

League of Women Voters of Wilmette

Stormwater Study, 2014

Objectives

- To review current status of stormwater management in Wilmette
- To understand outside entities whose regulations impact what the Village can or cannot do
- To review accepted and emerging best practices in stormwater management
- To evaluate Wilmette actions in the context of such practices
- If there are discrepancies, to determine what needs to happen to move Wilmette towards better practices
- To determine what the League's appropriate role is in this process

**A community-wide problem
requires a community-wide
response
from education => implementation**

Introduction

Stormwater flooding from intense rain events:

- is expensive to clean up (time and money)
- depresses property values
- devalues reputation of village as a place to live
- increases insurance rates or causes loss of coverage
- degrades quality of waterways
- affects public safety (electrical wires, impedes traffic)
- disrupts business

Stormwater Is Often Highly Polluted

- How we dispose of it matters!

- The **first inch of rain** creates the most polluted stormwater, especially after dry spells
 - Largest contributor: **transportation**
 - Oil & antifreeze droppings from cars, busses and trucks
 - Particulate material from exhaust and brake lining
 - Debris on roadways
 - Sand & salt
 - Second largest: **residential and commercial**
 - Lawn chemicals
 - Animal waste
 - Coal tar treatments on roadways and driveways
 - Soaps from car washing
 - Discharges of petrochemicals

Why is stormwater pollution an issue?

- **Nitrogen** and **phosphorus** from sewage plants, **urban stormwater runoff** and agricultural operations cause algae blooms
 - Chokes out other aquatic life
 - Robs water of oxygen fish need to survive
 - Impairs beaches & recreational activities
 - Affects drinking water supplies

Examples –

Emergence of the dead zone in Gulf of Mexico

An area the size of Connecticut

Algal growth has driven oxygen levels at seafloor so low virtually nothing can live there.

Lake Erie - algae blooms have returned in force

Lake Michigan seeing effects on drinking water, increased bacterial counts and beach closures

Stormwater Flooding in Wilmette, April 2013



Understanding Flooding

There are 3 types of flooding that commonly affect urban residents:

- **Water Backup** from floor drains, bathtubs, and sinks
- **Water Seepage** through cracks in floors or foundation walls
- **Overland Flooding** across yards or into basements

Terminology

inflow stormwater that enters sanitary and stormwater pipes through direct connections (downspouts, sump pumps, foundation drains, window wells)

infiltration stormwater as groundwater that enters sewers through cracks or leaks in pipes (property owners & municipal) and municipal street basins

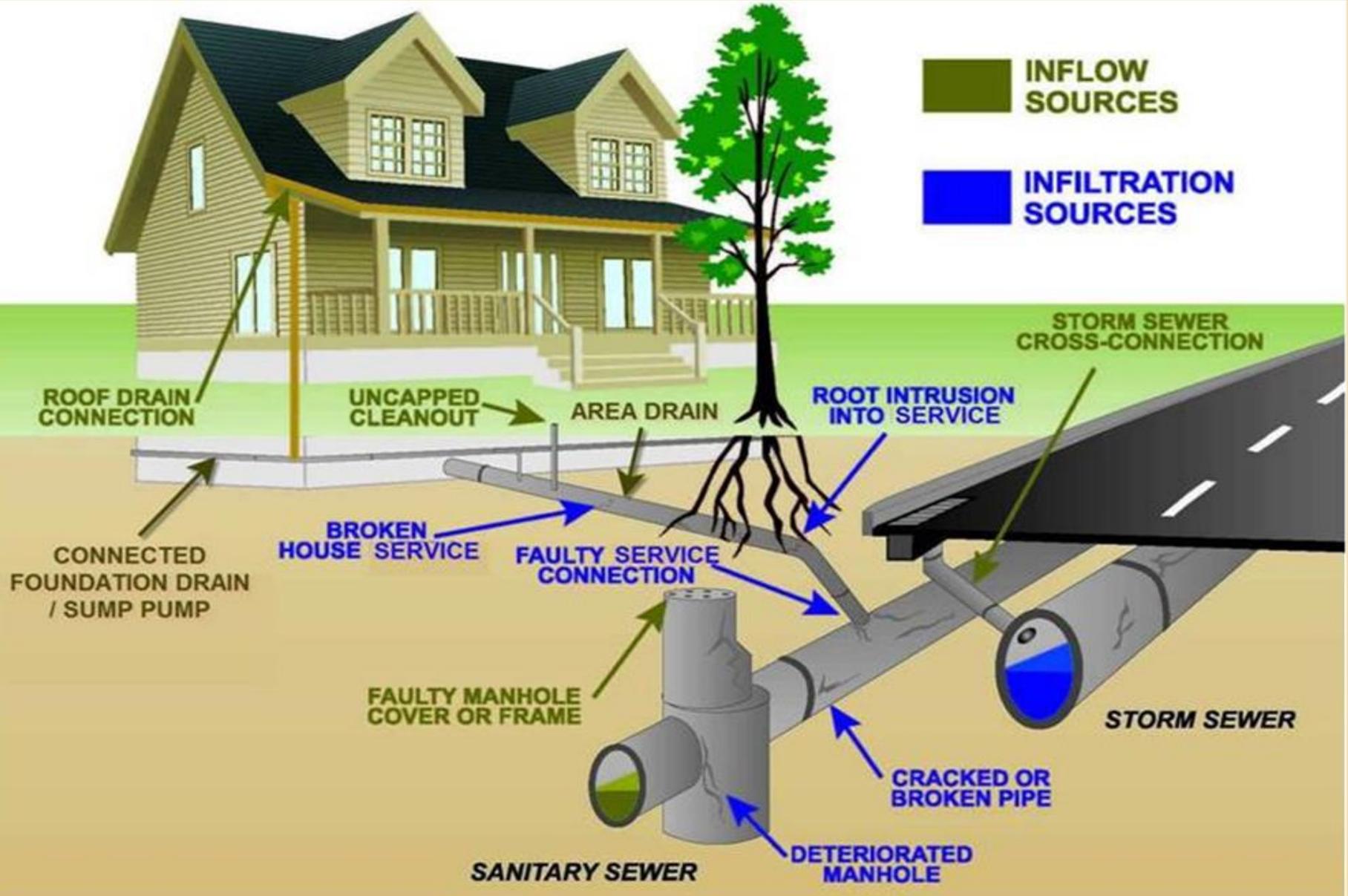
overland or surface flooding stormwater that flows over land and exceeds the capacity of drainage systems, accumulating in low-lying areas

overbank flooding stormwater that overflows rivers & streams

combined sewer overflow combined sewers full, contents spill over into waterways

INFLOW SOURCES

INFILTRATION SOURCES



Runoff with Respect to Land Coverage

Runoff volume after 1" rain in cubic feet of water

1 acre pasture land

Pervious



218

1 acre parking lot

Impervious



3,450

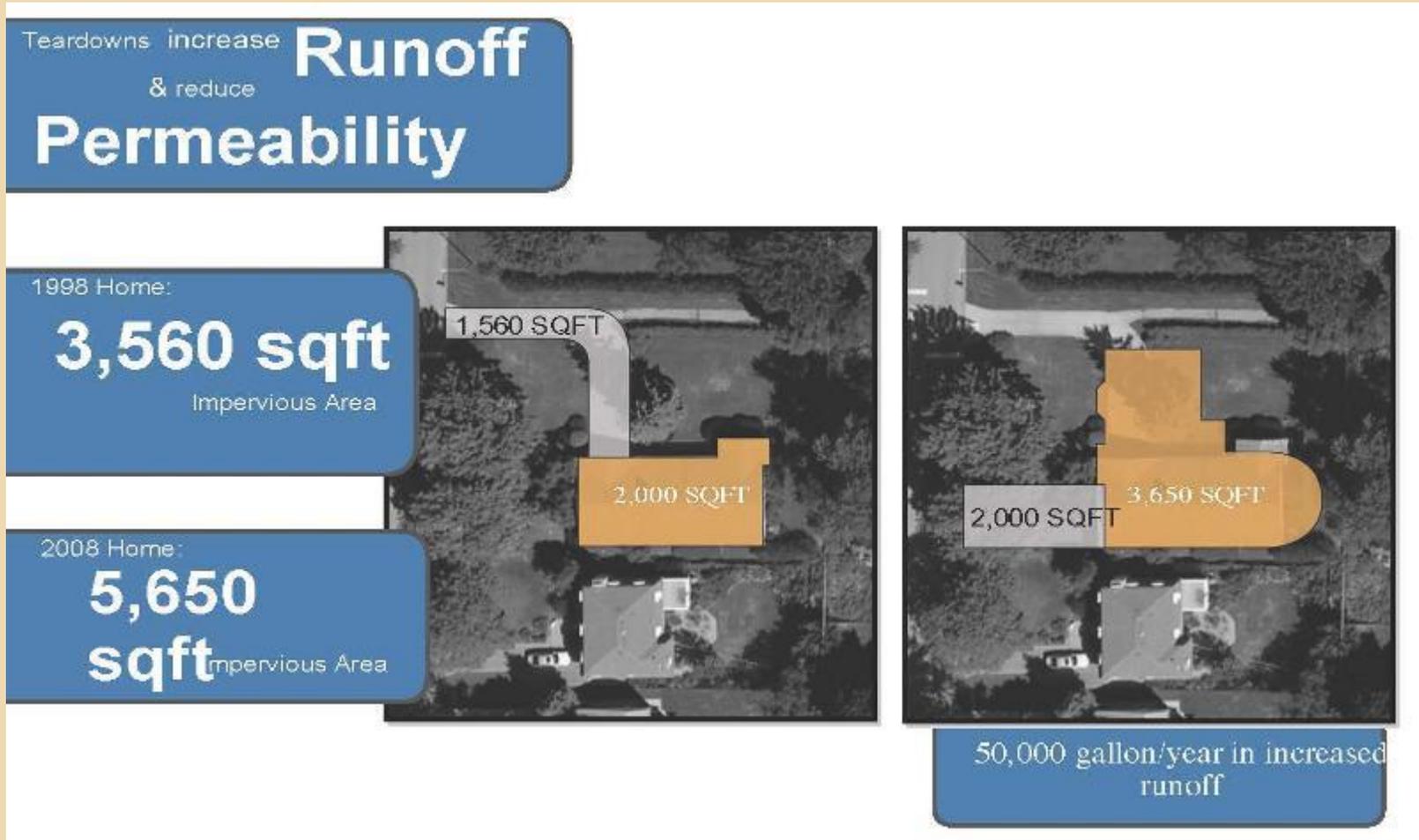
Shifts in land use have resulted in nearly a 16 time increase in runoff

Moreover, now much of our stormwater ends up in the Mississippi and thence to the Gulf of Mexico vs being retained within our community or treated and directed to the Lake – rain is not recharging water table here and Lake water is ending up in the Gulf.

Looking East from West Wilmette 1926 (Wilmette Ave on the left, Glenview Road on the right)



Increase in runoff as area of permeable surfaces decreases



Extra runoff goes into the same 12" pipe in the middle of the street.

Terminology

Gray infrastructure: pipes, deep tunnels, street basins, large detention storage areas

Green infrastructure: rain gardens, bioswales, retention basins, porous pavers, roof gardens



Ways to Increase Capacity to Manage Stormwater During Intense Storms

Increase size/number of pipes and treatment plants in system

Or

Slow flow of water and release it for processing over longer period of time (detention)

Or

Choose not to move water from where it falls (retention)

Or

Combine approaches

Stormwater Disposal Challenges

- Common problems throughout Wilmette
 - Many municipal pipes & catch basins are old, undersized, leaky or otherwise need repair
 - Property owners may have cross connections and/or inadequate property barriers*
 - Many parts of Wilmette were built before stormwater flooding was an issue
 - Enforcing compliance is complicated
 - Some older property owners “grandfathered”
 - Recent Clean Water Act rules only apply to new construction
 - Fines, tickets, and court actions for violations apply in some but not all cases

*Hundreds of homes have drain tiles without sump pumps that during storms dispose of stormwater into the sewer or stormwater systems.

Development of Sewer System for Wilmette

1872	Village incorporated. All sewage => Lake Michigan Village smaller (Ridge Rd to the Lake)
1914	All sewage => North Shore Channel
1924	Annexed Gross Point (became W Wilmette), but it was then mostly farms
1930-1940 1940-1950	E of Ridge, combined sewers => to MWRD for tx W of Ridge sanitary sewers => MWRD for tx stormwater => NBCR no tx
	1986 dye tested whole village looking for cross connections 1987 Ordinance requiring downspouts to be disconnected relief sewers (Greenleaf Avenue) street berms and inlet restrictors second stormwater outfall Backup generator at stormwater pump station sewer cleaning, televising, lining, rehabilitation sewer main repairs
	Current work in West Park

Waste & Stormwater Disposal

East of Ridge Rd

- All managed in **combined sewers** => via pipes to MRWD (Howard St.);
- **Theoretically all treated** – all treated water is ultimately discharged to the **Gulf of Mexico**
- **BUT in intense storms**
 - Some flows into North Shore Channel (this happens simply as a function of hydraulic pressure from the volume of stormwater)
 - Some stormwater is retained in street detention areas - then sent to MWRD after storm as street drains accept water (restrictors in storm basins released)
 - If there is too much water, combined overflow goes in the lake via opened locks (MWRD controls the locks)

Waste & Stormwater Disposal

West of Ridge Rd

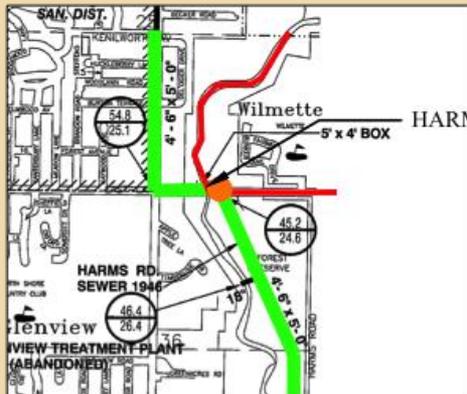
All **separate sanitary & stormwater** sewers

- Ridge Rd West to Romona Rd
 - **Sewage** => Princeton PI station => to MWRD & **treated**
 - **Stormwater** => Harms Rd station => **untreated** => North Branch of the Chicago River
- Romona Rd West to Harms Rd
 - **Sewage** => Harms Rd Station => to MWRD & **treated**
 - **Stormwater** => Harms Rd Station => **untreated** => North Branch of the Chicago River

Normal rainfall: no flooding issues but pollution in waterways

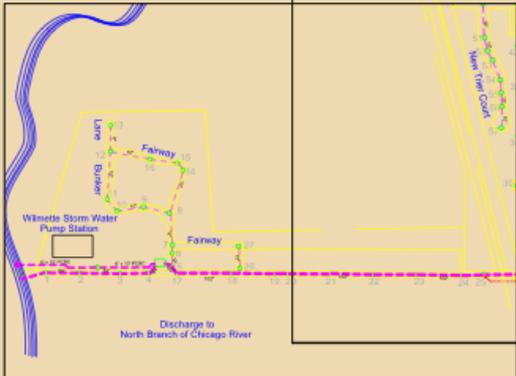
Intense rainfall: some neighborhoods experience sewage and/or stormwater backups. Also pollution in waterways

PRINCETON OUTFALL



HARMS OUTFALL





To Address the Problem, the Source Matters

- Most pipes last 20 - 50 yrs; many Wilmette pipes & lateral connections are older (**E** ~60-80 yrs **W** ~40-60 yrs)
 - Older pipes susceptible to cracks & breaks
 - Most private property pipes: **never evaluated**
 - Many property owners: **unaware of problem**
- Continuously flowing sump pump puts >7,000 g => sewer in 24-hr period (= daily avg flow for 26 homes)
 - Contributes to overload of municipal pipes
 - Burden to MWRD treatment plants

Stormwater Discharge Point

All of Wilmette W of Ridge Rd



- Few current volume limits or requirement for testing or management quality of water discharged.
- Wilmette's discharge blends with those from northern communities and is sent on to southern communities and ultimately to the **Gulf of Mexico**.

**Research has shown that in
as much as 70% of defect-related
inflow & infiltration of stormwater in
sanitary pipes in villages like Wilmette
the source is from private connections.**

sanitary sewer
line is filled with
extraneous stormwater => Capacity of
sewer is exceeded => Sewers
become surcharged => Sewage in
basements

Types of Problems Identified in West Wilmette Evaluations Made by Consultants in 1988

Infrastructure issues

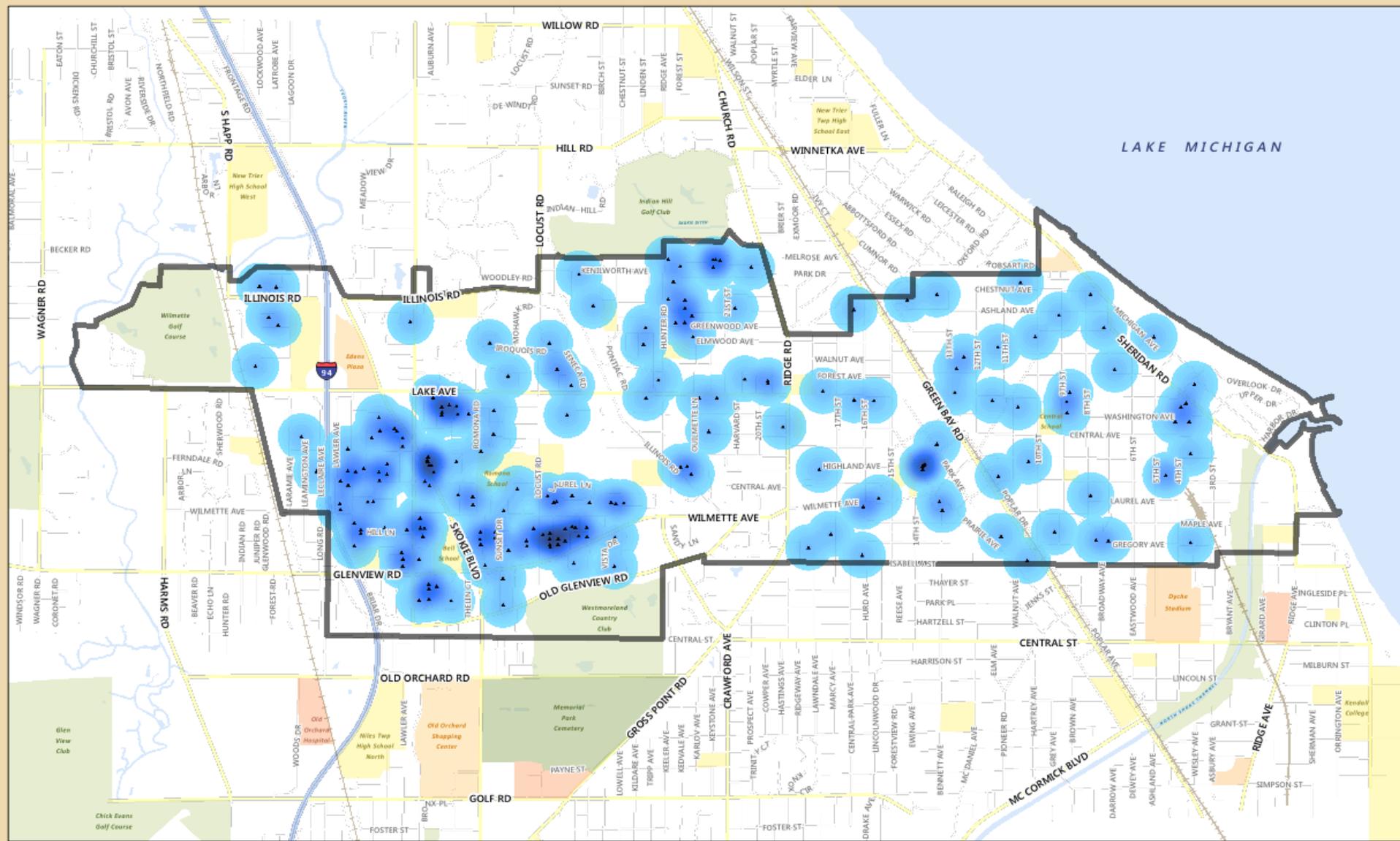
- Manhole covers in disrepair (**996**)
- Need for detention area at Princeton Place
- Specific places with undersized pipes, defective walls in street structures, grading issues

Property owners issues

- Downspouts directly connected to sanitary sewers (**3,189**)
- Stormwater sump pumps connected to sewers (**1,909**)
- Other cross connections (**66**)
- Foundation drains contributing groundwater to sewer load (**2648**)

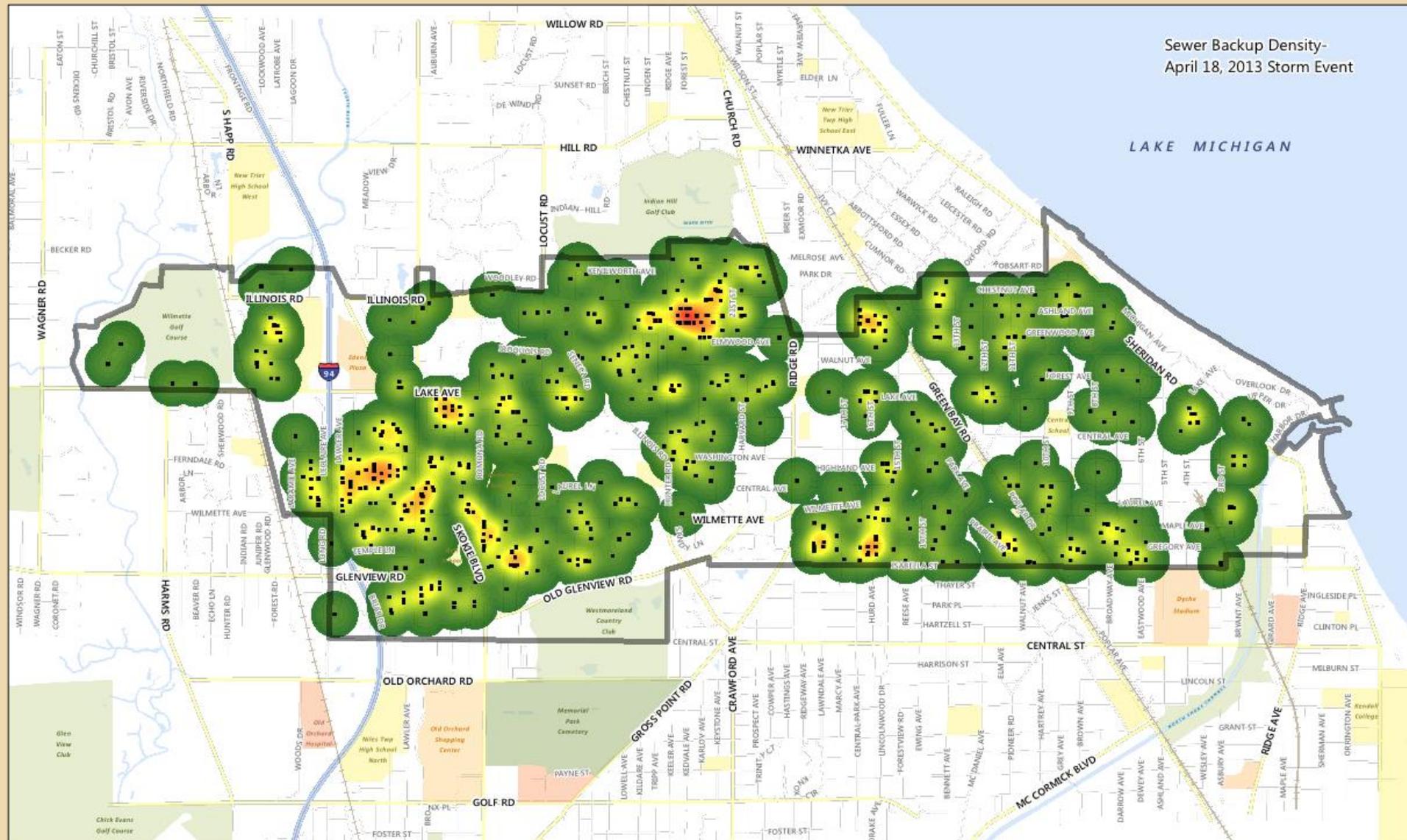
Outcome

- Recommended repairs were made on the Village side
- Property owners were given notice about needed repairs, given a timeframe for remediation, fined if remained non-compliant. Most addressed, the exception being foundation drain issues.



Sewer Backup Density-
April 18, 2013 Storm Event

LAKE MICHIGAN



rjngroup

- Sewer Backup Response is Yes
- Low Density
- Medium Density
- High Density
- Wilmette Boundary



Village of Wilmette
Exhibit 1-2
Sewer Backup- 2013-04-18 Storm Event
July 2013



Survey Results: Cautionary Note

Survey completion rates are low because property owners:

- Fear reporting will adversely affect property value
- Underreport stormwater issues because policies only cover sewage back ups
- Cultural norms preclude airing private problems

Ordinances: Cook County

Cook County Watershed Stormwater Ordinance

Ordinance will go into effect 4/1/2014

- Promotes the integration of green infrastructure into new development and redevelopment projects of >1 acre
- Reduces amount of runoff entering the sewer systems
- Not intended to solve current water pollution and flooding problems, only to prevent making situation worse

Challenges in Addressing Stormwater Flooding in Wilmette

- Infrastructure
 - Age of sewer system
 - Majority of village developed before stormwater was an issue
 - Complexity of incompatible systems as Wilmette grew
 - Scant funds for analysis & remediation
- Imperfect understanding of problem and solutions
 - Property owners
 - Municipal oversight
 - Regional oversight

Best Practices: General Principles

Create Stormwater Master Plan with long-term and annual goals including provisions to:

- Modernize stormwater infrastructure
 - Separate stormwater & sewer collection whenever possible
 - Line salvageable pipes; replace broken & undersized pipes
 - Develop detention regions
- Implement best practices for preventative maintenance
- Measure progress and inform public

Reduce need for costly upgrades to gray infrastructure by:

- Supplementing system using green infrastructure practices to slow the flow of stormwater and reduce the volume
- Increase effective capacity by shifting time when water is processed

Best Practices: General Principles (Cont'd)

Reduce inflow & infiltration into sewer system

- Test for cross connections in underground pipes
- Monitor for unnecessary connection from downspouts & sump pumps
- Enforce rules for eliminating identified problems

Increase pervious land within community

- Through land-use rules for permeability
 - By tightening criteria for zoning ordinances & variations
 - Applying rules to commercial, municipal, & residential properties
- Through incentives to create green spaces

Foster best practices among property owners

Engage property owners in campaign to reduce volume of stormwater going into municipal sewers

Best Practices: General Principles (Cont'd)

Establish rules for stormwater pollution control

Introduce stormwater-sensitive rules for lawn care, driveway upkeep, car maintenance practices

Foster the attitude that stormwater is a resource rather than something to dispose of (eg, control & manage close to the source)

Coordinate efforts with adjacent/overlapping jurisdictions in same watersheds

Best Practices: General Principles (Cont'd)

Involve public through efforts to educate, identify problems & solutions, and to prioritize

Lastly, to drive data-driven changes and monitor effectiveness

- **Monitor stormwater runoff for water quality**
 - From the site of discharge
 - For a number of water quality indices
 - On a regular schedule
- **Measure volumes discharged downstream - more than by estimating pump volumes and hours of use**

Rain Ready Approaches for Managing Stormwater Flooding

Center for Neighborhood Technology

1. Begin by assessing properties that are most at risk
2. Coordinate solutions by both properties and neighborhoods
3. Include contingent public right of way in assessments of problems
4. Introduce regulations and ordinances that address biggest contributions to stormwater runoff (eg, houses built in the wrong place, large parking lots without provisions for detention)
5. Reward property owners for good practices; create fair fee systems for stormwater fees
6. Promote coverage of flood insurance through National Flood Insurance Program certification and Community Rating system

Specific Best Practice Actions: Village

- Televise network of pipes for breaks & clogs *
- Clean sanitary & stormwater pipes *
- Clean & repair broken manholes *
- Line pipes (when appropriate); replace broken pipes *
- Regular street sweeping *
- Clear basins *
- Seek National Flood Insurance Program (NFIP) certification * and Community Rating System (CRS) to lower flood insurance fees
- Review Village ordinances for site development, sewer connections, floodplain policies & stormwater management
- Coordinate efforts with other municipalities
- Pursue internal and external funding sources
- Establish a Wilmette Stormwater Task Force

*These are happening in Wilmette to various extents

Specific Best Practice Actions*

Property Owners

- Televise network of pipes (laterals) for breaks and clogs
 - Line pipes (when appropriate)
 - Replace broken pipes
- Install overhead sewer systems
- Disconnect downspouts & direct water to pervious places on property
- Install rain gardens, bioswales, dry creeks, detention areas, porous driveways
- Mulch grass & leaves and retain vs => Village collection
- Minimize use of household water during intense storm events; do not drive through deep water

*These practices are happening in Wilmette on a patchwork, non-systematic basis

Best Practices - Summary for Municipalities

Ultimately, the goal for any village is to achieve effective stormwater control that:

- is fiscally responsible with respect to:
 - municipal costs/property taxes
 - impact on property values
 - cost of damage remediation
- minimizes environmental impact
- protects public safety
- is sustainable for long term

Best Practices: Pollution Reduction

- Street sweeping (vacuum grit, keep leaves & trash out of drains)
- Add ordinances for toxic-free, low-impact landscaping practices
- Require downspout disconnects (utilize pop up discharge systems)
- Introduce sediment control areas (detention/retention areas)
- Clean catch basins frequently
- Use parkland for retention basins that help cleanse stormwater and provide irrigation options for parks.
- Introduce municipal bioswales and other green infrastructure and incentivize residential and business installations.

Peter Senge in *The Fifth Discipline* tells us...

**Today's problems often stem
from yesterday's solutions**

In the context of stormwater management

- Deferring capital improvements now, leads to more costly repairs in the long run and greater costs to residents from repetitive storm damage
- Choosing options easiest for Wilmette now may adversely affect downstream communities later
- Failing to work collaboratively with neighboring communities now may adversely affect our community in years to come
- What we do in the short-term may affect long-term effects for generations to come

Wilmette needs to do this right