

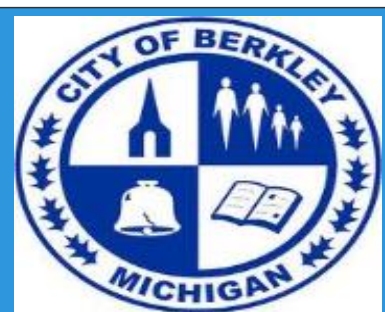
The City of Berkley Combined Sewer System Capacity Study



City Council Meeting

Monday, July 16, 2018





City of Berkley

Combined Sewer
System -Capacity
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Introduction

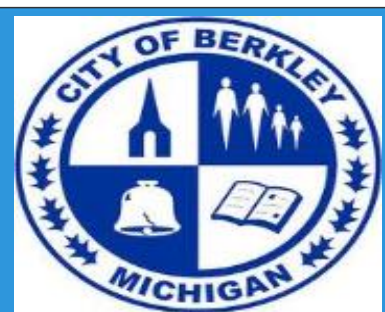
Project Team

City of Berkley:

- **Matthew Baumgarten, City Manager**
- **Derrick Schueller, Director of Public Works**
- **Darchelle Strickland Love, Deputy City Manager**
- **Shawn Young, DPW**

City Consultants (Hubbell, Roth & Clark, Inc.):

- **Roland Alix, Vice President**
- **James Surhigh, Associate**
- **Edward Zmich, Project Manager**
- **HRC Engineering Staff (Design, GIS, Field/Asset Mgmt.)**



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Background

- Severe rain events causing basement and/or street flooding has been a City of Berkley as well as a regional issue for decades.
- Most of the communities in southeastern Michigan still had combined sewer systems into the 1990's.
- For over 40 years, HRC has investigated numerous combined sewer systems, and prepared several similar studies/reports.
- These studies offer a framework, providing information and support the municipality's strategic planning process for future capital improvement projects (CIP)
- The content of the analysis/report is not a Project Plan. Going forward, it should support Berkley's planning and prioritization process



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Background

- By the 1970's, the City had already begun utilizing restricted catch basin covers in certain areas of the local sewer system to further reduce the risk of basement flooding after intense rain events.
- By the late 1970's, construction of the County's Twelve Towns combined relief sewers, as well as several City-funded combined relief sewers were completed.
- The City continued using restricted catch basin covers throughout the sewer system.
- Since the early 2010's, certain high intensity rain events resulted in basement flooding occurrences. The City subsequently engaged HRC to prepare this Combined Sewer System Capacity Study.



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Background

- The City sewers are tributary to the Southeast Oakland County Sewage Disposal District (SOCSD), which includes several Drains that are under the jurisdiction of the Oakland County Water Resources Commissioner (WRC).
- These Drains deliver flows to the Dequindre Interceptor, under the jurisdiction of the Great Lakes Water Authority (GLWA)/(DWSD), and eventually drains to the Detroit Wastewater Treatment Plant.
- All sewers and drains within City and County drain by gravity.
- Wet-weather combined flows that exceed the regulated rate to the Interceptor are diverted to the George W. Kuhn (GWK) combined sewer overflow Retention Treatment Facility (GWK RTF), owned and operated by WRC.



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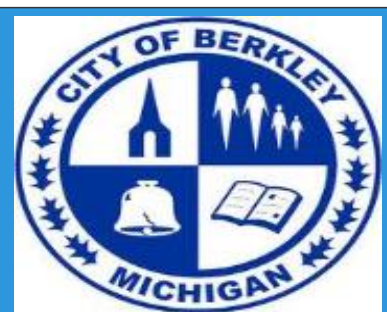
Task and Goals of Study

Task of Consultants

- Complete a City-wide Combined Sewer Capacity Study with respect to the 10-year design storm.
- Evaluate the benefits of catch basin restriction programs.

Goals of Study – Provide the City with:

- Information about its sewer system that can be used to strategically develop and implement future capital improvement projects (CIP)
- Additional information that can be used to evaluate capital improvement options as it relates to the sewer system and sewer system capacity, in addition to structural conditions.
- Context for future decision making related to overall infrastructure improvements to the roads, sewers, and water mains.
- Recommendations related to a multi-phased, multi-level approach in order to accomplish the goal of mitigating the potential for flooding due to extreme rain events. (Climate Resiliency)



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Report Content

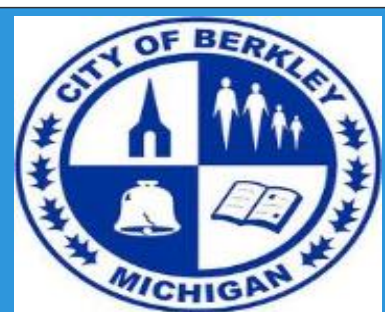
Overview of City's Combined Sewer System

Climate Resiliency/Flood Exposures within City

Challenges within local/regional sewer systems

City Mitigation Efforts to Date

Potential Future Mitigation Efforts

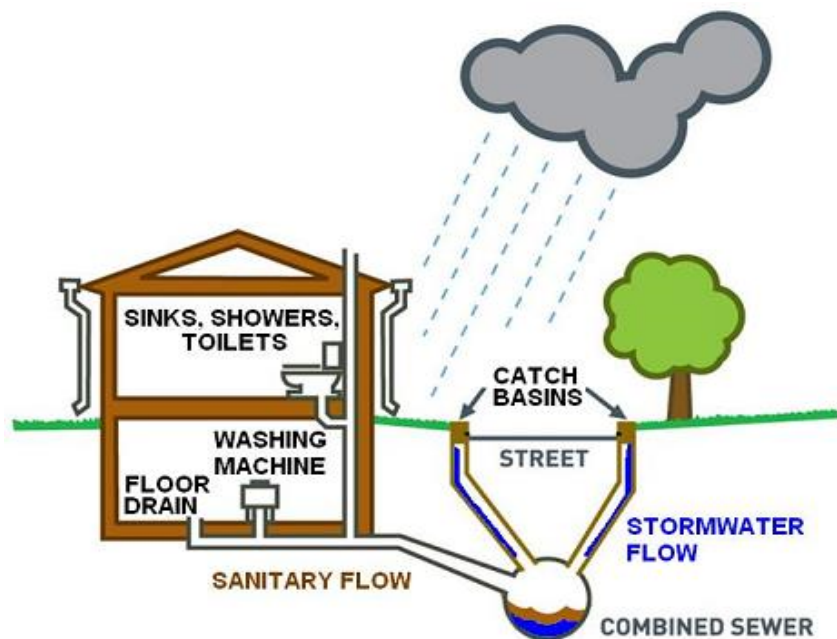


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City's Combined Sewer System



- Combined sewer system
- ~60 miles of sewer under Berkley jurisdiction
- The City has 77 sewer connections to the County drain system.
- The County system drains, by gravity, to a regional facility.
- Oldest sewers approaching 80 years old; ~ 30% have been structurally relined.
- Depending on pipe material, sewer lines can last 60-120 years
- Two components: maintenance and capacity / climate resiliency



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Climate Resiliency

- Climate Resiliency – refers to the ability of a municipality, or system, to function, adapt and absorb the stresses imposed upon it by climate change in order to improve the sustainability of the system, (i.e., to mitigate the potential for future risk of basement flooding).
- There are no “quick”, “easy”, or “cheap” methods to address climate resiliency
- Not just a Berkley issue – it is a regional issue



Climate Resiliency

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Climate Resiliency

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Challenges Within Local/Regional Sewer Systems

Challenges

- City's sewer system efficiency is firmly limited to its ultimate outlet (WRC Drains)
- No "natural" storm water outlets in the city limits
- Sewage back-up factors
 - ✓ System overwhelmed by storm water volume and intensity (from downspouts, footing drains and sump pumps directly connected).
 - ✓ Blockage in City's sewer or County drain (e.g., debris, roots, pipe collapse, etc.).
 - ✓ Blocked private sewer leads (residential/commercial property to the City's main).



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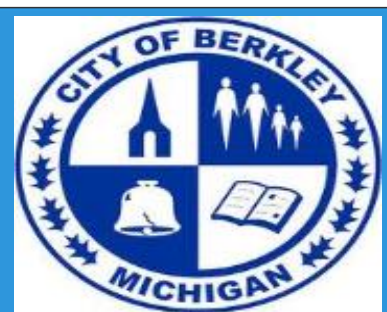
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Design Storm Event

“Design storm”:

- Refers to an intensity of rainfall, for a specified duration, based on a statistical analysis of actual, historic rain events for a region.
- Are generally referred to by both their recurrence interval and duration; such as 10-year, 1-hour storm event.
- Modern practice throughout southeast Michigan is to design combined sewers using the 10-year (1-hour) design storm as the basis-of-design.



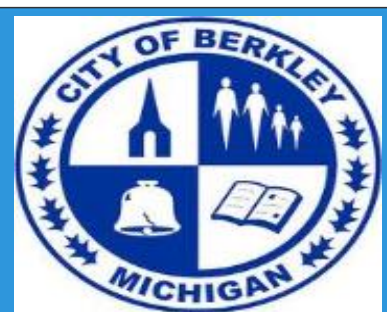
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Design Storm Event

- A 10-year storm has a 10% chance of occurring in ANY year, not once every 10 years.
- A 10-year storm can occur multiple times in a single year.
- From the 1950's through 1990's, there appears to be decreasing precipitation for a given recurrence interval.



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Design Storm Event

Over the last 25 years, there appears to be an upward trend. For example:

- the 10-year, 1-hour storm (10% recurrence interval) has increased from 1.66 to 1.70 inches,
- the approximate increase = 2%



City Mitigation Efforts to Date

- Catch Basin Restriction Program (ongoing)
 - 200 additional restricted covers installed in Spring, 2018
 - **Benefit:** Restricted cover slows the flow of storm / rain water entering the system

Restricted Cover



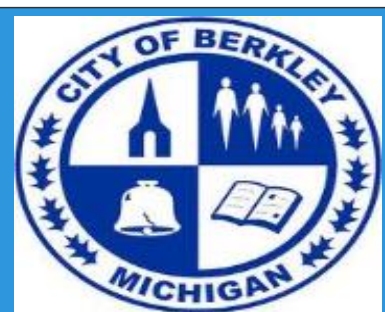
Non-Restricted Cover



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City Mitigation Efforts to Date

- City-wide Sewer Televising, Cleaning and Structural Lining Programs provide regular maintenance (cleaning and televising):
 - reduces likelihood of blockages and pipe failures
 - ensures optimum performance
- An ongoing process, takes 3 years to thoroughly clean and televise all Berkley sewers:
 - Approximately 30% are lined to date
 - ~ 1 mile lined every year, cost: \$300,000 per year
 - Adds 100 years to the pipe life span
 - A very high level of service compared to other cities that clean and televise every 7-10 years



City Mitigation Efforts to Date

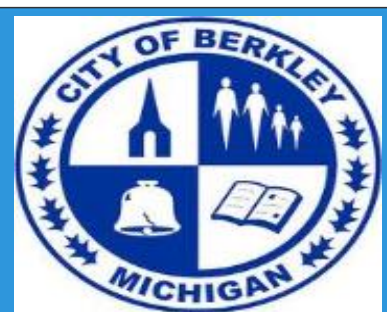
- Structural Lining: Pre- and Post- Lining Pictures



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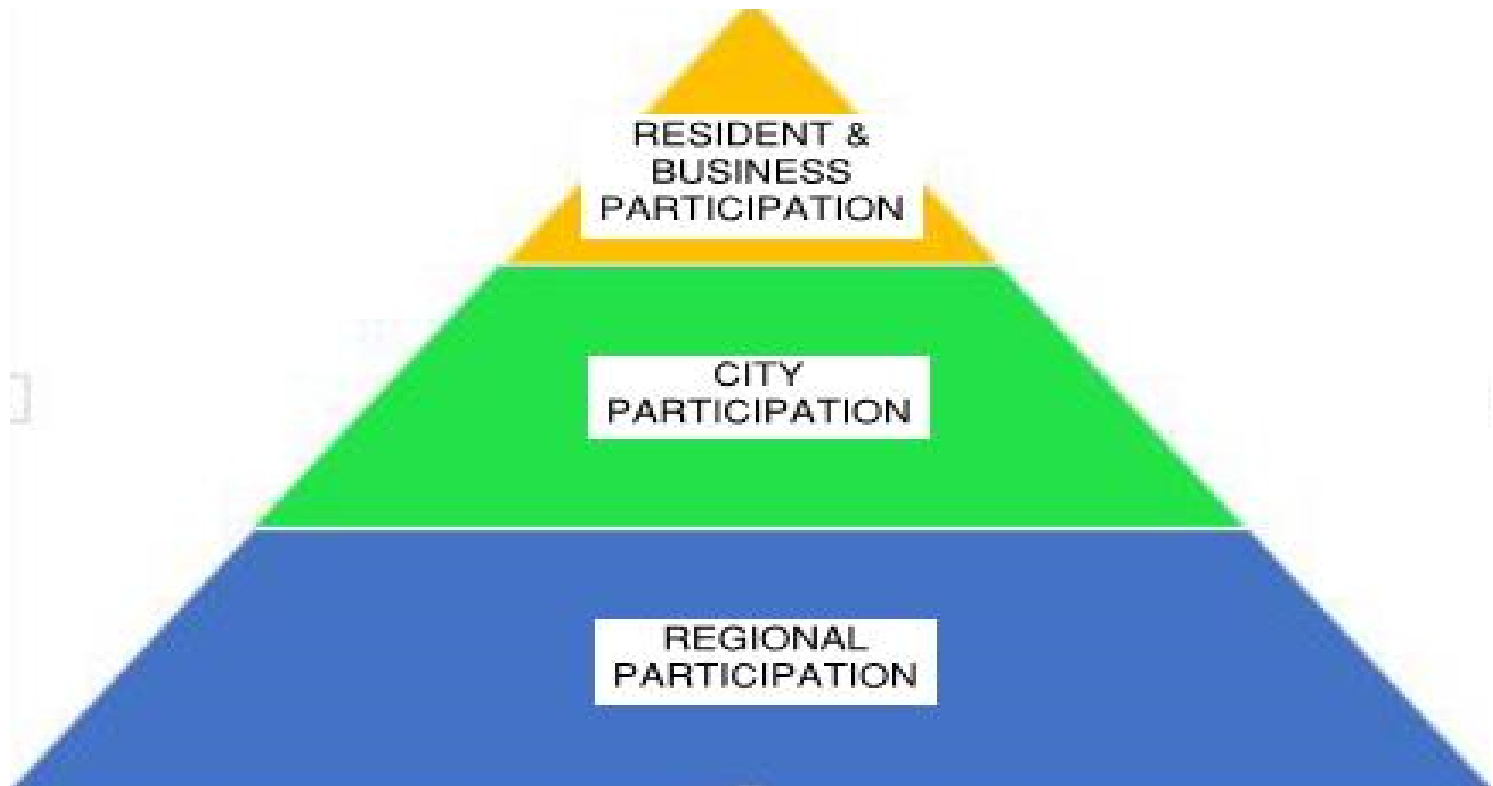
City Mitigation Efforts to Date

- Downspout Disconnection Programs
- Asset Management Plan completed in 2017 (SAW grant)
 - Electronic infrastructure inventory and condition assessment
 - Optimize operation and maintenance strategies
 - Support development of long term capital improvement planning
- Commercial development storm water requirements (i.e., restricted covers, storm water detention, etc.)



Future Mitigation Efforts

➤ Impact Pyramid: Multi-level participation



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Future Mitigation Efforts

Residential and commercial property owner participation:

- Regular maintenance of private sanitary leads (hiring a plumber to televise, clean, inspect lines, and replace, if necessary).
- Confirm all downspouts are disconnected from the main line sewer and either discharged on grade or directed to rain barrels.
- Install rain barrels and rain gardens.
- Plant trees, shrubbery and ground cover vegetation.
- Install backflow prevention measures on private lead.

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Future Mitigation Efforts

City Participation (Small-scale/moderate efforts):

- Expand the Catch Basin Restriction Program and monitor where additional restricted covers could be utilized.
- Investigate City-owned facilities, e.g., parking lots, alleys, etc., in the near future and provide additional restrictive covers, as necessary.
- Explore cost sharing options/arrangements for funding backflow prevention measures at individual homes and businesses



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Future Mitigation Efforts

City Participation (Small-scale/moderate efforts), cont.:

- Review and explore revisions for both commercial and residential properties, including requiring catch basin restriction and onsite detention, lot coverage restrictions, etc. to the:
 - ✓ Current Storm Water Ordinance
 - ✓ Current Standards for Development
- Re-evaluate the City's current E.R.U. (Equivalent Residential Units) calculations for determination of utility fees;
- Prepare a feasibility study for the implementation of bioswales / bioretention within City road rights-of-way.



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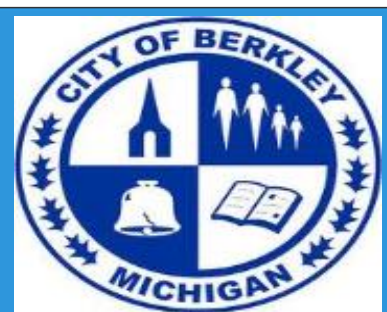
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Future Mitigation Efforts

City Participation (Large-scale efforts)

- Segment-by-segment replacement of combined sewers
 - Combined Relief Sewers
 - Storm Sewer Relief
 - Sanitary Sewer Separation (new parallel sewer)
 - Storage Facilities (Combined or Storm Water - detention/retention basins)
 - Implementing comprehensive catch basin restrictions
- Future sewer improvement projects in conjunction with other capital improvements projects in a given area, such as water main replacement, road rehabilitation, etc., or where unique opportunities or requirements may exist.



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Future Mitigation Efforts

Utilize the data in the Report to:

- Expand on the Catch Basin Restriction Program and identify new areas to be investigated
- Continue the City's sewer relining efforts
- Develop a long range capital improvement program (CIP) for sewers in conjunction with road projects.



Please Keep This In Mind:

- There are no “quick”, “easy”, or “cheap” methods to eliminate basement flooding in Berkley
- Changing weather patterns and corresponding high intensity rain events that can lead to flooding events are not going away
- Regardless of the capacity of any municipality/regional combined sewer system, there will always be the possibility that a larger storm will occur and overwhelm the system
- The City must weigh the costs and benefits of large scale capital improvements to the sewer system before they are implemented

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