Wastewater Master Plan
March 30, 2020
Alliance of Rouge Communities

Agenda

Background
Overview
Progress Highlights
Collection System
WRRF
Water Quality Monitoring
Background

WHERE?
Regional wastewater system.

WHAT?
Long range plan (40-years) to provide regulatory compliant and reliable wastewater services.

WHY?
Provide environmentally sustainable, reliable and cost-efficient regional services.
Regional Wastewater Collection

- Member Partners include 78 cities, villages and townships
- 944 square mile service area
- 25% of the service area has combined sewers
- 2.8 million residents served by GLWA
- 8% projected population growth by 2060

The Region Has Achieved Substantial Water Quality Progress in 50 Years

From

- Rouge River Fire in 1969
- Great Lakes Agreement and Clean Water Act

To

- 95% reduction in untreated combined sewer overflows from 1995 to present
- Treatment for 97% of all wastewater flow (WRRF and CSO facilities)
- Metropolitan Beach opened 98% of the time in 2018 and 2019
More Improvements are Needed to Protect Water Quality

- Currently ~2 billion gallons of untreated combined sewer overflows during a typical year (varies with rainfall)

- Water quality impairments still limit recreation and aquatic life uses

Sewer overflows cause low dissolved oxygen and threaten aquatic life

Water contact recreation standards are not fully realized

Overview of Wastewater Master Plan

GLWA
Great Lakes Water Authority
The Wastewater Master Plan Provides a Cost Managed Roadmap based on 5 Outcomes

- Most affordable and cost-effective projects first
- Larger projects are phased in based on financial capability
- Projects approved annually in GLWA and Member CIP budgets
- Affordability evaluated with each 5-year regulatory permit update
- Phased approach allows time to reassess and re-prioritize upcoming investments

Ways to Achieve the Desired Outcomes

Value for Investment Analysis*

- Complete Sewer Separation
- More Conveyance & Expand Wet Weather Treatment at WRRF
- Maximum Green Infrastructure
- 2010 Plan of Record: Multiple Treatment Facilities

A strategic mix of technologies with coordinated operations is most cost effective

*All alternatives include regional collection system and stormwater management best practices
The Implementation Plan Manages Affordability Through Adaptive Steps:

- **Phase 1 Structural Optimization**: NWI Diversion to Oakwood RTB, Meldrum Diversion to Leib SDF, Dearborn CSO Controls, MCPWO and OCWRC Projects.

- **Phase 1 CSO Controls**: GSI, Sewer Separation, In-System Storage, Northwest Interceptor HGL management.

- **Phase 2 CSO Controls**: New Storage Conduit & Continued GSI & Sewer Separation.

- **Phase 3 CSO Controls**: Netting & Disinfection for Remaining Outfalls.

Regional Operating Plan:

- **1st Flush Capture for Small Storms**
- **1st Flush Capture for Larger Storms**

Structural Optimization:

- **Eliminate Remaining Discharges**

The Adaptive Phases Are Sequenced by Value for Investment:

- **Phase 1**: Most Cost Efficient Projects
- **Phase 2**: Adaptive Phase 2 Projects
- **Phase 3**: Adaptive Phase 3 Projects

The graph illustrates the relationship between capital cost and desired outcomes progress score, with adaptive phases sequenced according to value for investment.
Priorities Focus on Optimizing Existing Facilities, Green Projects & Partnerships

- Use green infrastructure and sewer separation to reduce CSOs and improve streetscapes
- Use available in-system storage within Detroit trunk sewers to control CSOs for small storms
- Reduce highway runoff to combined sewers in coordination with MDOT projects
- Expand service areas to existing wet weather treatment facilities to use available capacity (Leib and Oakwood)
- Member Partners 1st Flush Treatment, Sewer Separation, Outfall Consolidation, &/or Wet Weather Treatment Facility Service Area Expansion

Regionally Coordinated Programs Optimize System Performance

- Regional Collection System Model applies Integrated Planning Strategies
- Regional Operating Plan optimizes system performance
- Regional Water Quality Monitoring supports adaptive prioritization of investments
- Coordinated Member Partner best practices and reporting:
  - Collection system inspection and maintenance
  - Stormwater management
Progress Highlights

Regional Collection System Model

- West Side Model
- Interim Wet Weather Operating Plan Model
- Central and East Side Model
- First-Tier Customer Models

GLWA Regional Wastewater Collection System Model
Regional Operating Plan

- Critical Hydraulic Grade Line
- Member Dashboards
- Regional Dewatering Plan
- Pre-Storm Planning
- Post-Storm Performance Review
- Regional SWMM Model as "Digital Twin" of Ovation system
- Ground Rules for Member Contract Capacity Management

Collaboration with MDOT

Seeking Removal of Stormwater from the Combined Sewer System

- I-375 Modernization
- I-94 Drainage Improvements
- I-75 North of 8-Mile Road
- Gordie Howe International Bridge
Gordie Howe International Bridge

- 167 acre site for toll plaza, interchange, customs facilities
- New separate storm sewers will be designed for 100-year storm and include stormwater detention basins
- Current discussions about the best way to remove stormwater from the combined sewer system
- Important for how stormwater is handled in new transportation projects.

Collection System Improvements
Rouge River – In-System Storage

Rouge River – Sewer Separation
Why Sewer Separation?

- Solves root cause of CSO's.
- Most resilient to rising river level.
- Repurposes existing large diameter relief sewers as new storm drains.
- Catalyzes coordinated capital improvements, potential redevelopment and MDOT participation.
- Ability to improve neighborhoods facing population decline or low growth.
- Multiple funding sources.

Green Stormwater Infrastructure

- Baseline of 7.4 square miles managed with GSI in Detroit (2017)
- Analyses of new publicly funded opportunities underway by DWSD, OCWRC, MCPWO and other Members
- Future projections for an additional 6 square miles managed with GSI by development-driven compliance with stormwater ordinances
- Implementation in conjunction with sewer separation and downspout disconnection
- Management of stormwater in low density areas using GSI as an interim practice until redevelopment occurs
- Featured in MDOT projects for I-375, I-94, GHIB, and M-39
- Tool as a best management practice for MS4 water quality compliance.
WRRF Improvements

Preliminary treatment improvements for improved operation

Biological phosphorus removal and optimization to reduce costs

SFE treatment to promote reuse

Long-term biosolids improvements for enhanced energy and resource recovery

Long-term disinfection improvements

Long-term side stream phosphorus recovery

Rehabilitation and Replacement Driven by Asset Management
WRRF Alternatives
Aeration Decks 1 & 2

- System underloaded
- ILPs have reached their useful life
- Some EBPR achieved but not optimized
- Mixer/aerators operate in a narrow band which requires significant operator attention
- Oxygen feed manually controlled

Water Quality Monitoring and Modeling Program
Water Quality Monitoring

Water Quality Based Plan

Pipes know no Boundaries! We can accomplish more together.

Water Quality Monitoring Program Design

Master Plan Concept for the Program based on:

- Water Quality History and Trends
- Water Quality Goals for Each Water Body
- Site Selection with Watershed Groups

Next Steps in Implementation

- GLWA and USGS
- Role of the Watershed Hub Core Group
Water Quality Monitoring and Modeling will Guide Priorities

Regional Water Quality Monitoring Program

- Re-establish water quality monitoring network from previous studies
- Continuous data for dry weather and wet weather conditions
- Include data from other organizations
- Reporting and assessment of findings
Water Quality Models will Augment the Monitoring Program

- New models were created during the Wastewater Master Plan
- Models can analyze "what if" scenarios
- Models can predict future improvements
- Current focus of modeling is on river flow, stage, dissolved oxygen and bacteria
- Future expansion of model capabilities to include:
  - Shorter river reach segments
  - Add nutrients and other constituents
  - Evaluate models for Clinton River and Lake St Clair to integrate into the regional model

Key Take-Aways

- Regional
- Collaborative
- Water Quality Focused