

Omaha CSO Program Update

Presented to:
SAME

January 13, 2022

Presented by:
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City of Omaha Public Works Department
CSO Program Coordinator



CSO!
Clean Solutions for Omaha

Presentation Outline

- Background Information
- Current CSO Program Status
- 2021 LTCP Update Process
- CSO Controls in the 2021 LTCP Update
- Performance Metrics
- Questions

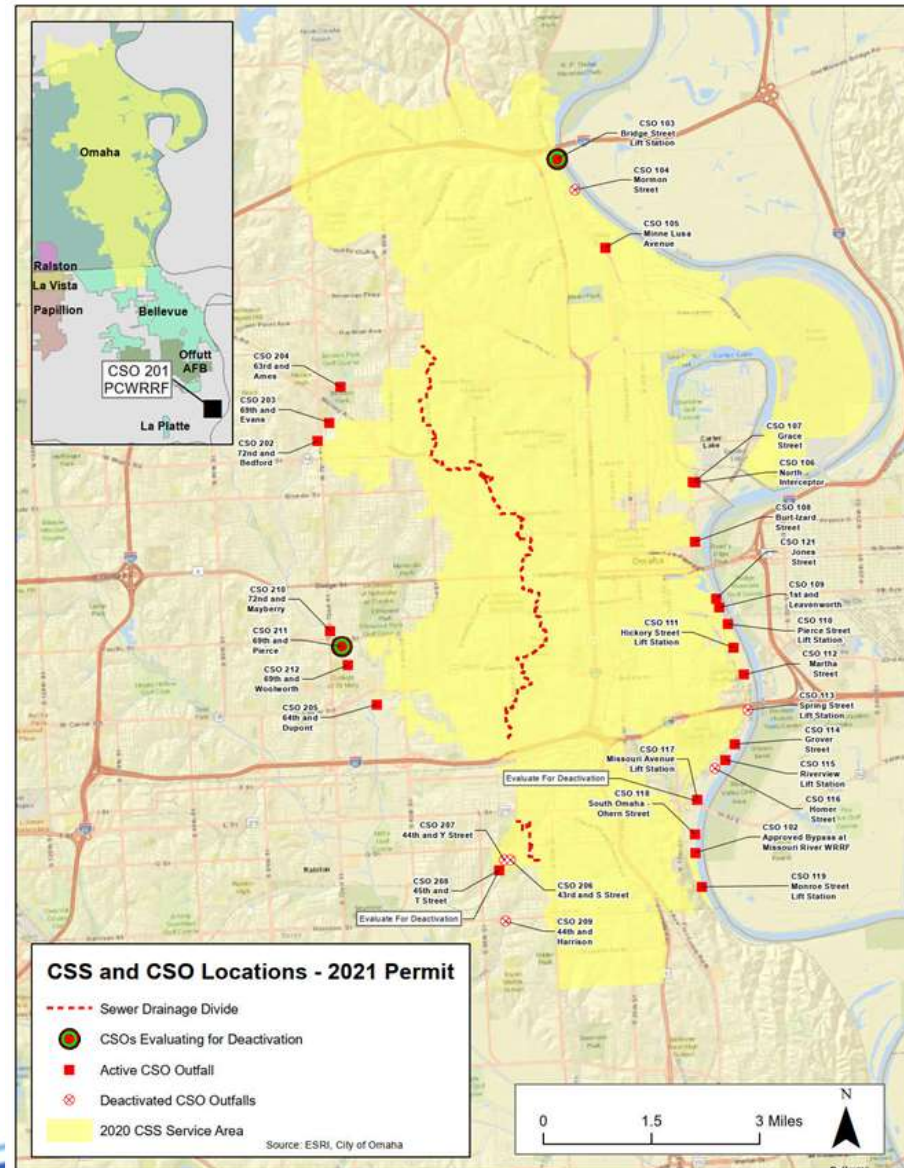
City of Omaha Regional Wastewater Utility

- Omaha's Collection System Stats
 - Two regional treatment plants
 - 10 wholesale customers
 - ~300 sq. mile drainage area (40 sq. mi. combined)
 - >600,000 service population
 - ~2000 miles of sewers
 - 82 sanitary/combined lift stations



Omaha Combined Sewer System

- 36 square miles of combined sewers
- 25 Current CSO Outfalls
 - 17 to the Missouri River
 - 8 to Papillion Creek tributaries
- 6 CSOs will be deactivated by end of next CSO permit term (2026)



Under 2002 conditions, the City of Omaha generated over 8 billion gallons of wet weather combined sewage



CSO Challenges Facing Omaha

- Meeting requirements of the federal Clean Water Act
- Balancing the following needs:
 - **Regulatory Compliance**
 - **Economic Affordability**
 - **Community Acceptance**



2014 Long Term Control Plan

CSO Controls

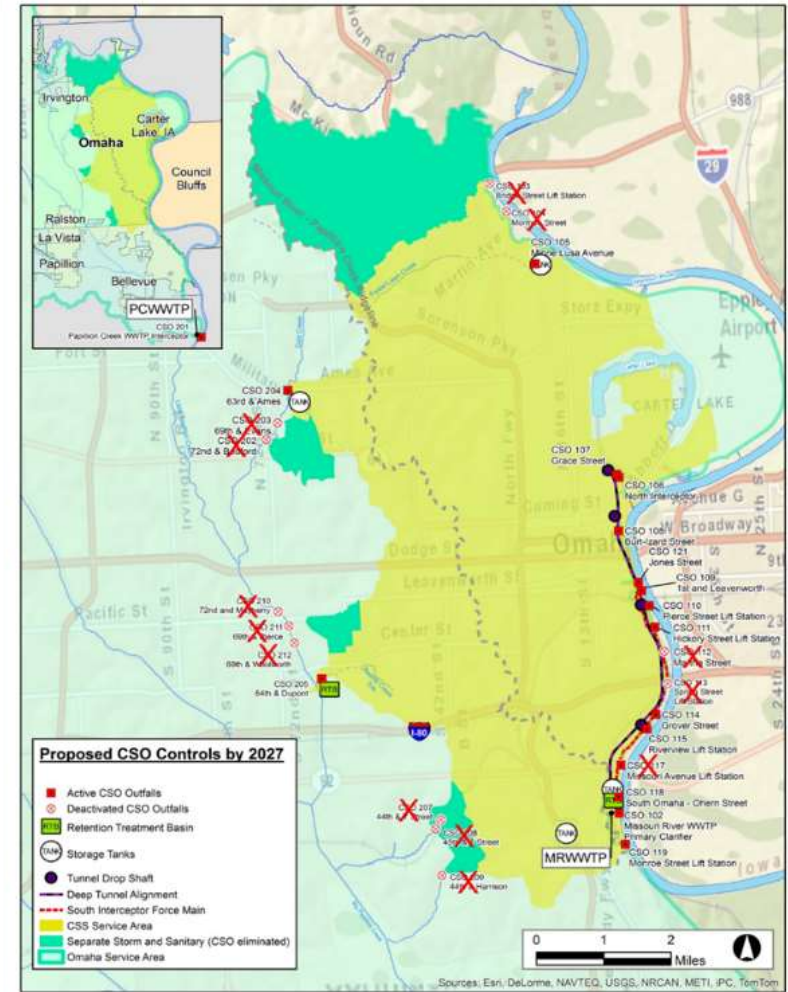


Green Infrastructure

Underground Storage Tanks



Targeted Sewer Separation



2014 Long Term Control Plan CSO Controls



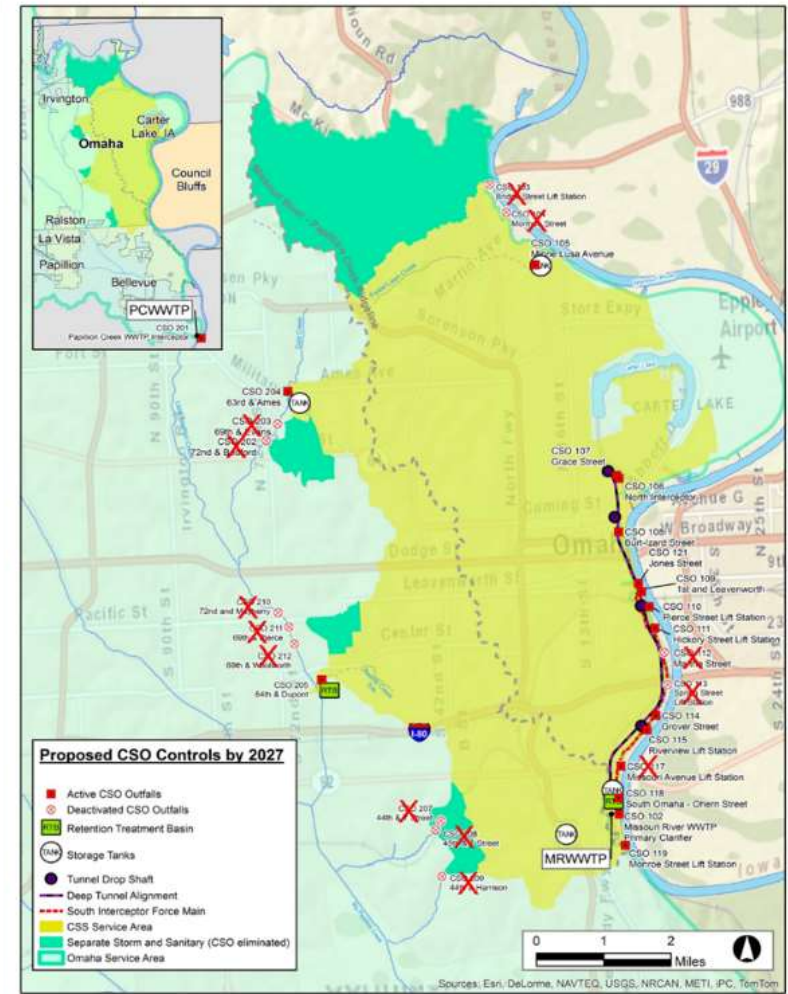
High-Rate Treatment Facility



Deep Tunnel System



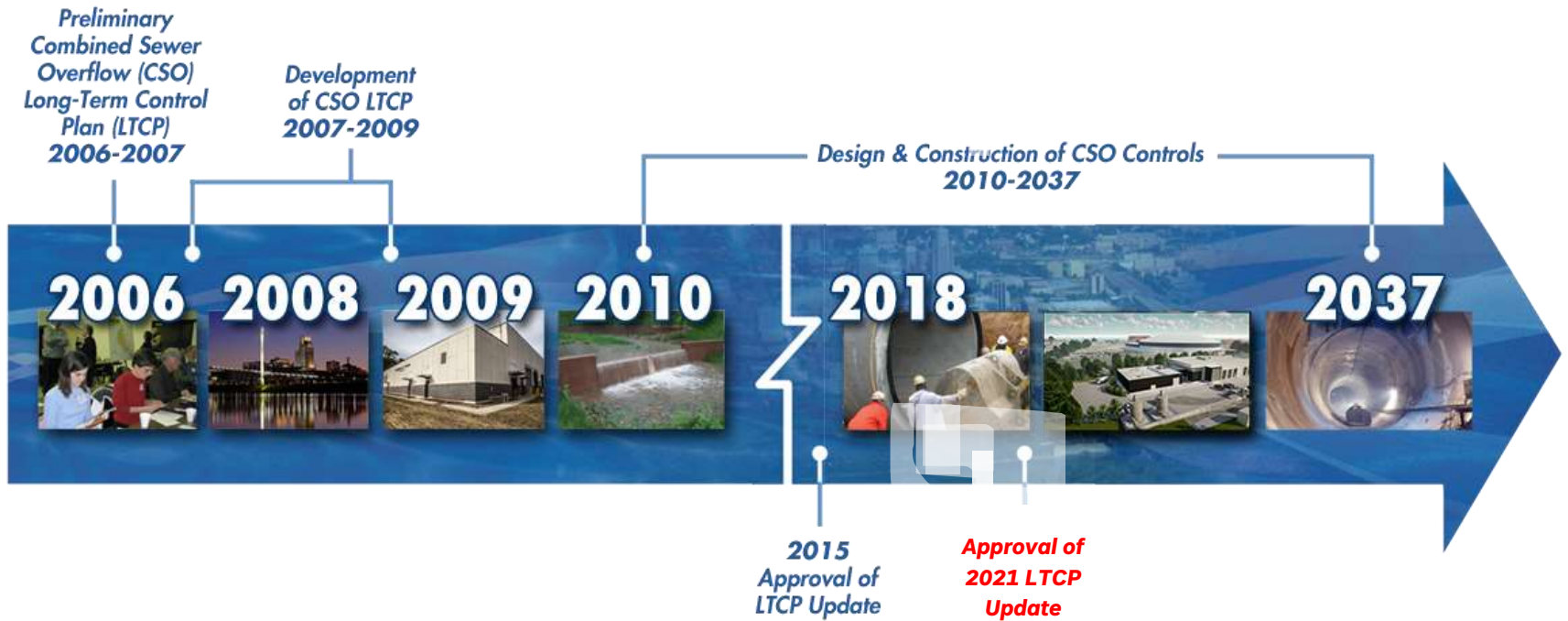
Plant and
Conveyance
Improvements



The Consent Order Has Been Amended Three Times

- City entered into a Consent Order with NDEE in 2007
 - Required LTCP submission by October 2009
 - Required implementation by October 2024
- Amended in May 2012 due to 2011 Flood
 - Changed completion date to October 2027
- Amended in January 2018 at the request of the City
 - Changed completion date to October 2037
 - Clarified Consent Order end goal as 85% Volume Capture
- Amended in October 2019 due to 2019 Flood
 - Changed submission of the LTCP Update from March 1, 2020 to March 31, 2021

Program Timeline



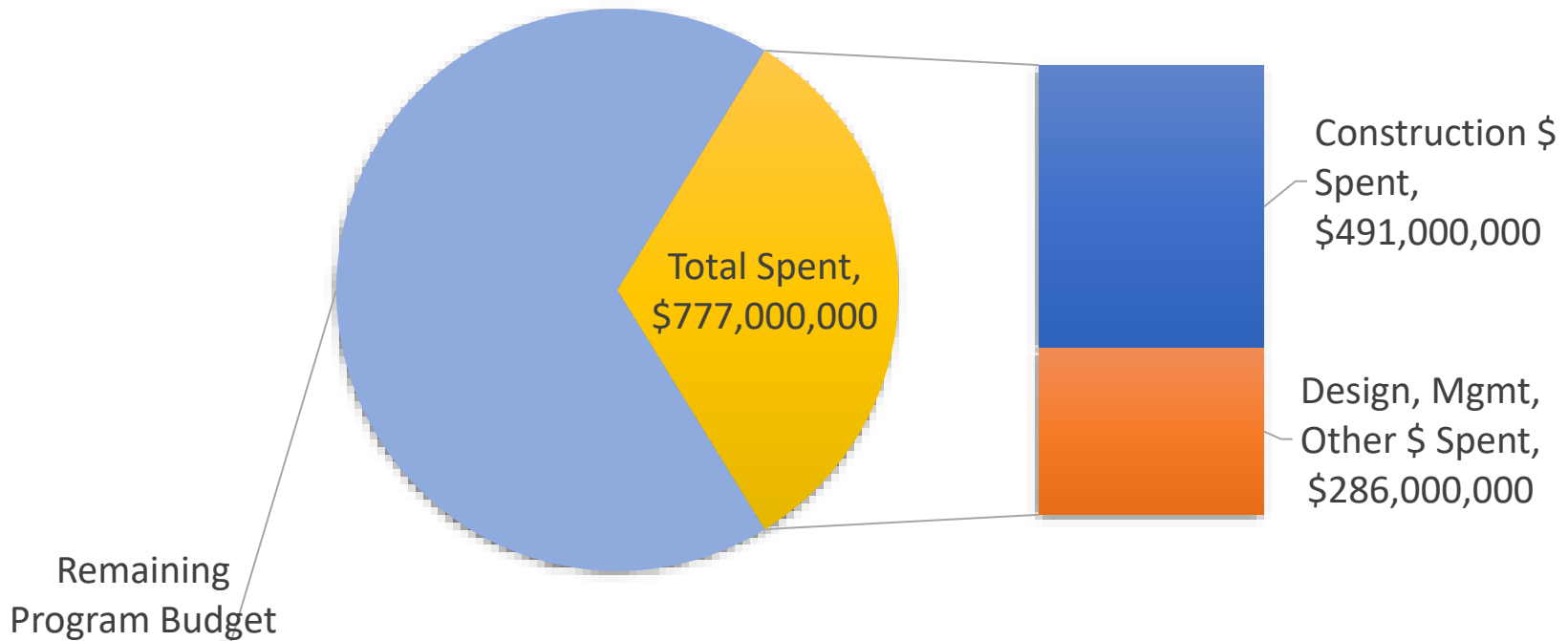
Current Program Status

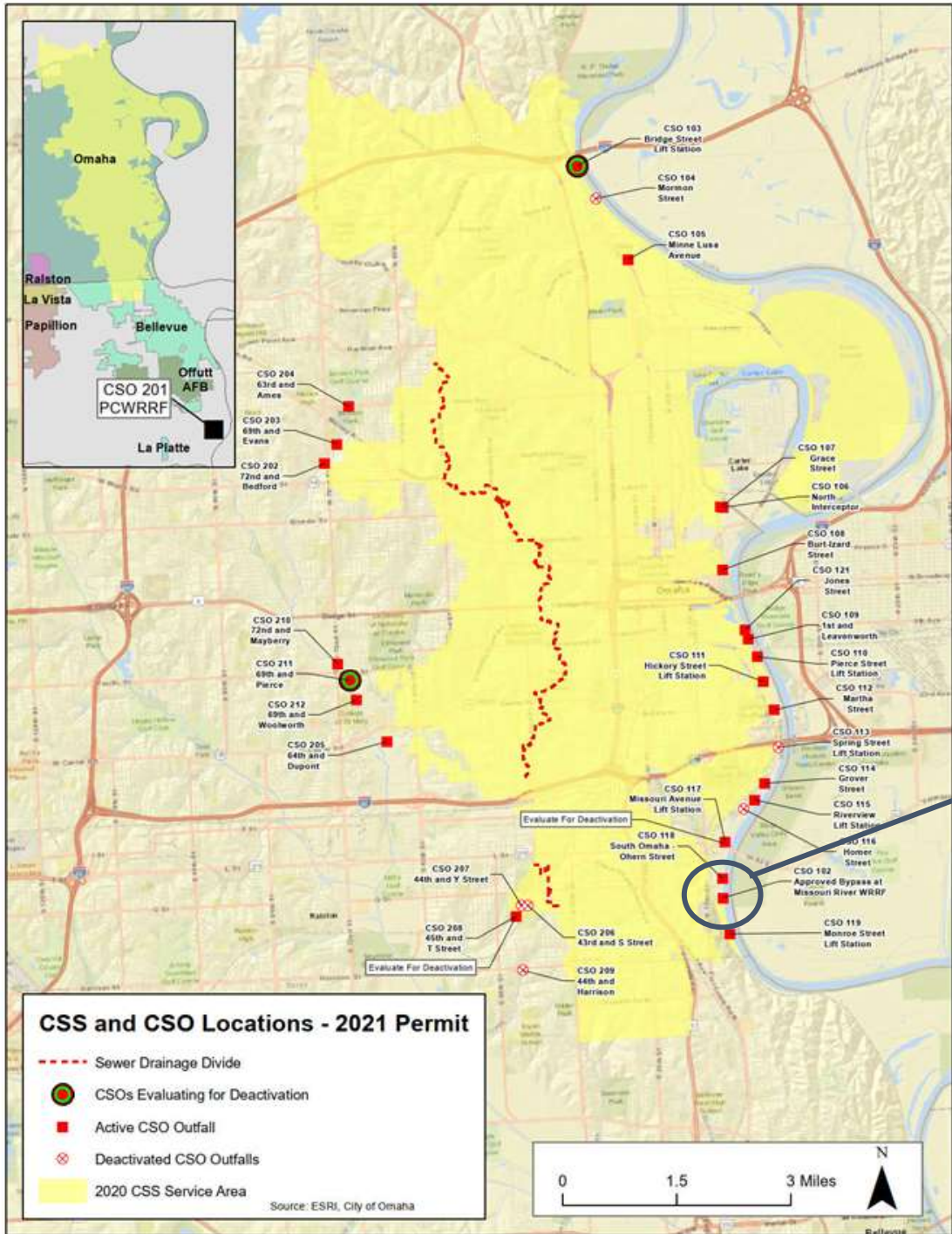
Status of Implementation

- Modeled Wet Weather Volume Capture for completed CSO Projects:
 - 56% capture in the Missouri River Watershed
 - Will be at 71% capture after completion of projects that are currently underway (“Optimization Baseline”)
 - 84% capture in the Papillion Creek Watershed
- 59 LTCP Projects:
 - 25 complete
 - 17 in design or construction
 - 17 future

Program Expenditures Through July 2021

Total Program Expenditures through July 2021





Missouri River WRRF

Missouri River WRRF and Conveyance Projects

- MRWRRF Improvements constructed from 2014 – 2019 at a cost of about \$150M
 - Separate treatment of industrial flows from South Omaha Industrial Area (SOIA)
 - Treatment of up to 150 MGD during wet weather and disinfect overflows
 - Maximized the use of existing facilities
- Conveyance projects included:
 - SOIA Lift Station, Force Main & Gravity Sewer
 - Leavenworth Lift Station
 - South Interceptor Force Main
- Treatment and conveyance projects working together reduce E. coli loading to the Missouri River by approximately 50%



Missouri River WRRF

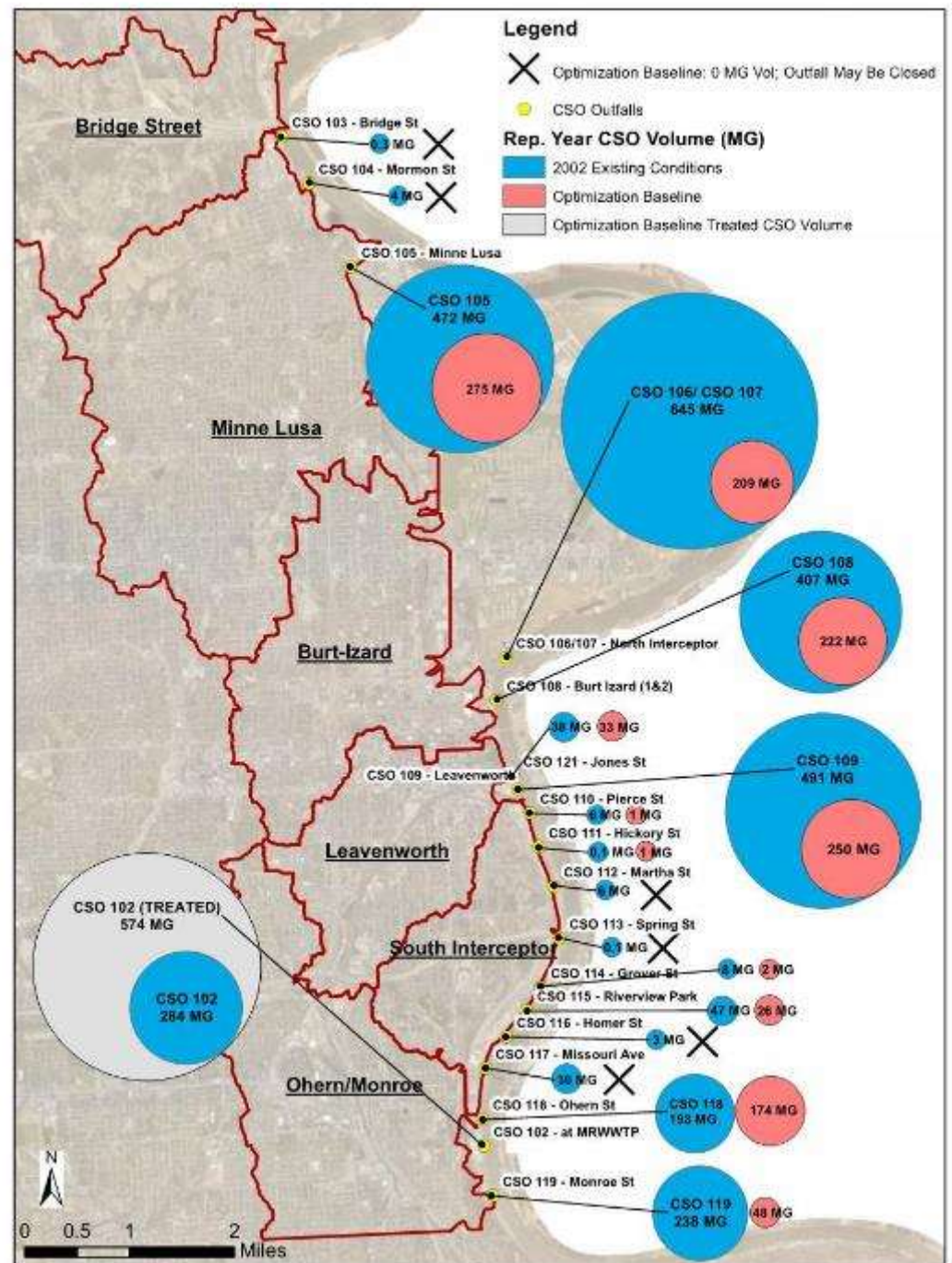
SOIA Lift Station



Leavenworth Lift Station

Missouri River Watershed Volume Capture: 2022 to Optimization Baseline

- Optimization baseline reflects projects that are completed or currently underway.



LTCP Update Process

Objectives of the 2021 LTCP Update

- Comply with the EPA CSO Control Policy Presumption Approach
 - Achieve $\geq 85\%$ wet weather volume capture
 - Meet water quality standards in the Missouri River and do not preclude achievement in the Papillion Creek watershed
- Document extensive evaluations to progress from current volume capture to 85%
- Revise the list of LTCP projects
- Develop a schedule, incorporating the additional 10 years provided by Consent Order Amendment

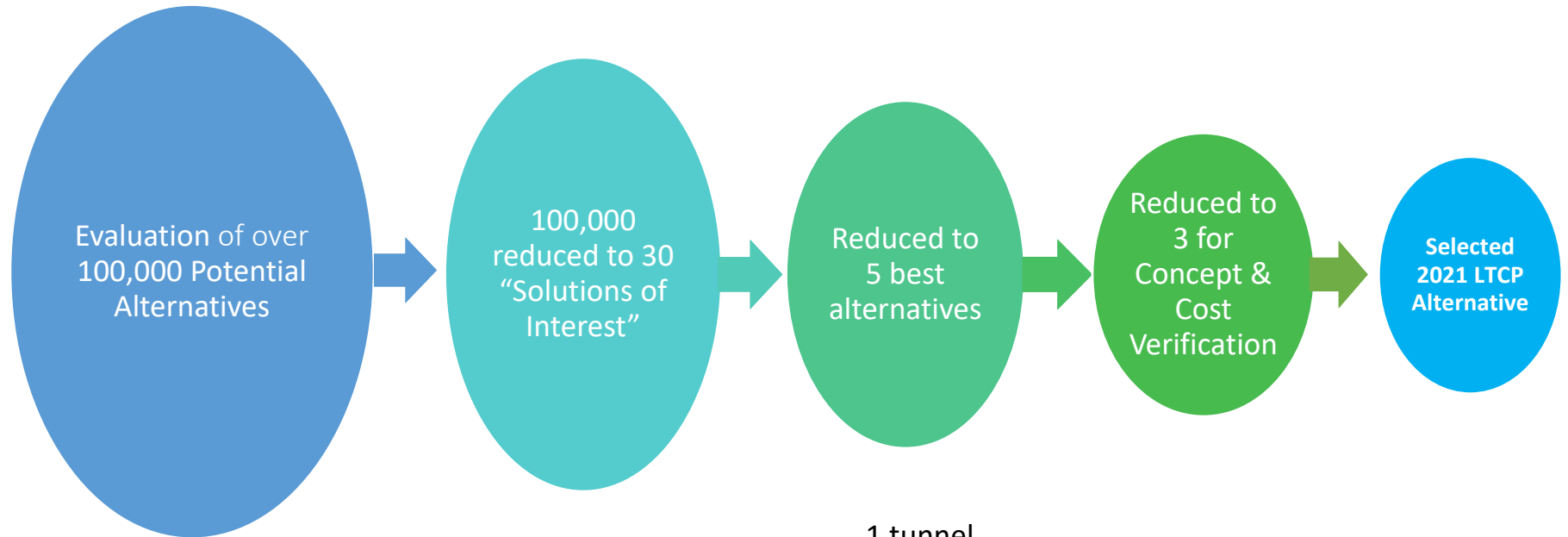
Evolving Method of Complying with Presumption Approach Set the Stage for Optimization

- 2009 LTCP focused on limiting CSO events to less than 4 per year, which would result in 93% volume capture
- 2014 LTCP Update allowed more CSO events, but still would result in 93% volume capture
- 2021 LTCP Update focuses solely on 85% volume capture
 - More knowledge and better tools
 - Backed up by water quality modeling results showing future compliance with WQ standards
 - Stated in 2018 Consent Order Amendment

Optimization Key Points

- Optimization Task Started in Early 2018:
 - Built on previous task (Technical Assessments for Cost Savings)
 - Optimization was a large effort using state-of-the-art modeling tools (Optimizer, InfoWorks ICM)
 - An alternative was identified that can significantly reduce cost of the Program
 - Replaces the planned Deep Tunnel System with other technologies (High-Rate Treatment, Storage Basin, Active Controls)
 - Identified alternative is reflected in 2021 LTCP Update

Optimization Evaluation

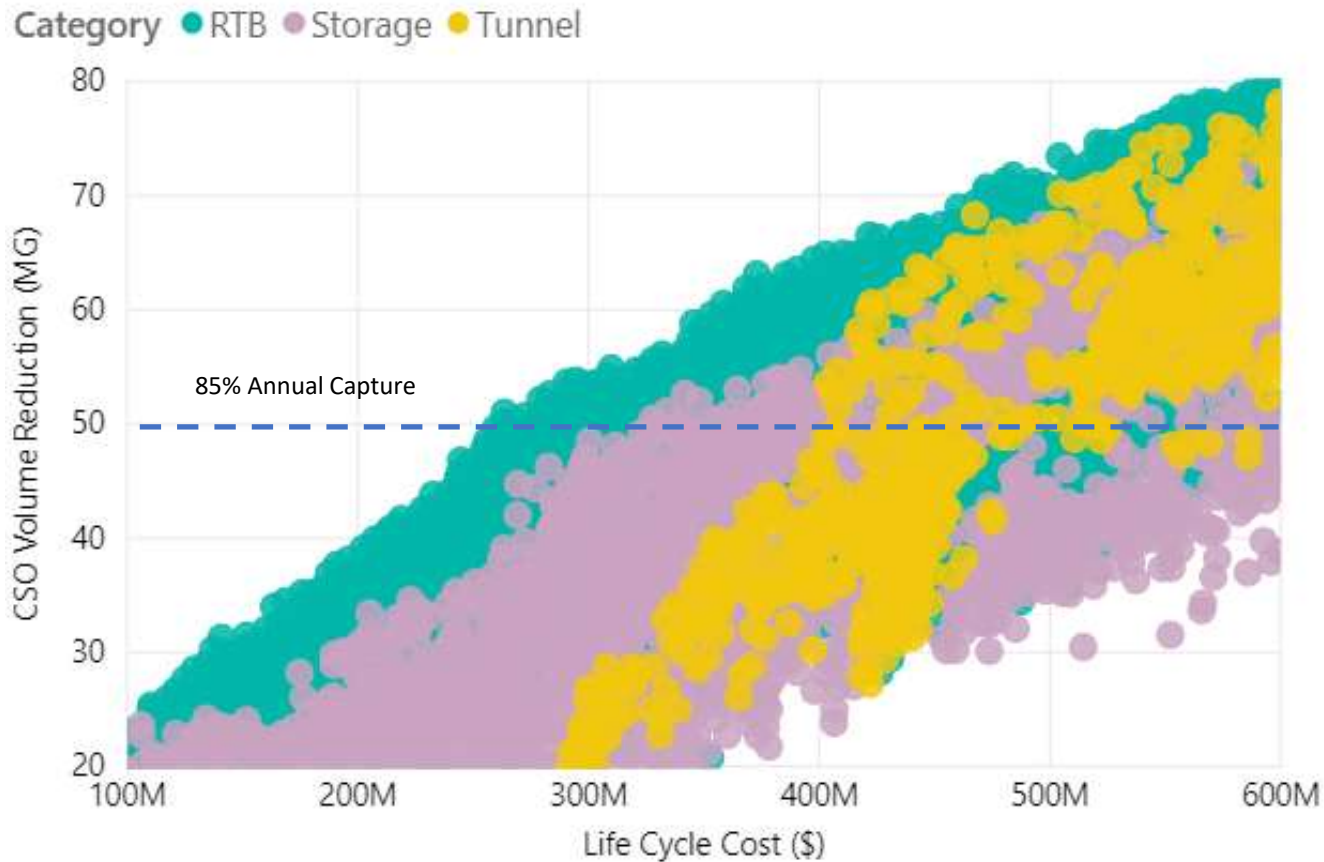


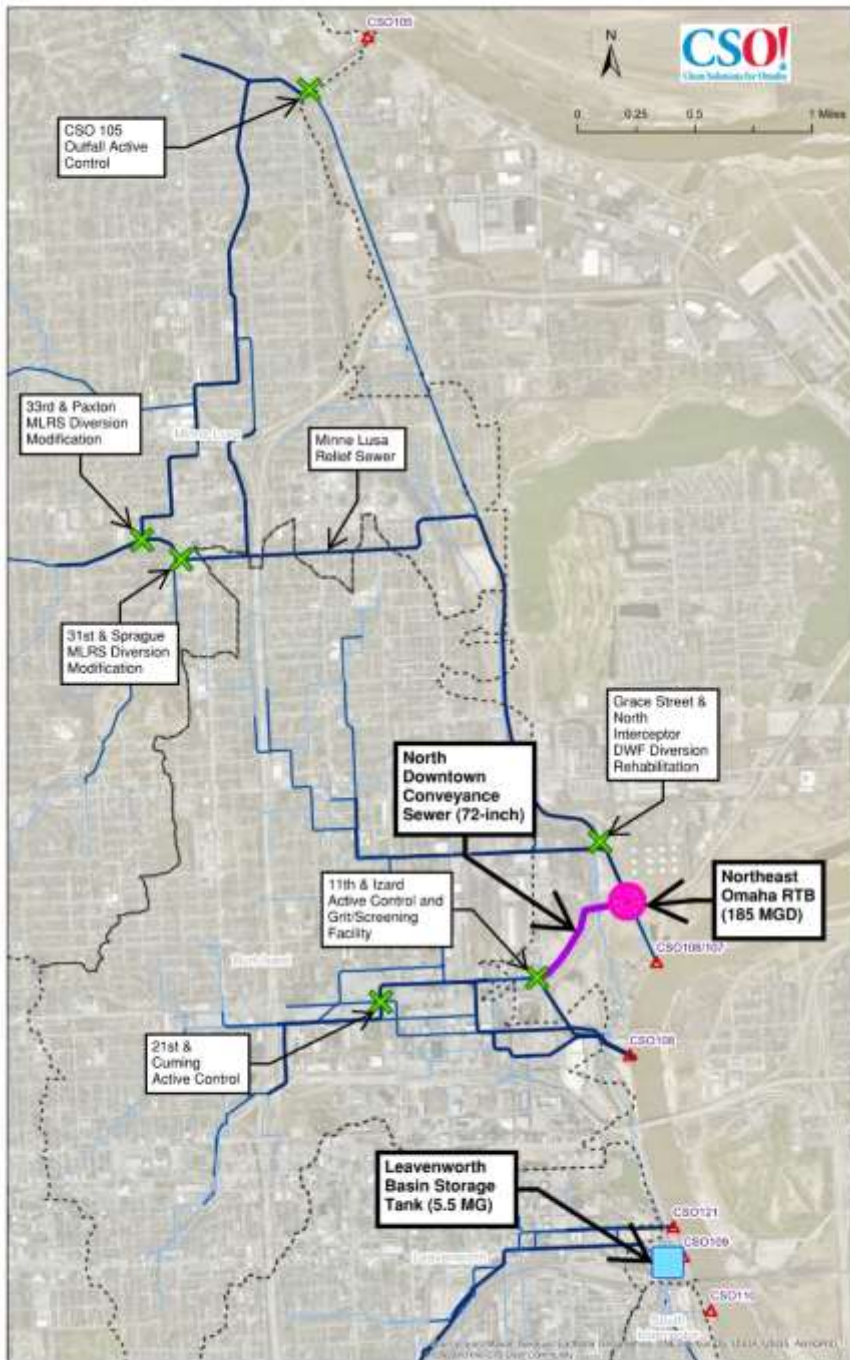
Made possible by using innovative techniques to shorten model run times

1 tunnel,
4 non-tunnel

CSO Volume Reduction Versus Cost

Symbolized by “primary” technology

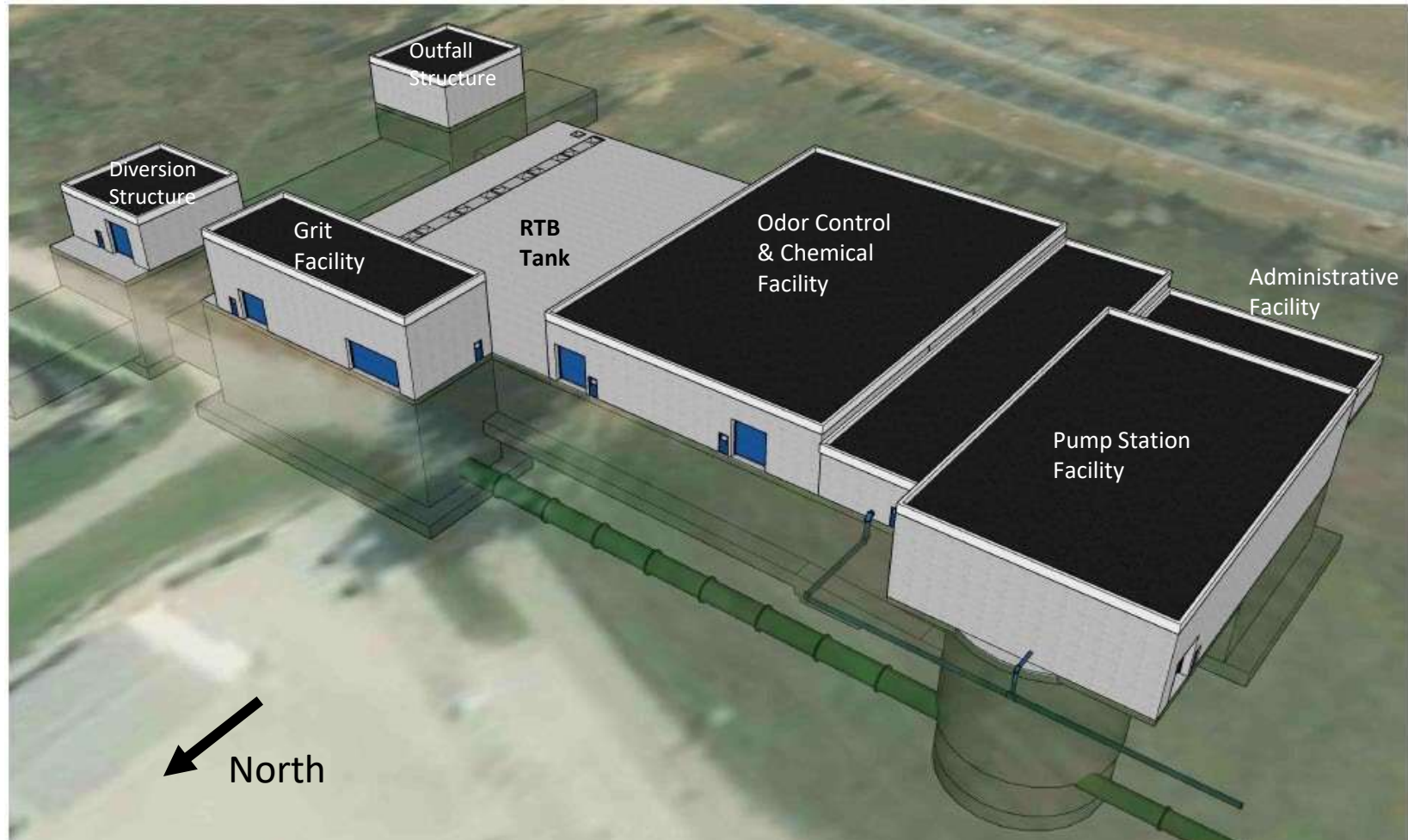




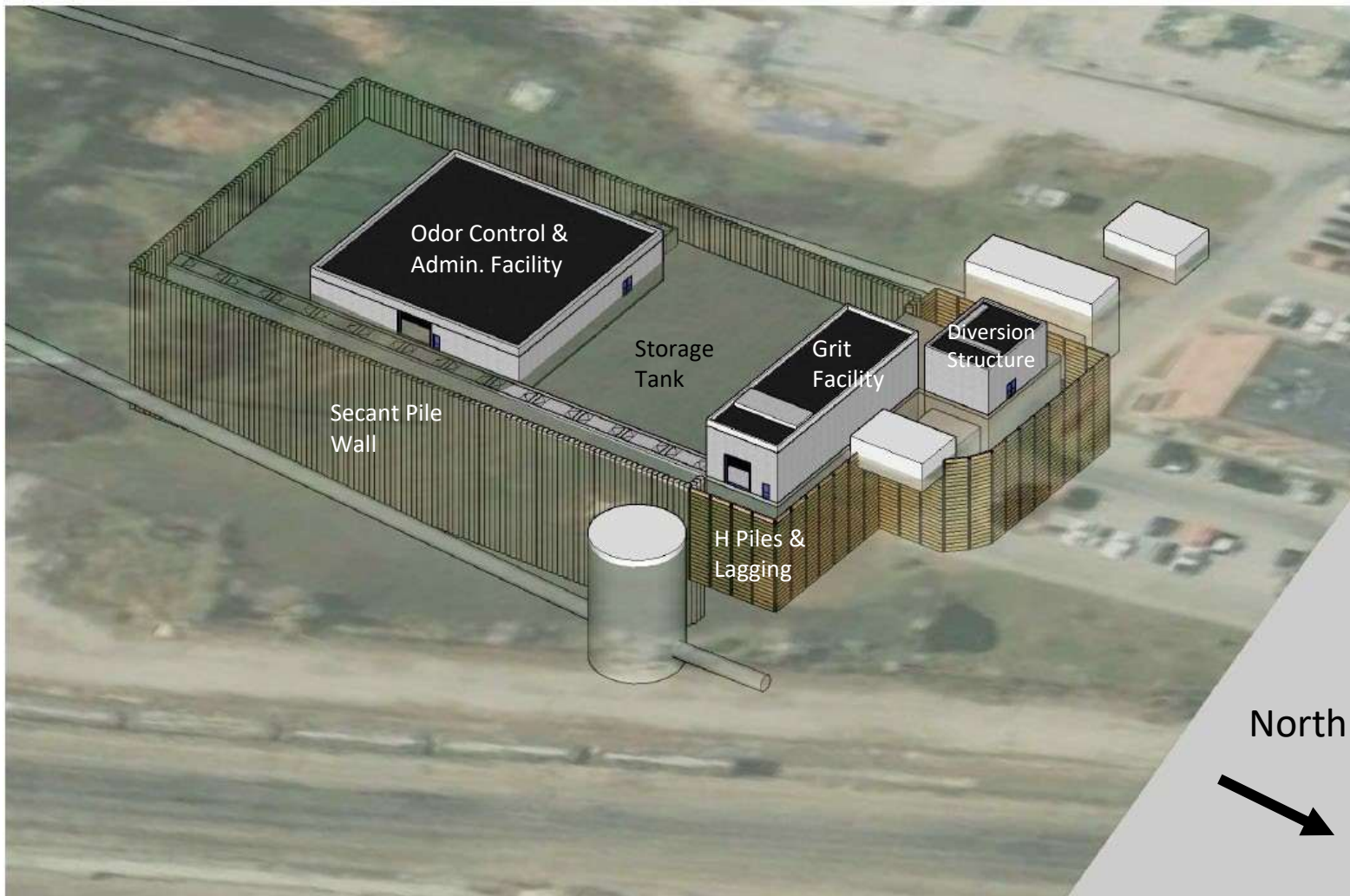
Optimization Evaluation Results

- Deep Tunnel System eliminated
- Northeast Omaha RTB System:
 - 185 mgd RTB at 6th and Abbott
 - North Downtown Conveyance Sewer (conveyance of flows to the RTB)
 - 11th & Iazard Grit and Screening
 - Active Controls at 11th & Iazard St, 21st & Cuming St, CSO 105
 - Minne Lusa Relief Sewer Diversion Modifications
- Leavenworth Basin Storage Tank:
 - 5.5 MG underground storage tank near river north of UPRR Bridge

Northeast Omaha (NEO) RTB



Leavenworth Basin Storage Tank

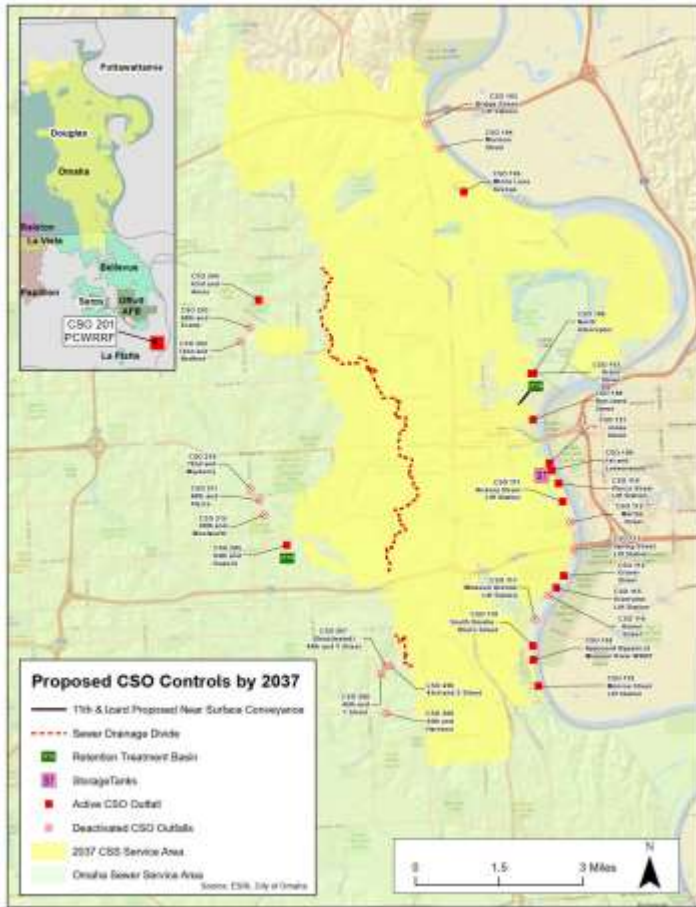


NDEE Review of LTCP Update

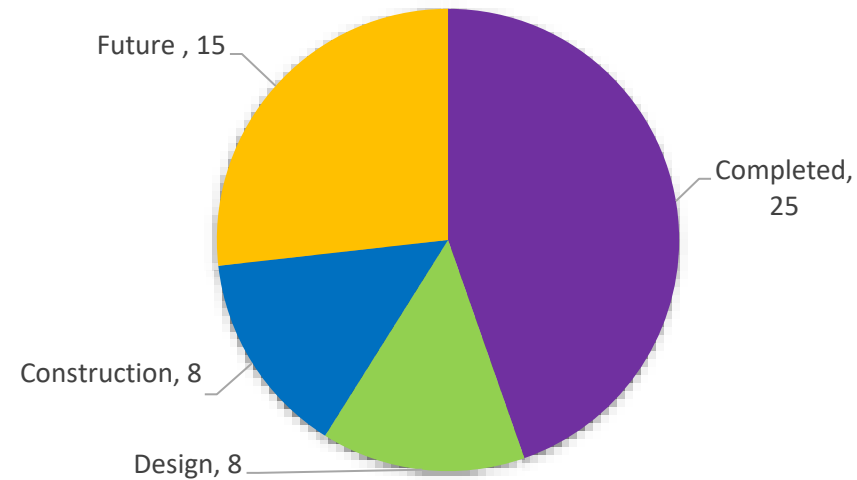
- Extensive communication, technical sessions, and meetings were held during evaluations and LTCP Update development
- LTCP Update submitted to NDEE on 3/31/21
- Received NDEE approval letter for the LTCP Update on 8/10/21
- Implementation is underway

CSO Controls in the 2021 LTCP

Controls in the 2021 LTCP Update



Breakdown of the 2021 LTCP Update Projects



- Sewer Separation Projects
- 2 Retention Treatment Basins
- 1 Storage Tank
- 4 CSO Active Controls
- Grit and Screening Facility
- 3 Conveyance Sewer/Storm Sewer/Diversion Sewer Projects
- 2 Rehabilitation Projects

Revised LTCP Update Costs

- Reflects known completed projects costs and those in progress
- Future costs have been escalated to 2037



Project Categories	2021 LTCP Update Cost
High-Rate Treatment Projects	\$423,000,000
SIFM Project	\$87,000,000
MRWWTP Improvements	\$184,000,000
Lift Station Projects	\$158,000,000
Storage Structure Projects	\$185,000,000
Sewer Separation Projects	\$533,000,000
Active Controls	\$85,000,000
LTCP Ongoing Costs	\$321,000,000
Miscellaneous Project Costs	\$23,000,000
Totals	\$1,999,000,000

LTCP Schedule

Project Name	October 1, 2021 to September 30, 2026					October 1, 2026 to September 30, 2031					October 1, 2031 to September, 2036						
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Cole Creek CSO 204 Area - Phase 3 Combined Sewer Separation (Taylor to Ruggles Between 56th and 61st)		█															
Papillion Creek North (PCN) 210 Sewer Separation		█															
Cole Creek CSO 203 Sewer Separation Project (CSO)			█														
Saddle Creek Retention Treatment Basin			█														
Forest Lawn Creek Inflow Removal and Outfall Storm Sewer				█													
CSO 212 - 64th Avenue and William Street					█												
Nicholas Street Sewer Extension - Phase 3B					█												
East Cole Creek Interceptor Rehabilitation					█												
CSO 119 South Barrel Conversion and Sewer Separation						█											
CSO 202 Phase 2 - 70th Avenue and Spencer Street							█										
Minne Lusa Relief Sewer Diversion Modifications								█									
61st and Radial Storm Sewer								█									
Grace St and North Interceptor DWF Diversion Rehabilitation									█								
CSO 105 Outfall Active Control										█							
CSO 204 Phase 4a - 57th Street and Pratt Street											█						
North Downtown Conveyance Sewer - 11th and Izard to 6th and Abbott												█					
CSO 204 Phase 4b - 56th Street and Bedford Avenue													█				
11th and Izard Grit and Screening Facility														█			
11th and Izard Active Control															█		
Northeast Omaha RTB - 6th Street and Abbott Drive																█	
Jones Street to Leavenworth Diversion																	█
21st and Cuming Active Control																	█
Hickory Street Sewer Separation																	█
Pierce Street Sewer Separation																	█
Leavenworth Basin Storage Tank (CSO 109)																	█

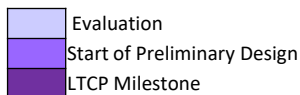
Projects to be completed 2021-2026

Project Name	2021	2022	2023	2024	2025	2026
Cole Creek CSO 204 Area - Phase 3 Combined Sewer Separation (Taylor to Ruggles Between 56th and 61st)	Start of Preliminary Design	LTCP Milestone				
Papillion Creek North (PCN) 210 Sewer Separation	Start of Preliminary Design	LTCP Milestone				
Cole Creek CSO 203 Sewer Separation Project (CSO)	Start of Preliminary Design		LTCP Milestone			
Saddle Creek Retention Treatment Basin	Start of Preliminary Design		LTCP Milestone			
Forest Lawn Creek Inflow Removal and Outfall Storm Sewer	Start of Preliminary Design			LTCP Milestone		
CSO 212 - 64th Avenue and William Street	Start of Preliminary Design				LTCP Milestone	
Nicholas Street Sewer Extension - Phase 3B	Start of Preliminary Design				LTCP Milestone	
East Cole Creek Interceptor Rehabilitation		Start of Preliminary Design				LTCP Milestone
CSO 119 South Barrel Conversion & Sewer Separation	Start of Preliminary Design					LTCP Milestone

 Start of Preliminary Design
 LTCP Milestone

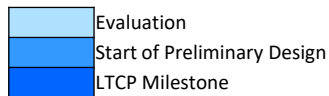
Projects to be completed 2026 to 2031

Project Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CSO 202 Phase 2 - 70th Avenue and Spencer Street	Start of Preliminary Design						LTCP Milestone				
Minne Lusa Relief Sewer Diversion Modifications			Evaluation					LTCP Milestone			
61st & Radial Storm Sewer		Start of Preliminary Design						LTCP Milestone			
Grace St and North Interceptor DWF Diversion Rehabilitation			Evaluation	Start of Preliminary Design				LTCP Milestone			
CSO 105 Outfall Active Control				Start of Preliminary Design					LTCP Milestone		
CSO 204 Phase 4a - 57th Street and Pratt Street	Start of Preliminary Design									LTCP Milestone	
North Downtown Conveyance Sewer - 11th and Iazard to 6th and Abbott			Evaluation	Start of Preliminary Design						LTCP Milestone	
CSO 204 Phase 4b - 56th Street and Bedford Avenue	Start of Preliminary Design										



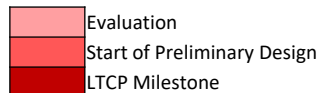
Projects Completed 2031 to 2036

Project Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
CSO 204 Phase 4b - 56th Street and Bedford Avenue	Start of Preliminary Design											LTCP Milestone				
11th & Izard Grit and Screening Facility			Evaluation	Start of Preliminary Design									LTCP Milestone			
11th and Izard Active Control			Evaluation	Start of Preliminary Design												
Northeast Omaha RTB - 6th Street and Abbott Drive			Evaluation	Start of Preliminary Design										LTCP Milestone		
Jones Street to Leavenworth Diversion									Start of Preliminary Design							LTCP Milestone

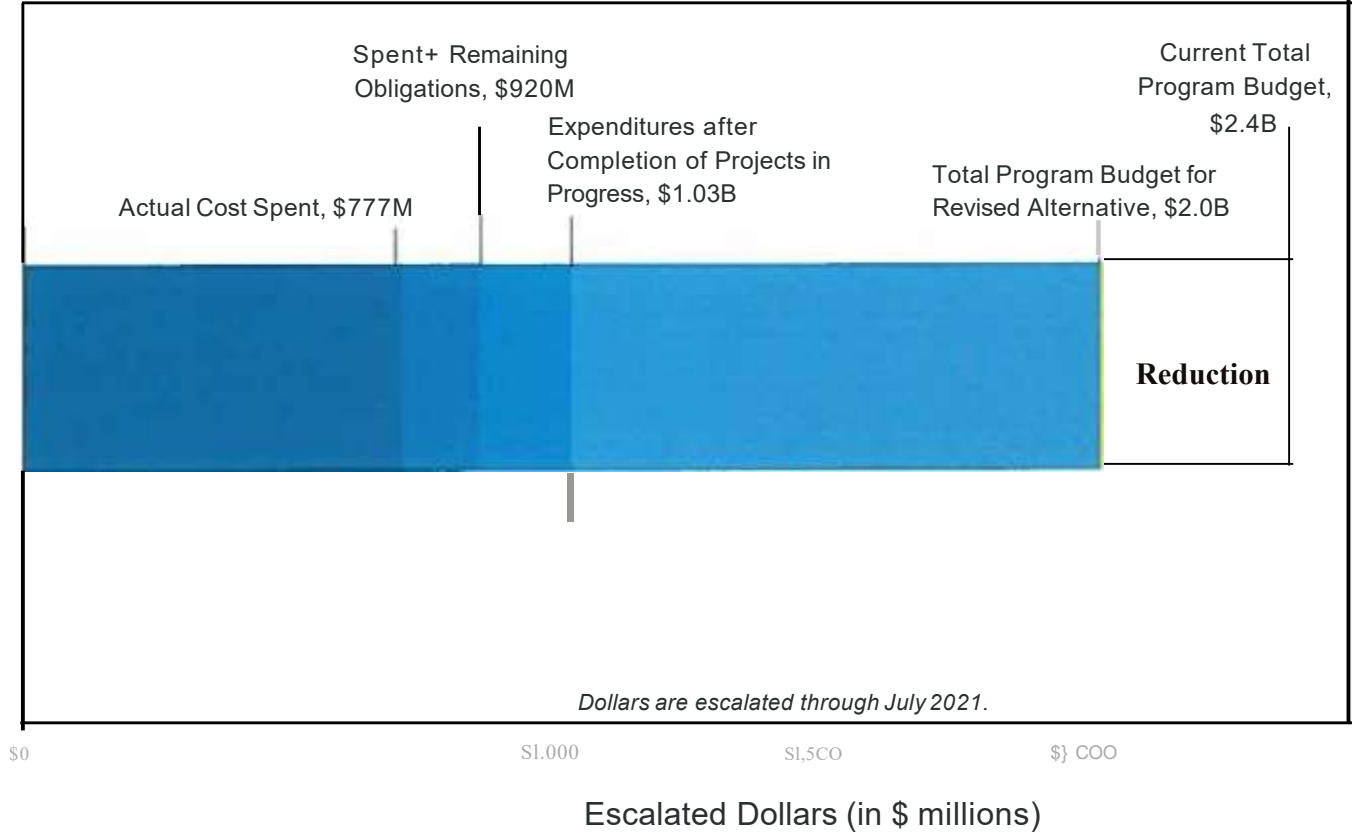


Projects to be completed 2036 to 2041

Project Name	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
21st and Cuming Active Control											
Hickory Street Sewer Separation											
Pierce Street Sewer Separation											
Leavenworth Basin Storage Tank (CSO 109)											



Total CSO Budget and Cost Reductions

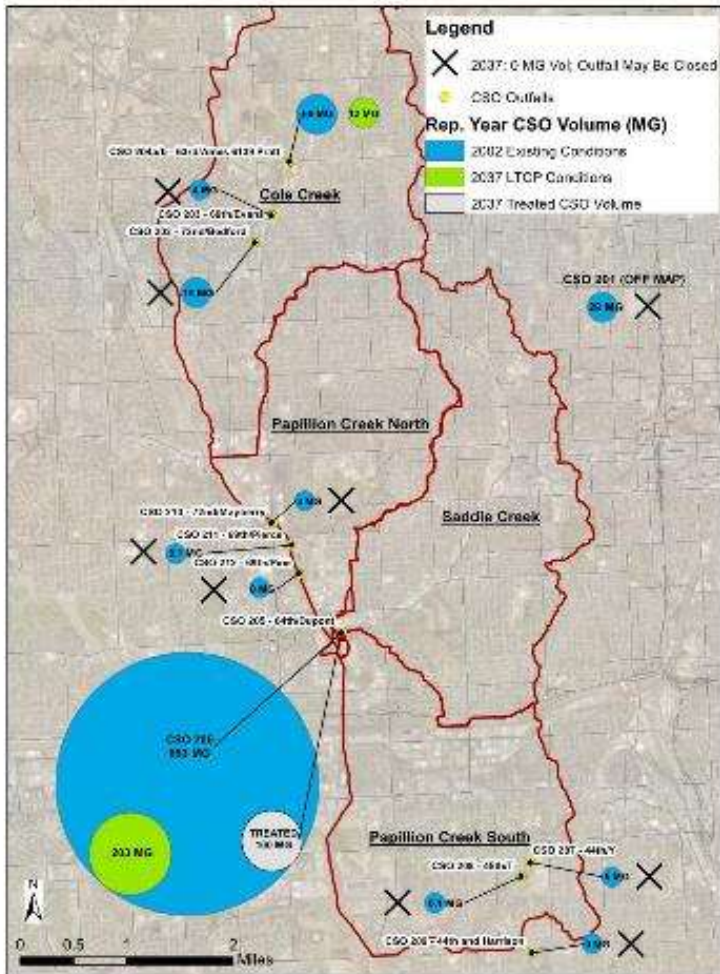


Performance Metrics

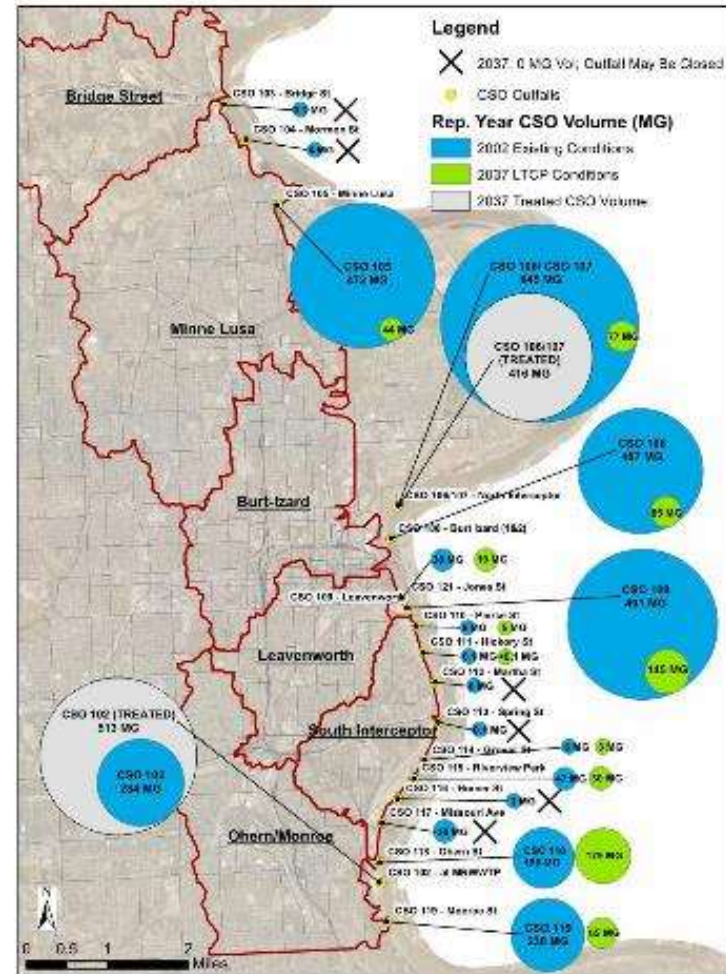
CSO Volumes

2002 Existing Conditions
 2037 LTCP Conditions
 2037 Treated Volume
 X – Closed and/or 0 MG

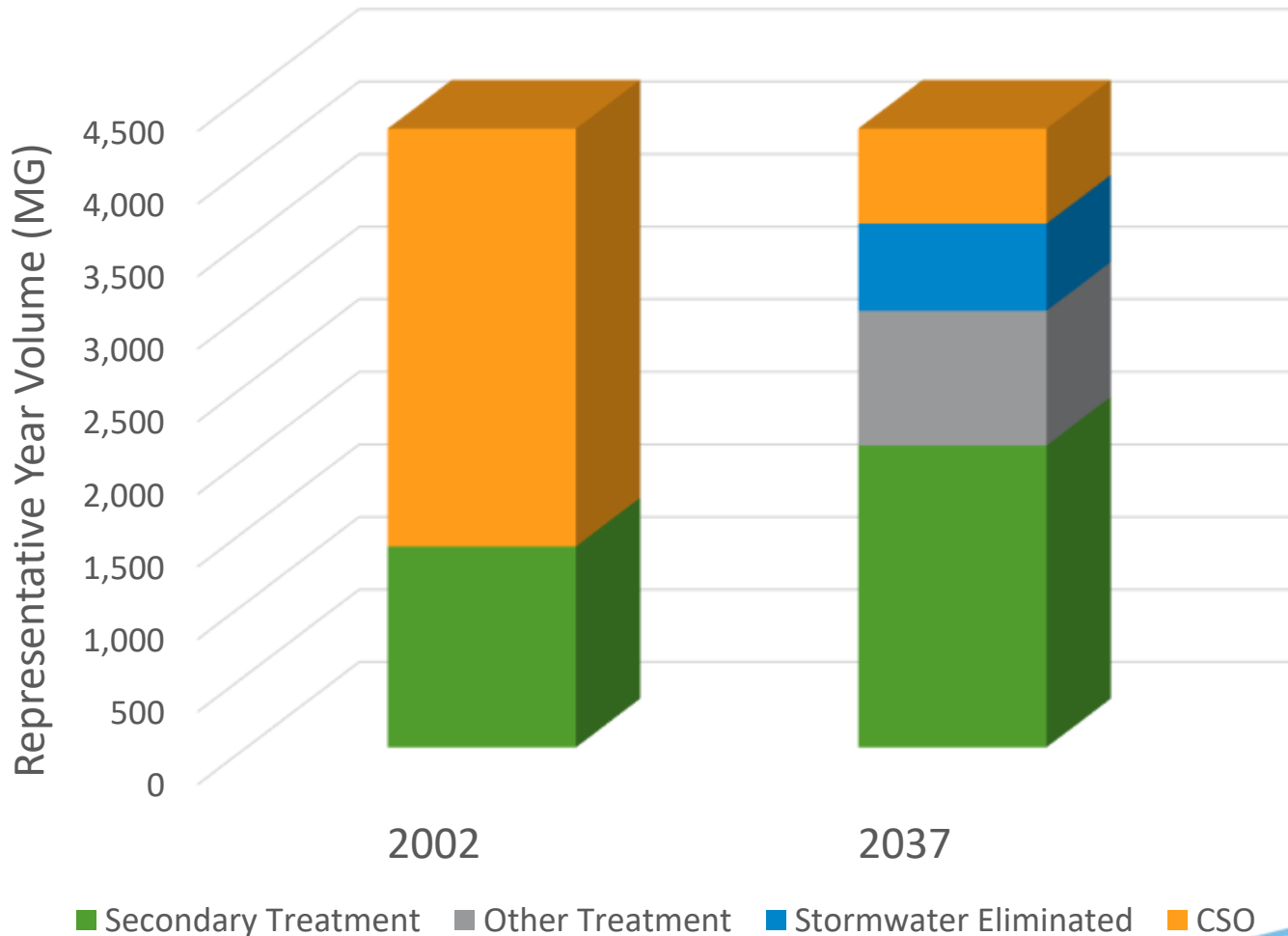
Papillion Creek Watershed



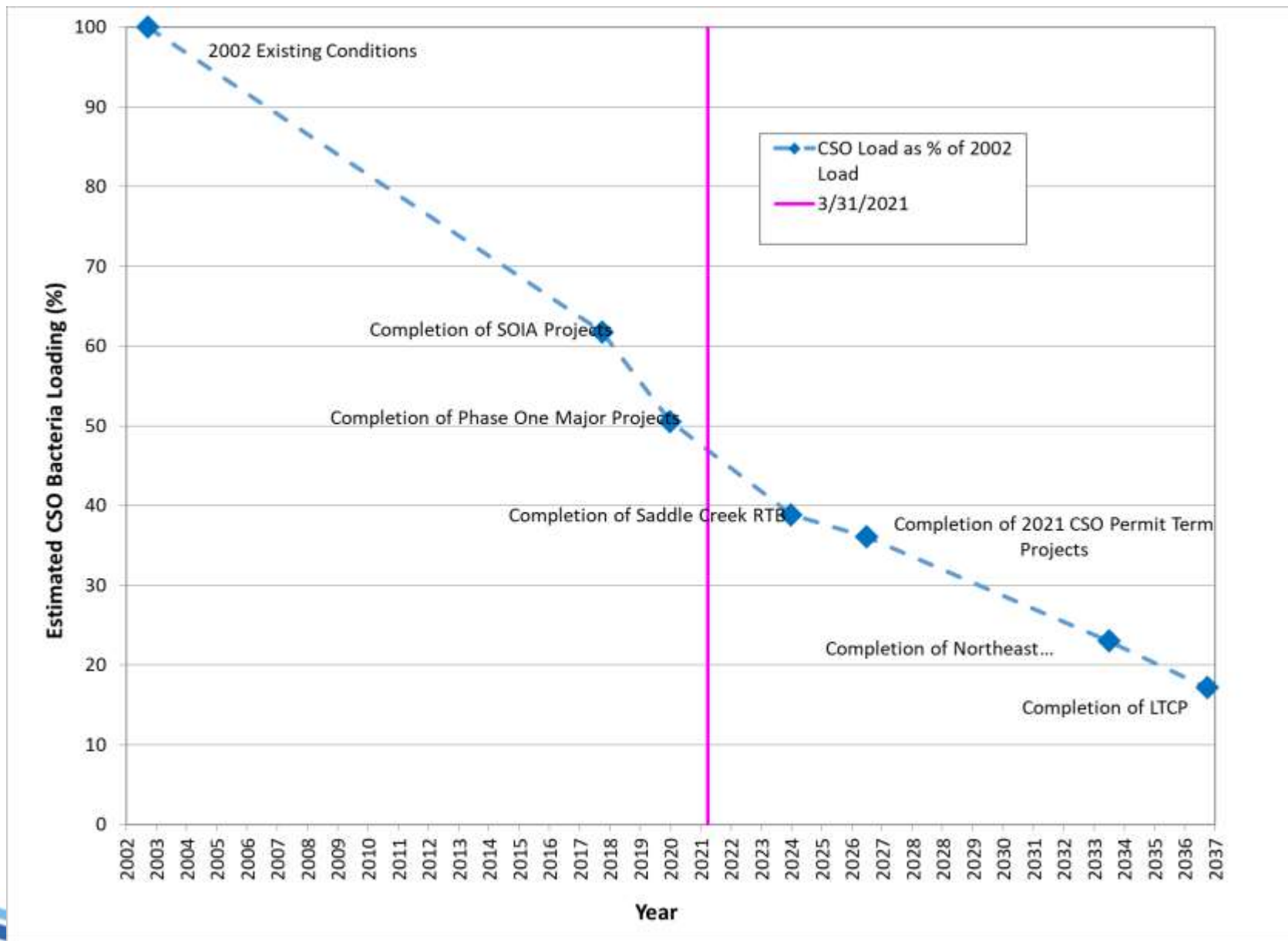
Missouri River Watershed



Missouri River Watershed Wet Weather Volume Comparison



CSO Load Reductions Over Time



LTCP Update – Water Quality Analysis

- The primary focus is *E. coli*
- Purpose of analysis was to provide confidence regarding the presumption that implementation of the LTCP will meet water quality standard or not preclude meeting the standard
- Used a new ICM Water Quality Model for Missouri River, spreadsheet model for Papillion Creek Drainage.

Key Contributors

- Program Manager: Tom Heinemann
- LTCP Update & Water Quality Model Lead: Pat Nelson
- City of Omaha: Jim Theiler
- Optimization: Mason Throneburg, Anjulie Cheema
- Hydraulics/InfoWorks Modeling: Perrin Niemann
- Concept & Cost Verification: Nick Sutko, Derek Gardels, Court Harris

Wrap Up

- The City of Omaha has made significant progress implementing the LTCP.
- Loading of E. coli to the Missouri River has been significantly reduced.
- LTCP Update was submitted to NDEE on time on March 31, 2021 and was approved in August.
- An Adaptive Management approach has been followed since the original 2009 LTCP, and will continue to be followed.
- Evolving method of meeting Presumption Approach has resulted in reduction in estimated Program cost.

Questions

