Summary of Opinions Presented to City Utilities Committee March 9, 2016

Sewer Overflow Matters of the Peachtree Creek Basin

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Key Themes of Presentation

- Connection of the Combined and Separated Sewage Systems
- 3 Modes/Systems of Operation
  - (1) Dry
  - (2) Wet
  - (3) Very Wet Weather
- Combined (Wet) Systems Performance
- Potential Solutions

Presentation consists primarily of excerpts from DWM reports and regulatory documents and is intended as a “leave behind”.

Access to Master Plans, Hydraulic Reports, GIS and other DWM data would provide additional insights and clarifications.

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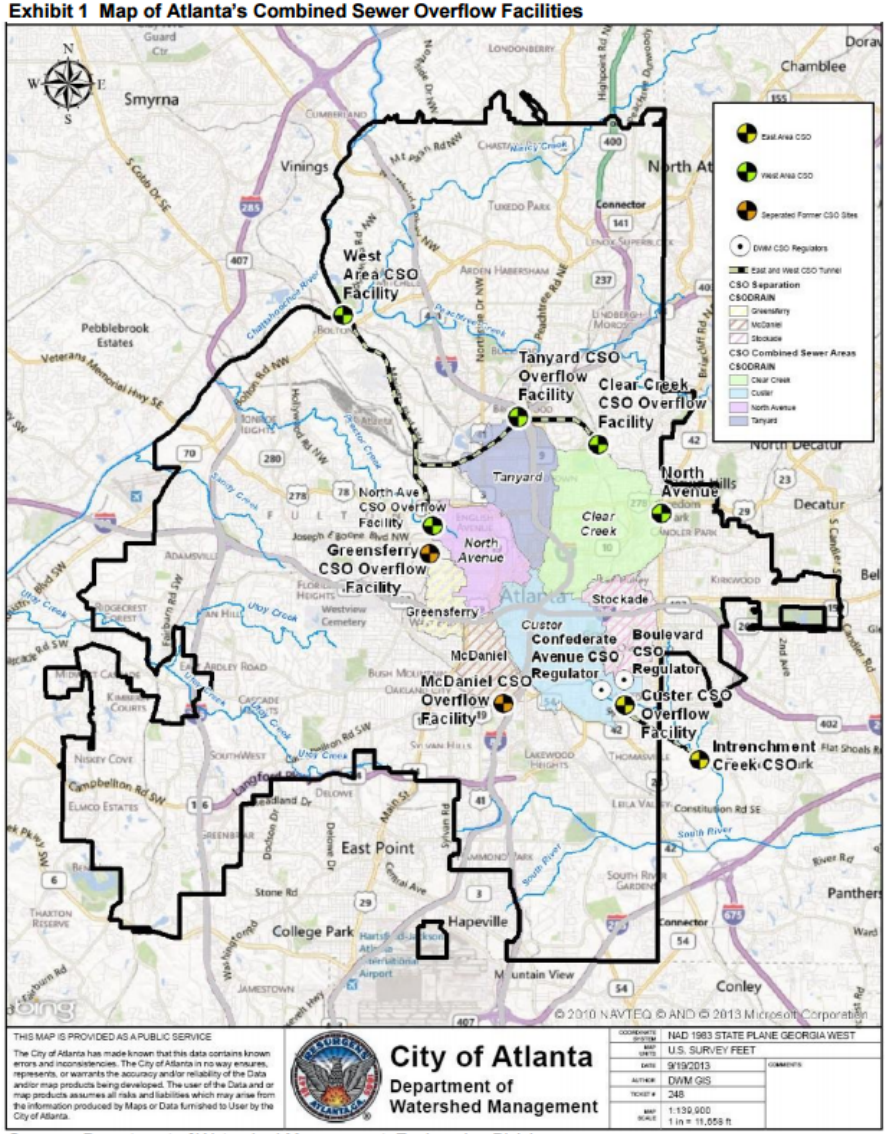
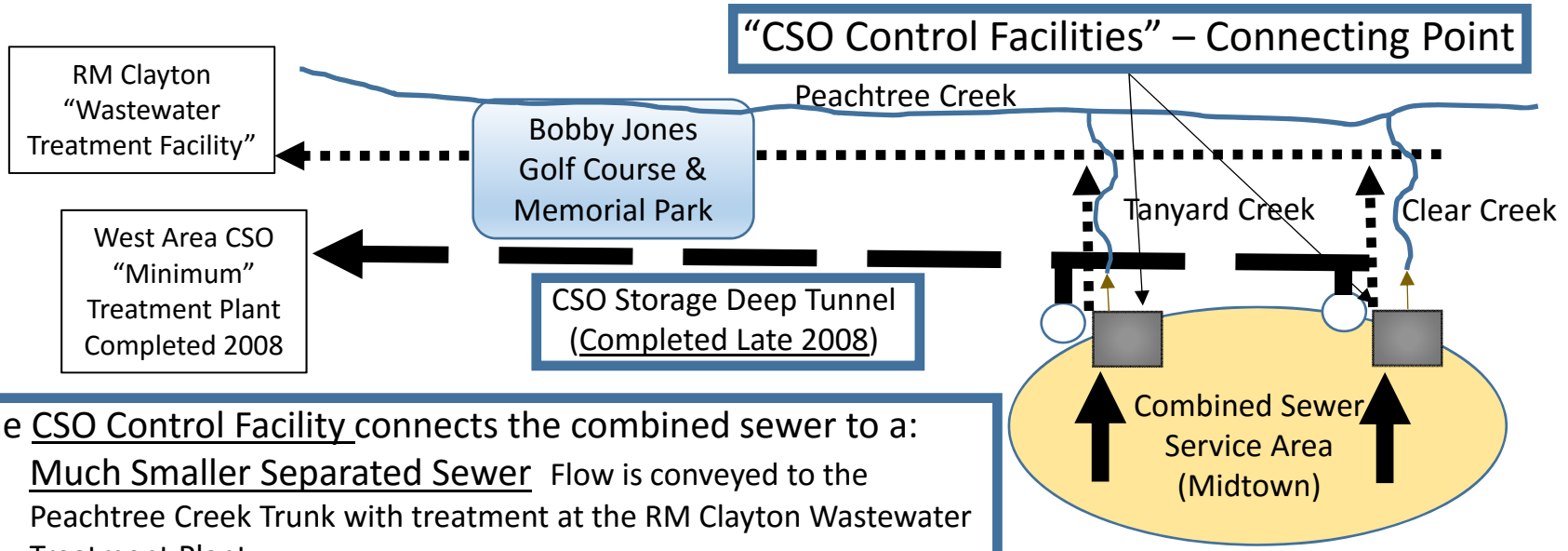
Exhibit 1 Map of Atlanta's Combined Sewer Overflow Facilities



Source: Department of Watershed Management, Engineering Division

2014 City Auditor Performance Audit

Peachtree Creek Basin Sewer System Conceptual Overview
"Combined" and "Separated" Sewer System - Connections



The CSO Control Facility connects the combined sewer to a:

1. Much Smaller Separated Sewer Flow is conveyed to the Peachtree Creek Trunk with treatment at the RM Clayton Wastewater Treatment Plant.
2. CSO Storage Tunnel – Wet Weather Flow in excess of the downstream "separated" sewer goes to the CSO Tunnel and dedicated CSO "minimum" treatment plant (both completed in 2008).
3. Tanyard and Clear Creek – Very Wet Weather – The excess flow that cannot be stored is discharged to the Creek.

Legend of Symbols

- CSO Tunnel Intake (shaft)
- "Separated" Sanitary Sewer
- "Combined" Sanitary Sewer
- Creek Discharge

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Combined Sewers carry both sanitary sewage and storm water runoff.
"Separated" sewers are dedicated to sanitary sewage only.

Tanyard Creek CSO Control Facility
Connecting Combined to Separated Sewer System and Wet Weather Facilities

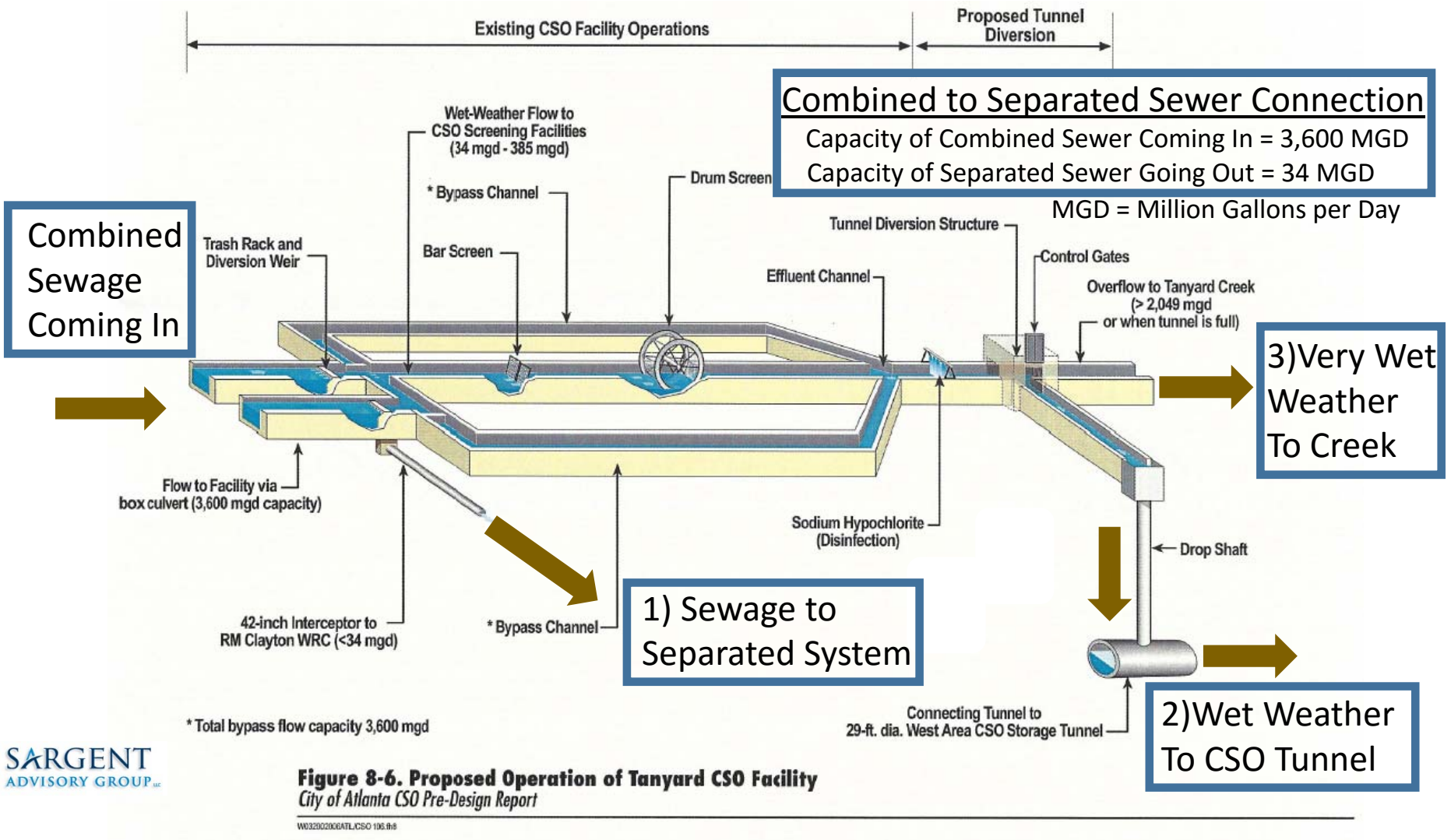

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Figure 8-6. Proposed Operation of Tanyard CSO Facility
City of Atlanta CSO Pre-Design Report

Levels of Treatment Required for Combined Sewage Per Consent Decree and State Permit

1998 Consent Decree[1]

"Wastewater Treatment Facility"

25. "Wastewater Treatment Facility" (WWTF) shall mean devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage. For purposes of this Consent Decree, this definition includes the following WWTFs owned, managed, operated, and maintained by the Defendant: R.M. Clayton Water Reclamation Center, South River Water Reclamation Center, Utoy Creek Water Reclamation Center, and the Intrenchment Creek Water Reclamation Center.

"Minimum" Treatment – Wet Weather

19. "Primary Treatment" shall mean one or more unit processes which achieve at least a 50% reduction in total suspended solids and a 25% reduction in biochemical oxygen demand.

Very Wet Weather

(ix) a program for controlling and preventing the discharge of solids and floatables from the CSOs, including a description of the current controls for removing solid and floatable materials at each CSO Control Facility, an analysis of

August 2015 State NPDES Permit

4) Maximization of Flow to the Water Reclamation Center (WRC) for Treatment

The permittee shall operate the WRCs at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of discharges from the Combined Sewage Control Facilities. The permittee shall deliver all flows to the WRCs within the constraints of the conveyance capacity of the system and the treatment capacity of the facility. The permittee shall operate the West Area WQCF at maximum treatable flow once capacity at the POTW is reached and storage in the collection system is maximized in order to reduce the magnitude, frequency, and duration of discharges from the Combined Sewage Control Facilities.

s. Minimum Treatment: The treatment of combined sewage, as defined in the CSO Control Policy (April 1994) which includes a minimum of primary clarification or equivalent treatment (removal of floatable and settleable solids may be achieved by any combination of treatment technologies or methods that are shown to be equivalent to primary clarification), solids or floatables disposal and disinfection of effluent, including removal of harmful disinfection chemical residuals, prior to discharge to waters of the State.

Previous State Permit (2005 thru Mid-August 2015)

events per year over a five year period. The portion of the CSOs in excess of the capacity of the proposed storage system will be screened, disinfected and discharged to the local streams through the remaining CSO control facilities (except for any that are separated as part of the plan). The CSO control facilities should only discharge during very large rain events, approximately four times a year as described above.

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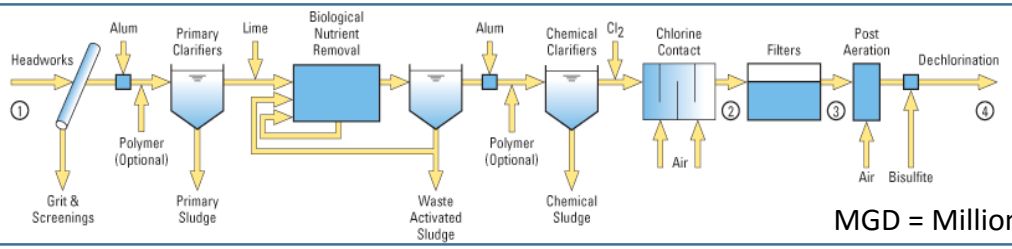
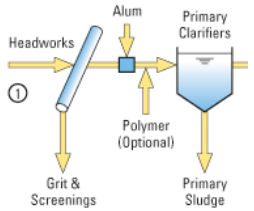
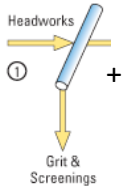
[1] "Definitions" are provided to understand the general scope of treatment, excerpts underneath the "Definitions" are from the Consent Decree

Process Schematic Illustrating Level of Treatment For Combined Sewage System

Level of Treatment	General Unit Processes	Discharge Location
"Wastewater Treatment Facility" **RM Clayton [1]**		Chattahoochee River (up to 240-MGD) MGD = Million Gallons per Day
"Minimum" Treatment (Wet Weather) Primary Clarification Or Equivalent **West CSO Plant**	 + Disinfection →	Chattahoochee River & Emergency Overflow to Peachtree Creek (up to 85-MGD) MGD = Million Gallons per Day
Very Wet Weather Screened and Disinfected **CSO Control Facility**	Disinfectant Added Upstream Before Screens  + Dechlorination →	Tanyard Creek Clear Creek Proctor Creek (up to 6,600-MGD) MGD = Million Gallons per Day

[1] Source: Generic Wastewater Treatment Process Diagram from USGS website, not intended to show exact unit process of facilities rather general scope of differences in level of treatment.

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CSO Control Facilities Do Not Provide Minimum Treatment (Based upon DWM Reports)

1994 EPA CSO Control Policy

Chapter 3 *Development and Evaluation of Alternatives for CSO Control*

The minimum level of treatment applicable to Criteria i and ii is defined in the CSO Control Policy as follows (II.C.4.a):

- *Primary clarification; removal of floatable and settleable solids may be achieved by any combination of treatment technologies or methods that are shown to be equivalent to primary clarification;*
- *Solids and floatables disposal; and*
- *Disinfection of effluent, if necessary, to meet WQS, protect designated uses and protect human health, including removal of harmful disinfection chemical residuals, where necessary.*

1998 Consent Decree – Primary Treatment

19. "Primary Treatment" shall mean one or more unit processes which achieve at least a 50% reduction in total suspended solids and a 25% reduction in biochemical oxygen demand.

Minimum Treatment = Primary Treatment
Primary Treatment = Removal of 50% TSS
CSO Control Facility = No TSS Removal Trend

2001 Technical Paper Submitted to WEFTEC by COA DWM Management and Consultants

CITY OF ATLANTA CSO SYSTEM EVALUATION

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Pollutant Removal Efficiencies of the CSO Facilities

The existing CSO facilities were designed to remove trash and to provide disinfection, except that the Intrenchment Creek CSO facility also removes solids (grit, soil, etc.) and materials that exert biochemical oxygen demand (BOD). In accordance with the consent decree, both combined sewage entering each facility (influent) and the overflows (effluent) were monitored and evaluated to see what removal rates occurred.

There was a trend showing removal of ammonia and substances that exert BOD, such as sewage and other organic waste. This removal could be attributed to the chlorine disinfection. Chlorine disinfects because it is a strong oxidizer of substances and kills bacteria (similar to using hydrogen peroxide on a wound). This oxidation could also reduce organic compounds exerting oxygen demand, including ammonia. While the trends in removal were obvious, the confidence in stating a fixed removal rate is low because there were great differences in the results. Also, there was no apparent trend in the removal of other pollutants such as total suspended solids (TSS) or metals.

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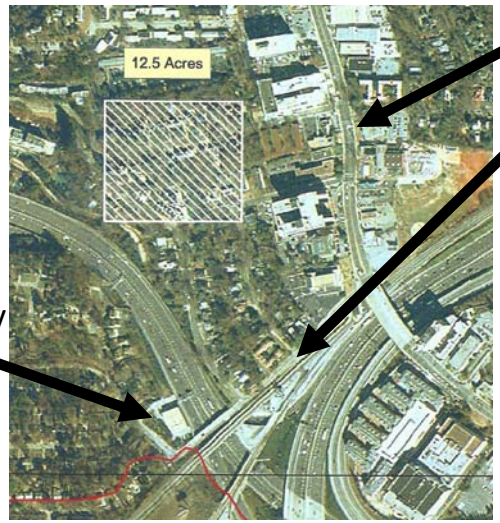
"Minimum" Treatment Alternatives at CSO Control Facility Locations Were Abandoned after Preliminary Evaluation in 2001 (for Wet Weather)

Remedial Measures Report (2001) – CSO Remedial Measures Preliminary Alternatives Evaluation



Site Selection in Brookwood Neighborhood Dismissed from Further Evaluation

Sewershed	Storage Volume Needed (MG)	Area Requirement (ac)
Clear Creek	79	17.8
Tanyard	55	12.4
North Avenue	42	9.5

On-Site CSO Storage

Storage basins, similar to those described in Alternative 3a, were included as needed in Alternative 3b. These are closed, buried concrete tanks with aeration and washdown facilities. In this case, a separate dewatering pumpout facility is not provided since dewatering could be provided by the influent pump station on-site treatment facility. The costs were determined using the same method as in Alternative 3a. Treatment facilities could be constructed over the storage facility to reduce land costs.

As a variation on this alternative, the stored CSO could be treated on-site and discharged to the stream. Combinations of on-site storage and treatment with BMPs such as street-sweeping were evaluated to identify the least-cost alternative. This concept was cost-competitive with the other alternatives, but involves two major drawbacks: the lack of space available to build on-site facilities at half of the outfalls and the general public objection to building and operating several complex satellite treatment facilities in neighborhoods. As a result, on-site treatment was eliminated and so is not discussed further.

Instead of constructing localized storage and "minimum" treatment, the West CSO Storage Tunnel and dedicated West CSO Plant were constructed. Completion was in late 2008.

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CSO Control Facilities and Bypass Discharges to Creeks
Summary of DWM Submittals to GAEPD/USEPA

Year	CSO Control Facility Discharges to Creeks (All 4 Facilities)	West Area Bypass Discharge To Peachtree Creek [1]	Total Discharge Events Not Receiving Minimum Treatment
2013	31	1	32
2014	34	4	38
2015	46	2	48

[1] Corresponding Volumes for CSO Control Facilities discharges were (in millions of gallons) approximately 740,000,000 in 2013, 530,000,000 in 2014 and 800,000,000 in 2015 (excluding West CSO Plant bypass). West CSO Plant bypass presumed to Peachtree Creek based on "unpermitted" language, but needs clarification.

Previous State NPDES Permit (2005 thru July 2015)

part of the plan). The CSO control facilities should only discharge during very large rain events, approximately four times a year as described above. meteorologically similar to the long term average. If an annual average of four overflows is exceeded at any location in this period, the permittee shall prepare a report explaining the exceedence. This report shall be submitted to the Division within three months following the

2004 DWM Environmental Report Submitted to State of Georgia

needed in lieu of BMPs to address future compliance issues related to storm water. There would be an average of four remaining discharges per year from the outfalls.

Consent Decree criteria, Regulatory Criteria & Design Criteria limited CSO Control Facility discharges to creeks to 4 per year (16 for all facilities).

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Design Data Indicates Facilities Not Capable of Screening All Combined Sewer Flow (Very Wet Weather)

2002 DWM West Tunnel Pre-Design Report

4.7.2 Additional Screening Facilities at Inflow Locations

Currently, CSO bypass flows are not screened. However, implementation of the tunnel systems for overflow reduction would divert bypass flow to the tunnel. At a minimum, a small-scale coarse screening system (trash rack) should be provided to protect the approach channel inlet at the dropshaft from debris. Unscreened flow entering the tunnel system could block the flow path and result in unwarranted overflow events. Table 4-2 lists the dropshaft diameter, approach channel inlet width, and recommended bar spacing for coarse screening.

TABLE 4-3

Existing and Additional Screening Capacity Requirements – East and West Area CSO Facilities

City of Atlanta CSO Pre-Design Report

CSO Facilities with Proposed Flow Intake Structure(s)	Bar Screen Capacity (mgd)	Drum Screen Capacity (mgd)	Fine Static Screen Capacity (mgd)	Dropshaft Capacity (mgd)	Additional Screening Required (mgd)
West Area CSO Facilities					
Clear Creek CSO Facility	2298	2300	-	3276	976
Tanyard CSO Facility	386	386	-	2048	1662
North Avenue CSO Facility	650	650	-	1303	653

2004 DWM Environmental Report Submitted to State of Georgia

Proposed Improvements at Existing CSO Facilities

Proposed improvements at existing CSO facilities include implementation of disinfection alternatives that provide non-detectable chlorine residual. The existing CSO facilities use sodium hypochlorite for disinfection. Whole Effluent Toxicity (WET), a water quality criterion, was identified in CSO facilities discharge when residual chlorine was present. EPA/EPD requested that the City "evaluate opportunities to minimize the use of chlorine compounds applied to the combined sewage while maintaining the required disinfection."

An alternative disinfection study was performed to determine if alternative disinfection methods are applicable at the CSO facilities. The study concluded that disinfection with chlorine compounds must be continued, therefore design and installation of dechlorination facilities for the CSO facilities will be included in the CSO Control Program.

No indication that screens were enlarged

Design data indicates screens for discharge to Creeks are substantially undersized based on "design" event, it is unclear under what condition bypass occurs. Operational issues reduce capacity even further (discussed later).

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Disinfection of CSO Control Facility Discharges to Creeks Has Proven Unreliable

1. Disinfectant added upstream to raw sewage continues to be unreliable.
2. Discharge events to Creeks can be greater than 100 million gallons.
3. DWM paid hundreds of thousands in "stipulated penalties" since Remedial Projects completed in 2008. A tabulation of the fines is not readily available.

West CSO Control Facilities [1] (Excludes Custer/Intrenchment Creek)

Year	Discharge Events	Fecal Sampled Exceedance Events	Failure To Sample
2011	5	0	0
2012	12	3	0
2013	11	2	1
2014	24	8	0
2015	34	10	2

4th Quarter 2015 DWM to GAEPD/USEPA Reporting Samples Exceeding Fecal Limit

Pre-Construction ← → Post-Construction

EXCEEDANCE OF FECAL COLIFORM DISCHARGE LIMITS

Facility	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012	2013	2014	1Q15	2Q15	3Q15	4Q15
EAST AREA FACILITIES																	
Custer Avenue	1	1	0	3	1		1	2	0	0	0	0	0	0	0	0	0
East Area (Intrenchment Creek) WQCF	0	0	1	1	0		1	0	0	0	0	1	1	0	0	0	0
East Area Totals	1	1	1	4	1		2	2	0	0	0	1	1	0	0	0	0
WEST AREA FACILITIES																	
Tanyard Creek	-	2	1	0	11		2	0	0	1	1	0	2	0	2	2	2
Clear Creek	-	1	1	2	1		1	0	0	2	2	2	4	0	1	0	1
North Avenue	-	1	0	1	8		1	0	0	0	0	0	2	0	1	0	1
West Area WQCF	-	-	-	-	0		0	0	0	0	0	1	0	0	0	0	0
West Area Totals	4	2	3	3	20		4	0	0	3	3	3	8	0	4	2	4

NOTE: Sampling was discontinued at the Greensferry CSO Control Facility (9/24/2007) and the McDaniel CSO Control Facility (8/29/2007) following substantial completion of sewer separation activities within the respective sewersheds.

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[1] West CSO Control Facilities are Clear, Proctor, and Tanyard Creek. Summary of DWM submittals to GAEPD/USEPA. The violations for fecal exceedance do not include "Failure to Sample" which has a separate "stipulated" penalty or bypasses at the West Facility for which no sampling data could be identified.

Combined Sewage (West Area) Wet Weather Storage and Treatment Systems Are Very Difficult & Expensive to Operate

4th Quarter 2015 DWM to GAEPD/USEPA Reporting

Major Gate/Equipment Failures

Table 3
West Area CSS Control Facilities
Summary of Wet Weather Combined Sewer Overflow (CSO) Events

Quarterly Report	Date	Unpermitted Discharge (Wet Weather CSO Event)	Cause
Clear Creek Combined Sewage Control Facility: No known Wet Weather CSO Events			
North Avenue Combined Sewage Control Facility: No known Wet Weather CSO Events			
Tanyard Creek Combined Sewage Control Facility: No known Wet Weather CSO Events			
West Area Water Quality Control Facility			
3rd Quarter 2009	9/19/2009	Reported to EPD as a *Force Majeure*	Severe wet weather event
2nd Quarter 2010	5/3/2010	Unpermitted discharge: Reported to EPD as a permit violation and as a major spill.	Severe wet weather events
2nd Quarter 2013	5/4/2013	Unpermitted discharge: Reported to EPD as a permit violation and as a major spill.	Mechanical gate closure delay at the Tanyard Creek CSO Control Facility
1st Quarter 2014	1/11/2014	Unpermitted discharge: Reported to EPD as a permit violation and as a major spill.	Mechanical gate closure delay at the Clear Creek CSO Control Facility
2nd Quarter 2014	4/7/2014	Unpermitted discharge: Reported to EPD as a permit violation and as a major spill.	Mechanical gate opening delay at the West Area WQCF
3rd Quarter 2014	7/19/2014	Unpermitted discharge: Reported to EPD as a permit violation and as a major spill.	Severe wet weather event
4th Quarter 2014	12/16/2014	Major Spill: Reported to EPD as a permit violation and as a major spill.	Equipment Failure
4th Quarter 2015	11/2/2015	Major Spill: Reported to EPD as a permit violation and as a major spill.	Mechanical gate closure delay at the North Avenue CSCF
4th Quarter 2015	11/7/2015	Major Spill: Reported to EPD as a permit violation and as a major spill.	Operator Error

Presumably CSO Tunnel filled and overflow to Emergency spillway to Peachtree Creek?

CSO Plant Shut-Down – July 2015

West Area Water Quality Control Facility					
Event Start Date	Start Time	Duration (hh:mm)	Rainfall (in/event)	Sodium Hypochlorite Volume Used (gal)	Discharge Volume (kgal)
July 2015	Off-line				

Presumably Major Repairs Required?

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The West Tunnel is designed to receive combined sewer flow (dropped approximately 300 feet) at a rate of up to 6,600 million gallons per day (or about 10,000 cubic feet per second) which is equal to approximately 1 swimming pool per second.

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CSO Control Facilities Need Improvements – What has been completed? (Per EPD Correspondence 2013, Internal Auditor 2014)

2013 DWM-EPD Correspondence

5. **Page 20 – Fecal Coliform Bacteria Comment:** EPD noted the data logs are incomplete and have lines drawn through the columns.

   Laboratory personnel responsible for sample management and analysis have been informed regarding the proper recordkeeping protocols and requirements. Periodic internal reviews will be performed to ensure records are properly created and maintained

Tanyard Creek CSO Control Facility

1. **Page 2 – General Conditions Item 3:** All treatment units and supporting equipment are in service and mechanically functioning properly? No. EPD observed one drum screen panel inoperable, but a replacement is onsite, and the backup control panel screen is inoperable.

   Although DWM has the necessary panel; the replacement process requires the use of confined space entry and lock-out/tag-out procedures. In addition, the removal and

2014 City Auditor Performance Audit

The department has accumulated $25-$36 million in deferred maintenance on the combined sewer facilities as it prioritized work on the sanitary sewer system in recent years. Consultants assessing the facilities in December 2011 and January 2012 identified broken equipment and leaking chemical tanks. We observed similar conditions in September 2013. Staff told us the department plans to resolve outstanding maintenance and repairs by the end of fiscal year 2015. We

12/14 Bond Supplemental Disclosure

- A *$43 million* ***Combined Sewer Facilities Compliance Improvement project:*** This project is currently under design and will replace equipment and improve reliability at the East and West Water Quality Control Facilities (WQCF), as well as the treatment facilities at Tanyard, North Avenue, Clear Creek, and Custer. Improvements include installation of belt filter presses at the two WQCFs, addition of sludge storage, replacement of drum screens and bar screens, and evaluation of alternative disinfectants. A new combined sewage facility and sewage pump station SCADA control and maintenance center will be built to replace the demolished administration building at Intrenchment. The anticipated construction start is 1st quarter of fiscal year 2016; anticipated construction completion is 1st quarter of fiscal year 2019.

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In the Context of Problematic Operations Restrictions on the Discharge from CSO Control Facilities was Removed from the New State Permit

1998 CSO Control Decree – Still in Effect

environmental benefits. Alternatives shall include, at a minimum, chlorination/dechlorination, alternative disinfection methods, sewer separation, storage to reduce overflows to no more than four per year, relocation of the CSO, Best Management Practices, and Primary Treatment of all flows.

(ix) a program for controlling and preventing the discharge of solids and floatables from the CSOs, including a description of the current controls for removing solid and floatable materials at each CSO Control Facility, an analysis of

Previous State Permit (2005 thru Mid-August 2015) – DELETED SECTION

events per year over a five year period. The portion of the CSOs in excess of the capacity of the proposed storage system will be screened, disinfected and discharged to the local streams through the remaining CSO control facilities (except for any that are separated as part of the plan). The CSO control facilities should only discharge during very large rain events, approximately four times a year as described above.

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Compounding the Concern, the Projects Completed in 2008 Did Not Incorporate Growth in Midtown or on the West Side

2004 DWM Environmental Report Submitted to State of Georgia

Section 3. Current and Future Situation

Background

The combined sewer service area is located in the most highly developed urban area in the City of Atlanta. The combined sewer service area is, in fact, largely built-out. The volume of combined sewer overflows is chiefly the result of rainfall and runoff. Pollutant loads result from runoff and sanitary wastewater flows. This plan addresses wet weather impacts.

The planning period is 20 years, and the basis of development of the CSO Plan is to mitigate existing CSO overflows per the Consent Decree and the remediation options are driven by the very large stormwater volumes resulting from rainfall in the greatly urbanized and highly impervious central core of the City of Atlanta. Population estimates were based upon ARC projections from the 1990 census, the most current data at the time. Anticipated population growth will have a negligible effect on the CSO Plan.

Current land use information was used in the CSO Remedial Measures Report to estimate stormwater volumes and pollutant loadings. Since this central core area of the city is largely built out and highly impervious, any changes in future land use will have negligible effects on the projected overflow volumes. Subsequent sewer separation

How does growth impact plan implemented?
Population growth = Increased pollutant load

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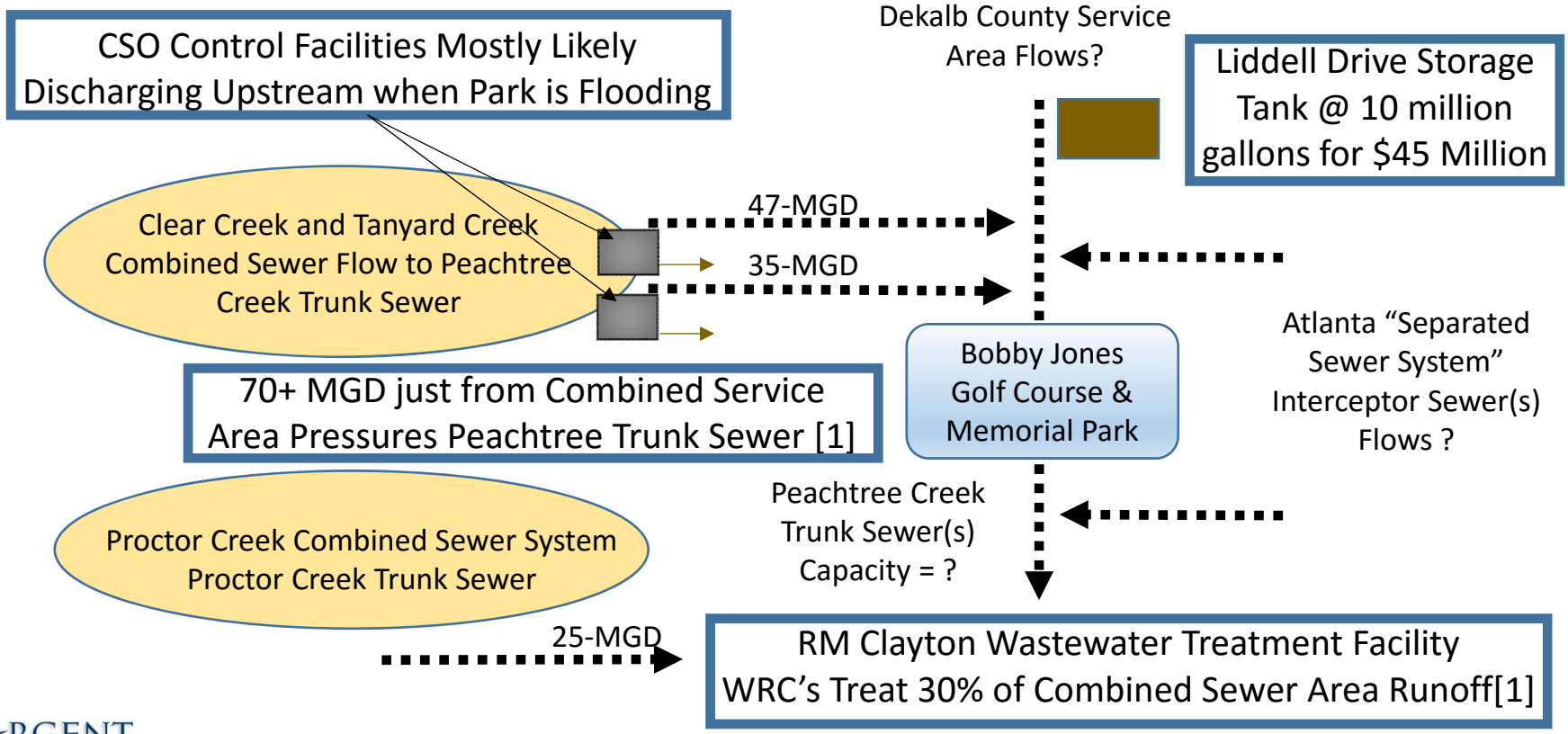
West Area Combined and Separated Systems are Connected
Significant Combined Sewer Flow in Overflowing Peachtree Creek Trunk Sewer



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[1] 2004 Environmental Report submitted to State, pipeline volumes based on maximum capacity.

Potential Solutions to Peachtree Creek Basin Sewage Flooding?

1. Peachtree Creek Relief Tunnel
    - Relieve Peachtree Creek trunk sewers serving high growth areas.
    - Provide more cost effective equalization storage.
    - Protect Peachtree Creek from structural failure of Trunk sewers.
    - Stop sewer overflows from manholes & exfiltration into parks.
    - Protect peak hydraulic capacity at RM Clayton.
    - Cost sharing formula(s) with Dekalb more than likely complicated by combined sewer service area.
2. Complete the separation of Proctor Creek Basin sewers then reallocate Proctor Creek CSO storage to Peachtree Creek Basin when it is no longer needed.
3. Take more storm-water out of the combined sewer system.
4. Alternatives that relocate sewage overflows to other neighbors should be deemed unacceptable.

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