



**Having Attained 93% Volumetric Reduction
Following 30 Years of Effort, the Greater Augusta
Utility District Had to Get Creative to Further
Advance its CSO Abatement Program**

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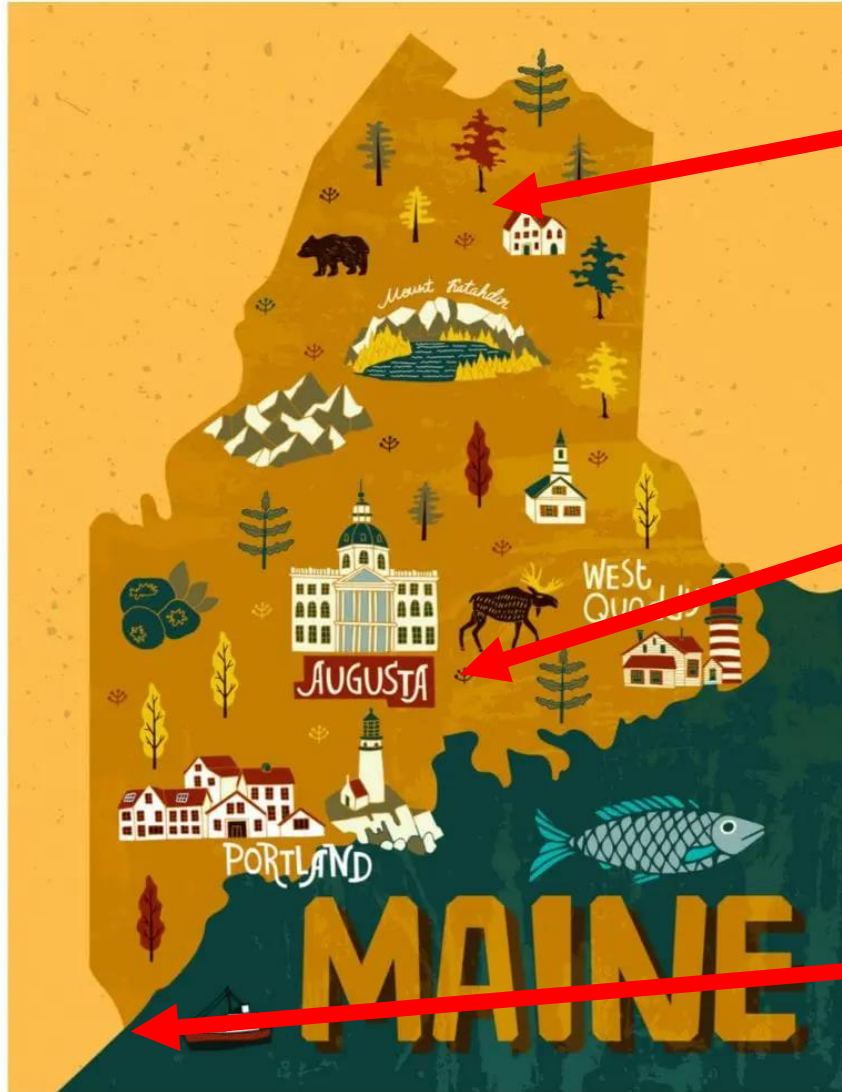
Kate Mignone, P.E., AECOM

Presentation Outline

- 1. Overview of Greater Augusta Utility District (GAUD)**
- 2. CSO Planning and Abatement**
- 3. 2020 LTCP Update**
- 4. Systemwide Performance**
- 5. Implementation**



Where is Augusta?



A LOT of trees.

Augusta

106 miles

Portsmouth

GAUD

- **Created in 2007**
- **Staff of 42**
- **Annual wastewater/storm-water budget of \$7.75 million**
- **9 trustees**



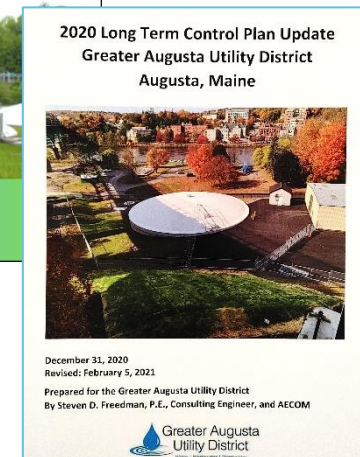
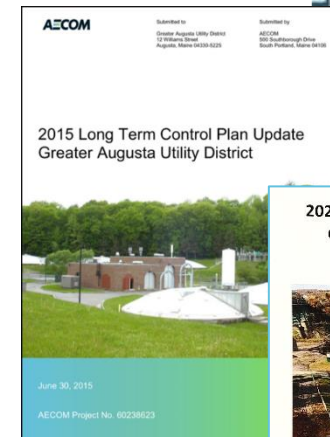
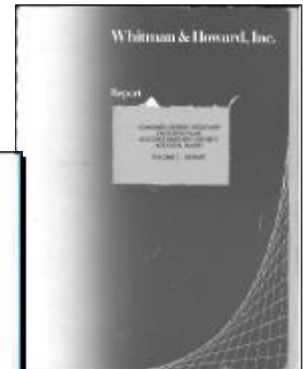
GAUD Services

- **Water to five municipalities**
- **Wastewater collection/treatment services to Augusta and Hallowell (combined population of around 21,000)**
- **Trunkline serves three western suburbs**
- **Stormwater in Augusta**
- **8 MGD pure-oxygen WWTP with peak wet weather capacity of 36 MGD with permitted CSO Bypass for flows in excess of the 12 MGD secondary capacity**



CSO Planning and Abatement

- First LTCP submitted in 1993
- Updated in 1999, 2006, 2015 and 2020
- Allowed for an effective “build-and-measure” process
- EPA Administrative Order expired with the completion of the Phase 1 CSO Abatement Project
- Now guided by MEPDES Permit and DEP and EPA CSO guidance documents



CSO Planning and Abatement (Cont.)

- **CSOs originally discharged to the Kennebec River and Bond, Kennedy, Noname, Riggs and Whitney Brooks**
- **There are currently 24 permitted CSOs (2015):**
 - **13 have been eliminated or controlled (possibly an additional one pending confirmation)**
 - **No remaining CSOs on any tributary**



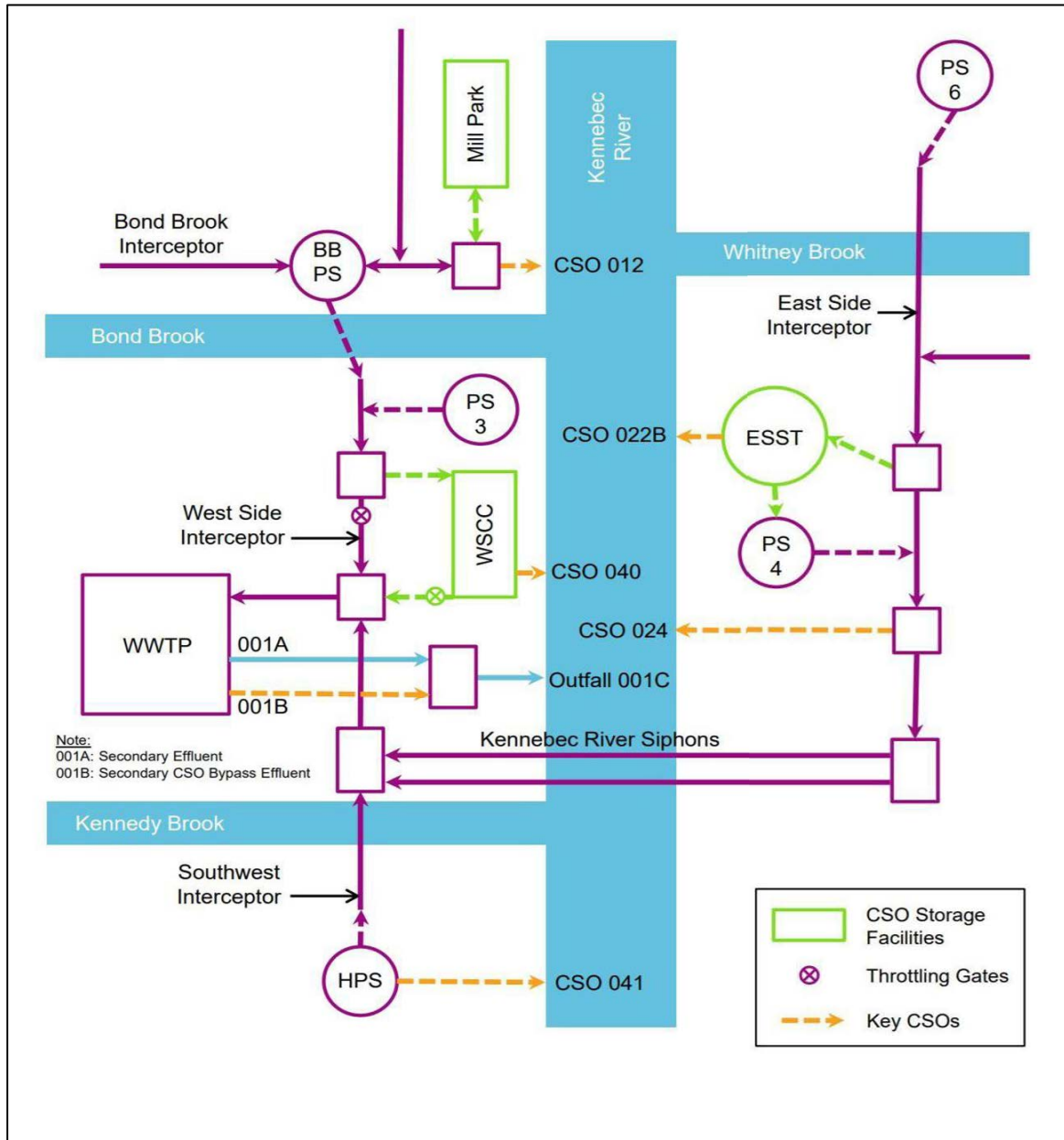
CSO Abatement Facilities

- **1998 High - Flow Management Facilities at the WWTP**
- **2002 - 1.6 MG West Side Consolidation Conduit**
- **2012 - 1.0 MG Mill Park Tank**
- **2020 - 1.0 MG East Side Tank**

93% Volumetric Reduction



System Schematic

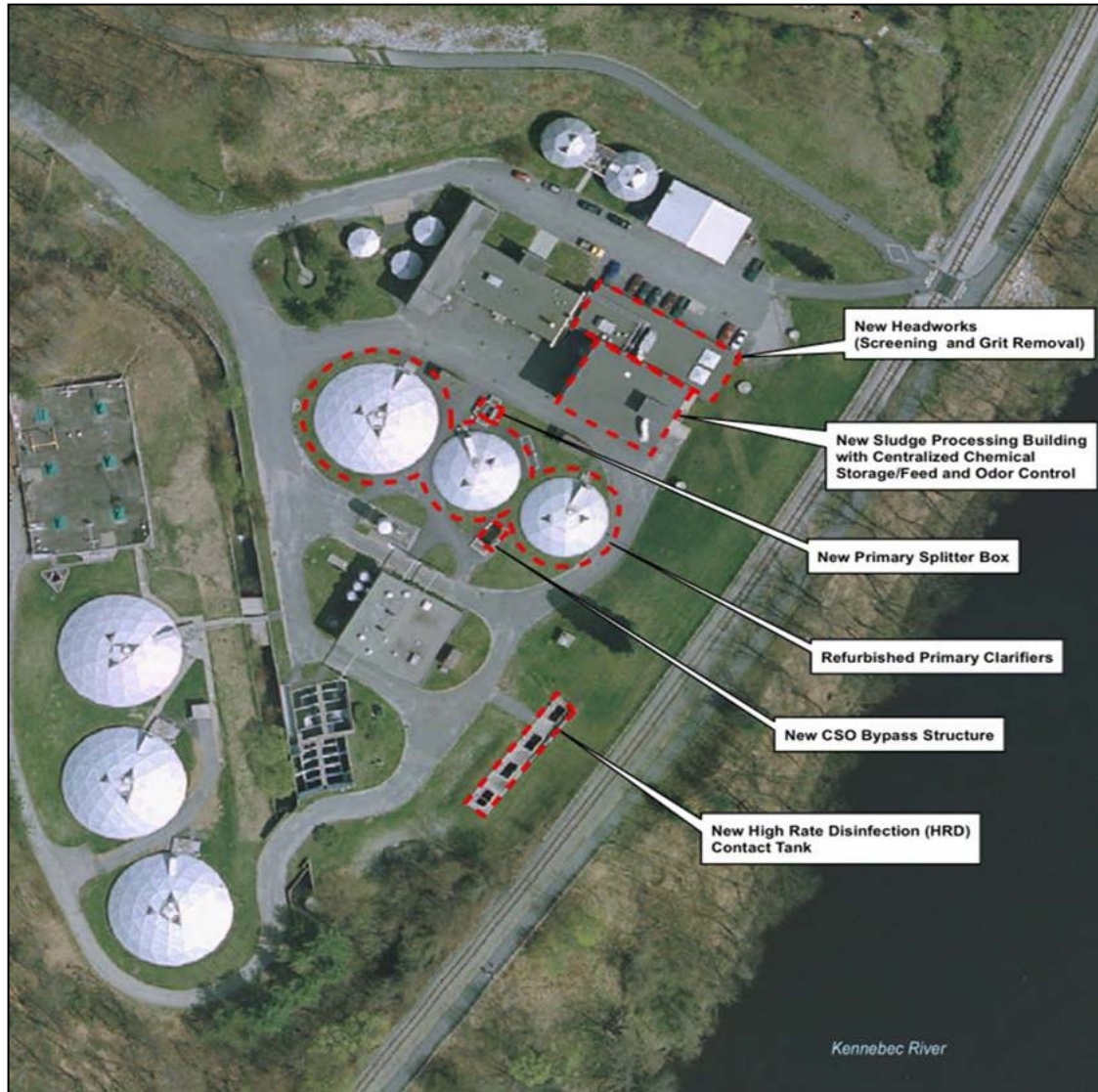


1993 Long Term Control Plan

- Established four planning subareas
- CSO and ambient monitoring/ characterization the combined collection system
- Developed hydrologic/ hydraulic model (SWMM)
- Recommended a four-phase, multi-year abatement program
- Abatement of the CSO Bypass was recommended for Phase 1: High Flow Management Facilities at the WWTP



Phase 1 – High Flow Management Facilities



- 36 MGD Peak Flow through preliminary and primary treatment
- High-rate (seasonal) disinfection

1999 LTCP Update

- **CSO monitoring/ revised SWMM**
- **Focused on West Side Subarea**
- **Reevaluated the abatement alternatives from the 1993 LTCP**
- **Offline storage recommended for Phase 2: West Side Consolidation Conduit (WSCC)**



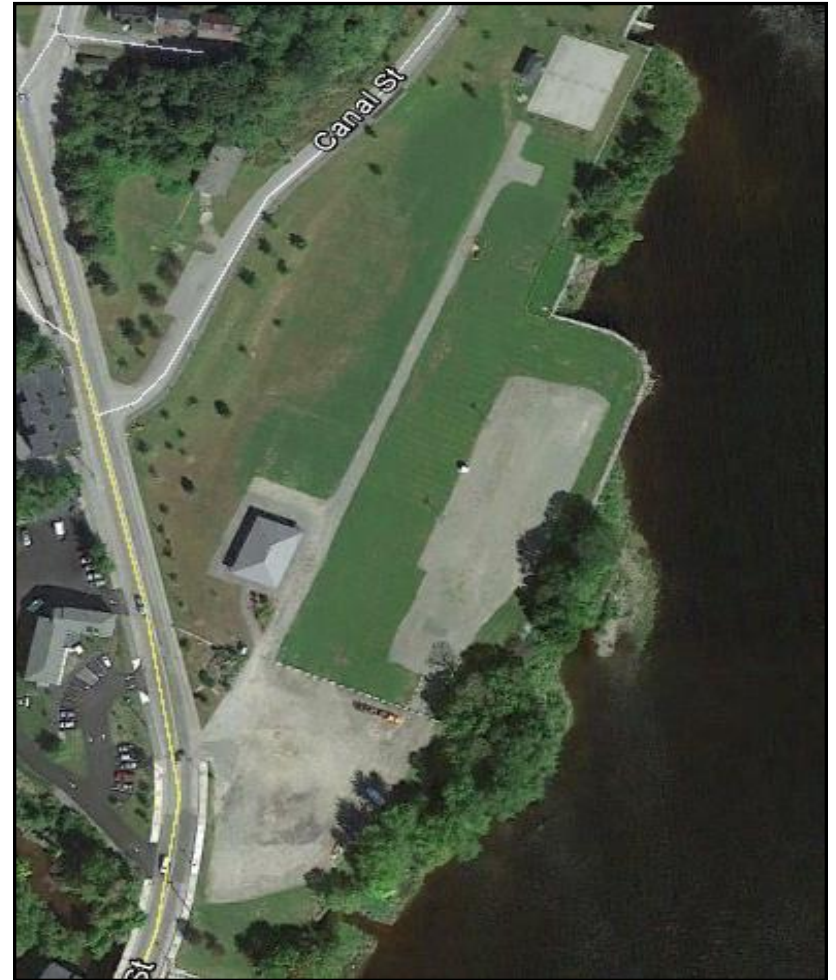
Phase 2 - 1.65 MG West Side Consolidation Conduit



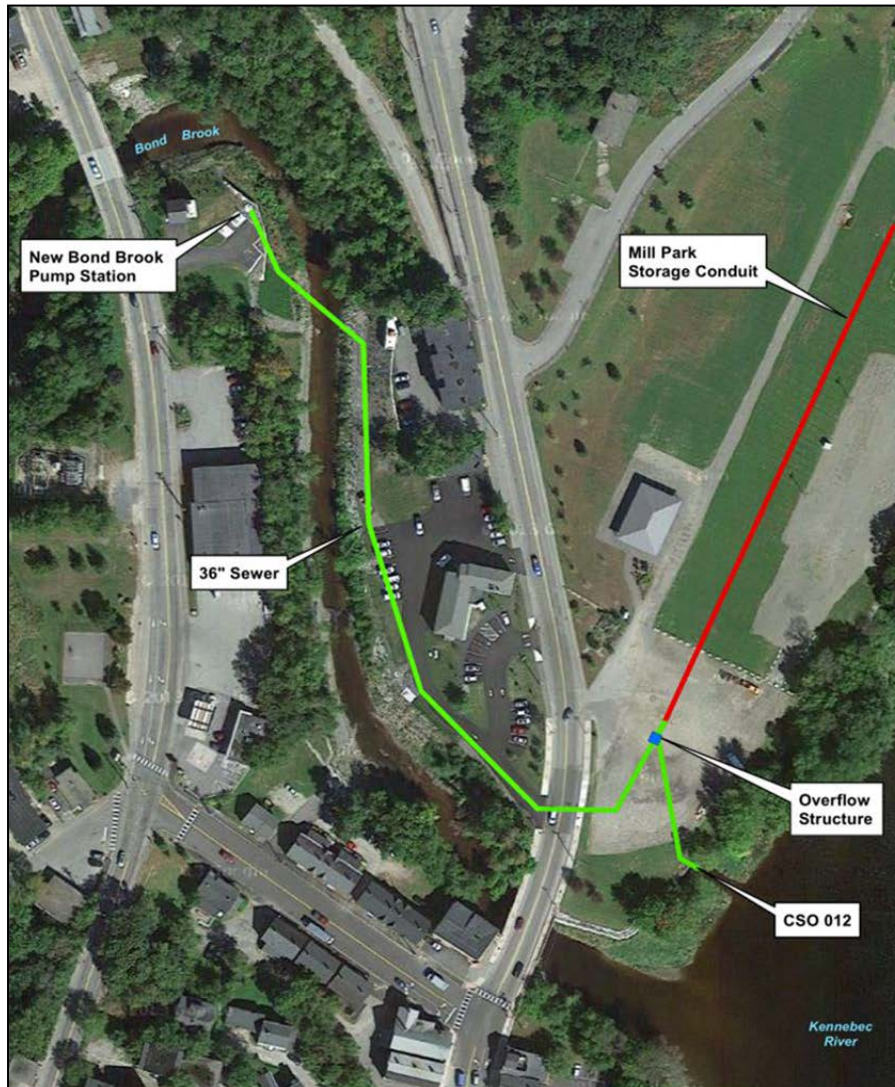
- 3,655 LF of 10' wide by 6' tall box culverts, each approximately 7' long
- Gravity in / gravity out
- Internal automated flushers
- Throttled discharge to WWTP
- Coordinated alignment with Kennebec River Rail Trail

Highlights of 2006 LTCP Update

- CSO monitoring/ revised SWMM
- Optimized WWTP and west conduit hydraulics
- Reevaluated the abatement alternatives from the 1999 LTCP
- Focused on the Bond Brook and East Side Subarea/switched abatement priorities from previous LTCPs
- Recommended storage at Mill Park



Phase 3 – 1 MG Mill Park ‘double barrel’ storage



- 670' of “double barrel” 10' by 10' box culverts
- Gravity in/gravity drain to new Bond Brook pump station
- Manual flushing gate - simplify
- Throttle gate on West Side Interceptor

Highlights of 2015 LTCP Update

- Focused on the East Side Subarea
- Coordinated with parallel LTCP for the Hallowell system
- CSO monitoring/ revised SWMM
- Reevaluated the abatement alternatives from the 2006 LTCP
- Systemwide performance evaluation of Phases 1, 2 and 3
- Recommended offline storage tank



Phase 4 - 1 MG East Side Storage Tank

- **Partially-buried 100' diameter tank**
- **Gravity fed from East Side Interceptor**
- **Drains to new pump station**
- **Online in late 2020**



Current Systemwide Performance

- **Impact on CSO discharges:**
 - *>83% reductions in activations per inch of rain: 12 to <2*
 - *>93% reduction in annual discharge volume: 58 MGY to <4 MGY*
- **Implementation of the 2020 LTCP Update will further improve performance**

Trends in CSO Activations per Inch of Rainfall

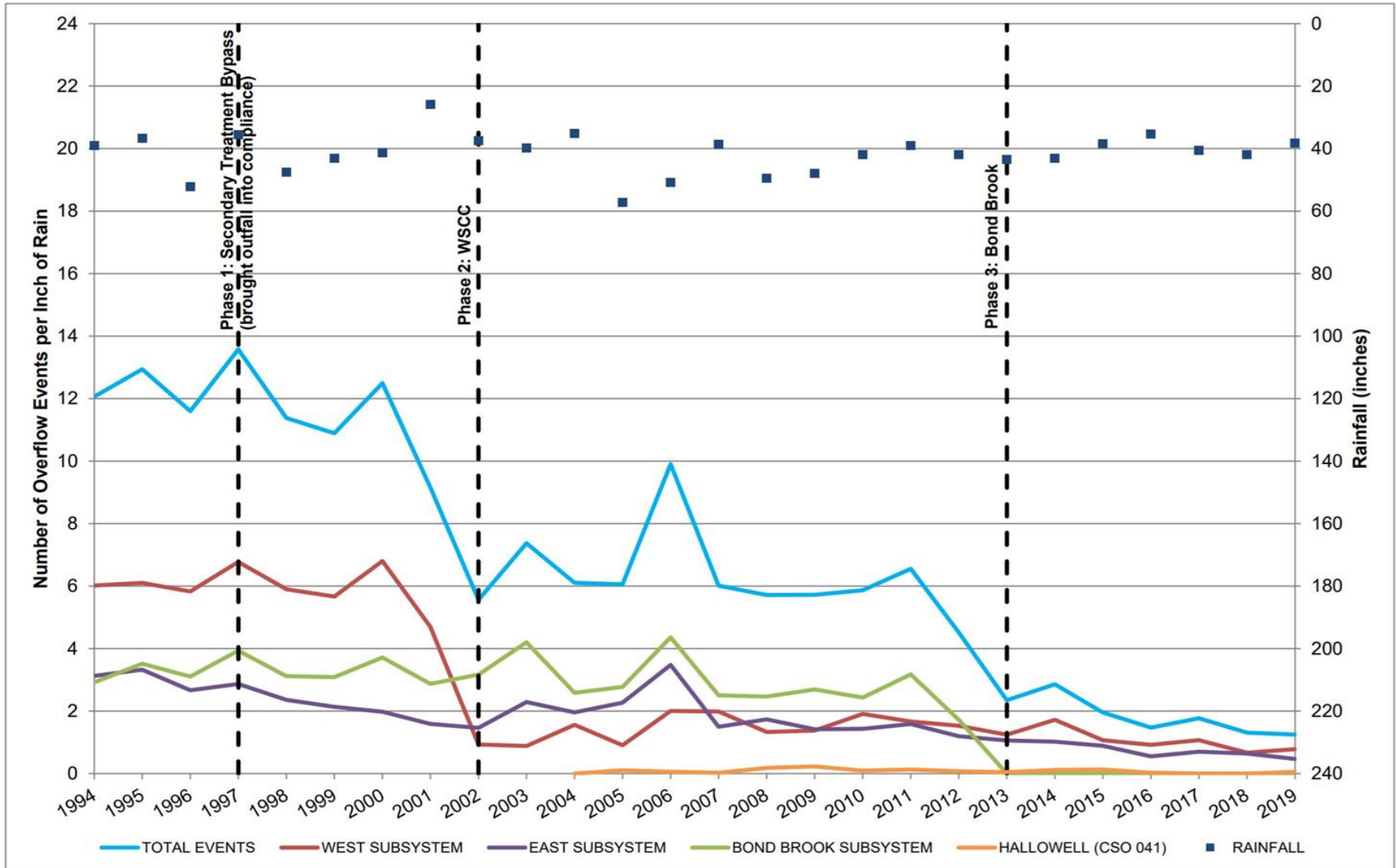


Figure 2-1. Trends in CSO Activations

Trends in Annual CSO Discharge Volume

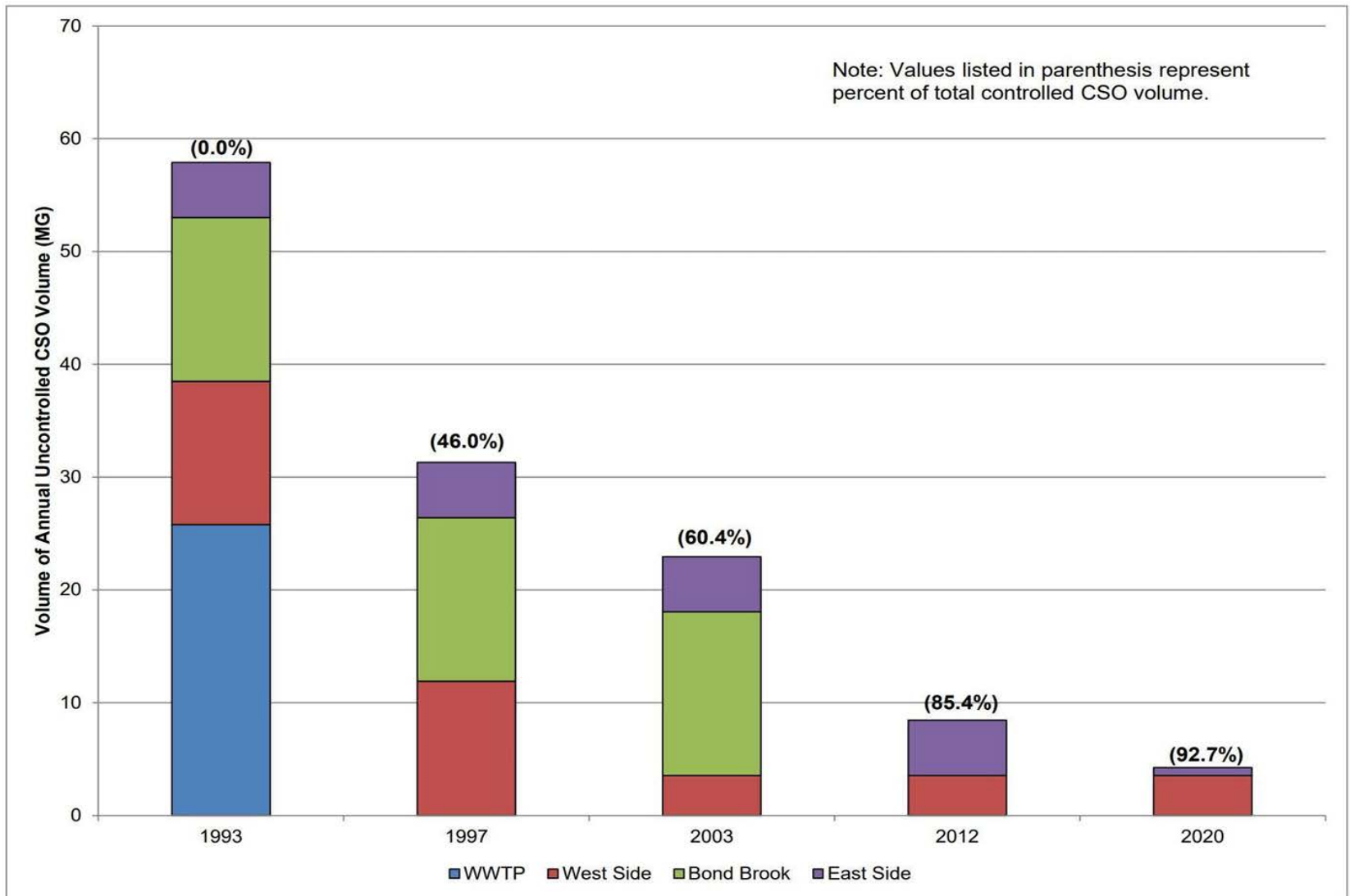


Figure 2-2. Trends in Systemwide CSO Volumetric Discharges

Highlights of 2020 LTCP Update

Primary focus on “Remote CSOs”

- Six in the West Side Subarea
- Three in the East Side Subarea

Secondary focus on System Optimization

- Increased flow and level monitoring
- Enhanced use of existing SCADA
- Explored Real-time Controls (RTC)

Model also revealed that the WSCC was under utilized

Highlights of 2020 LTCP Update (Cont.)

Alternatives considered:

- System optimization (e.g., weir/regulator adjustments, etc.)
- Sewer separation
- Consolidation or parallel conduits
- Small-scale storage

In all cases, system optimization proved to be most cost-effective approach

Highlights of 2020 LTCP Update (Cont.)

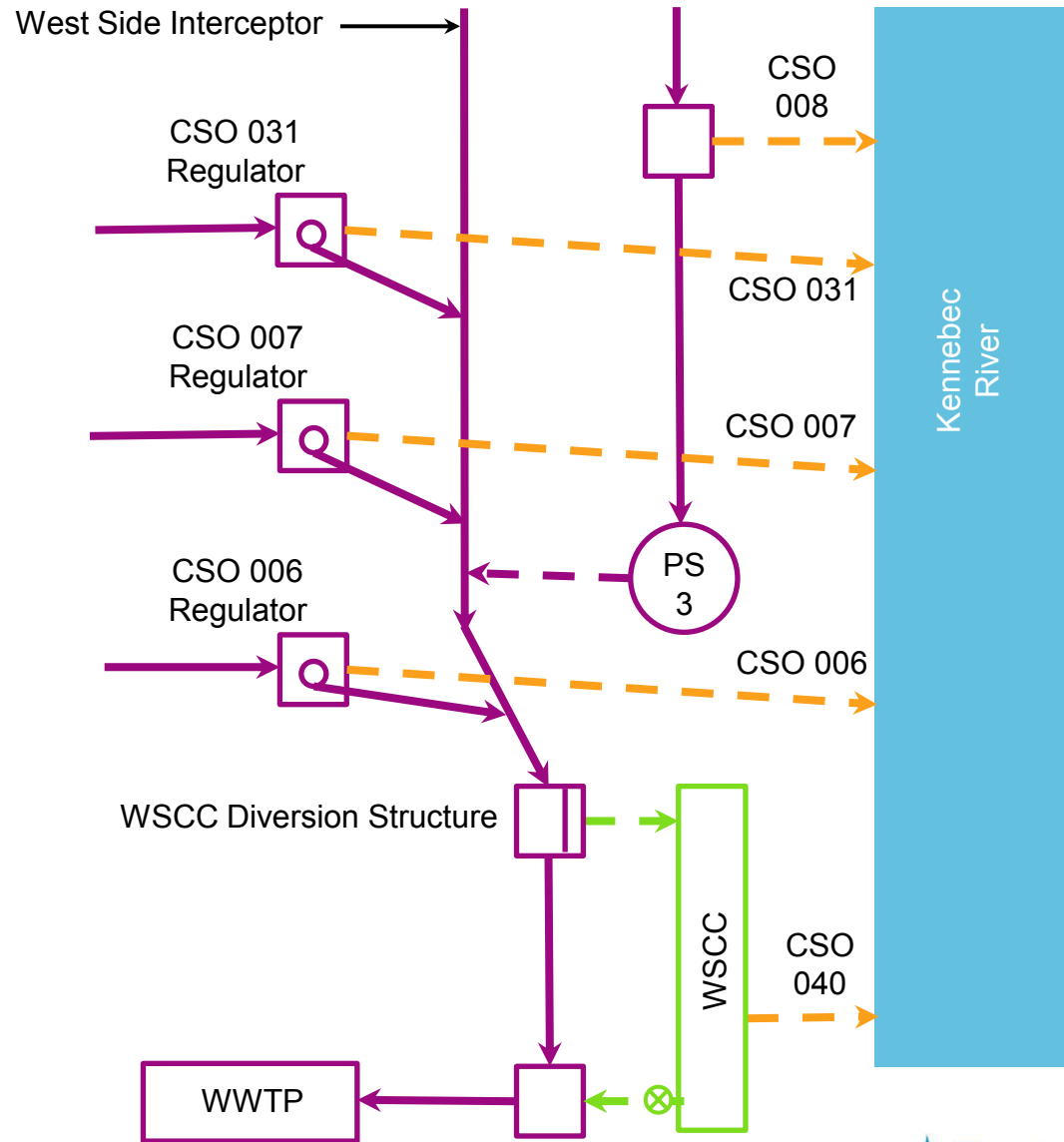
West Side Recommendations:

- Lower the weir elevation at the Diversion Structure between the WSI and WSCC
- Weir modifications for two other West Side remote CSOs, located away from both the WSI and WWSC

East Side Recommendations:

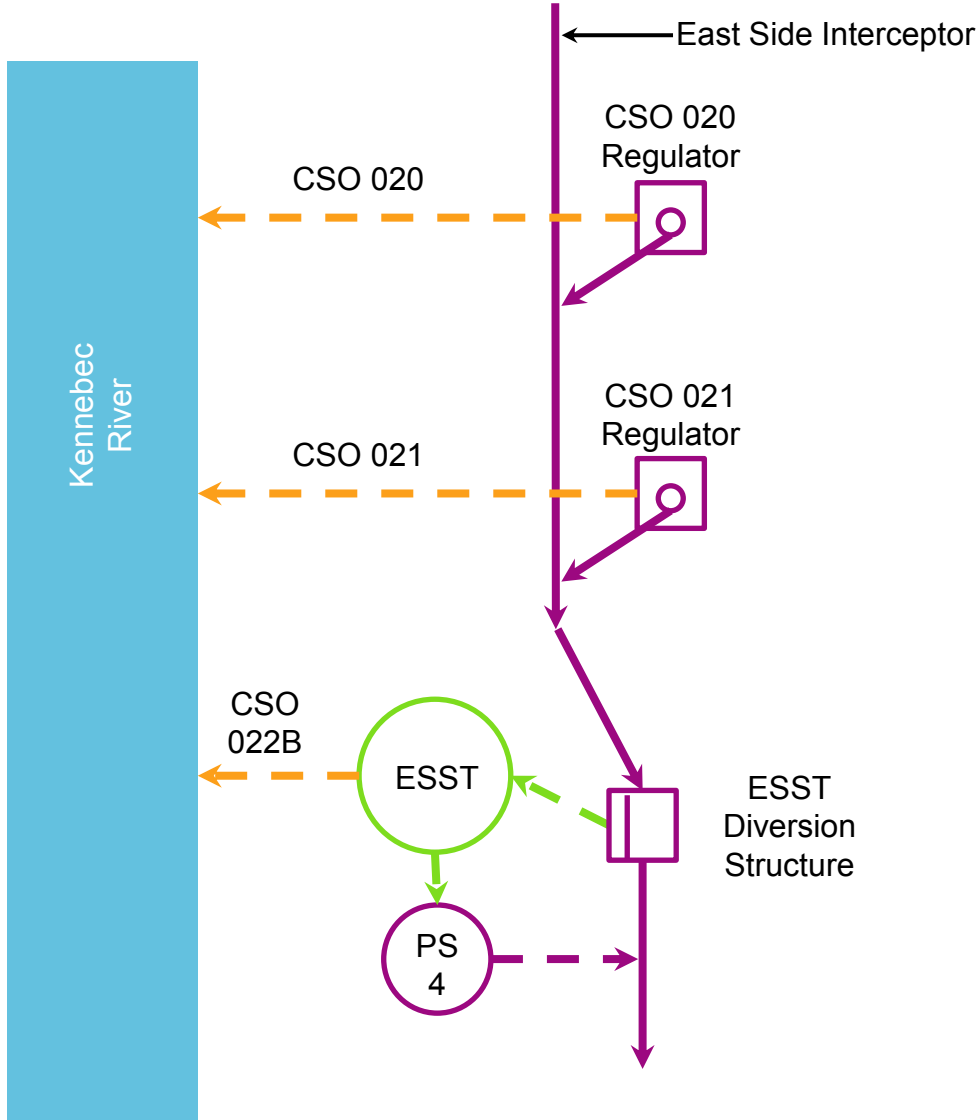
- Lower the weir elevation at the inlet to the new East Side Storage Tank along the ESI

Proposed WSI HGL Modifications



Note: Orifice plates to be removed in each regulator

Proposed ESI HGL Modifications



Note: Orifice plates to be removed in each regulator

Financing and Implementation

- **To date, GAUD has spent roughly \$60M (2020 dollars) on CSO abatement including completion of the four capital-intensive phases outlined in the 1993 LTCP**
- **This equates to roughly \$1.10 per gallon of controlled overflow volume**
- **Due to the relatively low cost of the 2020 LTCP Update recommendations, no new financing is warranted as the work will be performed through annual O&M budgets**

Closing Thoughts

- **The control of the first 93% was not easy, or cheap, but logical and manageable**
- **The next 7% will be challenging but less costly**
- **Because instrumentation is now more reliable, and affordable, greater emphasis is being placed on system optimization through expanded instrumentation and automation**

In general GAUD prefers spending on pipes that are use everyday versus tanks that are only used a few days per year

Closing Thoughts (Cont.)

- **GAUD's CSO network took much time to build and will continue to take time to remediate**
- **Finally, keeping regulators aware of our steady progress toward meeting our goals is critical**



Questions?