City of Grand Rapids

Improving Water Quality in the Grand River Basin through Strategic Investment
Cities With Combined Sewers in the United States

- Common construction practice until 1920’s
- 772 communities nationwide
- 31 communities in Michigan
What are Combined Sewers?

Combined sewer overflow (CSO) occurs when a single collection pipe is used to convey both storm runoff and sanitary wastes. During heavy rains or snow melts, the overflow, which includes sewage, is discharged into a nearby river or lake.

Recognizing that combined sewer overflows are sources of pollution, state and federal legislation and guidelines have been adopted to reduce or eliminate them by various means, including separation of combined sewers.
Grand Rapids Combined Sewer Overflow History (Billion Gallons)

- Total Overflow
- Plant Expansion
- Retention Basin
- Final Effluent Pump Station
- Calendar Years: 1935 through 200

The chart shows the combined sewer overflow history from 1935 to 2010, with significant reductions starting in the 1980s, indicating improvements in wastewater management. Key events include:

- Wastewater Plant Expansion
- CSO Project Starts
Market Avenue Retention Basin (MARB)
Front & Scribner Storm Water Pump Station
Impact on Neighborhoods
Grand River CSO’s 2010 Million Gallons

- East Lansing, 8.7
- Grand Rapids, 1.7
- Lansing, 337

Source: Michigan Department of Environmental Quality
Combined Sewer Overflow (CSO) Sanitary Sewer Overflow (SSO) and Retention Treatment Basin (RTB) Discharge 2010 Annual Report (January 1, 2010 - December 31, 2010)
Remaining CSO Overflow Locations

59 CSO locations prior to corrective work started in the early 90’s

Today 4 CSO locations remain and annual CSO volumes have been reduced by over 99.8%

Construction Timeline

- **F-10**: Complete
- **F-01**: 2013
- **W-21**: 2013
- **F-03**: 2016
- **F-04**: 2016
2004-2012 CSO Discharge Comparison
In System vs. MARB

Grand Rapids CSO (MG)
- 1987 = 1,960
- 2004-2012 Total = 610
- 2004-2012 In System = 62
- 2004-2012 MARB = 548
Market Avenue Retention Basin (MARB) Effluent Quality 2004 – 2012

Fecal Coliform
Colonies/100 ml

Water Quality Standard – 7-Day 400 colonies per 100/ml, 30-Day 200 colonies per 100/ml
Wright Township Sewer System
Connected to Grand Rapids System

- Connected to Grand Rapids system, added another sewer partner
- Eliminated failing lagoon system
- Approximately 50,000 GPD routed to Grand Rapids Wastewater Plant
- Eliminated discharge to Sand Creek
  - Eliminate BOD
  - Eliminate SS
  - Eliminate Fecal
  - Eliminate Phosphorous
  - Eliminate Odor Problems in Tallmadge Township
- Eliminated sewage leaking into ground water

- Total Cost - $2,650,000
  - Grand Rapids - $800,000
  - Wright Township - $850,000
  - Tallmadge Township - $1,000,000
Grand River Water Quality Monitoring

Sampling Locations

Grand River
1. Plainfield Ave. bridge
2. Wealthy St. bridge
3. Railroad bridge south
4. Railroad bridge north
5. M-11, Wilson Ave. bridge
6. 68th St. bridge

Tributaries to the Grand River
7. Rogue River at West River Dr.
8. Mill Creek at West River Dr.
9. Indian Mill Creek at Turner Ave.
10. Silver Creek at Crofton St. & Roy Ave.
11. Plaster Creek 1 at Burton St.
12. Plaster Creek 2 at Market Ave.
13. Buck Creek at Chicago Dr.
14. Deer Creek at Leonard St.
15. Storm #1, Coldbrook storm drain
**Grand Rapids Region**

**Upstream (Yellow)/Downstream (Blue)**

**Water Quality Index (WQI)**

<table>
<thead>
<tr>
<th>WQI value</th>
<th>Water quality</th>
<th>Aquatic life</th>
<th>Recreational use</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25</td>
<td>Poor</td>
<td>Very limited</td>
<td>No body contact</td>
</tr>
<tr>
<td>25-50</td>
<td>Fair</td>
<td>Low diversity</td>
<td>Limited body contact</td>
</tr>
<tr>
<td>51-70</td>
<td>Average</td>
<td>Some stress</td>
<td>Use with caution</td>
</tr>
<tr>
<td>71-90</td>
<td>Good</td>
<td>High diversity</td>
<td>Very few limits</td>
</tr>
<tr>
<td>91-100</td>
<td>Excellent</td>
<td>High diversity</td>
<td>Fully usable</td>
</tr>
</tbody>
</table>

The graph above illustrates the water quality index for the Grand Rapids Region from 1985 to 2011, comparing upstream and downstream conditions.
## Sources of Pollutants in Michigan Rivers

<table>
<thead>
<tr>
<th>Source</th>
<th>Total Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric deposition</td>
<td>52,316</td>
</tr>
<tr>
<td>Source unknown</td>
<td>6,139</td>
</tr>
<tr>
<td>Habitat alterations</td>
<td>3,986</td>
</tr>
<tr>
<td>Hydromodifications</td>
<td>3,200</td>
</tr>
<tr>
<td>Municipal permitted discharges</td>
<td>2,516</td>
</tr>
<tr>
<td>Storm water permitted discharges</td>
<td>2,434</td>
</tr>
<tr>
<td>Agriculture - grazing</td>
<td>2,180</td>
</tr>
<tr>
<td>Agriculture - crop production</td>
<td>2,165</td>
</tr>
<tr>
<td>Agriculture - animal feeding/handling</td>
<td>2,110</td>
</tr>
<tr>
<td>Spills and unpermitted discharges</td>
<td>1,750</td>
</tr>
<tr>
<td>Urban related runoff/storm water</td>
<td>1,899</td>
</tr>
<tr>
<td>Legacy/historical pollutants</td>
<td>839</td>
</tr>
<tr>
<td>Industrial permitted discharges</td>
<td>637</td>
</tr>
<tr>
<td>NPS</td>
<td>545</td>
</tr>
<tr>
<td>Land application/waste sites</td>
<td>570</td>
</tr>
<tr>
<td>Natural</td>
<td>215</td>
</tr>
<tr>
<td>Resource extraction</td>
<td>168</td>
</tr>
<tr>
<td>Groundwater loadings</td>
<td>26</td>
</tr>
<tr>
<td>Construction</td>
<td>22</td>
</tr>
<tr>
<td>Turf management</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: MDEQ Draft 2012 Integrated Report
Sources of Pollutants in Michigan Rivers

- NONPOINT SOURCES
  - Livestock
  - Cropland
  - Impervious Surfaces
  - Construction Sites
  - Illicit Connections to Storm Sewers
  - Septic Systems
  - Channelization
  - Steambank Erosion

Source: Lower Grand Watershed Management Plan
Green Infrastructure – 26B & 26C

WATER QUALITY IMPROVEMENT
CSO CONTRACT NO. 26B
2012 - 2013 CONSTRUCTION

GREEN INFRASTRUCTURE LEGEND

- PROPOSED INFILTRATION BASIN
- AREA SEPARATED BY PROJECT
- POTENTIAL TREATMENT AREA
- NEW PARKWAY TREES
  (MORE WILL BE PLANTED THAN SHOWN)
- SURFACE FLOW DIRECTION
- HYDRODYNAMIC SEPARATOR
- POROUS PAVEMENT
- PROPOSED PROJECT LIMITS
Green Infrastructure

Infiltration Catch Basin

Rain Garden Bulb Out

Porous Payment Parking Lane

Hydro Separator
Joe Taylor Park – 40 acres
CSO Project Costs (Sewer Fund)

- **Westside Separation**
  - 52 Contracts
  - $114,667,585

- **Eastside Separation**
  - $102,423,429 (Expenditure to Date)
  - $20,000,000 Construction (Remaining – Last Drop)

- **Total** - $237,091,014
Water Quality Initiatives

- Lower Grand Watershed Organization
- Green Grand Rapids Master Plan Update
- Sustainability Plan
- Renewable Energy
- Green Infrastructure Portfolio Standards
- Energy Efficiency Projects
- Stormwater Master Plan
- Soil Erosion and Sedimentation Control
- Grand River Water Quality Monitoring
In Conclusion

- Grand Rapids CSO all but eliminated
- Only the last drop remains of the CSO Program
- There is a plan in place to eliminate all CSO’s
- Grand Rapids has been leader in the State
- There are many sources of pollutants
- Green Infrastructure is part of our future
- A watershed approach must be the taken to improve Water Quality.

City of Grand Rapids web site
www.grcity.us
Questions?

Presenters;

Eric Delong,
Deputy City Manager

Mike Lunn
Environmental Service Manager