



Special City Council Meeting on August 28, 2017 Flood Event

September 7, 2017

Our sincere thanks...

- ▶ **To the Residents of the City of Berkley**

- ▶ Thank you to the many who helped their neighbors and who submitted addresses and the questions that this presentation was built from.

- ▶ **City Council**

- ▶ Thank you for their leadership in calling this meeting on short notice, and pushing for better communication and outreach during last week.

- ▶ **Berkley School District**

- ▶ Thank you for the use of this auditorium. This is not always an option for us but this meeting could not have happened in any of the City's meeting spaces.
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Common Questions

- ▶ We were *all* left with lots of questions after the storm event Monday night.
- ▶ Many of us were asking the same questions:
 - ▶ What caused the City flooding like it is?
 - ▶ What did the City learn after 2014?
 - ▶ Why are the residents in this situation again?
 - ▶ Why is this not being fixed once and for all?
 - ▶ Why are some homes flooded in one area and not in another?
 - ▶ What is the City going to do?



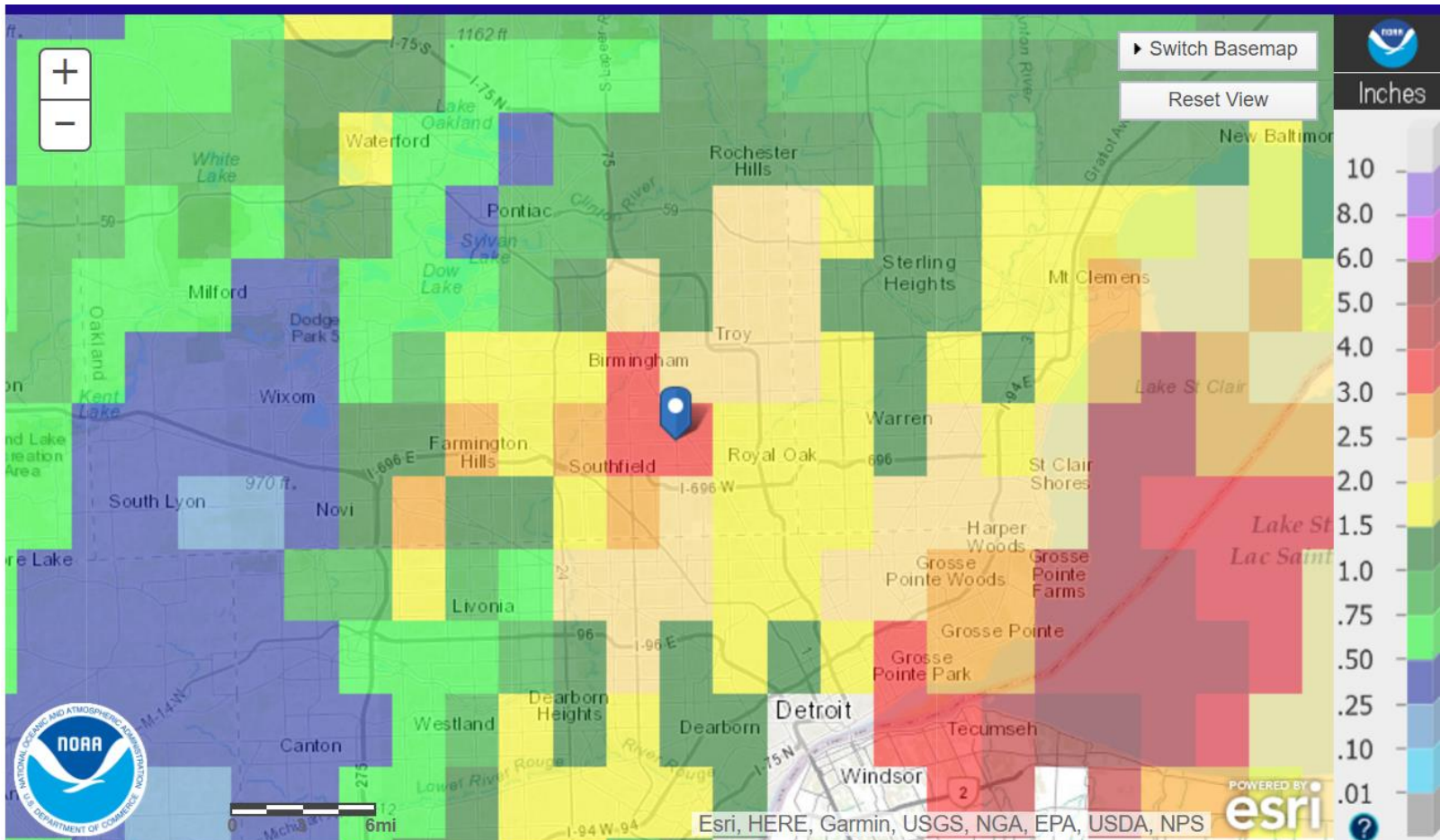
Specific Questions

- ▶ We also had some very specific questions:
 - ▶ Why do we still have a combined system?
 - ▶ Do the new builds add to the problem?
 - ▶ Should I get a backflow preventer (check valve)? If everyone had one, would that propose a problem to the infrastructure?
 - ▶ What control does the city have over the flow of water into the sewer system?
 - ▶ Does Berkley have visibility into the system?
 - ▶ Has Berkley spoken to other cities? What solutions have you discovered? Have any costs been determined?
 - ▶ What impact does the I-696 pump failures have on the local communities' sewer systems?
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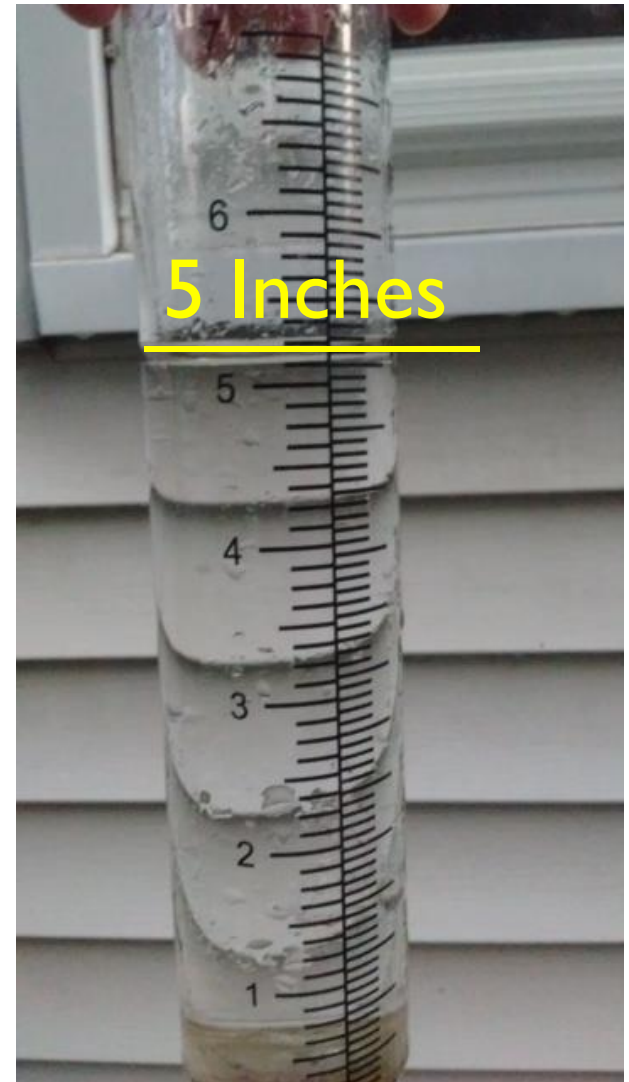
August 28, 2017 Rain Storm

- ▶ National Oceanic and Atmospheric Administration (NOAA) tracked the Mondays storm across Metro Detroit.



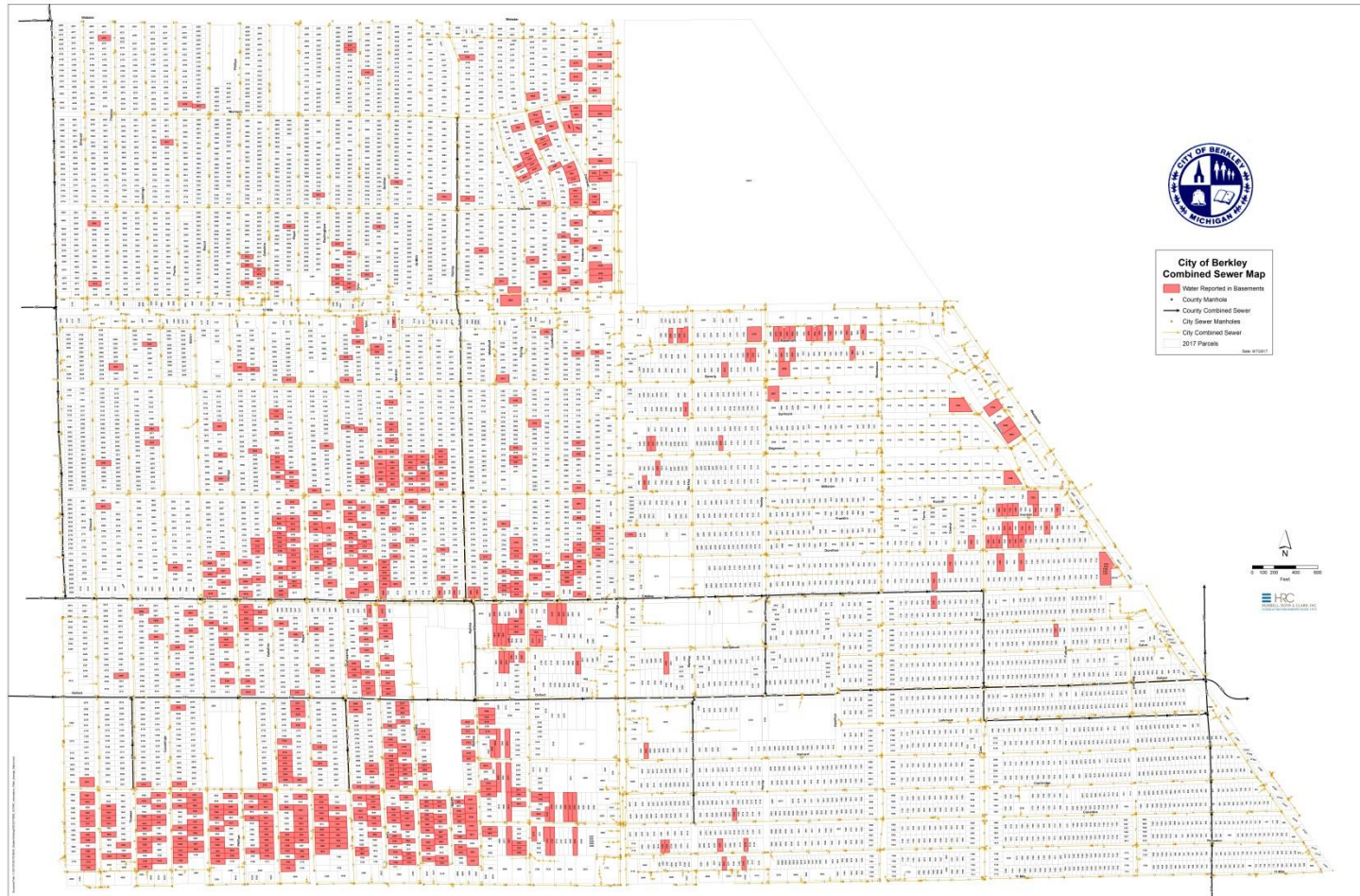
August 28, 2017 Rain Storm

- ▶ The NOAA estimates are an average based on the storm's behavior, not on specific rain gauge readings
- ▶ Local rain gauges varied from less than 2 inches at certain Weather Underground observation sites to just over 5 inches at resident's home at 2678 Buckingham (pictured)
- ▶ Likewise a resident on Cumberland measured 4 inches of rain in their gauge on August 28th



Reported Instances of Flooding

- ▶ Over 700 or 10% of homes reported at least some water in basement



DTE Statement on August 29th outage

DTE Energy apologizes for any inconvenience to residents of Berkley and appreciates your understanding following a recent power outage.

Power quality in your area hasn't been up to our standard lately, and we're working to improve it. In July, DTE crews repaired equipment and replaced wires damaged during the March windstorm. In addition, in 2014 we invested over \$250,000 to address power quality issues in Berkley, including installing equipment that allows us to isolate damage and re-route power around trouble spots, in turn, reducing the number of customers impacted by outages and shortening the length of outages that do occur.

Our engineers are currently evaluating the circuit for other opportunities for improvement. Please look for future communication once these opportunities have been identified and work is scheduled.

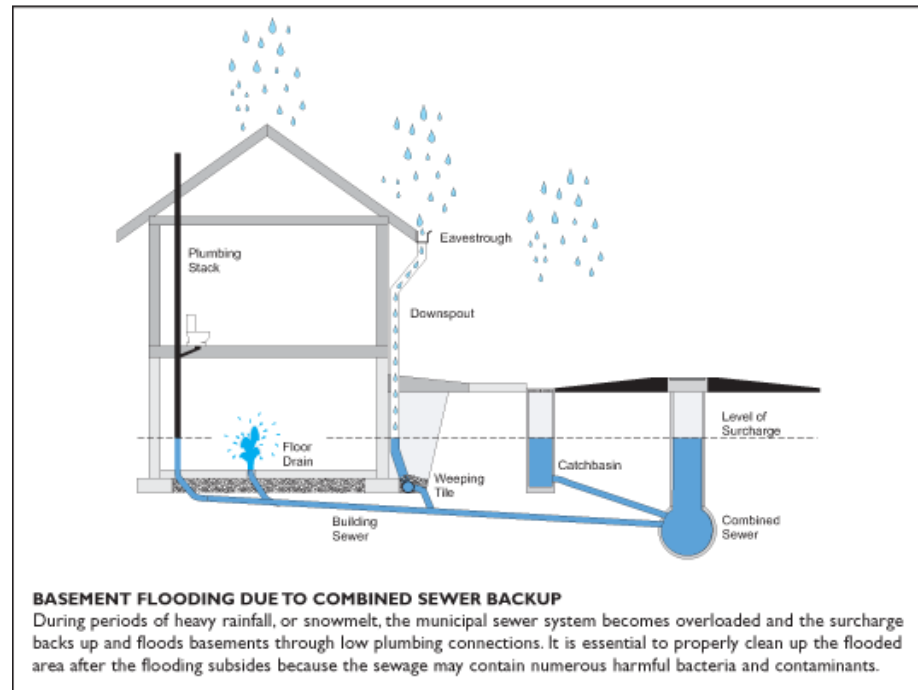
We know how important reliable electricity is to our customers, and we remain committed to providing you with safe dependable service. We humbly request your continued patience, as we work to improve your service and power quality in Berkley.

We apologize for the inconvenience and thank you for your patience and understanding as we work to provide you with more reliable energy and peace of mind.



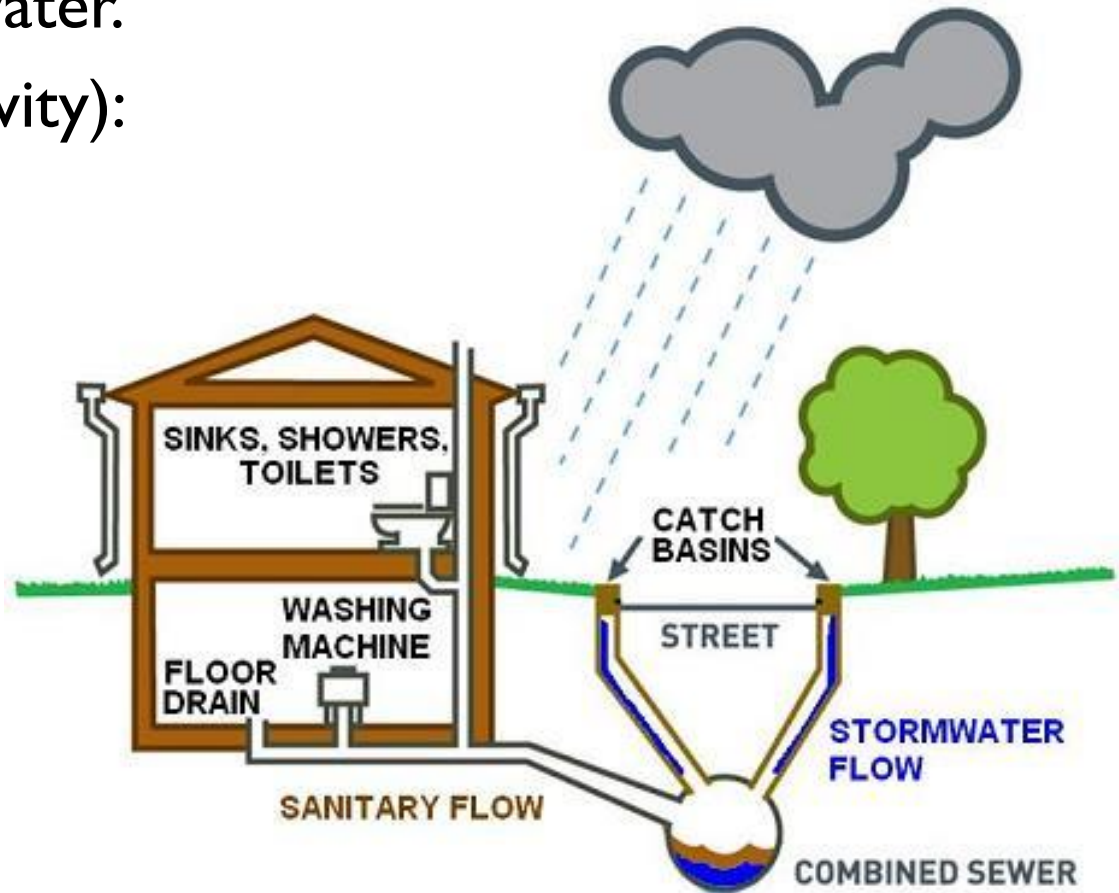
Why Did This Happen?

- ▶ Most Likely Cause: The fast, strong rainfall exceeded the capacity of the City & County's systems
- ▶ Both the County and City's sewer system received more water than they were designed to handle



Berkley's Combined System

- ▶ Utilizes single pipe to collect both storm (rain) and sanitary (waste) water.
- ▶ Three Phases (gravity):
 - ▶ Street Collection
 - ▶ Berkley Pipes
 - ▶ WRC System



Street Detention

- ▶ Many have asked why their streets look like this in a heavy rain storm:



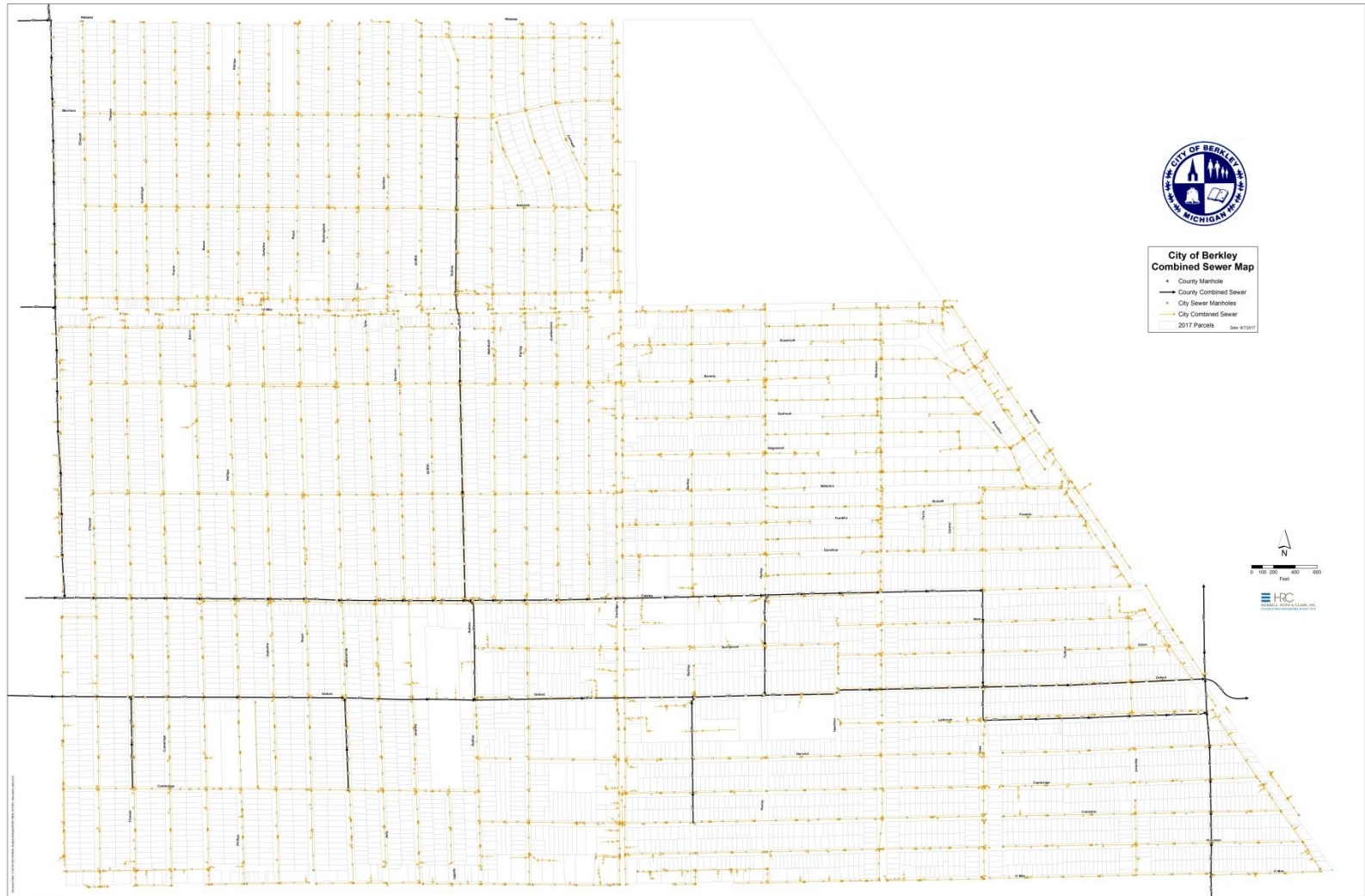
Photos were posted to Facebook group "Berkley" by Meghan Schubring and Nick McIntosh on August 28, 2017

Street Detention

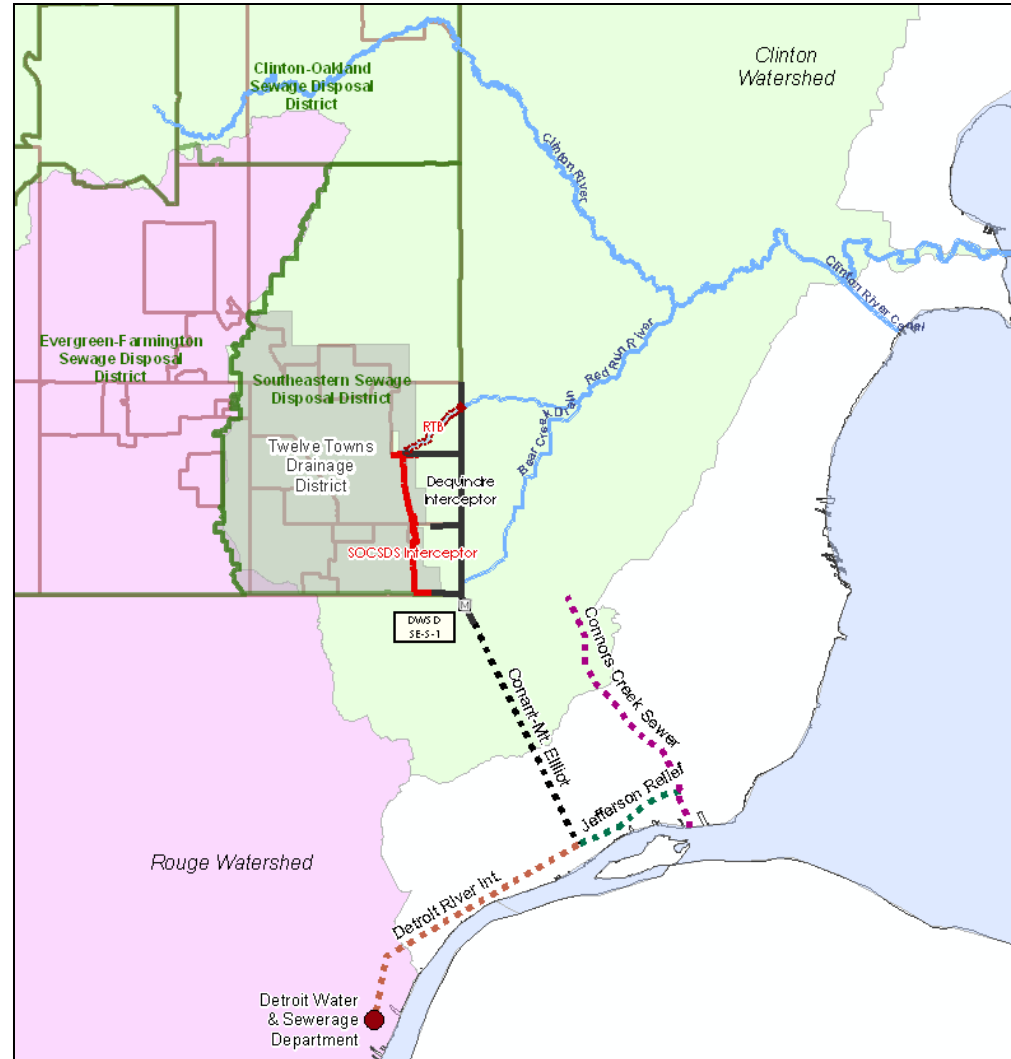
- ▶ Berkley Streets are designed as first line of defense in heavy rain events.
- ▶ Storm/Rain water is slowed by restricted manhole covers so that water does not quickly overwhelm pipes.
- ▶ Allows water in at reduced rate as opposed to all at once so that water can disburse within pipes.



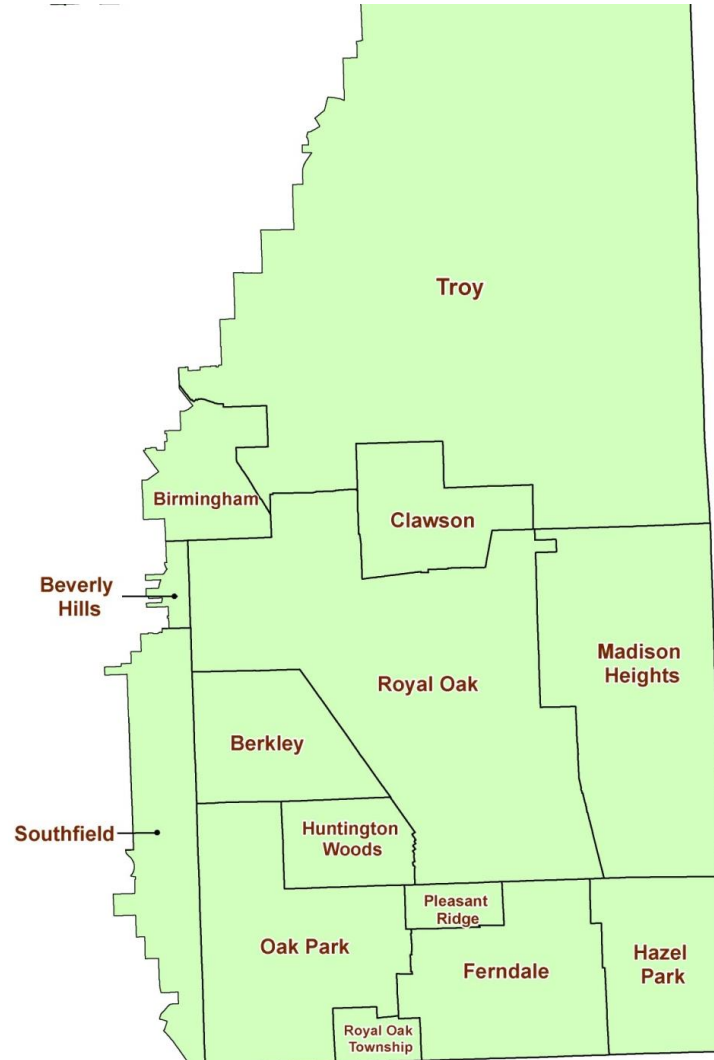
Combined Sewer Network within Berkley



GWK Drainage System

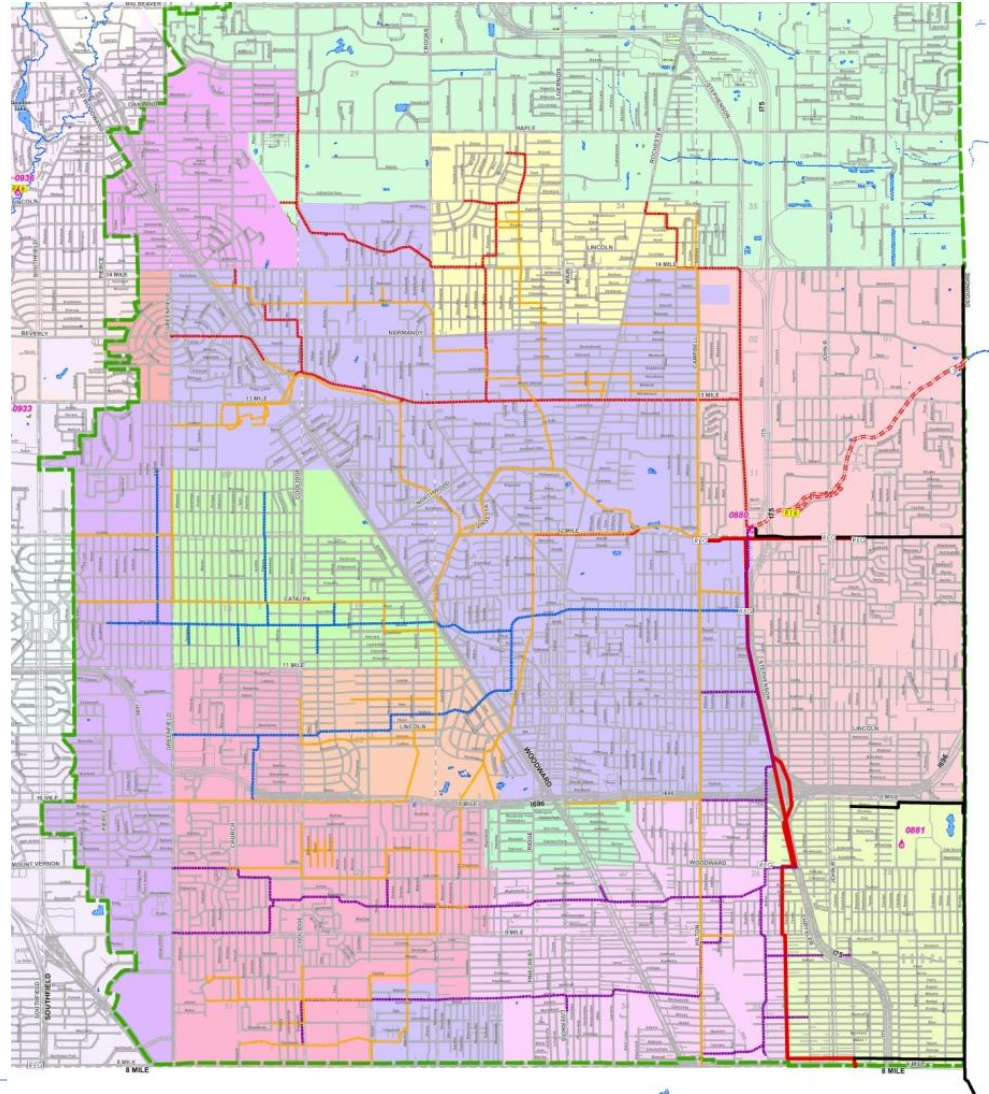


GWK Drainage District

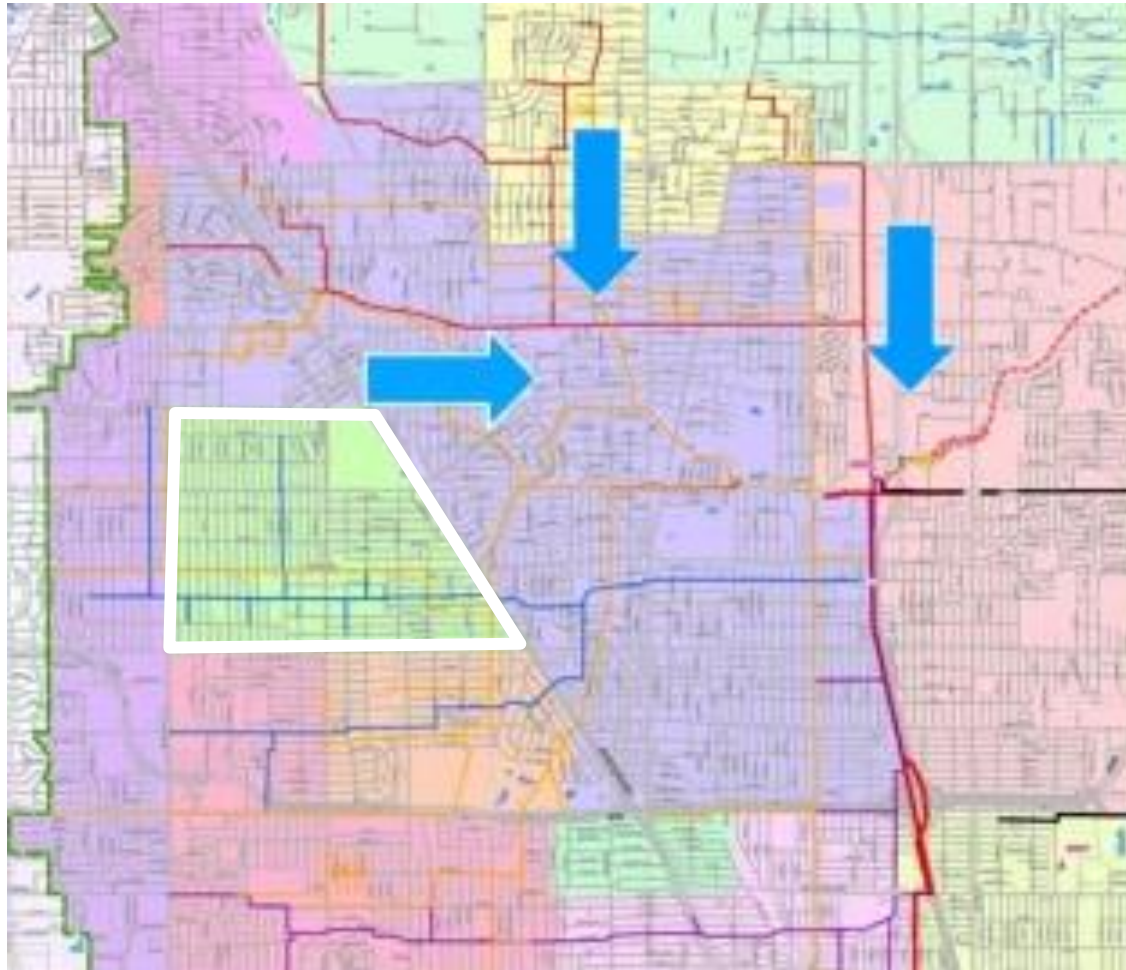


GWK System Piping

- Dequindre Interceptor
- GWK RTB
- SOCSDS Interceptor
- Original Combined Drains
- Twelve Towns Relief North Branch
- Twelve Towns Relief Middle Branch
- Twelve Towns Relief South Branch



Berkley's Place within the System



12 Towns South & Middle



THE TWELVE TOWNS RELIEF DRAIN
OAKLAND COUNTY, MICHIGAN
CONTRACT 3.3.1
CONTRACTOR ROGERS-HEALY GARGARO-BARTON MALOW

PHOTO NO. 4515-2 DATE 7-11-62

CONSULTING ENGR. - FATE, HERN & BOULE, INC.
PHOTO BY GARGARO ASSOCIATES, INC.

Comparisons to August 2014

- ▶ The rain and flood event of August 11, 2014 saw 4 to 6 inches of rain fall over a 4 hour period mostly in Wayne, Southern Oakland and Macomb counties
 - ▶ Labeled a 300 to 500 year storm (What does that even mean? We'll get to that...)
- ▶ August 2017 saw as much as 4 to 5 inches fall in less than 2 hours. Intense storm cells centered over various portions of Berkley.
 - ▶ Appears to be over 100 year storm (again, what does that mean?)



Measuring Storms in Years

- ▶ Why does it seem like we keep having 100 (and greater) storms each year?
- ▶ **The Problem:** A “100 Year Rain Storm” does not mean that it happens only once every hundred years but rather that, statistically, meteorologists believe that there is only a 1% chance of it happening in any one year.

Recurrence intervals and probabilities of occurrences

Recurrence Interval, in years	Probability of occurrence in any given year	Percent chance of occurrence in any given year	Annual exceedance percentage (AEP)
100	1 in 100	1	1
50	1 in 50	2	0.50
25	1 in 25	4	0.25
10	1 in 10	10	0.10
5	1 in 5	20	0.05
2	1 in 2	50	0.02



What has the City Done Since 2014?

- ▶ New response policies - Trash and EOP manual
- ▶ City has a long-standing tradition of regular preventative maintenance on our sewer system
- ▶ In 2013 received state grant, Storm water, Asset Management, and Waste water (SAW) and invested \$669,047 in last two years into system under a 90/10 split with the State of Michigan
- ▶ Over 50 miles of pipe has been cleaned, inspected and mapped in last two years.
- ▶ The cleaning process uses high pressure water inside pipes to remove sediment, sludge, and potential blockage that has yet to form.



Ongoing Maintenance

- ▶ “Televising” the system uses cameras inside the newly cleaned pipes to examine conditions
- ▶ Health of pipes are then rated based on various features and a work plan is developed for relining or replacement
- ▶ We have utilized this technique for many years maintain the integrity of the system to provide documentation that maintenance is working



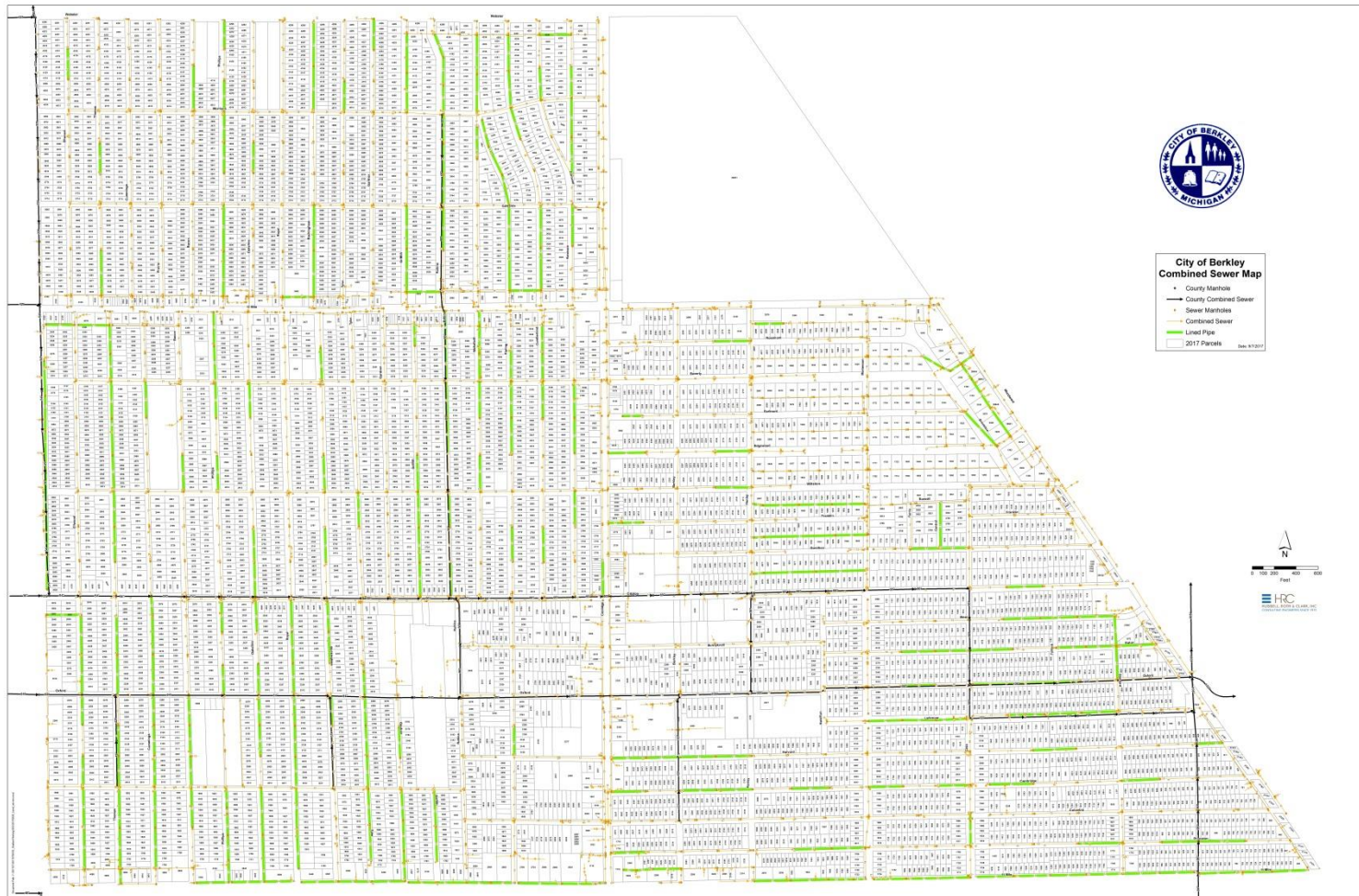
Ongoing Maintenance

- ▶ Structural Re-Lining of Pipe (CIPP) for over 20 years
- ▶ Places “new” plastic pipe inside old pipe
- ▶ Berkley increased annual investment to \$350K in this budget year
- ▶ Adds up to 100 years to life span to pipe



Relined Pipes in Berkley System

City has relined 16 miles of our 57 miles of pipe or 28% of total system



Resident Questions

- ▶ Is there too much new construction going on?
 - ▶ SEMCOG Impervious Surface Survey
 - ▶ Less than 4% of Berkley's building stock has been replaced
 - ▶ New commercial & multi-unit residential have to meet current standards and detain storm water flows onsite and release at much slower rate
- ▶ Did somebody forget to flip a switch?
 - ▶ Both the City's system and WRC's system within Berkley operate on gravity.
 - ▶ There are no switches, valves, pumps, levers, or buttons that need to be pushed to move water out of Berkley.



Resident Questions

- ▶ Did the DPW find & remove a blockage or add something to allow everyone's water to drain?
- ▶ No
- ▶ Our crews were out with Vactor truck but did not vacuum any catch basins until after event to alleviate street flooding on Gardner.



OK, then... Why??

- ▶ Berkley has done everything in its power to optimize our existing system
- ▶ After a preliminary investigation we are left with the most plausible explanation: Rainfall exceeded the capacity of our system, and the level of service does not meet resident expectation
- ▶ True for both Berkley and WRC systems



Will this happen again?

- ▶ Alas... most likely, at some point we will see rainfall that exceeds our system's capacity.
- ▶ Mother nature is mighty...
- ▶ What does next 30 years hold for weather patterns?
- ▶ Windsor Scenario: What if we invest \$60 Million to build a 4 inch system and then get a 5 inch storm?



The critical questions we face...

- ▶ Will “100 Year” storms be the new normal?
- ▶ How does this affect federal design standards?



What can Berkley do moving Forward?

- ▶ **Green Policies and Designs**

- ▶ The Environmental Advisory Committee, City Engineers, and DPW are working on an updated storm water management policy.

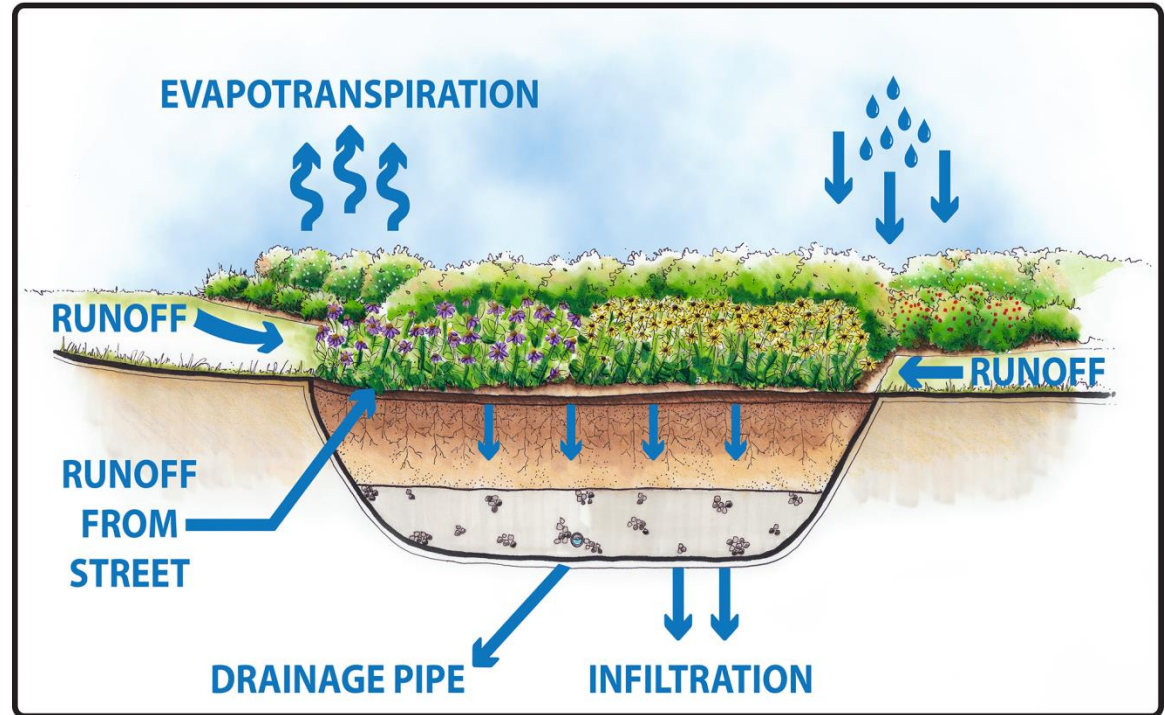
- ▶ Separately, the DDA is updating the district design guidelines to incorporate green design and rooftop storm water retention strategies.



Seedum installed on Ferndale Public Library expansion

What can Berkley do moving Forward?

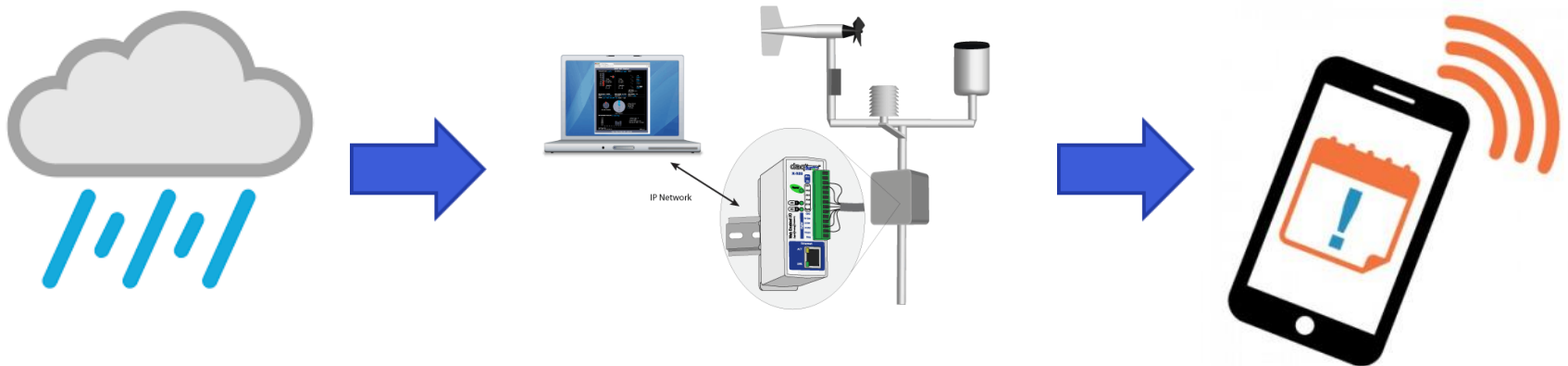
- ▶ Surface Retention
 - ▶ The City can incorporate rain gardens in public right of way.



Cross-section of one of four "bioretention flower gardens" under construction in Detroit's Cody Rouge neighborhood. The gardens will soak up and store storm water to help reduce overflows during large storms. Image credit: Tetra Tech

What can Berkley do moving Forward?

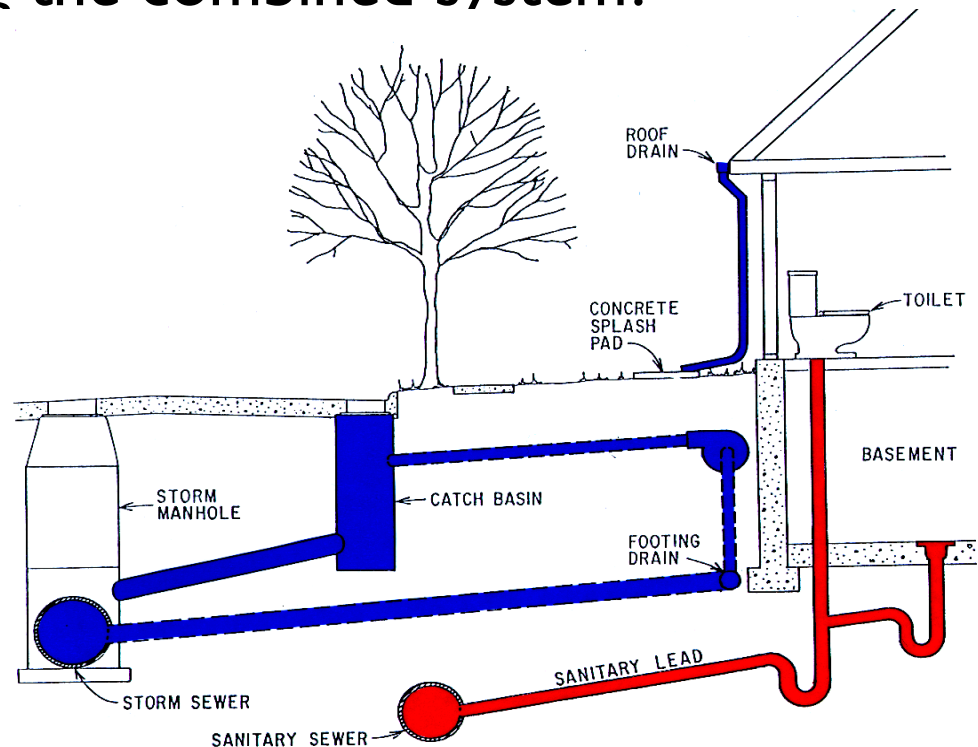
- ▶ What about installing early warning systems?
 - ▶ Purchase weather stations and rain gauges that could be interconnected warning system that sends messages when rain levels exceed specific parameters.
 - ▶ Install throughout the city to give accurate picture of rain events
 - ▶ Could help residents protect their possessions.



What can Berkley do moving Forward?

▶ What about separating the combined system?

- ▶ The cost could likely exceed a billion dollars.
- ▶ All portions of right-of-way (streets, sidewalks, and trees) would be affected
- ▶ Would require a 100 year work plan
- ▶ City can only bond for 10% of total property value

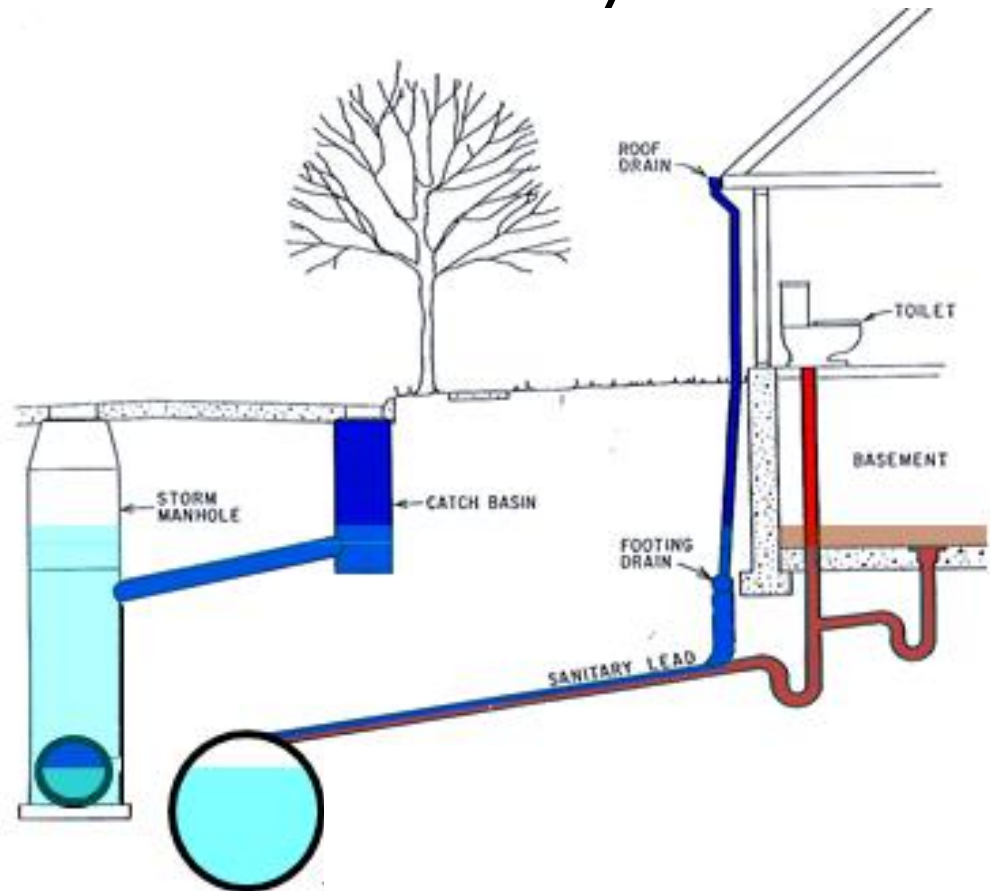


SEPARATE SEWER SYSTEM

What can Berkley do moving Forward?

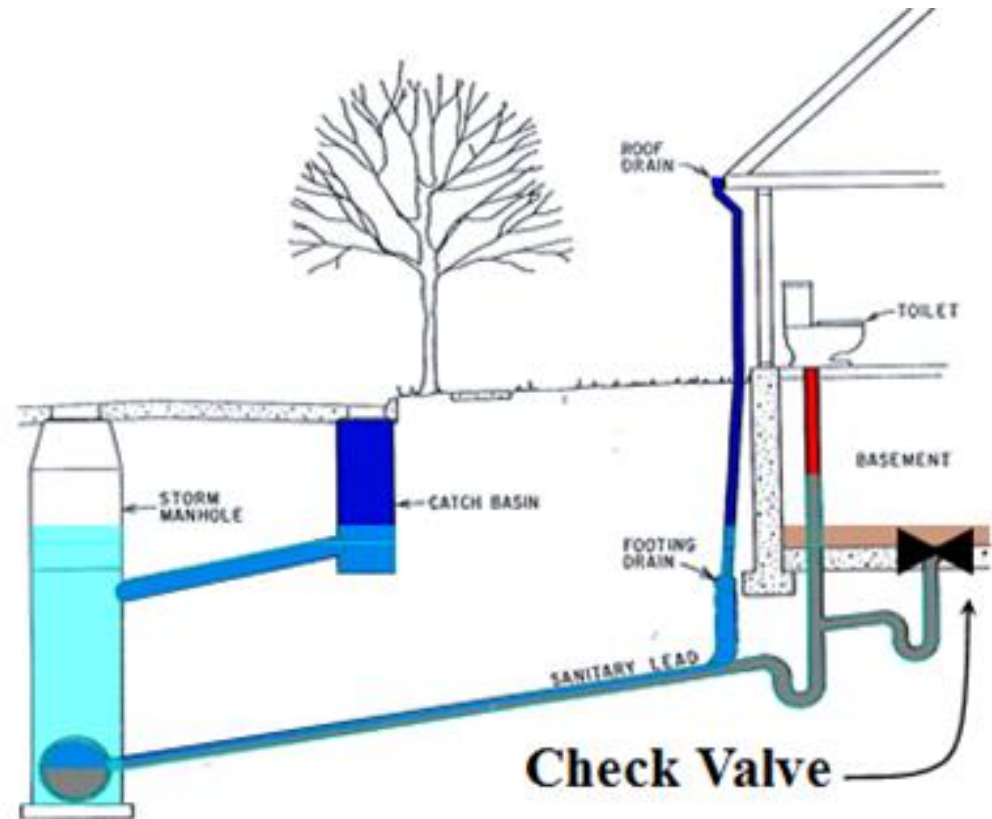
▶ What about building a relief sewer in the City?

- ▶ Only benefits limited areas
- ▶ Would require them build strategy around community
- ▶ Carries cost similar to full separation
- ▶ Would likely require 50 to 100 years to fully implement



What can Berkley do moving Forward?

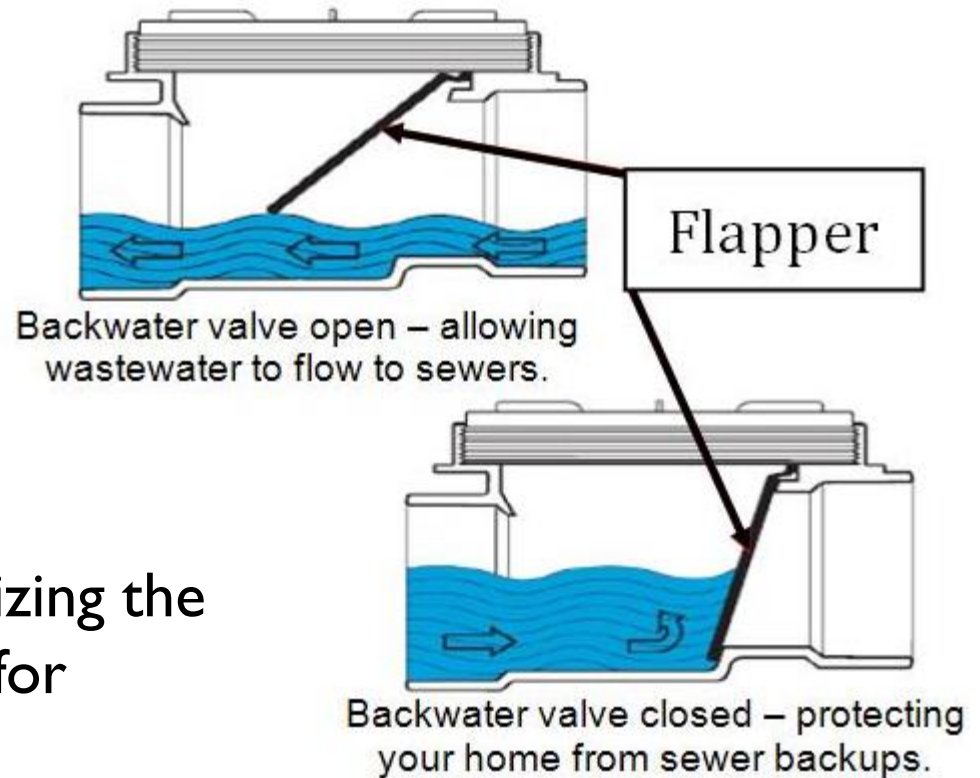
- ▶ What about working with homeowners to install check valves?
 - ▶ Also called a backwater valve or backflow preventer
 - ▶ Installed in home to prevent sewer surcharges into home
 - ▶ Required by Plumbing Code on new homes since the 1980s
 - ▶ Does come with some risk and required maintenance



What can Berkley do moving Forward?

- ▶ Backwater valves continued
 - ▶ What if only a few get them? Will make other's worse?
 - ▶ Does require routine maintenance to ensure proper function
- ▶ City is exploring incentivizing the purchase of these valves for homeowners

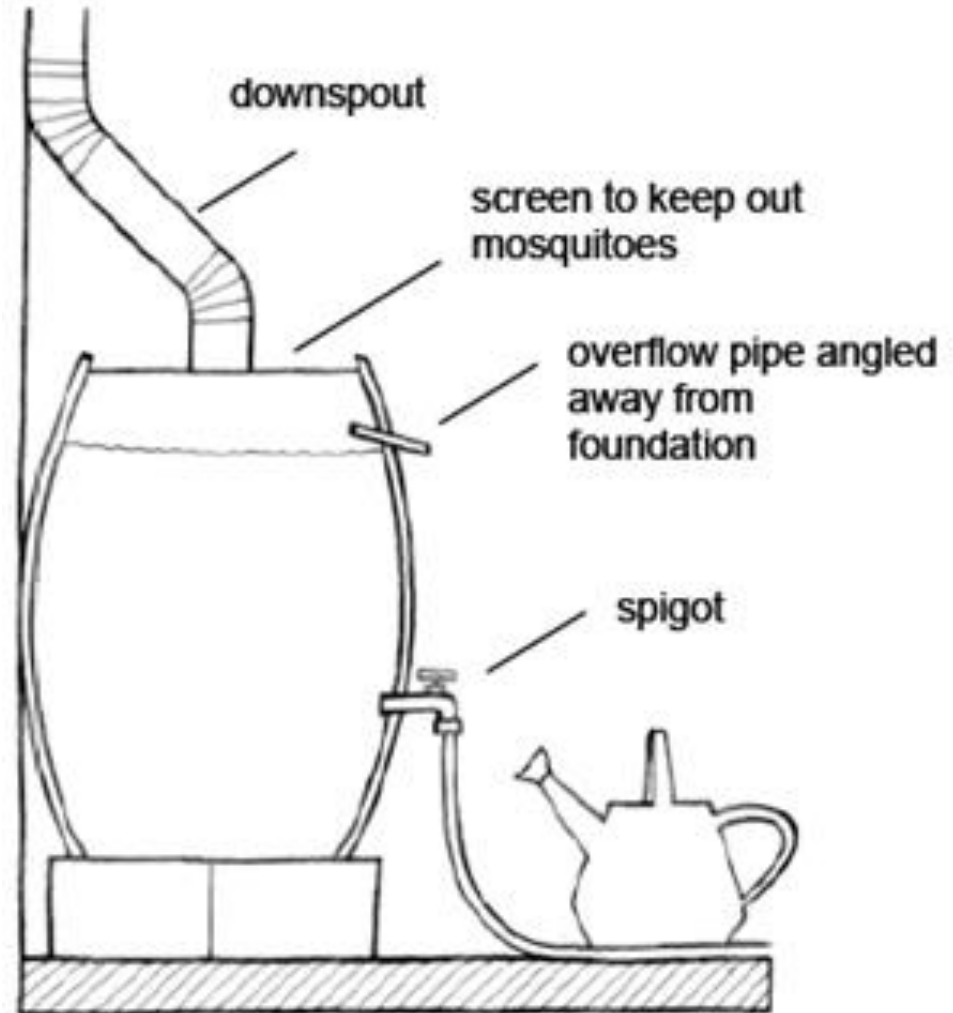
Backwater Valves



What can Berkley homeowners do?

► Rain Barrels

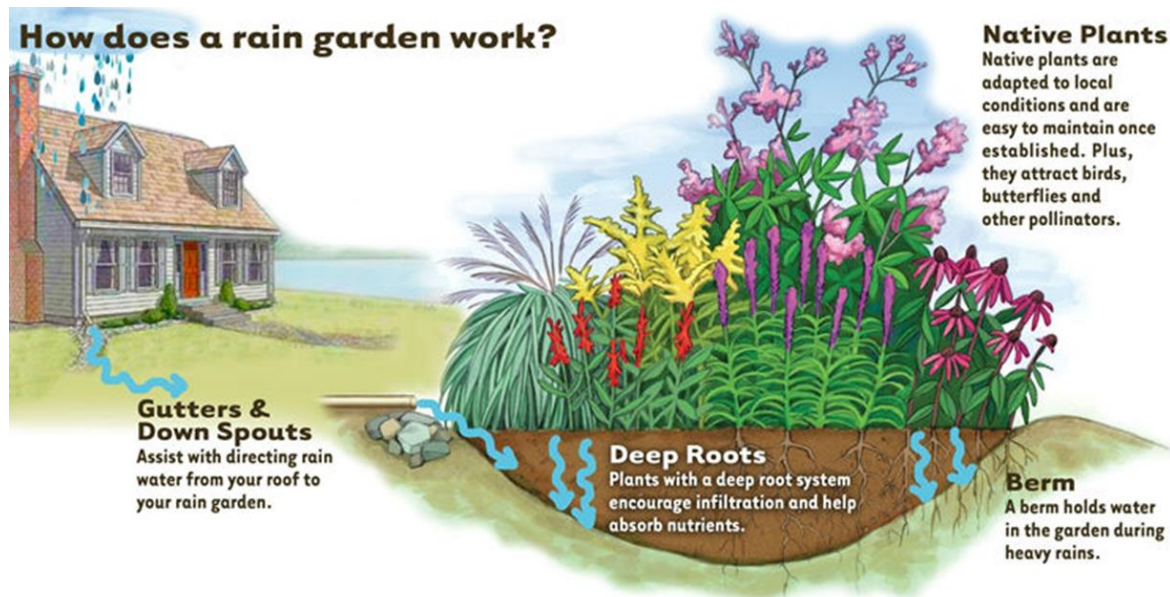
- Captures and repurposes rainwater
- Diverts overflows from system
- Offers a source of “free” water for flowers, gardens, irrigation
- Non-potable water



What can Homeowners do?

► Rain Gardens:

- Berkley's soil is mostly clay and does not absorb rainwater very well.
- Interested homeowners can try to divert rain water away from streets and system by installing a mini-retention basin called a “rain garden” complete with flowers and plants.



Source: watershedcouncil.org

Additional Questions Submitted Tonight

- ▶ Thank you for your questions on the provided cards!
 - ▶ We have grouped them by common themes and points
 - ▶ In this segment, we cover these themes together
-
- ▶ After tonight's discussion, the conversation continues!
 - ▶ Please send additional questions to rainevent2017@BerkleyMich.net and we will provide regular updates

