# Workshop on Clear Water Cross Connections & Inspections

7/23/2012

# Agenda

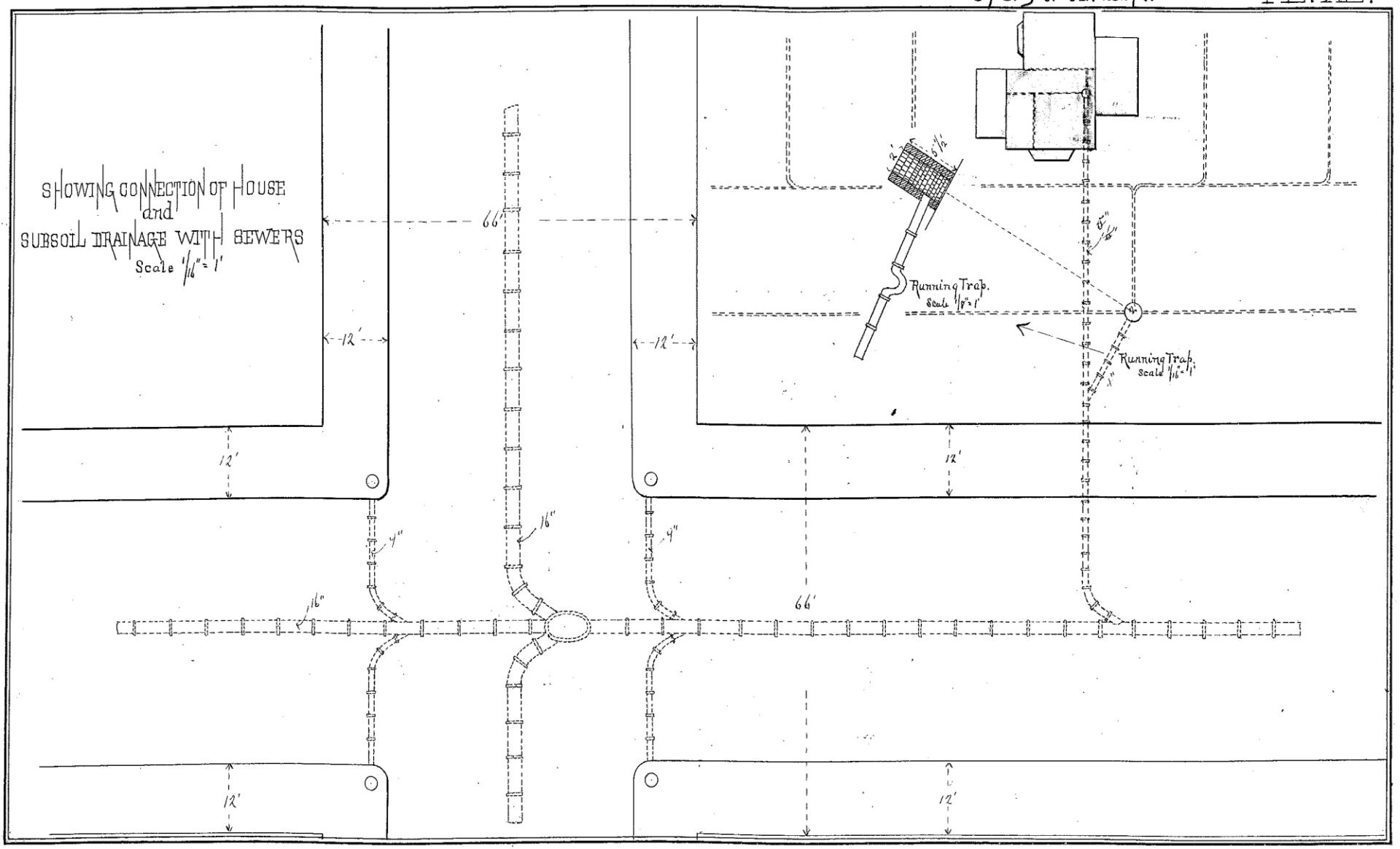
- Sewer Systems and Inflow & Infiltration (I & I) Problem
- EPA Orders
- Options for Identifying Sources & Current Practice
- Corrective Action Issues

# History

- Originally City Had One Sewer System Carrying Wastewater and Storm Water to Lake Winnebago and Fox River
- In 1936, The City Constructed its' First Wastewater Treatment Plant
- Separate Storm and Sanitary Sewer Systems Were Being Developed
- All Preexisting Clear Water Drains Remained Connected Directly to Sanitary Sewer
- City Still Allowed Clear Water Connections to Sanitary Sewer

FROM 1884 BOOK TITLED - SEWER PLANS / CITY OF OSHKOSH, WI

PL. XL.



# History (cont'd)

- 1950's – State Statutes Established Any Clear Water Connections to a Sanitary Sewer Are Illegal
  - Prior to 1950, 10,607 houses were built in city limits.
  - After 1950, 7,497 houses were built.

  Given these numbers, 59% of Homes Could Have Foundation Drains Connected to Sanitary Sewer

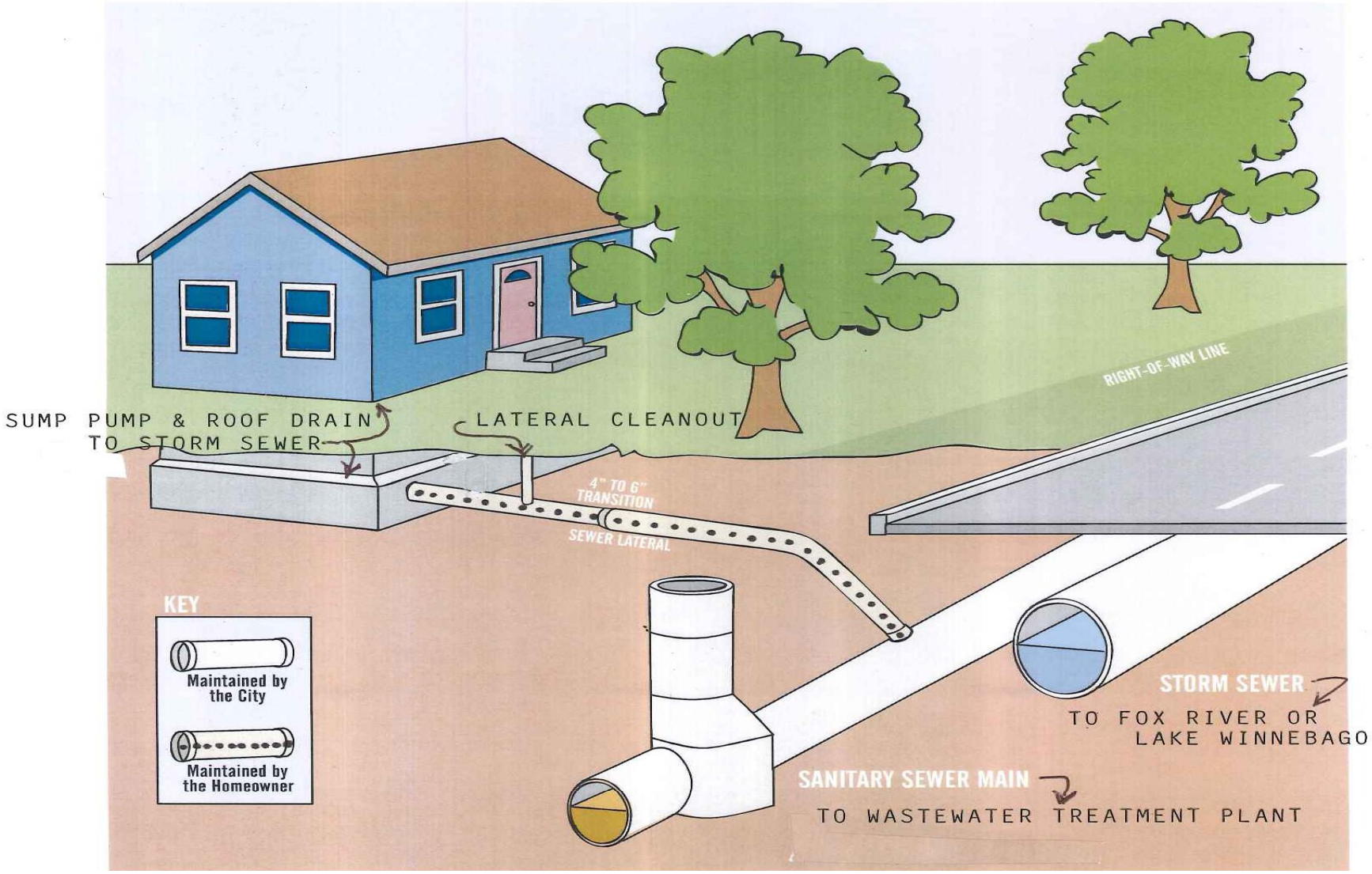
# EPA Orders

- City received and Acknowledged Orders in October of 2011
- Orders Required Additional Analysis of the Sanitary Sewer System
- Orders May Require Additional Operational and Maintenance Activities by the City

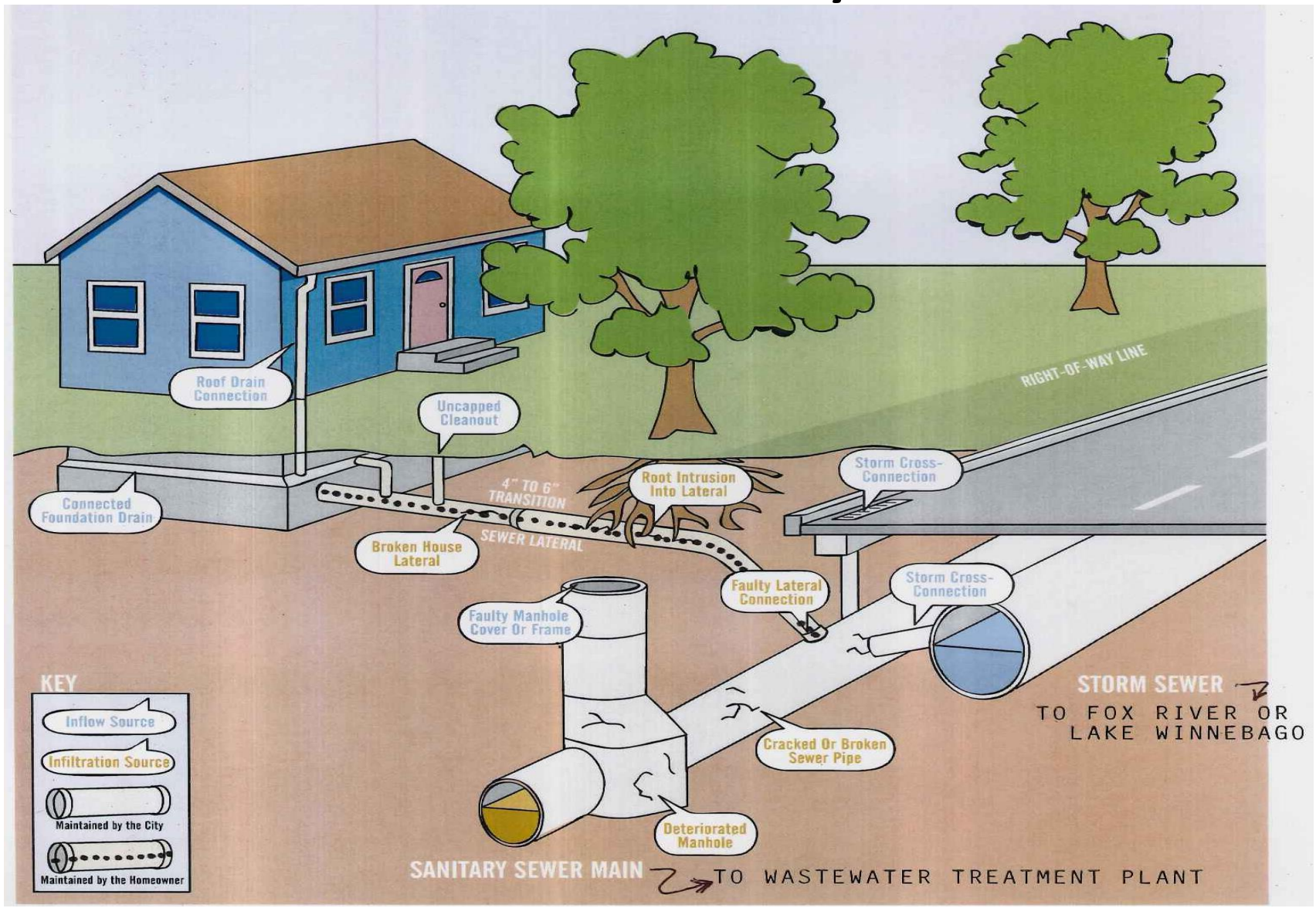
# Sewer Systems

- Sanitary Sewer System
  - Carries wastewater to treatment plant for processing
  - Over 270 miles of pipes ranging in age (new to 120+ years) and approximately 6,000 manholes
  - 22,000+ metered properties/ 18,000 residential dwellings
  - Gravity system and 17 pump stations
  - Components are publicly owned and privately owned
- Storm Water Sewer System
  - Collects rain and snowmelt from streets and adjoining properties and carries it to Lake Winnebago or the Fox River
  - **DOES NOT GO TO TREATMENT PLANT**

# In a perfect world…



# But in reality…



# Inflow and Infiltration (I/I)

- Inflow
  - Refers to clear water from rain and snowmelt that improperly drains into the sanitary sewer system
- Infiltration
  - Refers to ground water that leaks into the sanitary sewer system through cracked or faulty sewer pipes
- Both sources of water are considered “Clean” and **DO NOT NEED TO GO TO THE WASTEWATER TREATMENT PLANT**

# Private and Public Sources of I/I

| Private (Owner Responsibility) | Public (City Responsibility) |
| --- | --- |
| • Faulty Laterals -Out to Main<br>• Uncapped Cleanout<br>• Roof and Yard Drain Connections<br>• Foundation/Sump Pumps Drains | • Faulty Sanitary Sewer Mains<br>• Faulty Manhole Cover or Frame<br>• Storm Sewer Cross Connects |
| <u>200 Miles of Private Infrastructure</u> | <u>270 Miles of Public Infrastructure</u> |

# Recording of N. Main St

# When I/I isn't eliminated

Sanitary Sewer Overflow Occurs

Basement Backups Occurs

# When I/I isn't eliminated (cont'd)

## Clean Water is Treated at Treatment Plant

| Date June | Water Pumped* | Water Treated* |
|---|---|---|
| 1 | 6.058 | 10.714 |
| 2 | 6.548 | 10.329 |
| 3 | 6.061 | 10.414 |
| 4 | 7.533 | 10.362 |
| 5 | 6.88 | 10.524 |
| 6 | 7.951 | 10.317 |
| 7 | 7.490 | 10.408 |
| 8 | 7.493 | 10.407 |
| 9 | 7.581 | 10.014 |
| 10 | 7.406 | 10.021 |
| 11 | 7.323 | 10.507 |
| 12 | 8.522 | 10.212 |
| 13 | 7.678 | 10.124 |
| 14 | 7.833 | 10.166 |
| 15 | 8.161 | 10.091 |

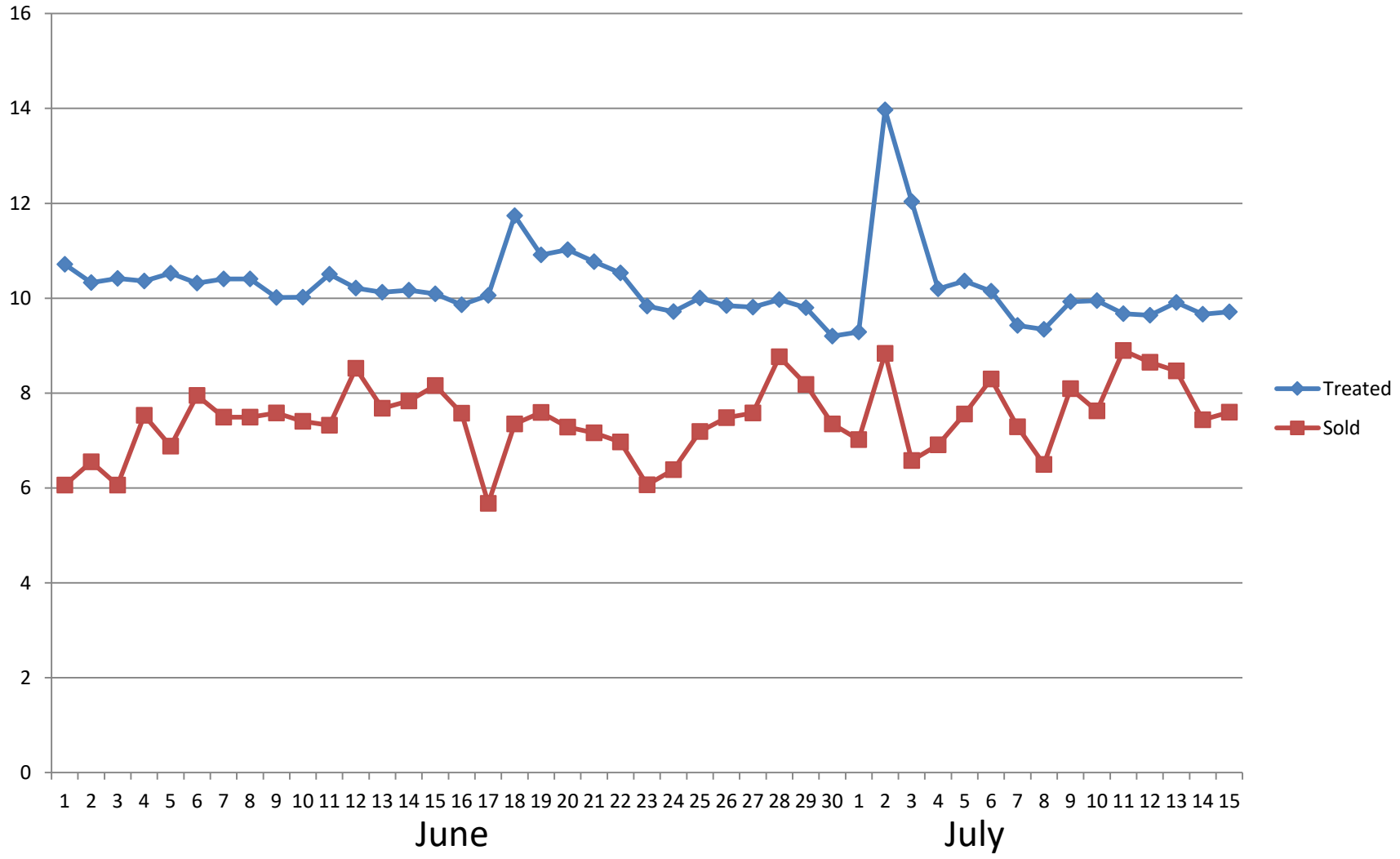
| Date June | Water Pumped* | Water Treated* |
|---|---|---|
| 16 | 7.574 | 9.858 |
| 17 | 5.672 | 10.058 |
| 18 | 7.348 | 11.740 |
| 19 | 7.592 | 10.910 |
| 20 | 7.285 | 11.020 |
| 21 | 7.161 | 10.770 |
| 22 | 6.970 | 10.530 |
| 23 | 6.064 | 9.833 |
| 24 | 6.385 | 9.715 |
| 25 | 7.188 | 10.002 |
| 26 | 7.481 | 9.846 |
| 27 | 7.581 | 9.812 |
| 28 | 8.766 | 9.973 |
| 29 | 8.18 | 9.800 |
| 30 | 7.347 | 9.199 |

| Date July | Water Pumped* | Water Treated* |
|---|---|---|
| 1 | 7.021 | 9.288 |
| 2 | 8.834 | 13.967 |
| 3 | 6.576 | 12.036 |
| 4 | 6.91 | 10.199 |
| 5 | 7.56 | 10.361 |
| 6 | 8.297 | 10.144 |
| 7 | 7.288 | 9.423 |
| 8 | 6.497 | 9.345 |
| 9 | 8.095 | 9.925 |
| 10 | 7.626 | 9.951 |
| 11 | 8.899 | 9.675 |
| 12 | 8.646 | 9.642 |
| 13 | 8.469 | 9.908 |
| 14 | 7.437 | 9.664 |
| 15 | 7.594 | 9.714 |

* Calculated in Millions of Gallons Per Day (MGD)

# When I/I isn't eliminated (cont'd)

## Clean Water is Treated at Treatment Plant




Calculated in Millions of Gallons Per Day (MGD)

# Rain Events

- May 3rd 2012

79.117 Million Gallons of Water Treated

- June 13th 2008

89.266 Million Gallons of Water Treated

# Removing I/I From the Source Public (City Responsibility)

- Aggressive CIP and Major Street/Utility Reconstruction Projects
- Maintenance and televising of Sanitary Sewer System
- Sewer Main Replacement and Repairs
- Inspection and Repair/Replacement of Manholes
- Storm Water Management Facilities to Control Flooding
- Continued emphasis in strategic plan.

# Removing I/I From the Source Private (Owner Responsibility)

- Current Practice
  - Corrective actions are issued to citizens when improper cross connections are discovered
    - DPW – Major Construction Projects
    - Building Inspections Division – Discovery During Inspections
  - Crews routinely conduct Closed Circuit TV (CCTV) inspections of laterals and mains
  - Current practice isn't sufficient to resolve I/I problem

# Removing I/I From the Source Private (Owner Responsibility)

- Private Side I/I Not Widely Recognized as a Problem by the Public
- Problem Exists in Majority of Homes Due to Many of the Homes in Oshkosh Being Built Prior to Separation of Clear Water from Sanitary Sewers

# Removing I/I From the Source Options

1. Expand Capacity of City Infrastructure
2. Inspections At Time of Sale
3. Proactive Enforcement (Rotation Through City)
4. Inspections During Street Reconstruction Projects
5. Cross-Train Other Staff Members
6. Expand Building Inspections Division Activities
7. Increase Public Education
8. Review Sump Pump Connections
9. Require Backflow Preventers

# Option One
# Expand Capacity of City Infrastructure

- **Description**
  - Expand capacity of Wastewater Treatment Plant and corresponding sewer lines to handle I/I
- **Municipalities Currently Utilizing**
  - Milwaukee and Chicago “Deep Tunnel”
- **Impact**
  - Increased capacity could handle peak flows during moderate rain events and other I/I issues, reducing the number of sanitary sewer overflows and basement backups
- **Proposed Method of Administration**
  - Funded through increased borrowing and Wastewater Utility Fees
- **Department/Division Responsibility**
  - Various. DPW, Community Development
- **Potential Associated Costs**
  - Unknown but is expected to be in the hundreds of millions
- **Pros**
  - Solves overflow issue and basement backups for moderate rain events
- **Cons**
  - Extremely expensive and unrealistic giving current borrowing limits and system needs

# Option Two
# Inspections At Time of Sale

- **Description**
  - Before a homeowner may sell a home, an inspection must be conducted to ensure compliance
- **Municipalities Currently Utilizing**
  - Appleton, Green Bay, Sheboygan
- **Impact**
  - On average, 400 to 1,200 homes change hands every year
- **Proposed Method of Administration**
  - Inspectors will be notified each time a house enters the market and conduct an inspection for improper connections. After the inspection, the inspector will inform the home owner, issue corrective orders and follow-up activities or issue a certificate of compliance
- **Department/Division Responsibility**
  - Community Development/Building Inspections Division
- **Potential Associated Costs**
  - Associated inspection costs will be covered by a fee
- **Pros**
  - Protects new home owners, doesn't allow the problem to be ignored
- **Cons**
  - Associated fee may be viewed negatively. Won't address enough residences

# Option Three
# Proactive Enforcement (Rotation)

- **Description**
  - Properties will be evaluated on priority basis with door to door inspections being made throughout the City
- **Municipalities Currently Utilizing**
  - Fond du Lac, Menasha, Green Bay, Town of Algoma
- **Impact**
  - Proactive approach will ensure a minimum of 5% compliance rate each year for 20 years until entire city is covered.
- **Proposed Method of Administration**
  - The City will identify high priority areas. Inspectors will go door to door, ensuring compliance with current connection codes. If a property requires corrective actions, inspectors will inform home owner, issue orders and conduct follow up activities
- **Department/Division Responsibility**
  - Community Development/ Building Inspections Division
- **Potential Associated Costs**
  - Proactive enforcement will require additional staffing and resources
- **Pros**
  - Addresses high priority areas, consistently makes progress on correcting private sources of I/I
- **Cons**
  - May be viewed as intrusive, requires additional staffing/resources

# Option Four
# During Street Reconstruction Projects

- **Description**
  - As the City moves forward with major reconstruction projects, an opportunity exists to commence CCTV inspections of private lateral connections from the right of way to the housing foundation
- **Municipalities Currently Utilizing**
  - La Crosse, Neenah, Appleton, Eau Claire, Green Bay
- **Impact**
  - City has an opportunity to inspect an additional 100 - 350 homes per year.
- **Proposed Method of Administration**
  - As construction crews replace underground utilities, staff from the DPW and Building Inspections Division will video inspect private laterals to ensure integrity and conduct inspections inside the home. If corrective actions are needed, the building inspectors will inform the home owner, issue orders and conduct follow up activities
- **Department/Division Responsibility**
  - DPW and Building Inspections Division
- **Potential Associated Costs**
  - Additional costs will be minimal as this option is based on current activities
- **Pros**
  - Convenient, doesn't require additional staff or resources, completes inspection of laterals
- **Cons**
  - May be viewed as intrusive

# Option Five
# Cross Train Other Staff Members

- **Description**
  - Many current city services/activities require non Building Inspection staff to access private property. An opportunity exists to have these employees audit the property for improper connections
- **Municipalities Currently Utilizing**
  - Unknown
- **Impact**
  - The City currently replaces about 2,000 water meters a year. The Assessors office conducts property reviews of at least 20% of residential properties per year
- **Proposed Method of Administration**
  - Employees responsible for installing or performing maintenance on water meters, and employees in the Assessors department could be trained as auditors. These employees will serve as an extra set of “eyes” to inform the Building Inspections Division and correspondingly homeowners of any potential clear water connections
- **Department/Division Responsibility**
  - Utilities and Assessors
- **Potential Associated Costs**
  - Additional costs will be minimal as this option is based on current activities
- **Pros**
  - Convenient, utilizes current staff and resources
- **Cons**
  - May be viewed as intrusive. May not identify all cross connections with cursory review

# Option Six
# Expand Building Inspections Division Activities

- **Description**
  - Require I/I inspections during any inspection i.e. electrical, building, plumbing
- **Municipalities Currently Utilizing**
  - Unknown
- **Impact**
  - The Building Inspections Division conducted 3,000 home inspections during 2011 and have the potential to reach this amount
- **Proposed Method of Administration**
  - As inspectors enter resident's homes, they will be required to check for improper connections in the basement, regardless of what type of construction the property owner is doing
- **Department/Division Responsibility**
  - Building Inspections Division
- **Potential Associated Costs**
  - Additional costs will be minimal as this option is based on current activities
- **Pros**
  - Convenient, Utilizes existing staff and resources
- **Cons**
  - May be viewed as intrusive. Potential exists for decreased compliance with building permit requirements as residents could be reluctant to have other building inspections conducted

# Option Seven
# Education

- **Description**
  - Develop an education and communication plan to inform citizens on issues associated with improper drainage issues
- **Municipalities Currently Utilizing**
  - No formal communication plan but to a degree, all municipalities are currently engaging in educating their residents
- **Impact**
  - Potential to reach all homes within City
- **Proposed Method of Administration**
  - In cooperation with the DPW, the Building Inspections Division and Media Services (OCMS), a communication plan would be created to inform citizens on current issues and solutions. The purpose of the plan would be to educate citizens enough to ensure self compliance
- **Department/Division Responsibility**
  - DPW, Building Inspections Division, OCMS
- **Potential Associated Costs**
  - Costs will be associated with different types of communication mediums
- **Pros**
  - Increases citizen engagement. Prevents any misinformation from reaching the public. Promotes openness
- **Cons**
  - Slow, potentially expensive or ineffective. Results can’t be measured

# Option Eight
# Review Sump Pump Connections

- **Description**
  - Require sump pumps in houses at time of sale to be connected to the Storm Sewer System
- **Municipalities Currently Utilizing**
  - Green Bay
- **Impact**
  - Potential to reach 400-1,200 homes
- **Proposed Method of Administration**
  - City Council would pass an ordinance requiring all homes at time of sale to have a sump pump connected to the storm sewer system
- **Department/Division Responsibility**
  - DPW, Building Inspections Division
- **Potential Associated Costs**
  - Associated inspection costs could be covered by a nominal fee
- **Pros**
  - Protects new home owners. Issue would not be ignored.
- **Cons**
  - Fee and construction costs could be viewed negatively. Storm Sewer is not available to some properties.

# Option Nine
# Require Backflow Preventers

- **Description**
  - Require residents to purchase and install backflow preventers for new home construction
- **Municipalities Currently Utilizing**
  - Green Bay
- **Impact**
  - Potential to reach 50-300 homes per year
- **Proposed Method of Administration**
  - City Council would pass an ordinance requiring all new homes to purchase and install backflow preventers
- **Department/Division Responsibility**
  - DPW, Building Inspections Division
- **Potential Associated Costs**
  - Additional costs will be minimal because inspection can be combined with other activities.
- **Pros**
  - Provides basement backup protection to new homes. Minimal construction costs.
- **Cons**
  - Only covers new home constructions.

# Compliance Issues

- Hardships
  - Depending on the necessary corrective action, residents could be expected to pay $100 to $7,500+
  - City has options to provide assistance
    - Low Interest Loans
    - Grants
    - Special Assessments/Deferred Costs
    - Surcharge
    - Create a Reward/Incentive Program for Voluntary Compliance

- Review of Identification Options

| Options | Pros | Cons | Potential Impact |
|---|---|---|---|
| **Expand Current Infrastructure Capacity** | Solves overflow issue and basement backups for moderate rain events | Extremely expensive and unrealistic giving current borrowing limits and system needs | Unknown |
| **Inspections At Point of Sale** | Protects new home owners, doesn't allow the problem to be ignored | Associated fee will be viewed negatively, wont address enough residences | 400-1200 homes |
| **Proactive Enforcement (Rotation)** | Addresses high priority areas, consistently makes progress on correcting private sources of I/I | May be viewed as intrusive, requires additional staffing/resources | Minimum, 5% each year |
| **Inspections During Street Reconstruction** | Convenient, doesn't require additional staff or resources, completes inspection of laterals | May be viewed as intrusive | 100-350 homes |
| **Cross Train Other Staff Members** | Convenient, Doesn't require additional staff or resources | May be viewed as intrusive. May not identify all cross connections with cursory review | 2000-4000 homes |
| **Expand Building Inspections Division Activities** | Convenient, Utilizes existing staff and resources | May be viewed as intrusive. Potential exists for decreased compliance with building permit requirements as residents could be reluctant to have other building inspections conducted | 3000 homes |
| **Increase Public Education** | Increases citizen engagement, prevents any misinformation from reaching the public, promotes openness | Slow, potentially expensive or ineffective. Results can't be measured | Potential to reach all homes |
| **Review Sump Pump Connections** | Protects new home owners. Issue would not be ignored | Fee and construction costs could be viewed negatively. Storm Sewer is not available to some properties. | 400-1200 homes |
| **Require Backflow Preventers** | Provides basement backup protection to new homes. Minimal construction costs. | Only covers new home constructions. | 50-300 homes |