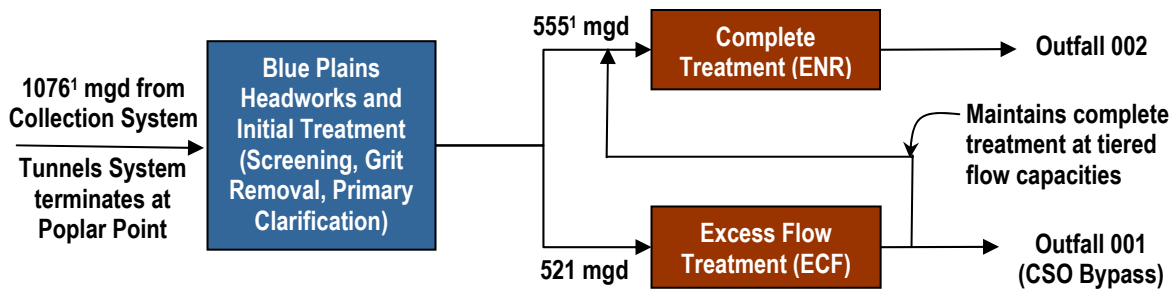
Summary and Findings

- Combined Sewer System Flow (CSSF) conditions (this constitutes wet weather conditions) exist when the total flow conveyed to the Blue Plains headworks exceeds 511 mgd. CSSF conditions stop when the total flow conveyed to the Blue Plains headworks falls to less than 511 mgd or a period of four hours has elapsed from the start of a CSSF condition; whichever occurs last.
- When CSSF conditions exist, flow conveyed to the Blue Plains headworks receives Complete Treatment and Excess Flow Treatment according to the flow distribution listed in the table above and is discharged from Outfalls 001 and 002.
- When CSSF conditions do not exist, flow conveyed into the Blue Plains headworks is all discharged from Outfall 002 after receiving Complete Treatment
- The predicted quality of the average year combined effluent discharged from Outfalls 001 and 002 will equal or exceed the quality predicted for the LTCP.
- Depending on the alternative, Outfall 001 may serve as a CSO bypass or as a CSO.
- Excess flow treatment will be based on primary clarification using plain sedimentation and enhanced clarification facilities (ECF) employing ballasted flocculation technology. The effluent quality from ECF has been demonstrated as being of a higher quality (e.g. lower pollutant load) compared to that produced by plain sedimentation.
- For an arrangement where the tunnels system is extended to Blue Plains, additional storage will be provided to capture peak flow rates and store such flow prior to delivery to the Blue Plains headworks. Storage capacity has been based on providing tunnel capacity for the difference in the peak flow rates conveyed to Complete Treatment (740 mgd vs. 555 mgd) during the first four hours of a wet weather condition. The tunnel volume required is 740 mgd less 555 mgd which equals 185 mgd for four hours, or 31 million gallons (mg). When additional storage is provided by the tunnel extension, the peak treatment rate at Blue Plains can be reduced to less than 1076 mgd because the storage can be used to equalize the rate being treated while producing an overall effluent quality discharged from Outfalls 001 and 002 of equal or better than that predicted for the LTCP. For an additional storage capacity of 31 mg, the studies show that excess flow treatment employing ECF at a capacity of 225 mgd or an overall peak treatment flow rate of 780 mgd (555 + 225) can be expected to produce an average year effluent quality equal to that produced by treating a peak rate of 1076 mgd (555 + 521 or 740 + 336) without adding additional storage.
- The tunnels system will be arranged to be dewatered during and after a storm for treatment at Blue Plains according to the flow distribution table above and whether or not CSSF conditions exist.
- New biological nitrogen removal facilities (enhanced nitrogen removal or ENR) will be provided with sufficient biological and hydraulic capacity to meet the new total nitrogen effluent limit based on the flow distribution table above and CSSF conditions.

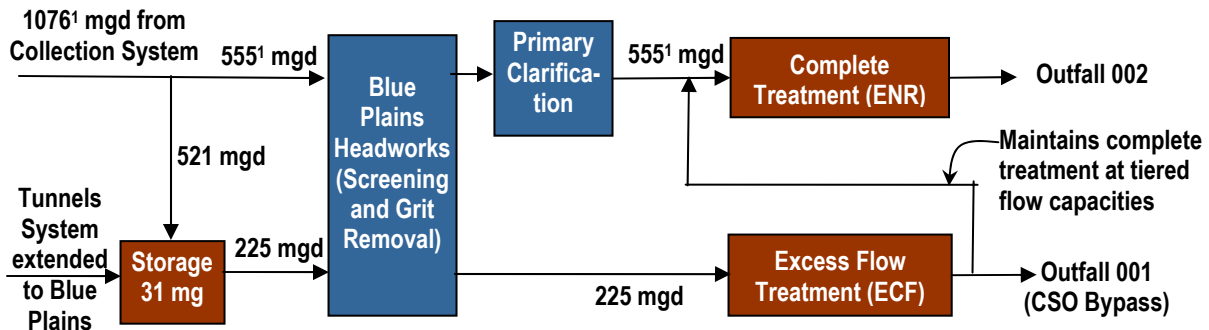
Summary and Findings



Maintain Current Peak Flow Rates to Complete Treatment



Reduce Peak Flow Rate to Complete Treatment and Add Enhanced Clarification for Excess Flow Treatment



Reduce Peak Flow Rate to Complete Treatment, Add Storage and Enhanced Clarification for Excess Flow Treatment

Notes: 1. Flow Rates during first four hours of a wet weather event

**Figure S-3
General Approaches to Complying with Total Nitrogen Effluent Limit**

Collection System and Receiving Water Evaluations

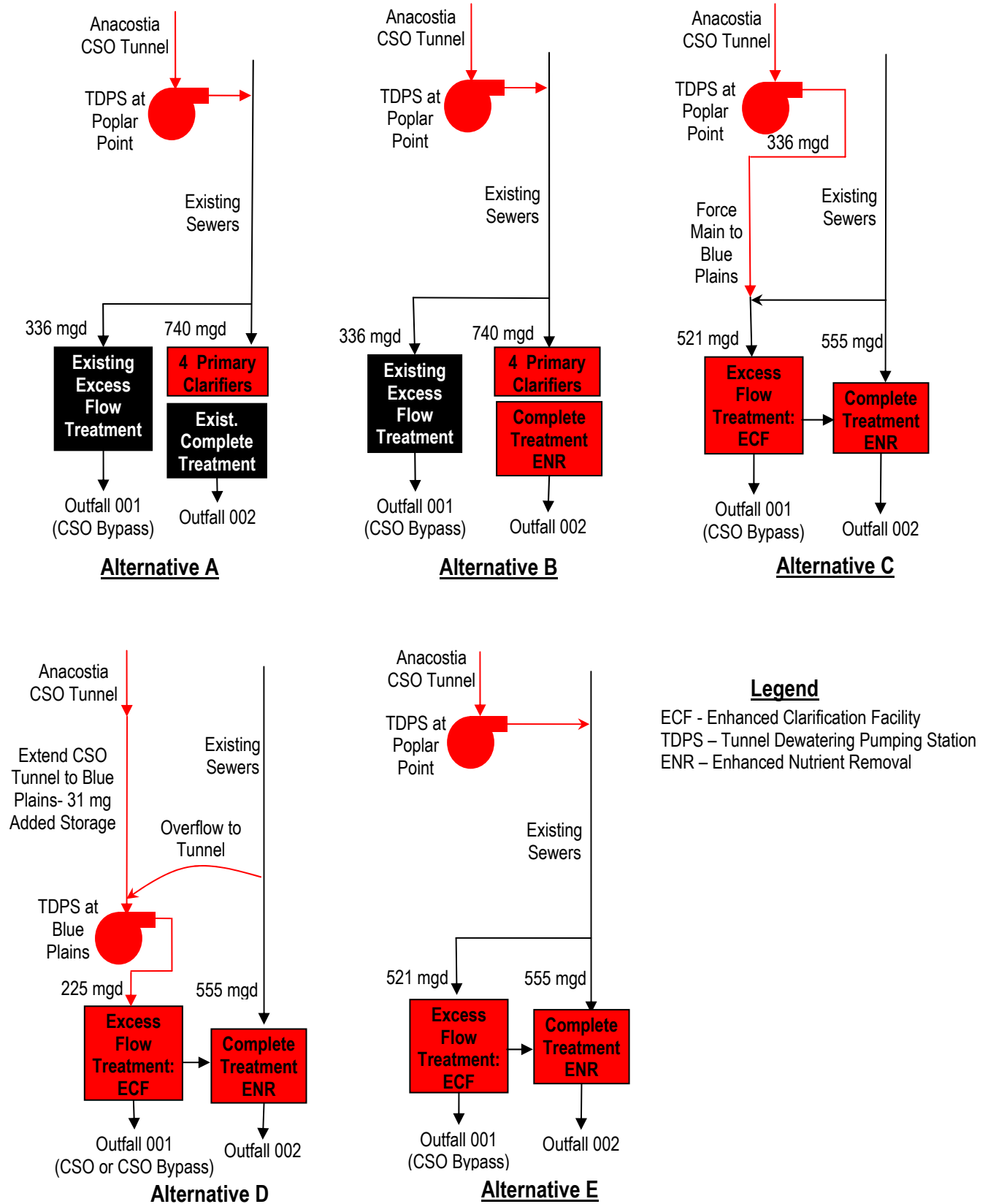
The same analytical procedures used to develop and evaluate the LTCP were used to evaluate the alternative TN/WW plans. The model of the combined sewer system developed and calibrated during the LTCP was used to predict flows and loads to Blue Plains and the CSOs. Models of the receiving waters developed and calibrated during the LTCP were used to predict the water quality of alternative TN/WW plans. Alternatives were evaluated on the basis of the average climatic year. This was the period 1988, 1989 and 1990, which is the same period used to develop the LTCP and period used by EPA and D.C. DOE to develop TMDLs for the receiving waters in the District.

Alternative Projects for Total Nitrogen Removal/Wet Weather Treatment

A series of alternative projects have been developed to compare the technical designs for meeting the new total nitrogen effluent limit and providing sufficient wet weather treatment capacity at Blue Plains to accommodate performance requirements of the LTCP. The alternative projects are diagrammed on Figure S-4 and are described briefly as follows:

- Alternative A – This project is the same as the excess flow improvements in the LTCP. This alternative comprises the addition of four new primary clarifiers for Excess Flow Treatment together with improved hydraulic controls. During wet weather conditions, a peak flow rate of 740 mgd would continue to be conveyed to Complete Treatment for the first four hours. After four hours, the rate to Complete Treatment would be reduced to 511 mgd and up to 336 mgd would be treated in the excess flow facilities during wet weather conditions. This alternative would not have the hydraulic or biological capacity in the initial and complete treatment facilities needed to meet the new total nitrogen effluent limit for Outfall 002. Therefore, this alternative has not been included in the comparison of alternative projects.
- Alternative B – This alternative adds the new total nitrogen effluent limit on top of the existing permit conditions for treating wet weather flows under the LTCP. Flow to complete treatment would be 740 mgd for the first 4 hours and 511 mgd thereafter. A maximum of 336 mgd would receive excess flow treatment (primary clarification and disinfection) and be discharged from Outfall 001. In order to meet the new total nitrogen effluent limit and existing permit conditions for treating wet weather flows, new and expanded biological and hydraulic capacity would be required for the treatment facilities at Blue Plains. Because of site restrictions and complexities related to interfacing new and existing facilities, the improvements needed to implement this alternative, while technically feasible on paper, would involve a substantial degree of uncertainty with respect to long term reliability. For example, the improvements needed would likely require constructing stacked (double-deck) clarifiers and complex flow distribution to physically separated treatment units.
- Alternative C – Under this alternative, peak flow rates to Complete Treatment would be reduced to 555 mgd for the first 4 hours and 511 mgd thereafter. The difference in the maximum rate (1076 mgd) conveyed to the headworks at Blue Plains and that to be conveyed to Complete Treatment (555 mgd) is 521 mgd. New ECF would be constructed with a capacity of 521 mgd to handle the reduction in peak flow to Complete Treatment. The Anacostia River Tunnels System would remain the same as included in the existing LTCP. The tunnels dewatering pumping station at Poplar Point would, however, pump into a force main that would convey flow captured in the tunnels to new headworks at Blue Plains for treatment in the new ECF. Operating provisions would involve arrangements to dewater the tunnels system during and following wet weather events and to convey the ECF effluent to Outfall 001 and/or Complete Treatment depending on the capacity available in the Complete Treatment facilities. New enhanced nitrogen removal (ENR) facilities would be constructed at Blue Plains with capacity to meet the new total nitrogen effluent limit.

Summary and Findings



**FIGURE S-4
 ALTERNATIVE PROJECTS**

Summary and Findings

- Alternative D - This alternative is based on maintaining a peak flow rate of 1076 mgd from the collection system to Blue Plains. Peak flow rates to Complete Treatment would be reduced to 555 mgd for the first 4 hours and 511 mgd thereafter. A tunnel would be constructed between Poplar Point and Blue Plains, and flows exceeding the complete treatment capacity would be diverted to the tunnel. The total storage would be 157 mg (126 mg + 31 mg) spread over the Anacostia River tunnels system and the new Blue Plains Tunnel. Flow captured in the tunnels would be dewatered through new headworks at Blue Plains for treatment in a new ECF having a capacity of 225 mgd. Operating provisions would include arrangements to dewater the tunnels during and following wet weather events and to convey ECF effluent to Outfall 001 and/or to Complete Treatment depending on the capacity available in the Complete Treatment facilities. New ENR facilities would be constructed at Blue Plains with capacity to meet the new total nitrogen effluent limit. For this alternative, Outfall 001 could be permitted as a CSO bypass or as a CSO outfall.
- Alternative E – For this alternative, peak flows to complete treatment would be reduced to 555 mgd for the first 4 hours and 511 mgd thereafter. The difference in the maximum rate (1076 mgd) entering the headworks and that to be conveyed to complete treatment (555 mgd) would be 521 mgd. New ECF would be constructed with this capacity (521 mgd) to handle the reduction in peak flow to complete treatment. The facilities to dewater the tunnels system would be located at Poplar Point and would discharge into the existing combined sewers in the area. Operating provisions would include arrangements to dewater the tunnels during and following wet weather events. Flow control provisions would be needed to assure that dewatering the tunnels when other pumping stations are pumping at peak flow rates would not exceed capacities at Blue Plains. Flow treated by the ECF would be discharged from Outfall 001 and/or conveyed to Complete Treatment depending on the capacity available in the Complete Treatment facilities. New ENR facilities would be constructed at Blue Plains with capacity to meet the new total nitrogen effluent limit.

The alternative projects developed for Total Nitrogen Removal/Wet Weather Treatment (TN/WW Plan) have been compared based on the following:

- Capacities of facilities to handle flows and loads conveyed to Blue Plains from the collection system and tunnels.
- Predicted Potomac River water quality in the vicinity of Blue Plains after implementation of a TN/WW Plan.
- Predicted combined sewer overflows to the Anacostia River after implementation of a TN/WW Plan
- Implementation schedule
- Opinions of capital, operating, and maintenance costs
- Qualitative factors such as performance reliability, feasibility of construction considering planned development in the District and other implementation requirements such as modifications to the existing LTCP

Factors used to compare the alternative projects developed for TN/WW plans have been summarized in Table S-2. Detailed comparisons including estimated loads and water quality predictions for pollutant parameters are included in Section 4 of the report.

Summary and Findings

**Table S-2
Comparison of Alternatives**

Parameter	A (Existing LTCP)	Alternatives			
		B	C	D	E
Facility Capacities					
Blue Plains Complete Treatment during wet weather events (mgd)					
1 st 4 hrs	740	740	555	555	555
After 4 hrs	511	511	511	511	511
Excess Flow Treatment (mgd)	336	336	-	-	-
Enhanced Clarification capacity (mgd)	None	None	521	225	521
Anacostia/Blue Plains tunnels storage volume (mg)	126	126	126	157	126
Anacostia/Blue Plains tunnels max dewatering rate (mgd)	170	170	336	225	250
Predicted Average Year Water Quality					
Anacostia River CSO Overflows					
• Number per average year (no./avg yr)	2	2	0 (1)	0 (1)	0 (1)
• Volume per average year (mg/avg yr)	54	54	0 (1)	0 (1)	0 (1)
Blue Plains Outfall 001 + 002 Discharges					
• Overall quality	Per LTCP	Better than LTCP	Much better than LTCP	Much better than LTCP	Much better than LTCP
Fecal Coliform (MPN x 10 ¹⁵ /avg yr)					
• Outfall 001	411	411	2.1	2.0	1.7
• Outfall 002	106	106	105	105	105
Potomac River at Blue Plains					
• Overall quality	Per LTCP	Better than LTCP	Much better than LTCP	Much better than LTCP	Much better than LTCP
• No. days fecal coliform >200 /100 ml/avg yr	9	5	1	1	1
Other Comparative Measures					
Capital Cost Opinion (\$ M, ENR CCI = 7888)	\$ 28	\$ 1,287	\$ 901	\$ 783	\$ 732
Performance Reliability					
• Meet new TN effluent limit	Cannot meet	Has uncertainties	Reliable	Reliable	Reliable
• CSO control	Per LTCP	Flow control complex	Flow control complex	Reliable flow control	Flow control complex
Schedule					
	Not applicable	Longer than C, D, and E	Equal	Equal	Equal

Notes:

1. Modeling predicts no overflows in an average year. At the low levels of CSO overflows projected herein, model accuracy is highly dependent on many variables such as the accuracy of rainfall data, information on the drainage area and other factors. As a result, the model predictions mean that CSO overflows in the range of zero to 2 overflows and 54 mg can be expected in an average year. Further, additional overflows will occur for rain events which exceed or are not represented in the average year. The model predictions contained herein do not change the level of CSO control committed to by WASA in its LTCP, which was approved by EPA and the D.C. Department of the Environment.

Summary and Findings

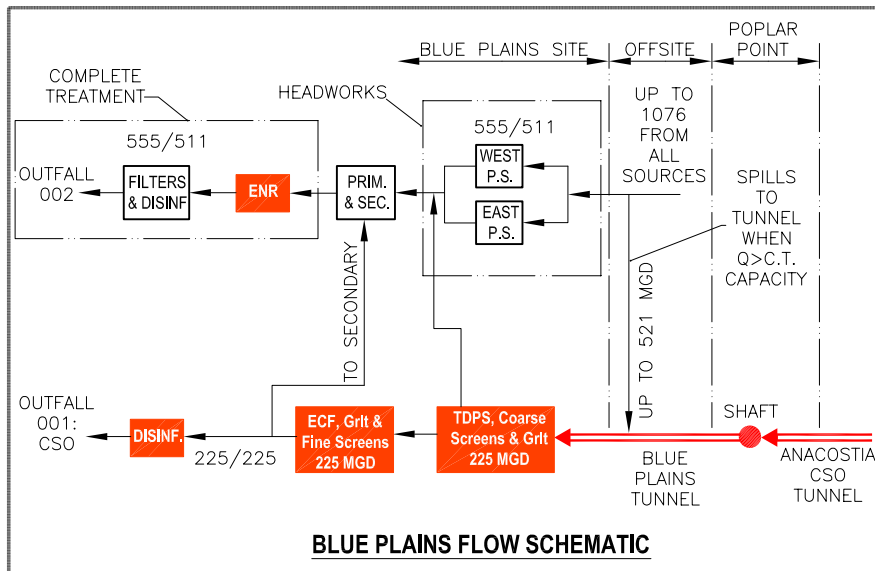
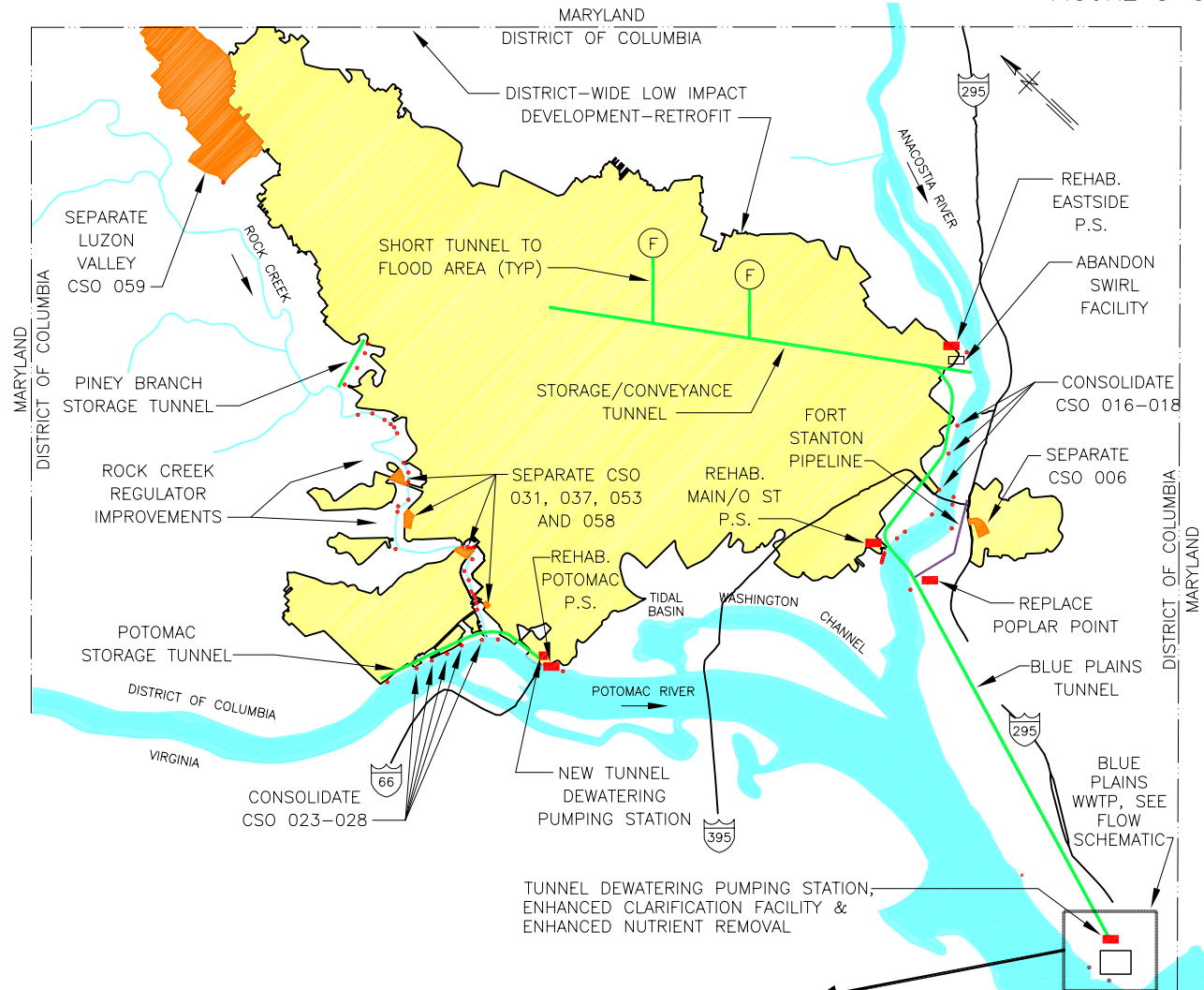
Selected Total Nitrogen Removal/Wet Weather Plan

The comparative features of the various alternative projects have been evaluated to select a TN/WW Plan and the principal comparisons are summarized as follows:

- Alternative A cannot meet the new TN effluent limit and was not considered further.
- Alternatives B and C are not cost effective in terms of capital cost compared to Alternatives D and E. Also, the water quality predicted for Alternative B is not as good as that predicted for Alternatives C, D and E; while the predicted water quality for Alternatives C, D and E is equal. Based on cost effectiveness and predicted water quality performance, Alternatives B and C were not considered further.
- Alternatives D and E appear to be equal in terms of cost effectiveness and predicted water quality. Alternative D includes extension of the tunnels system to Blue Plains and provides greater reliability for CSO control in terms of capture, treatment and expandability.

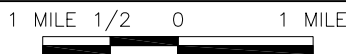
The comparative evaluations show Alternative D to provide the best features for water quality, performance, reliability, cost effectiveness and capability to meet CSO control requirements. Alternative D is, therefore, recommended for selection as the TN/WW Plan. The principal components of the recommended plan are shown on Figure S-5 and are summarized as follows:

- Blue Plains complete treatment capacity - Blue Plains will provide complete treatment for up to 555 mgd for the first four hours and 511 mgd thereafter. In accordance with the existing NPDES permit, combined sewer system flow (CSSF) conditions (i.e. wet weather events) exist and start when plant influent flow is greater than 511 mgd. CSSF conditions stop four hours after plant influent flow drops below 511 mgd or 4 hours has elapsed since the start of CSSF conditions, whichever occurs last.
- Enhanced nitrogen removal (ENR) – ENR facilities will be constructed with capacity to provide complete treatment for the flow rates identified above and to meet the new total nitrogen effluent limit. ENR technologies to meet the new total nitrogen effluent limit will be evaluated. Technologies that may be evaluated include conventional nitrification/denitrification reactors, moving bed biofilm reactors (MBBRs), biological anoxic flooded filters (BAFs) and integrated fixed film activated sludge (IFAS). The evaluation will include pilot studies of one or more technologies to select the appropriate process and to obtain detailed information on parameters for design.
- Enhanced Clarification Facility (ECF) – a 225 mgd ECF facility will be constructed at Blue Plains. Pilot testing of this treatment technology will be performed to confirm its suitability and parameters for design.
- Tunnel to Blue Plains and System Storage Volume – a new tunnel will be constructed from Poplar Point to Blue Plains. The total tunnels system storage volume will be increased from the 126 mg included in the LTCP to 157 mg. The diameters of the tunnels system and the apportionment of the storage volume among the various tunnel sections will be dependent on facility planning. This new tunnel segment will serve as a flow equalization facility which provides for reducing the capacity of the ECF.



- LEGEND**
- CSO OUTFALL
 - WWTP OUTFALL
 - COMBINED SEWER AREA
 - COMBINED SEWER AREA TO BE SEPARATED
 - NEW PUMPING STATION OR MODIFIED EXIST. PUMPING STATION
 - NEW TUNNEL
 - NEW PIPELINE
 - (F) FLOOD AREA
- TDPs TUNNEL DEWATERING PUMPING STATION
P.S. PUMPING STATION
C.T. COMPLETE TREATMENT
ECF ENHANCED CLARIFICATION FACILITY
ENR ENHANCED NUTRIENT REMOVAL
- BLUE PLAINS FLOW RATES (MGD)
1ST 4 HRS/AFTER 4 HRS

RECOMMENDED PLAN



METCALF & EDDY
GREELEY AND HANSEN LLC
LIMNO-TECH, INC

D.C. WATER AND SEWER AUTHORITY
TOTAL NITROGEN/WET WEATHER PLAN

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- Outfall Sewer Overflow to Blue Plains Tunnel – a connection between the existing outfall sewers on the influent side of Blue Plains and the tunnel to Blue Plains will be constructed. This facility will allow flow from the collection system that exceeds the complete treatment capacity of the plant to overflow to the tunnel.
- Tunnel Dewatering Pumping Station – in the Final LTCP, the tunnel dewatering pumping station was to be constructed at the tunnel terminus at Poplar Point. As part of the TN/WW plan, the tunnel dewatering pumping station at Poplar Point will be deleted and constructed at the new terminus of the tunnel at Blue Plains. The pumping station will be sized to have a minimum firm capacity of 225 mgd, equal to the capacity of the ECF. In addition, the facility will have the ability to dewater the tunnels system to the new ECF and discharge ECF effluent to complete treatment for discharge at Outfall 002 or for discharge at Outfall 001.

Schedule

The schedule for implementing nitrogen control was developed considering constructability and the desire to achieve nitrogen control as early as practicable. It is assumed that the LTCP consent decree will be modified to include the projects required to implement the TN/WW Plan. Based on this evaluation, the schedule identified below has been developed. The schedule is based on receipt of EPA approval of the TN/WW Plan by January 1, 2008. If approval occurs after this date, then revision of the schedule will be required.

- Nitrogen Limit Compliance – place nutrient removal facilities in operation by July 1, 2014, which is 6 years and 6 months after approval of the TN/WW Plan (assumed to occur January 1, 2008). Since nitrogen compliance is judged based on a full calendar year, start compliance with the TN limit the first full calendar year following placing facilities in operation.
- Wet Weather Facilities - place facilities in operation by March 23, 2018, which is 10 years and 3 months after approval of the TN/WW Plan (assumed to occur January 1, 2008). Note that the 2018 date is also the deadline in the LTCP Consent Decree for placing in operation the Anacostia Tunnel and appurtenances from Poplar Point to Northeast Boundary. The wet weather facilities include the Enhanced Clarification Facility, Tunnel to Blue Plains and Tunnel Dewatering Pumping Station.

Outfall 001 Nitrogen Allocation and Permitting Approach

The Blue Plains NPDES permit was modified on April 5, 2007 to include a TN limit for Blue Plains of 4.689 million pounds of nitrogen per year. The permit allocated this entire load to Outfall 002, the complete treatment outfall. For Outfall 001, there were no allocations for nitrogen or any other parameter. The fact sheet accompanying the permit indicated the derivation of the TN limit was as shown on Table S-3. The fact sheet did not explain why an allocation was not assigned to Outfall 001.

Summary and Findings

**Table S-3
EPA's Derivation of TN Limit for Blue Plains
Fact Sheet Accompanying April 5, 2007 NPDES Permit Modification**

Source	TN Load Allocation (mil lbs/yr)
D.C. CSO after LTCP	0.0053
D.C. non-point sources	0.28
D.C. portion of Blue Plains	2.115
Total D.C.	2.4
D.C. portion of Blue Plains	2.115
Maryland part of Blue Plains	1.993
Virginia part of Blue Plains	0.581
Total Blue Plains	4.689

The LTCP demonstrated that Outfall 001 met the requirements of a CSO bypass per the CSO Policy. This was approved along with the entire LTCP and the NPDES permit recognized Outfall 001 as a CSO bypass.

As with other CSOs, flows and pollutant concentrations from Outfall 001 vary dramatically based on the rainfall, the nature of the storm event, antecedent moisture conditions and other factors. Like other CSOs, end of pipe effluent limits are inappropriate for this outfall. This was recognized in the NPDES permit which includes no effluent limits for bacteria, TSS, BOD or other parameters for Outfall 001 or any other CSO. Instead, the LTCP and permit provide that the water quality performance of Outfall 001 and the other CSOs are to be evaluated by post construction monitoring. The evaluation would include monitoring of the discharges and the receiving waters for an extended period of actual operation. The measured discharges from the outfalls and the measured water quality in the receiving waters would be related back to average year conditions using modeling. The predicted performance in the average year would be the basis for determining whether the LTCP (including 001) was performing as predicted and therefore meeting water quality standards or whether additional CSO controls were required. This was the basis for EPA and the D.C. Department of the Environment approval of the LTCP as meeting water quality standards, subject to post construction monitoring. This approval was made based on the predicted performance of Outfall 001, the remaining CSOs and the predicted water quality after implementation of the LTCP.

In addition to the new ECF, implementation of the TN/WW Plan includes a tunnel dewatering pumping station, grit removal and coarse screening facilities to be constructed for Outfall 001. These facilities provide separate headworks for Outfall 001. As a result, Outfall 001 could be permitted either as a CSO bypass or as a CSO outfall. The allocation of nitrogen under each of these approaches is described below:

- Outfall 001 as a CSO Bypass – Under this approach, a nitrogen load would be allocated to Outfall 001 as a CSO bypass. The load would be treated in a fashion similar to CSOs in that there would be no mass or concentration permit limit and the performance would be evaluated based on post-construction monitoring. The load allocated to Outfall 002 would be reduced accordingly to maintain the same total nitrogen load for the District. Table 5-3 shows this load allocation.
- Outfall 001 as a CSO – Under this approach, the nitrogen load allocated to Outfall 001 would be added to the CSO nitrogen load. The load would be treated like all of the other CSOs in that there would be no mass or concentration permit limit and the performance would be evaluated based on post-construction monitoring. The load allocated to Outfall 002 would be

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reduced to maintain the same total nitrogen load for the District. Table S-4 shows this load allocation.

**Table S-4
Proposed TN Load Allocation – Outfall 001 as a CSO Bypass or CSO**

Source	TN Load Allocation (mil lbs/yr)		
	Fact Sheet Accompanying April 5, 2007 Permit Modification	Outfall 001 as a CSO Bypass	Outfall 001 as a CSO
D.C. CSO after LTCP	0.0053	0.0053	$0.0053 + 0.18 = 0.1853$
D.C. Blue Plains CSO Bypass (001)	-	0.18	-
D.C. non-point sources	0.28	0.28	0.28
D.C. portion of Blue Plains	2.115	$2.115 - 0.18 = 1.935$	$2.115 - 0.18 = 1.935$
Total DC	2.4	2.4	2.4
D.C. portion of Blue Plains	2.115	1.935	1.935
Maryland part of Blue Plains	1.993	1.993	1.993
Virginia part of Blue Plains	0.581	0.581	0.581
Total Blue Plains	4.689	4.509	4.509

Under either approach, the nitrogen load allocated to Outfall 001 would be evaluated based on post construction monitoring and performance with the allocation measured against the average year. This is entirely consistent with the allocations to CSOs made for other parameters under various TMDLs and the fact that nitrogen allocations are to be made TMDLs. Average year TMDL allocations to CSOs include daily and annual allocations for representative climate periods. For TMDLs with climate periods different than that used for the LTCP, the TMDL will be translated to an equivalent TMDL for the LTCP climate period.

Considering the foregoing, it is recommended that Outfall 001 be permitted as a CSO because it will have a separate headworks after implementation of the TN/WW Plan and because this approach best fits and makes clear the performance expectations and evaluations for this outfall.

Implementation Requirements

Implementation of the wet weather plan will require modification to the LTCP consent decree and WASA's NPDES permit.

Modifications to the LTCP consent decree are summarized as follows:

- Adjust the Anacostia River Projects tunnels storage capacities
- Adjust the work included for the Poplar Point Pumping Station
- Delete the Blue Plains Excess Flow improvements, including the four additional primary clarifiers
- Add the new tunnel to Blue Plains
- Add the new ECF and pumping complex at Blue Plains
- Include NPDES permit conditions in the consent decree modification that would become effective when the new ECF complex is placed in operation.
- Other changes needed to make the LTCP consent decree consistent with the TN/WW Plan.

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The NPDES permit will need to be modified to agree with TN/WW plan. Modifications for the NPDES permit are summarized as follows and are applicable after the Enhanced Clarification facilities have been placed in operation.

- Part 1, Section A – Effluent Limitations and Monitoring Requirements Outfall 001
 - Revise the status of Outfall 001 to reflect it being a separate CSO and the discharge for the new ECF complex
 - Revise the description of the treatment provided to Outfall 001 to include enhanced clarification and disinfection
 - Revise the maximum flow rate to be treated and discharged from Outfall 001 to be 225 mgd
 - Discharge limitations and monitoring remain unchanged

- Part 1, Section B – Effluent Limitations and Monitoring Requirements Outfall 002
 - Dry Weather Flow (DWF) conditions exist when plant influent flows are equal to or less than 511 mgd.
 - Combined Sewer System Flow (CSSF) conditions exist and shall be deemed to start when plant influent flows are greater than a rate of 511 mgd. CSSF conditions shall be deemed to stop 4 hours after plant influent flows drop to a rate less than 511 mgd or a period of 4 hours has elapsed since the start of CSSF conditions, whichever occurs last.
 - Delete Excess Flow Treatment
 - The following flows shall receive complete treatment:
 - For the first four hours, plant influent flows less than or equal to 555 mgd
 - After four hours, plant influent flows up to 511 mgd
 - When DWF conditions exist, no flow may be discharged from Outfall 001.
 - When CSSF conditions exist, plant influent flows greater than the 555 mgd or 511 mgd rates required to receive Complete Treatment; shall receive Excess Flow Treatment and a maximum rate of 225 mgd may be discharged from Outfall 001

- Part III, Section D – Post Construction Monitoring
 - At subsection 4, add a provision for translating TMDLs and other allocations developed for climate periods different than that used for the LTCP, to be translated to an equivalent TMDL or allocation for the LTCP climate period.

- Clarify the nitrogen allocation in Part 1 Section B and in Part IV Section E to indicate that the permit load applies to Outfall 002 only.

- Other changes needed to make the NPDES Permit consistent with the TN/WW Plan.