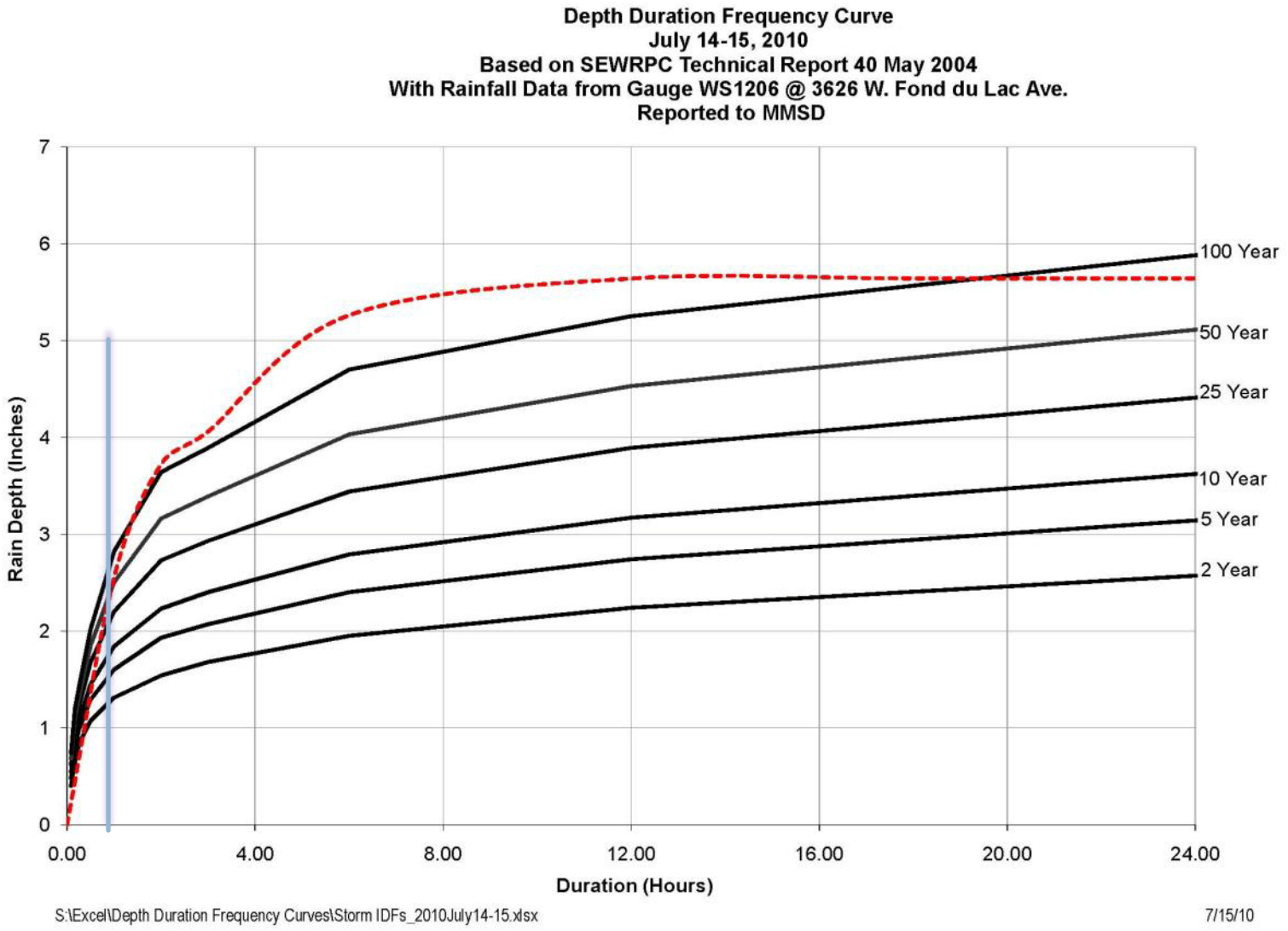
VILLAGE OF SHOREWOOD

Sewer System Information Meeting 11/4/10

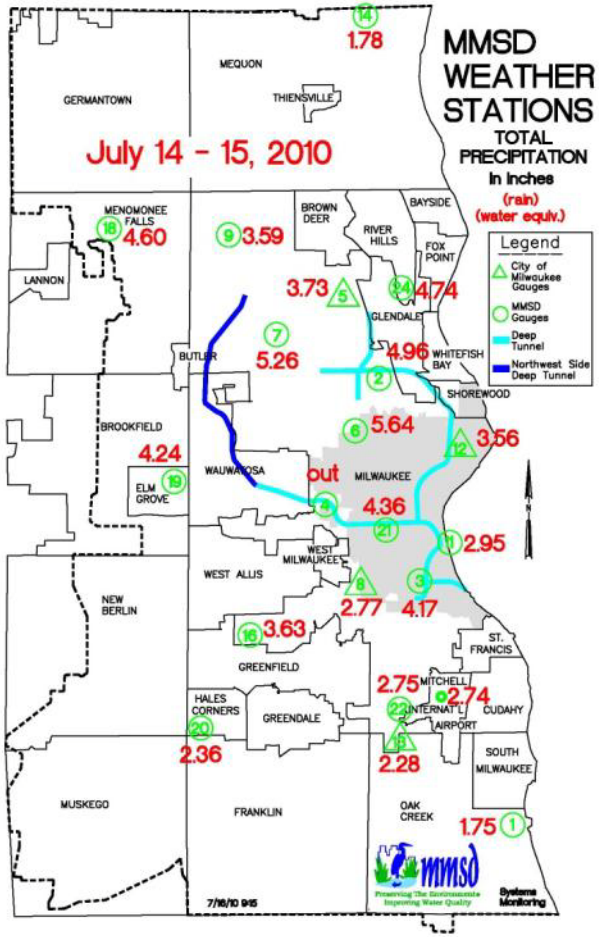
Framework

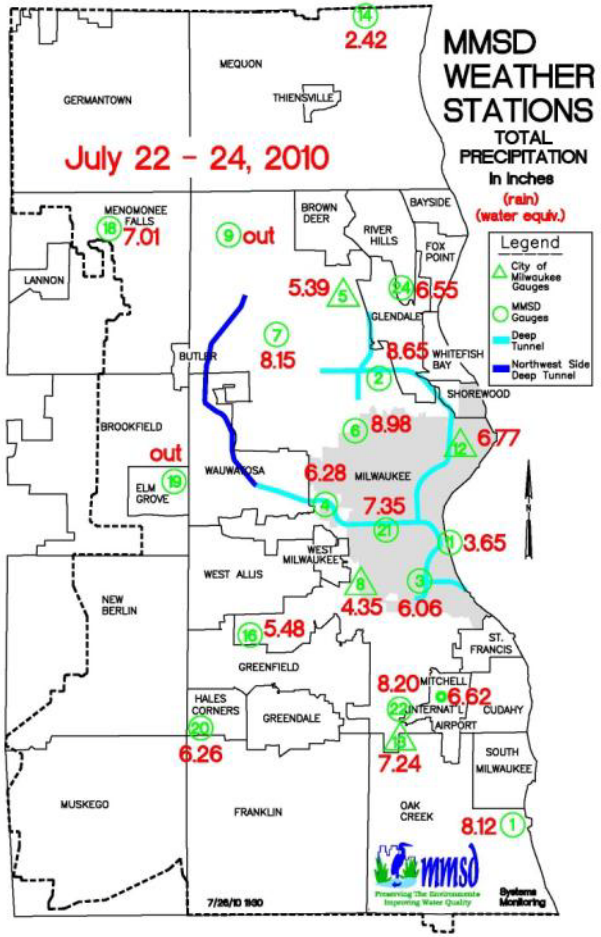
- Community agreement on levels of protection
- Prioritization of solution alternatives
- Financial Strategy
- Communication to the Community
- Consensus Building
- Implementation

Perspective on Probability of Rain



July 2010 Rain Statistics

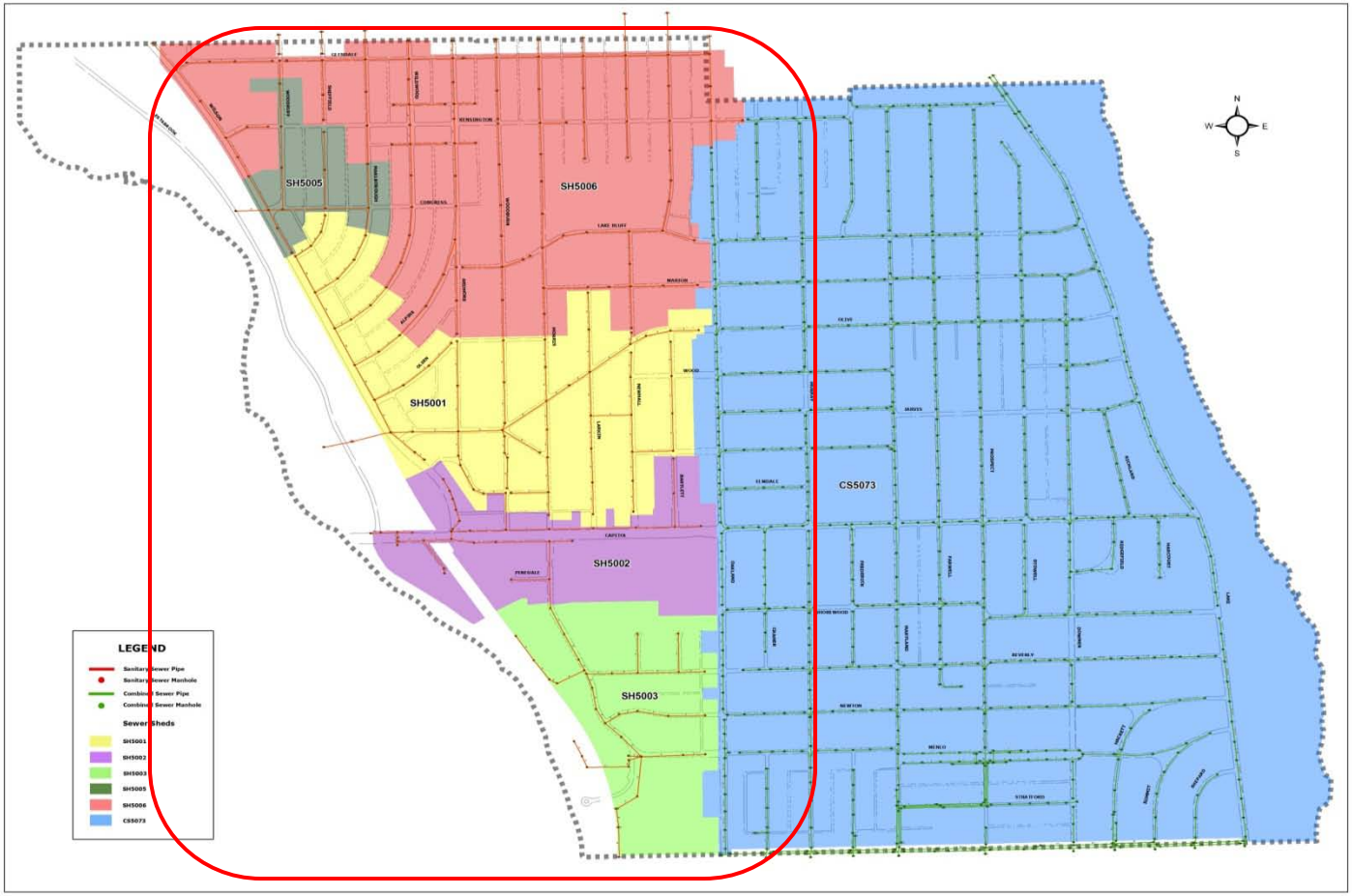




Number of Buildings in Each Basin

- Basin 1 – 402
- Basin 2 – 28
- Basin 3 – 146
- Basin 5 – 72
- Basin 6 – 644
- SUBTOTAL SEPARATED AREA: 1,292
- SUBTOTAL COMBINED AREA: 1,856
- **GRAND TOTAL: 3,148**

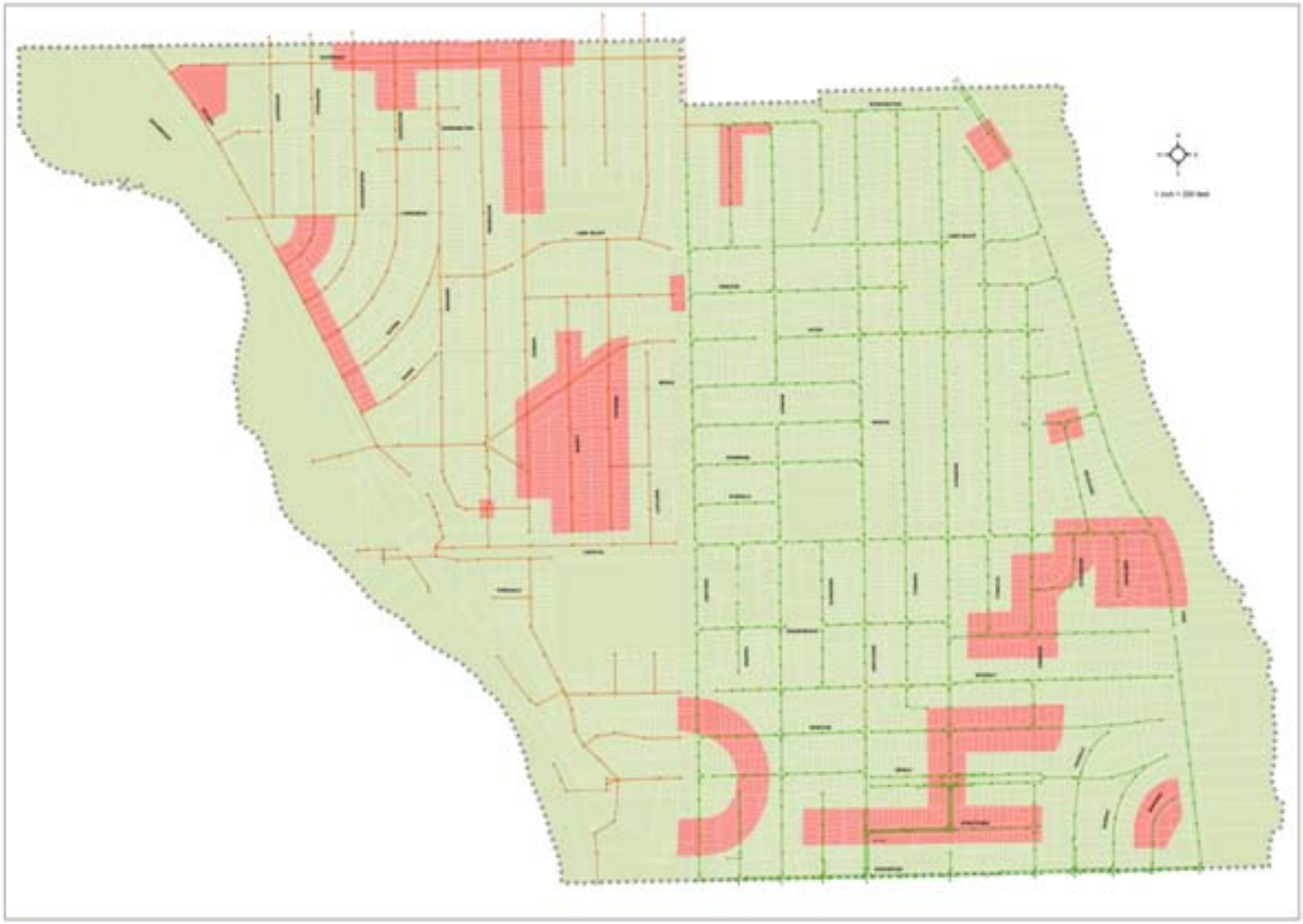
Separated Sanitary Sewer Area



Basin 1 Sanitary Sewer Backups

- Focus on frequent backups on Larkin, Bartlett, and Newhall, south of Olive, north of Capitol
- Affecting approximately 150 properties in a **2 inch-1 hour** rain

2 inch-1 hour Rain



Basin 1 Sanitary Sewer Backup Risk Reduction – PIPE CONSTRUCTION

- Replacement and re-route of 5,000 ft of sewer on Larkin, Bartlett, Newhall, and Olive
- Provides **2 inch-1 hour** rain service
- Wet weather discharge to MMSD is 65% over limits

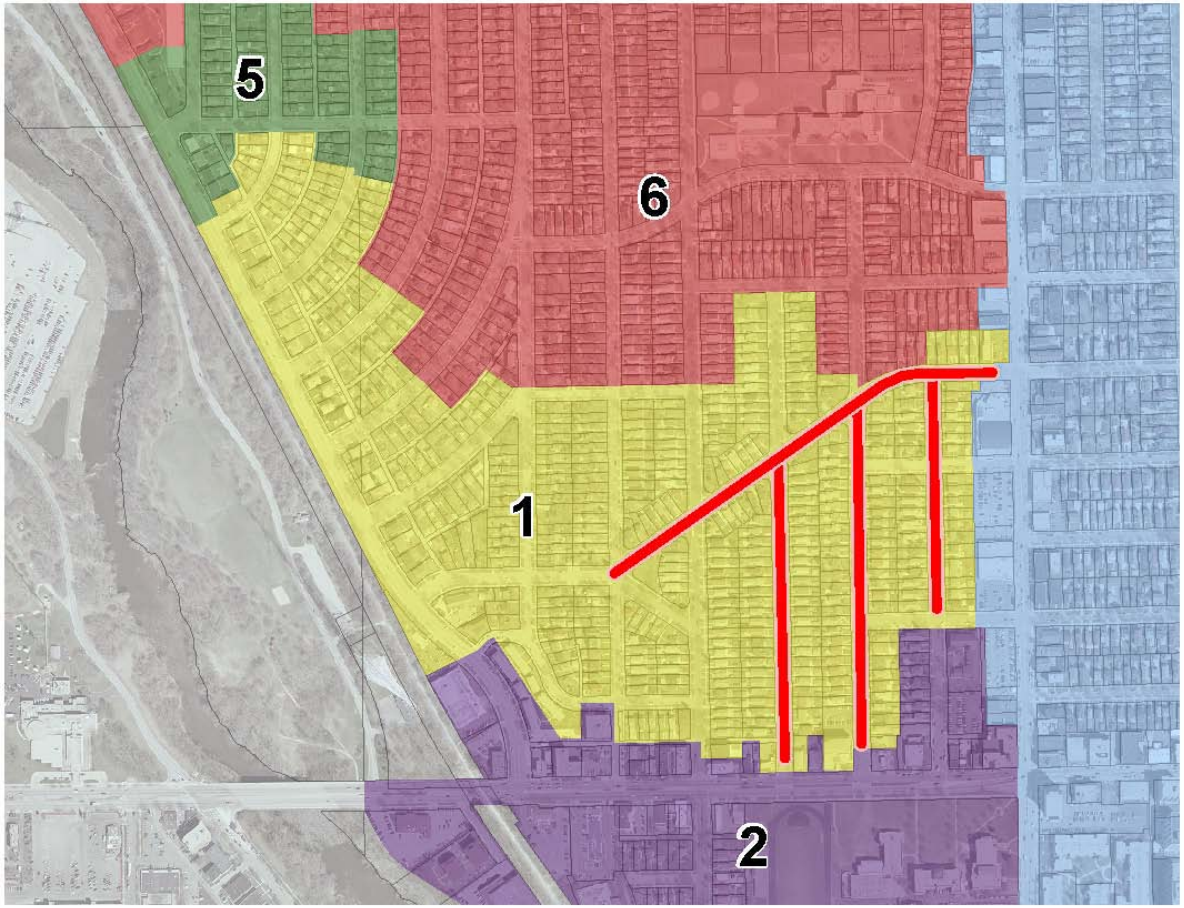
Basin 1 Sanitary Sewer Backup Risk Reduction – I/I REDUCTION

- Protection against more than the **2 inch-1 hour** rain **REQUIRES** inflow and infiltration reduction
  - Continued mainline and manhole rehabilitation
  - Estimated 16,000 feet of mainline sewer
  - New initiative to rehabilitate sanitary laterals
    - Approximately 400 laterals at $4,000 each.
  - New initiative to disconnect foundation drains from sanitary sewers
    - Approximately 400 foundation drains at $7,500 each.

Basin 1 Sanitary Sewer Backup Risk Reduction – SUMMARY

	Incremental Cost	Cumulative Cost	Number of Homes at Risk in Rainfall			
			1 inch-1 hour	2 inch-1 hour	3 inch-1 hour	4 inch-1 hour
Existing	-	-	-	150	400	400
Sanitary Sewer Construction	$ 2 M	$ 2 M	-	-	400	400
Lateral Rehab **~ 40% reduction in I/I**	$ 1.6 M	$ 3.6 M	-	-	-	400
Foundation Disconnect **~ 80% reduction in I/I**	$ 3.0 M	$ 6.6 M	-	-	-	-

Basin 1 Proposed Sanitary Sewer



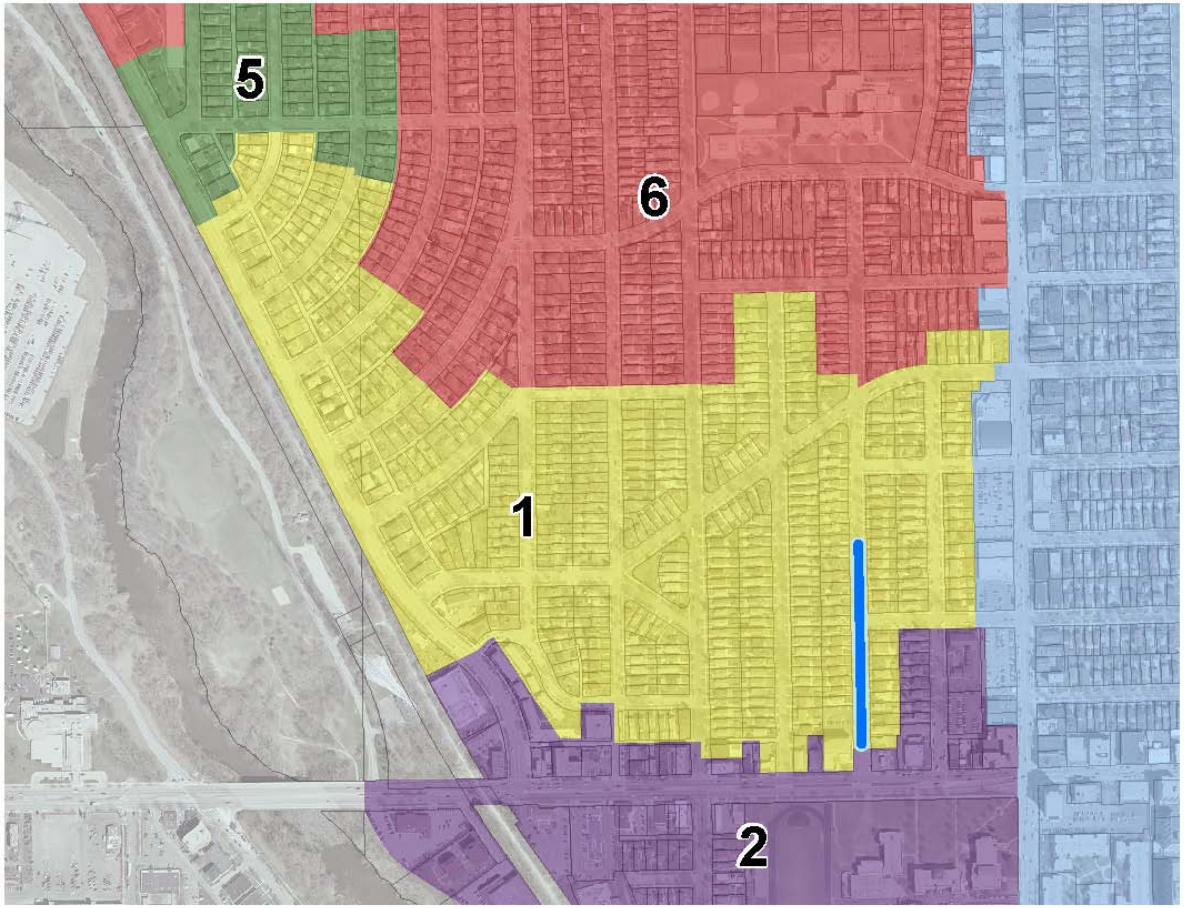
Basin 1 Street Flooding

- Surface depression centered at Kenmore and Newhall – directly affecting about 30 homes.
- Approximately 700 foot section of Newhall can collect up to 2.5 feet of rain during a 1 inch-1hour rain without overland flow.

Basin 1 Street Flooding – STORM SEWER CONSTRUCTION

- CHANGE drainage route by building a storm sewer pipe from Kenmore and Newhall to the new Capitol Drive storm sewer at Capitol and Newhall
- 1,000 feet of NEW STORM SEWER on Newhall
- Estimated $300,000
- Recommended performance goal is a **maximum 2 feet** of ponding during 3 inch-1 hour rain.

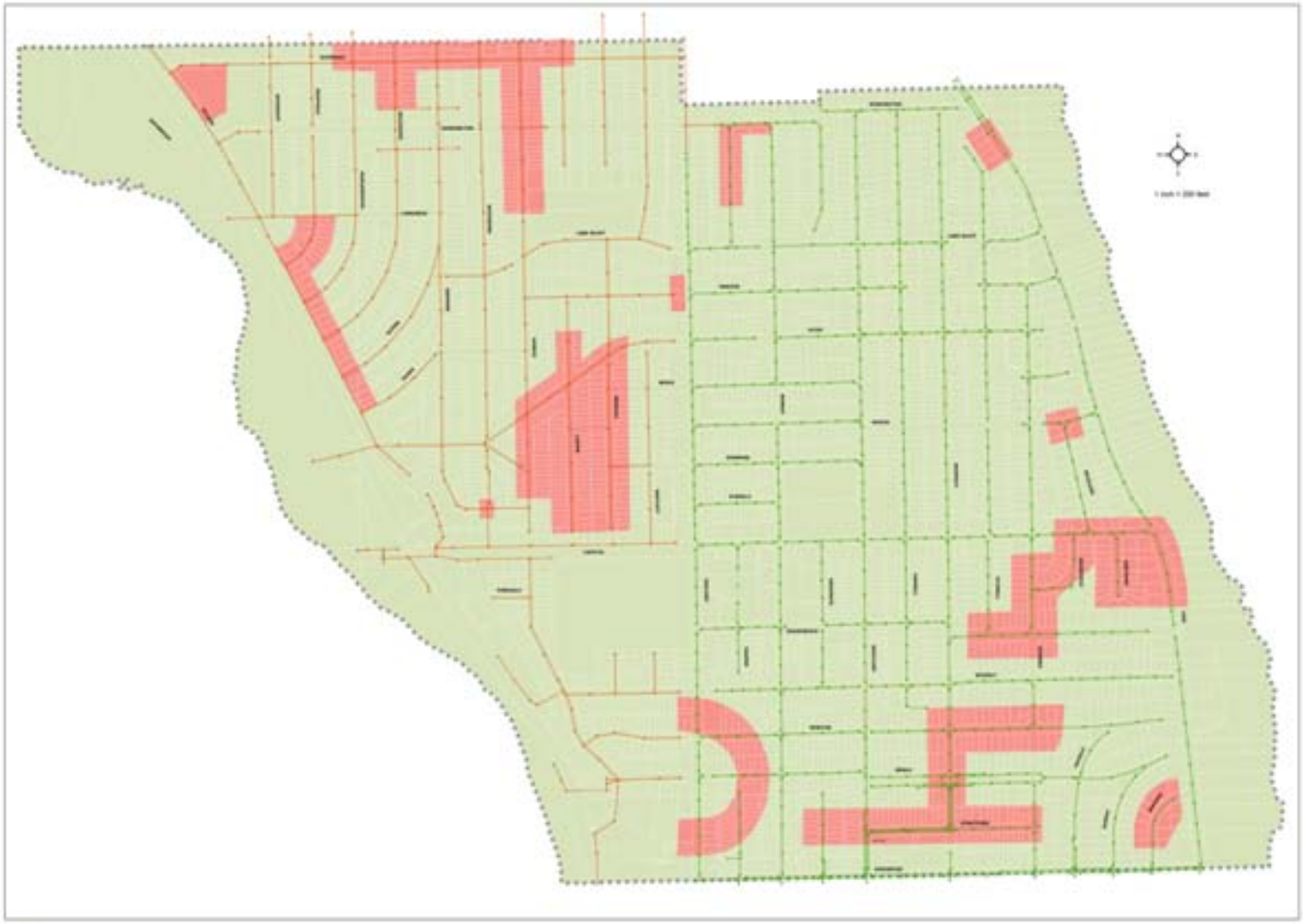
Basin 1 Proposed Storm Sewer



Basin 6 Sanitary Sewer Backups

- Focus on the central portion of the sewer area, bound by Glendale, Marlborough, Lake Bluff, and Larkin.
- Affecting approximately 175 properties in the **2 inch-1 hour** rain

2 inch-1 hour Rain



Basin 6 Sanitary Sewer Backup Risk Reduction – PIPE CONSTRUCTION

- 4,200 feet of **NEW** Sanitary Sewer construction on Kensington to intercept and re-route sewage to the west, then south to the Congress MIS connection
- 2,000 feet of **NEW** Sanitary Sewer construction on Glendale to separately collect sewage from Whitefish Bay, and convey it back to Whitefish Bay at Marlborough. **FULL** disconnection from Whitefish Bay
- Provides **3 inch-1 hour** rain service

Basin 6 Sanitary Sewer Backup Risk Reduction – I/I REDUCTION

- Protection against more than the **3 inch-1 hour** rain **REQUIRES** inflow and infiltration reduction
  - Continued mainline and manhole rehabilitation
  - Estimated 26,000 feet of mainline sewer
  - New initiative to rehabilitate sanitary laterals
    - Approximately 700 laterals at $4,000 each.
  - New initiative to disconnect foundation drains from sanitary sewers
    - Approximately 700 foundation drains at $7,500 each.

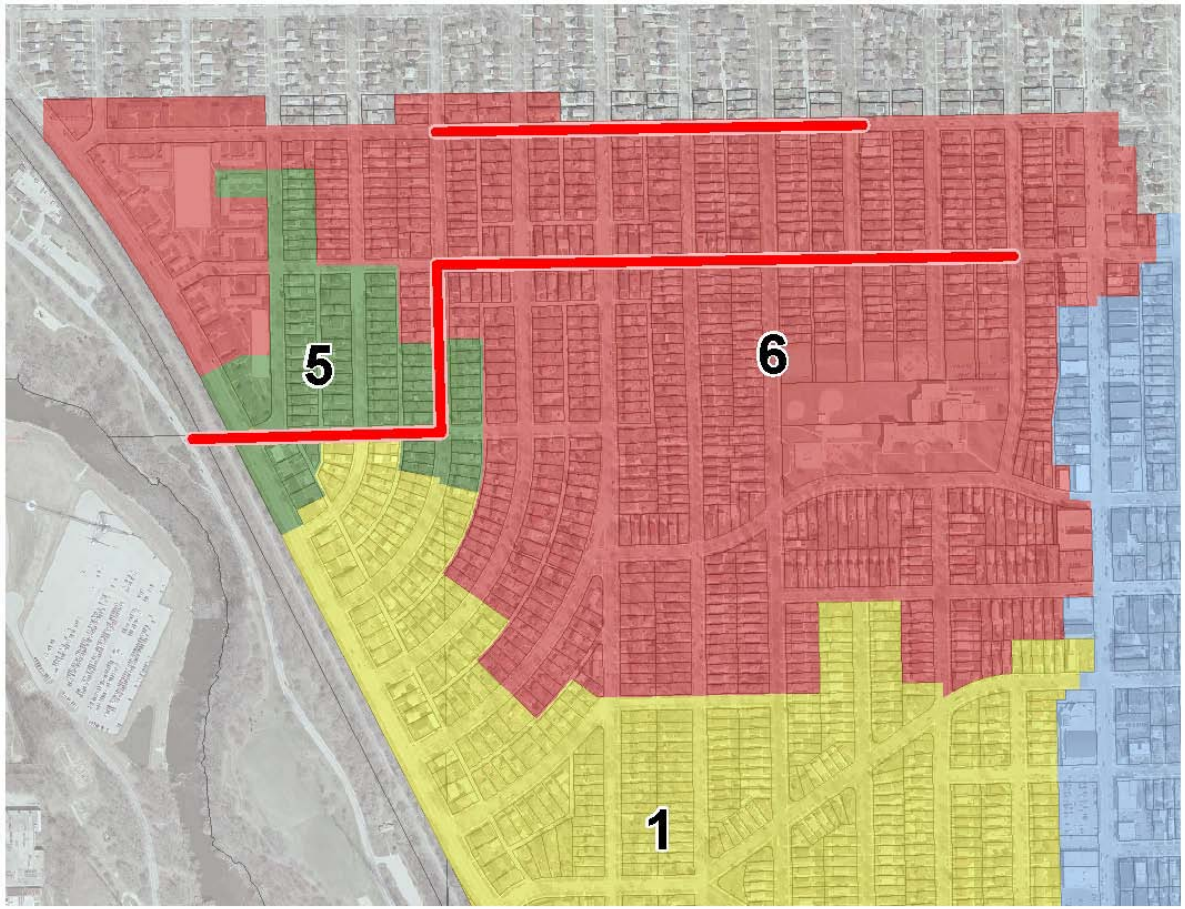
Basin 6 Sanitary Sewer Backup Risk Reduction – BYPASSING

- Currently, the Glendale Sanitary Sewer has 4 bypasses to the storm sewer – provides relief starting at the **1 inch-1 hour** rain.
- As rainfall amount increases, the effectiveness decreases – because the storm sewers have more and more water in them.

Basin 6 Sanitary Sewer Backup Risk Reduction – SUMMARY

	Incremental Cost	Cumulative Cost	Number of Homes at Risk in Rainfall			
			1 inch -1 hour	2 inch -1 hour	3 inch -1 hour	4 inch -1 hour
Existing	-	-	-	175	600	640
Sanitary Sewer Construction	$ 3 M	$ 3 M	-	-	-	640
Lateral Rehab **~ 40% reduction in I/I**	$ 2.8 M	$ 5.8 M	-	-	-	175
Foundation Disconnect **~ 80% reduction in I/I**	$ 5.25 M	$ 11.05 M	-	-	-	-

Basin 6 Proposed Sanitary Sewer



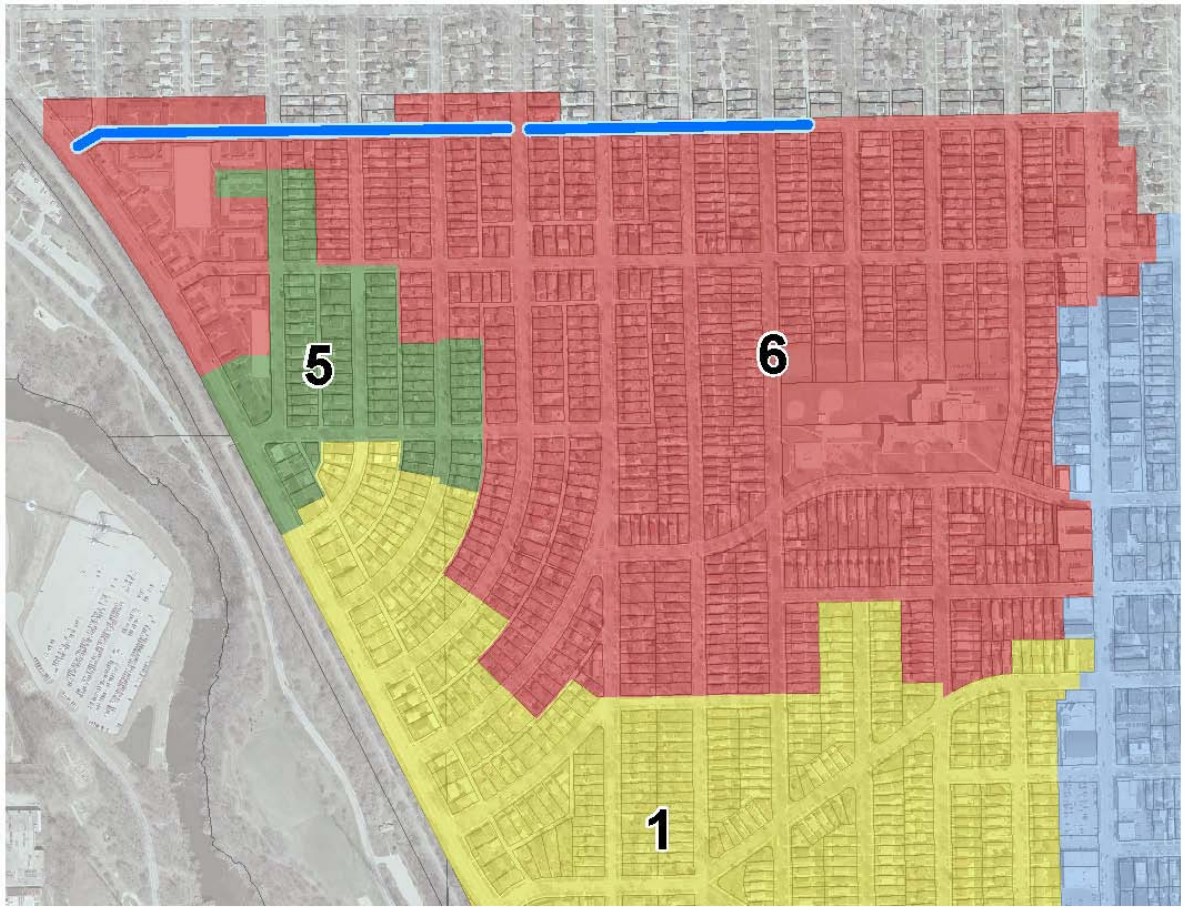
Basin 6 Street Flooding

- Surface depression on Glendale between Marlborough and Ardmore – directly affecting about 40 homes
- Approximately 600 foot section of Glendale can collect up to 3 feet of rain without overland flow

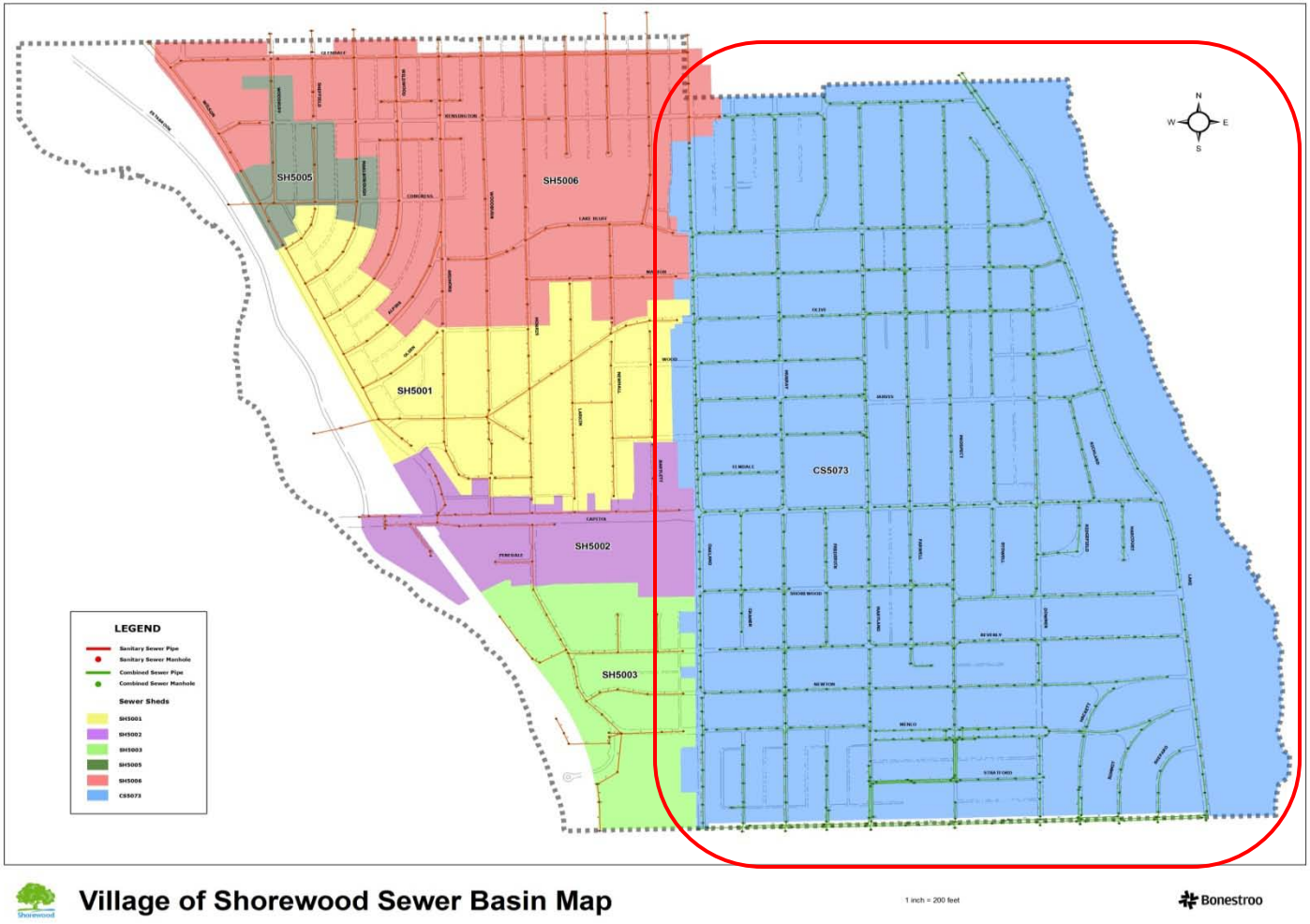
Basin 6 Street Flooding – STORM SEWER CONSTRUCTION

- UPSIZE 1,200 feet of existing storm sewers on Glendale from Wildwood to Larkin
- $420,000
- ADD 1,800 feet of NEW storm sewers on Glendale from Wildwood to the Milwaukee River
- $900,000
- Recommended performance goal is a of **maximum 2 feet** of ponding during 3 inch-1 hour rain.

Basin 6 Proposed Storm Sewer



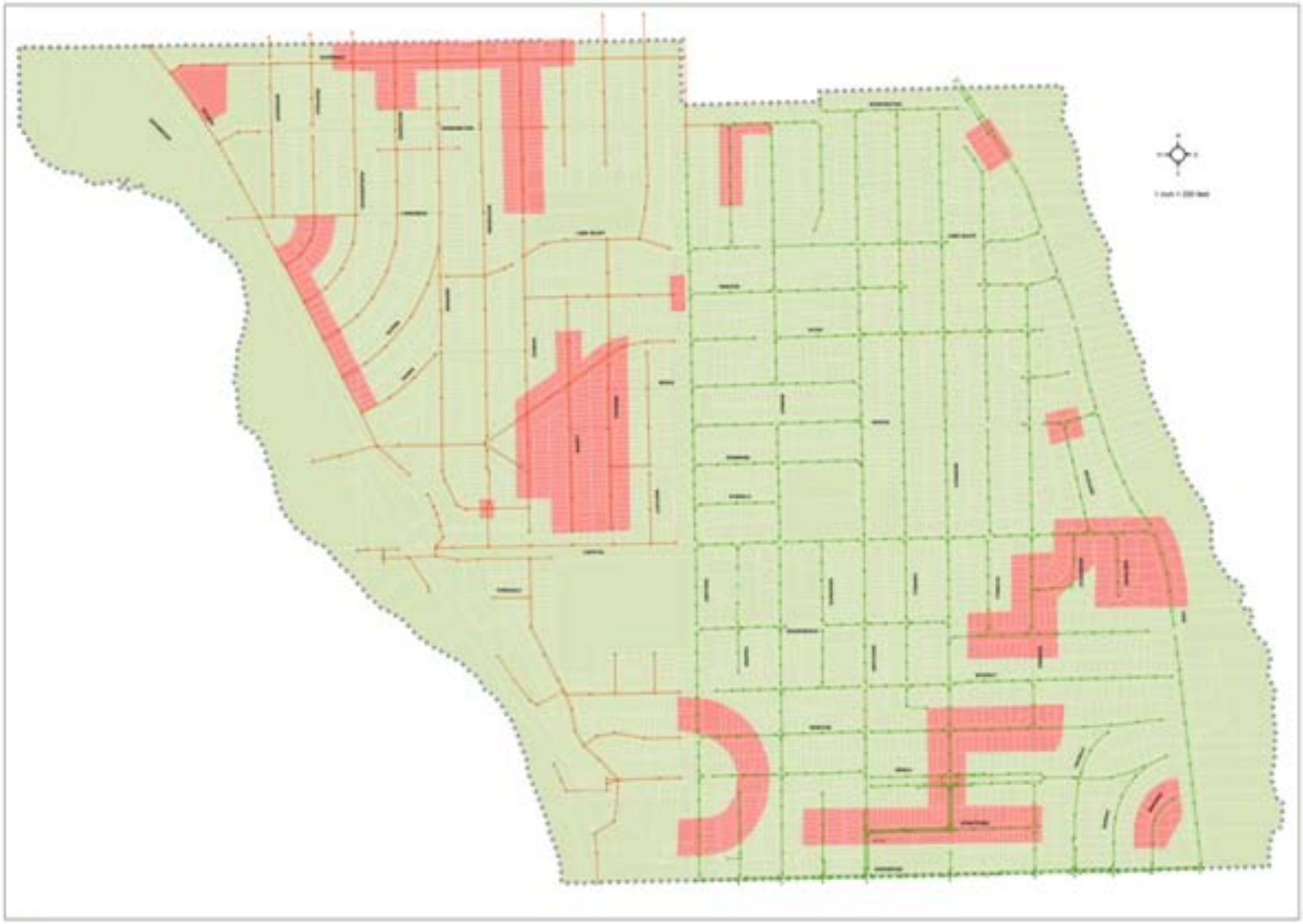
Combined Sewer Area



Combined Area Basement Backups

- Focus on
  - Cramer, Murray, and Maryland at Kensington
  - Ridgefield, Richland, Harcourt at Capitol Drive
  - Lake Drive, north and south of Capitol
  - Shorewood, Newton, Menlo, and Stratford between Downer and Prospect
  - Along Edgewood and areas to the immediate north, between Downer and Oakland
- Affecting approximately 225 properties in rains of less than **2 inches-1 hour**

2 inch -1 hour Rain



Combined Area Street Flooding

- Surface depressions without overland flow routes:
  - Shorewood, Prospect to Downer
  - Beverly, Prospect to Downer
  - Maryland, Stratford to Edgewood
  - Hackett, Menlo to Edgewood
  - Summit
  - Edgewood and Lake
  - Oakland And Edgewood

Combined Area Basement Backups – COMPREHENSIVE APPROACH

- VIRTUAL SEPARATION by adding to existing storm sewers in the north half by 2,500 feet
- VIRTUAL SEPARATION by constructing 8,000 feet of new storm sewers to Lake Michigan between Downer and Lake Drive, south of Shorewood
- COMBINED SEWER capacity increase with upsizing of 6,500 feet of pipe along Kensington, Cramer, Maryland, Richland, Ridgefield, Prospect

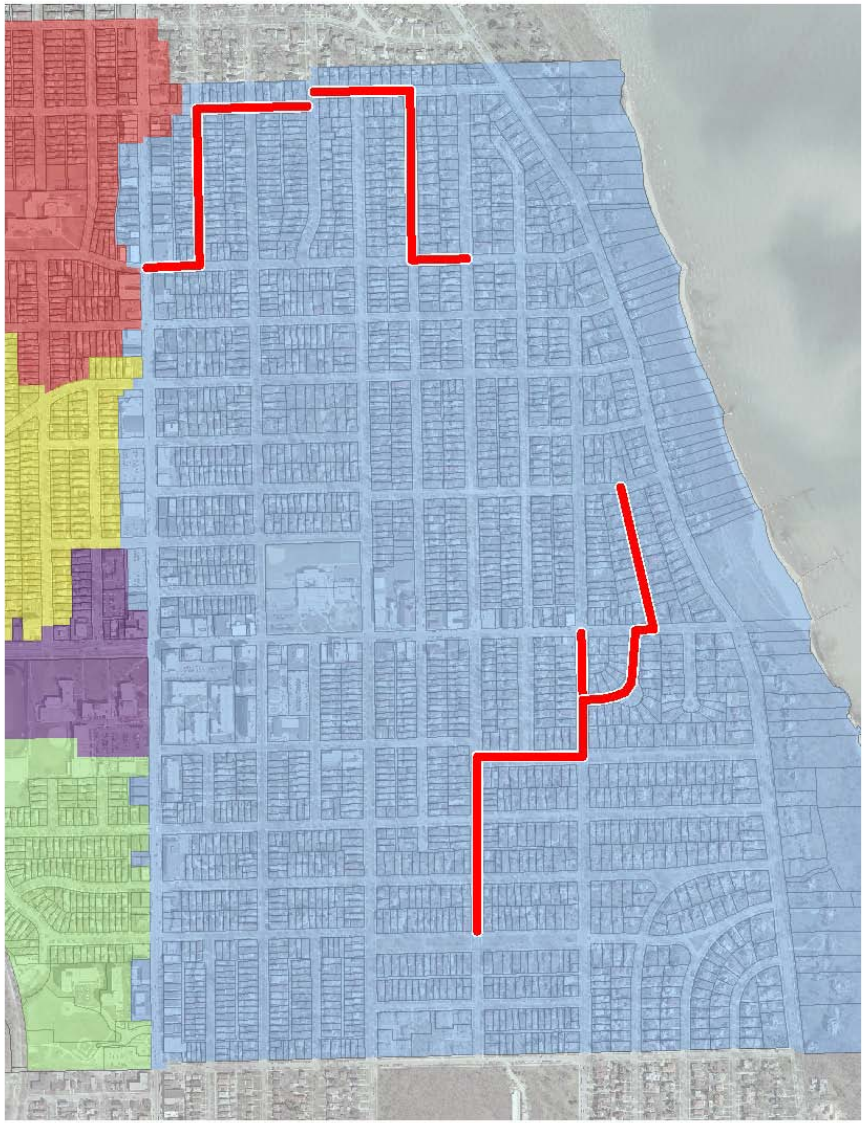
Combined Area Basement Backups – COMPREHENSIVE APPROACH

- UNCOUPLING Milwaukee Combined Sewers from Shorewood Combined Sewers at Edgewood and Maryland.
- UPSIZED MMSD pipe from Oakland to the Deep Tunnel – 1,400 feet of 72 to 96 inch.
- NEW DRAINAGE-WAY from Oakland to Milwaukee River – prevents Oakland/Edgewood ponding.

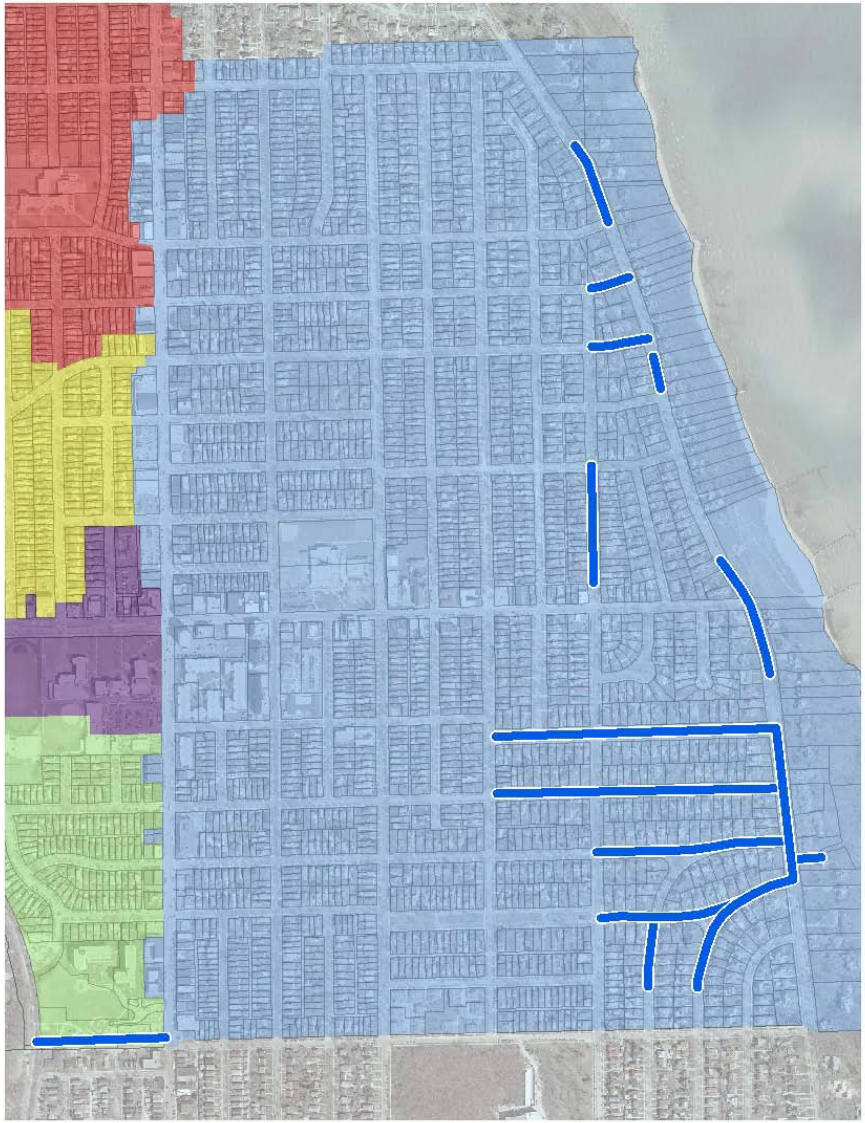
Combined Area Basement Backups – COMPREHENSIVE APPROACH

- Strategic, priority FULL SEPARATION by building 30,000 feet of NEW SANITARY SEWERS at the southwest corner of the combined area
- Where storm sewers are in place FULL downspout and foundation drain disconnection. Currently, there are about 920 homes with access to storm sewers.

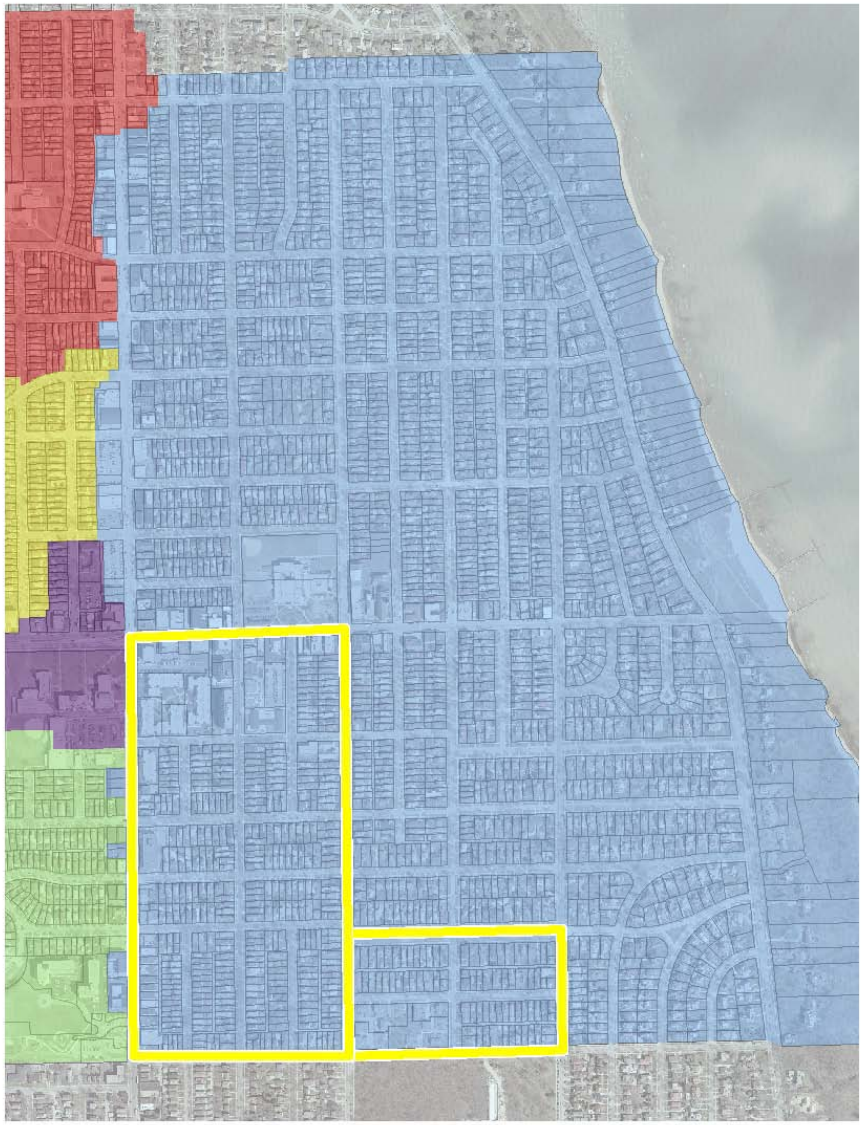
NEW COMBINED SEWERS



NEW STORM SEWERS



PRIORITY SEPARATION AREA



Combined Area Basement Backups – BYPASSING

- Bypassing requires a free outfall LOWER than the maximum water level sought
- Usually, adjacent storm sewers provide this outfall, though not always FREE OUTFALL – there is already flow in the storm sewers while we try to bypass
- Storm Sewers on Kensington (already has bypass) and some Lake Drive locations are lower than combined sewer

Combined Area Basement Backups – BYPASSING

- Everywhere else, bypassing would require **NEW RELIEF SEWERS**, deeper than combined sewers, and built just for bypassing
- Instead, we recommend building new sanitary sewers and achieve **virtual or full separation**

Combined Sewer Backup Risk Reduction – SUMMARY

	Incremental Cost	Cumulative Cost	Number of Homes at Risk in Rainfall			
			1 inch -1 hour	2 inch -1 hour	3 inch -1 hour	4 inch -1 hour
Existing	-	-	-	225	1600	1850
Combined Sewer Upgrades	$ 3.3 M	$3.3 M	-	-	1350	1850
Storm Sewer Construction	$ 3 M	$ 6.3 M	-	-	1000	1500
Strategic Separation	$7.5 M	$ 13.8	-	-	600	1100
or						
Full Separation	$ 24 M	$ 30.3	-	-	-	-

Next Steps

- Community agreement on levels of protection
- Prioritization of solution alternatives
- Financial Strategy
- Communication to the Community
- Consensus Building
- Implementation