

# Town of West Hartford Drainage System Evaluation

Phase 2 – Public Meeting



Cindy Baumann  
Joe Laliberte

*October 26, 2021*



**CDM  
Smith®**

# Agenda

- Project Overview
- Existing Conditions
- Recommendations
- Costs
- Prioritization: Phase 1 and 2
- Groundwater Study
- Next Steps



# Project Overview

# Project Objectives

## Primary

- Street flooding
- Address Drainage system capacity:
  - Pipes are not clogged
  - There are generally adequate number of catch basins
  - Pipes are too small

## Secondary

- Connection for sump pumps, foundation drains and roof leaders
- Future connections available for private property owner connections to address private property ponding



# Causes of Flooding in West Hartford

## Stormwater Flooding

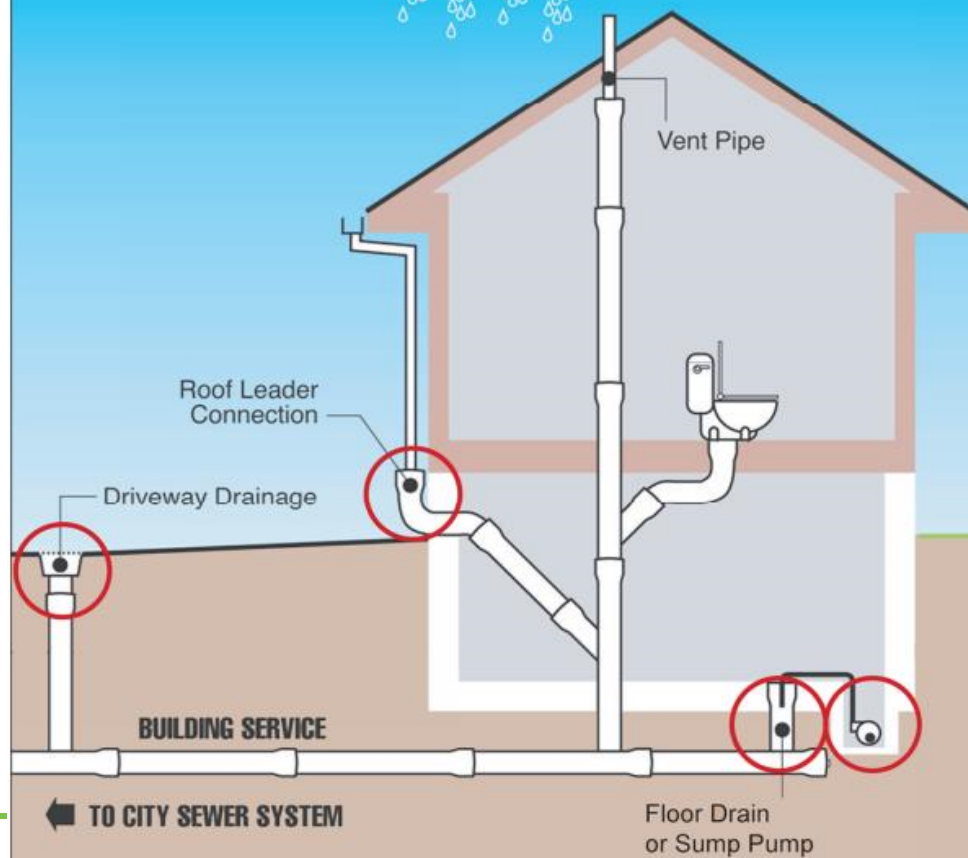
- Urbanized area with high impervious area
- More frequent/high intensity rain events and development causes increased flow that exceeds capacity of the existing drainage system
- High groundwater
- Poor draining soil

## Sewer Surcharging

- Private property stormwater connections to sewer system

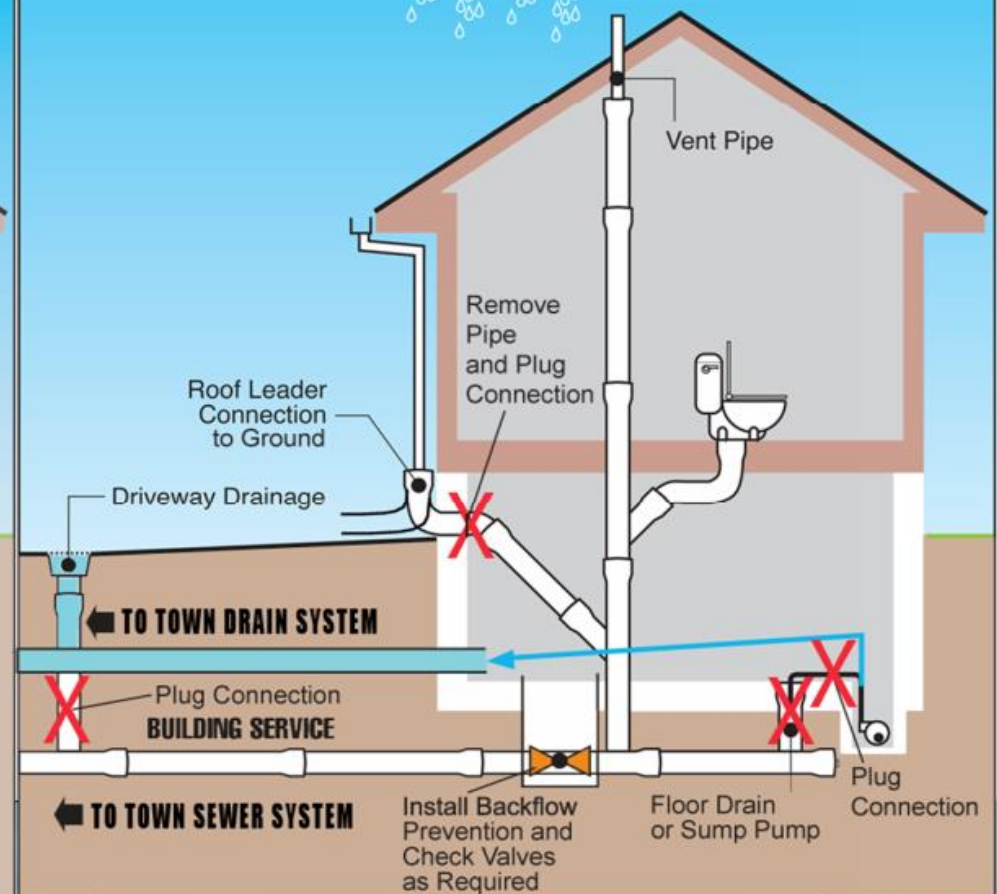
## Typical Existing Household

Rain



## Typical Proposed Household

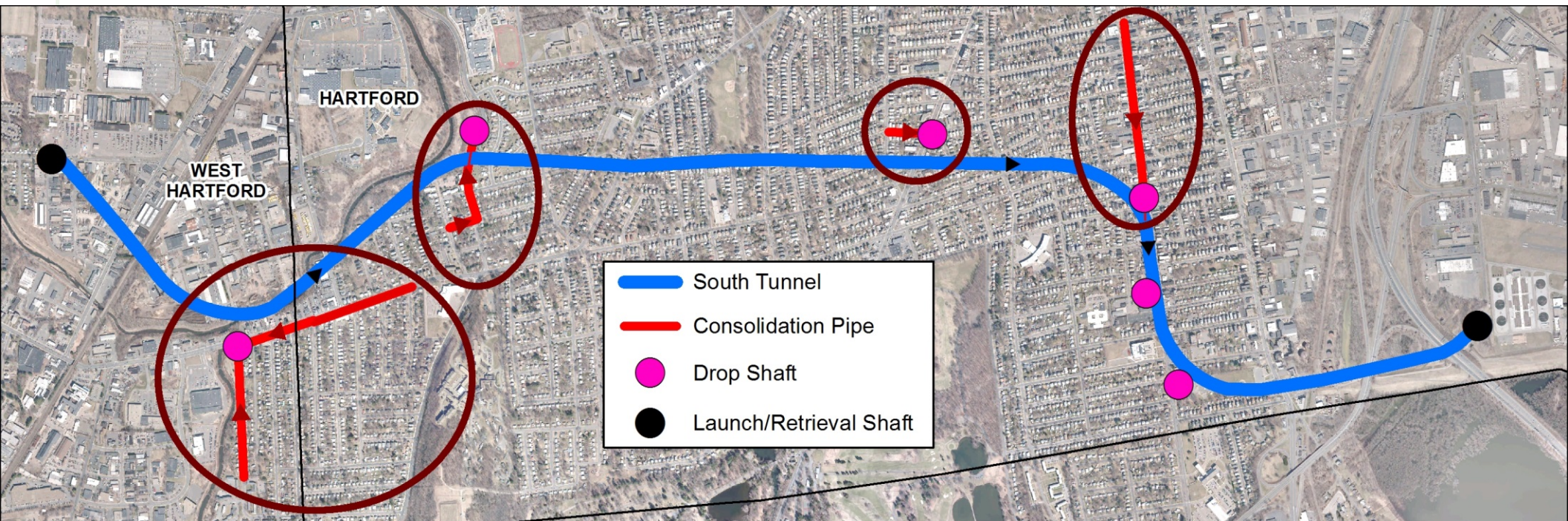
Rain





# South Hartford Tunnel System at a Glance

- 4 miles long, 18-foot diameter
- 175 to 250 feet deep
- Will address sanitary sewer overflows in southeast West Hartford, but won't address sewer surcharging in other areas from private property connections
- 4 consolidation conduit areas
- Construction underway



# Project Timeline

## Milone & MacBroom Study: November 2018

- November 2018: Final Report
- Recommendations for culvert replacements along Trout Brook

## CDM Smith Drainage Study – Phase 1

- June 2020: Final Report
- October 2020: Town Council Workshop
- November 23<sup>rd</sup> & 30<sup>th</sup> 2020: Public Information Meetings
- Grant Submissions: January 2021
- MDC Coordination: Ongoing

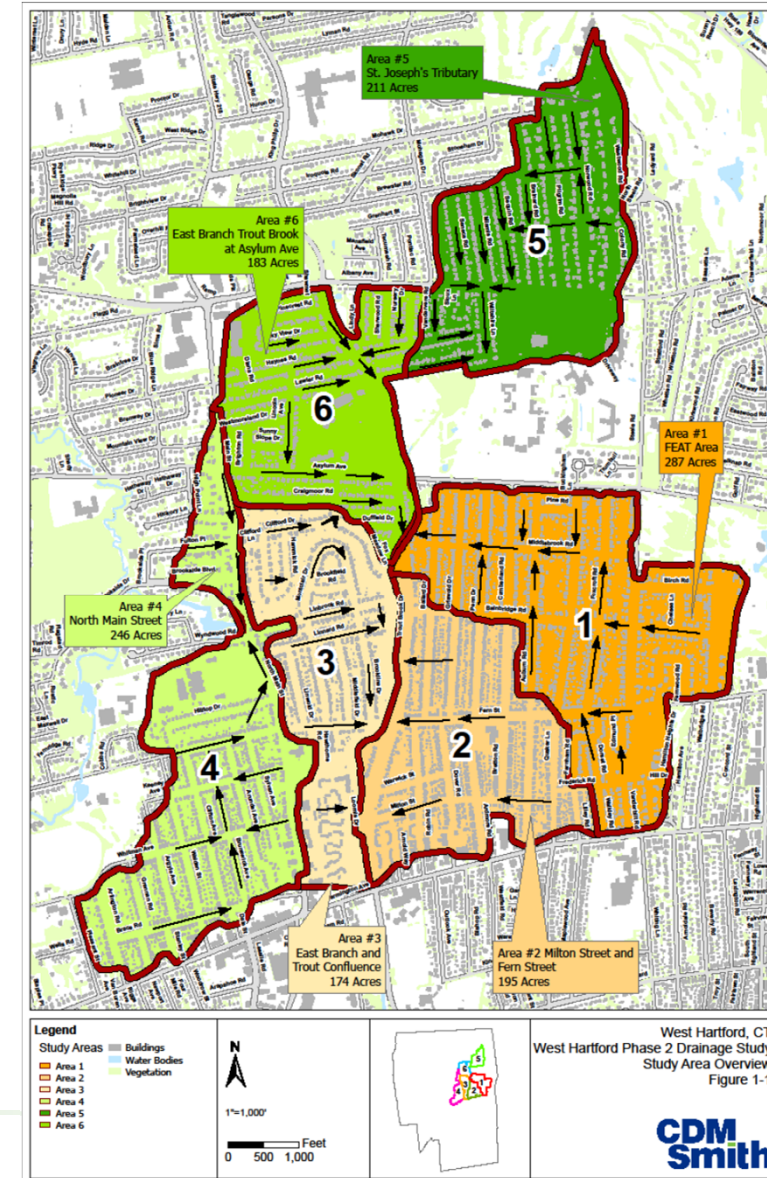
## CDM Smith Drainage Study – Phase 2

- August 2021: Final Report
- September/October 2021: Town Council and Public Information Meeting
- MDC Coordination: Ongoing



# Project Area History

- Town project includes six drainage areas
- Significant flooding within the six areas
- Recent significant storm events
  - April and September 2018
  - August 2019
  - Fall 2021 – Hurricane and Tropical Storms
- First Public Meeting – June 2019
- Completed Phase 1 Study (Areas 1 to 3)
- Second Public Meeting – November 2020
- Completed Phase 2 Study (Areas 4 to 6)
- Third Public Meeting – October 2021

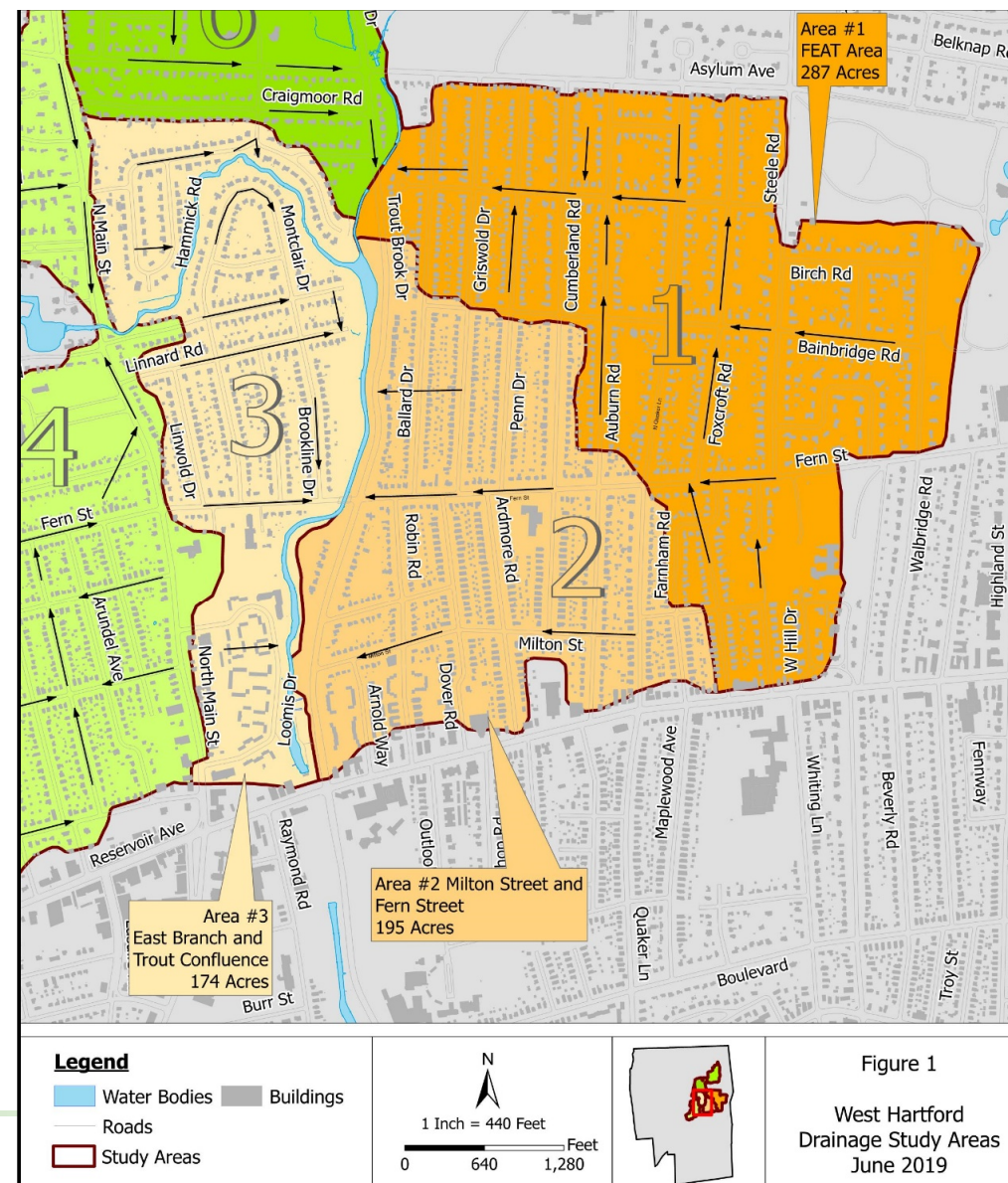


# Phase 1

Study completed for Areas 1 to 3

- Collect and review data
- Survey and field work
- Stormwater system modeling
- Alternatives analysis
- Recommendations

|                    | Acre (acres) | Number of Properties | % Area of Town |
|--------------------|--------------|----------------------|----------------|
| Area 1 – FEAT      | 270          | 785                  | 1.9%           |
| Area 2 - Milton St | 232          | 510                  | 1.6%           |
| Area 3 - Linbrook  | 174          | 400                  | 1.2%           |
| <b>Total Area</b>  | <b>676</b>   | <b>1,695</b>         | <b>4.7%</b>    |



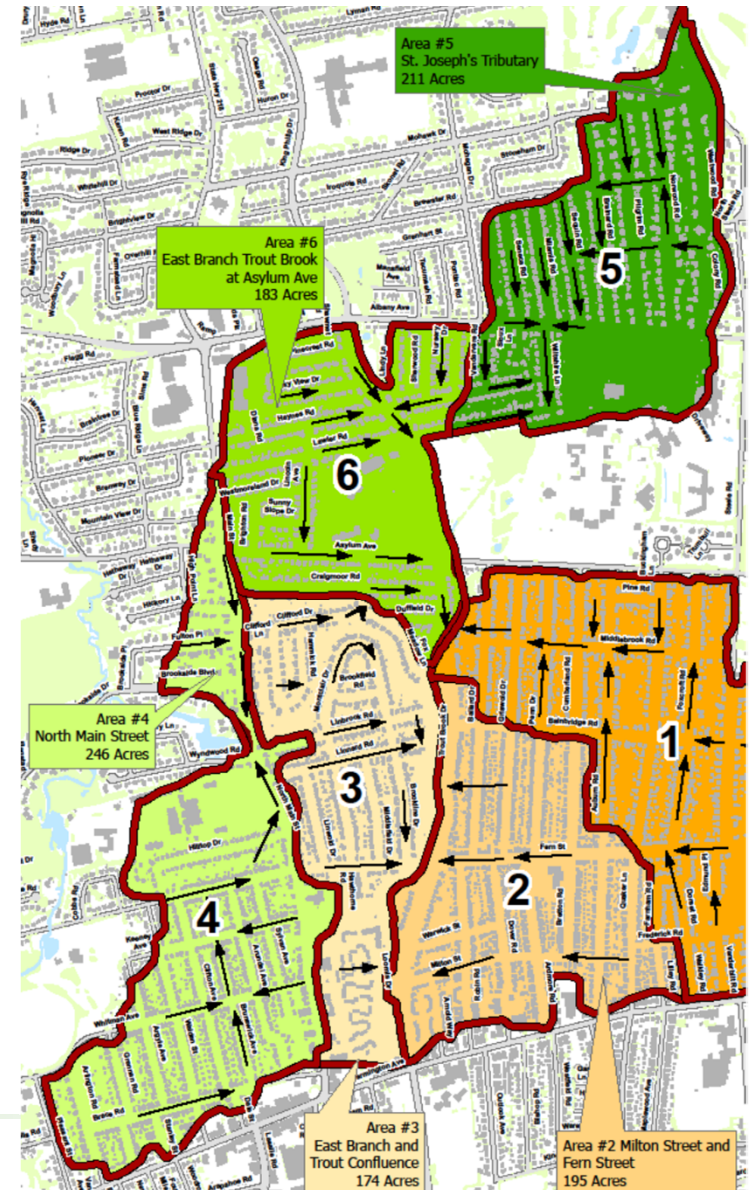


## Phase 2

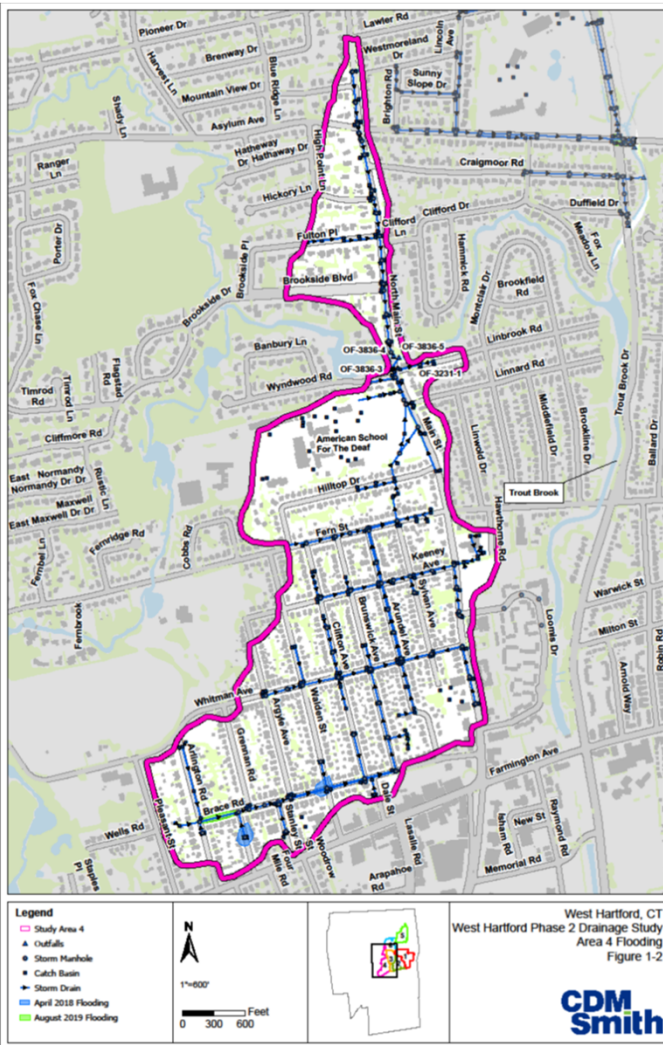
Study completed for Areas 4 to 6

- North Main Street Area
- St Joseph's Tributary Area
- East Branch of Trout Brook Area

|                          | Acre<br>(acres) | Number of<br>Properties | % Area<br>of Town |
|--------------------------|-----------------|-------------------------|-------------------|
| Area 4<br>N. Main St     | 246             | 736                     | 1.7%              |
| Area 5<br>St Joseph's    | 183             | 386                     | 1.3%              |
| Area 6<br>EB Trout Brook | 287             | 391                     | 2.0%              |
| <b>Total Area</b>        | <b>716</b>      | <b>1,513</b>            | <b>5.0%</b>       |



## Area 4



## Area 5



## Area 6



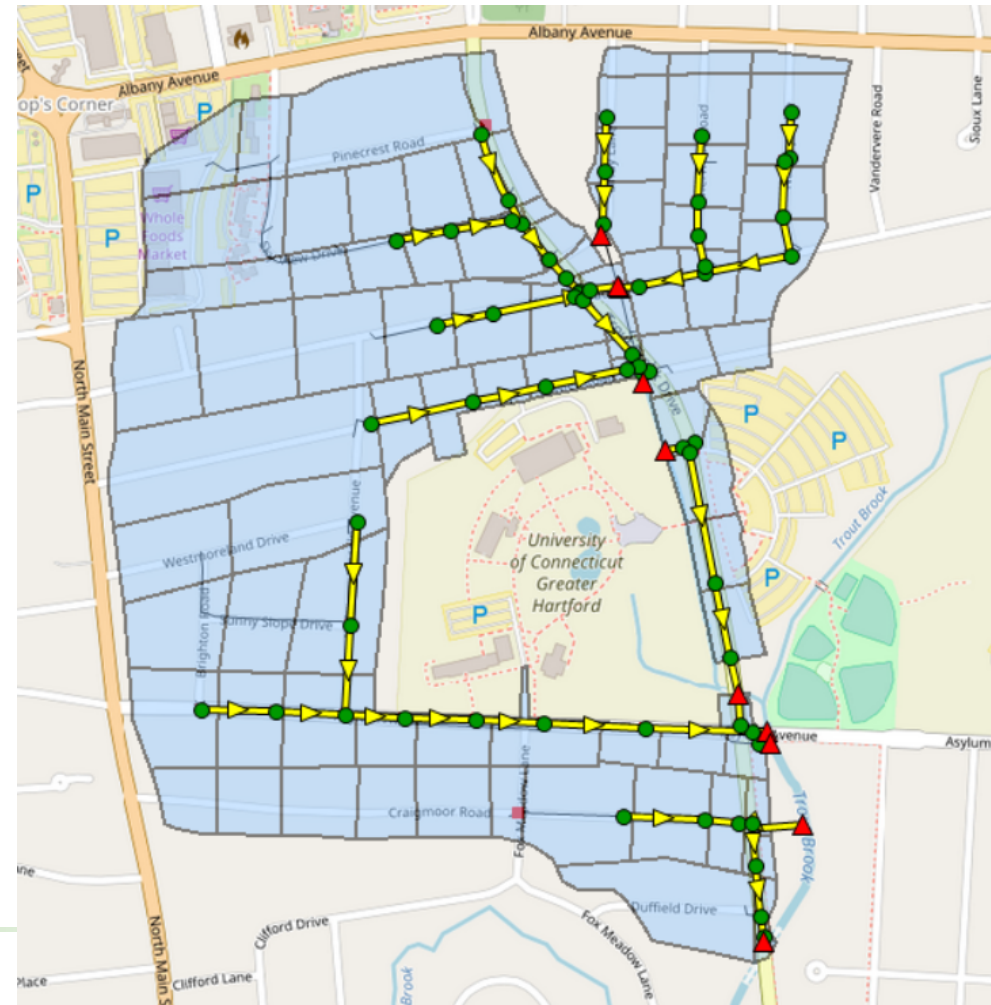




## Existing Conditions – Phase 2

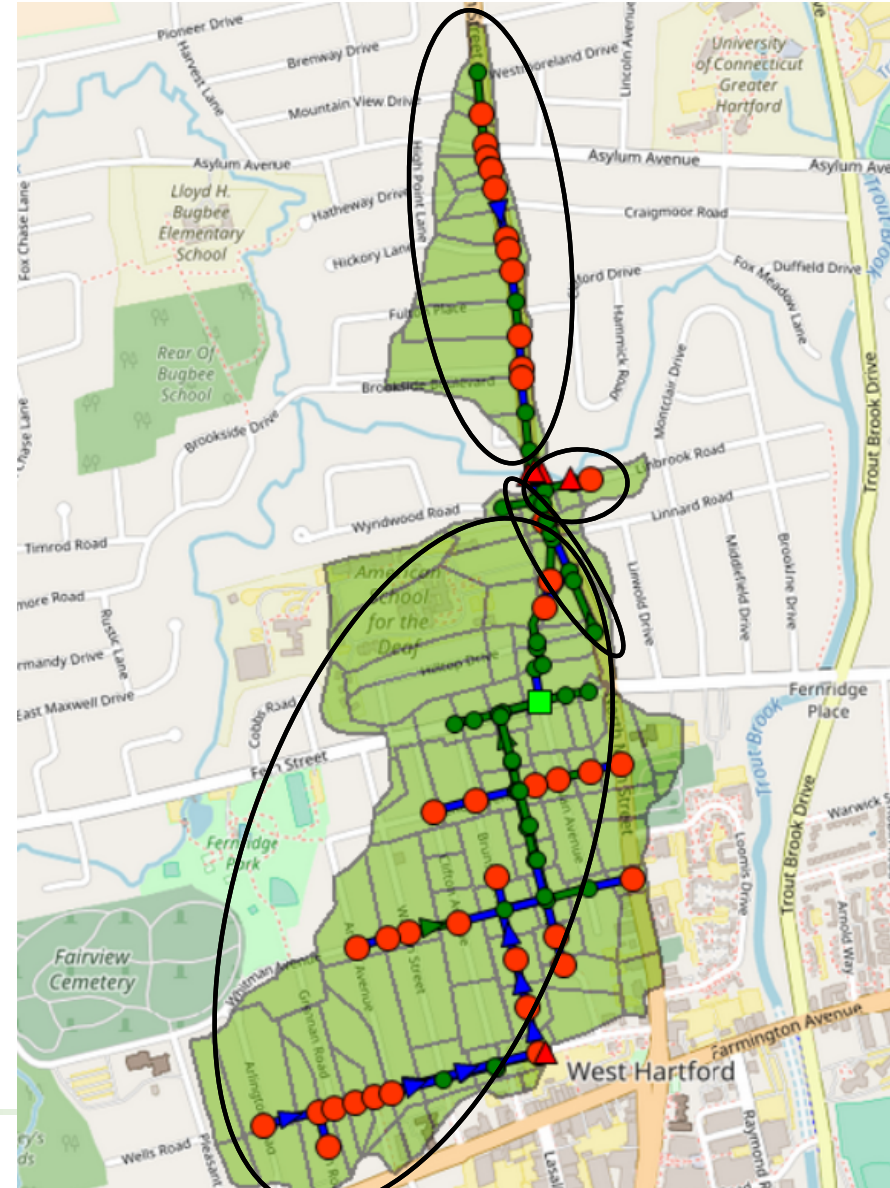
# Drainage Model Development

- Developed computer model of storm drain system to simulate flooding
- Modeled 10-Year storm – 10% chance of occurring in any given year
- Compared model results with flow meter data and reported flooding



# Overview – Area 4

- Total Area: 249 acres
- 4 Storm Drain Systems:
  - North Main Street (North)
  - Linbrook Road
  - North Main Street (South)
  - Arundel Avenue



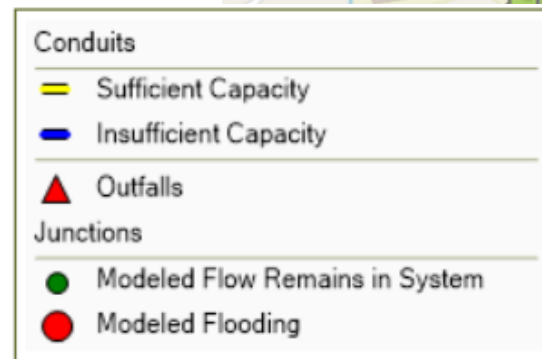
## Area 4 - Arundel Avenue System

Existing Conditions

10% Occurrence 10-year Storm

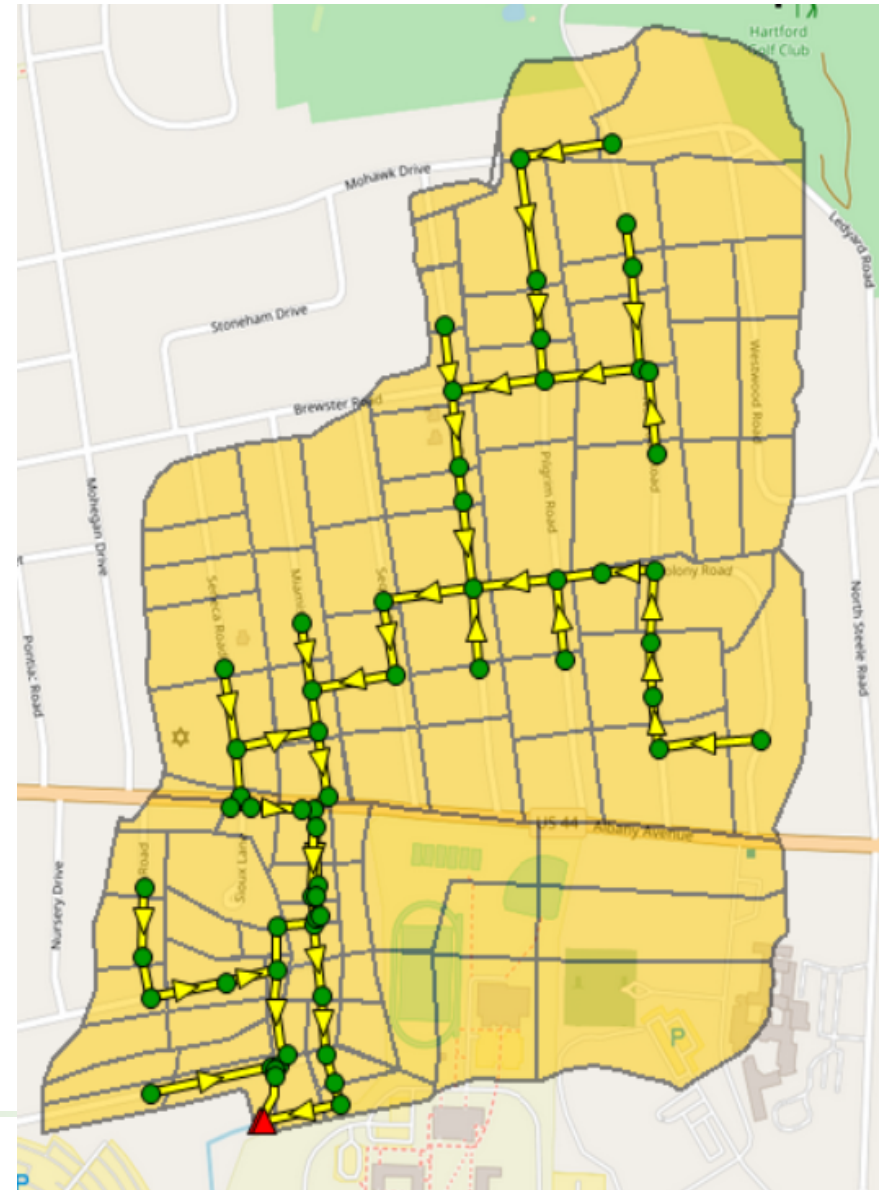
Significant flooding along:

- Brace Road
- Brunswick Avenue
- Whitman and Keeney Avenues
- North Main Street near Trout Brook



## Overview - Area 5

- Total Area: 205 acres
- One drainage system with two outfalls





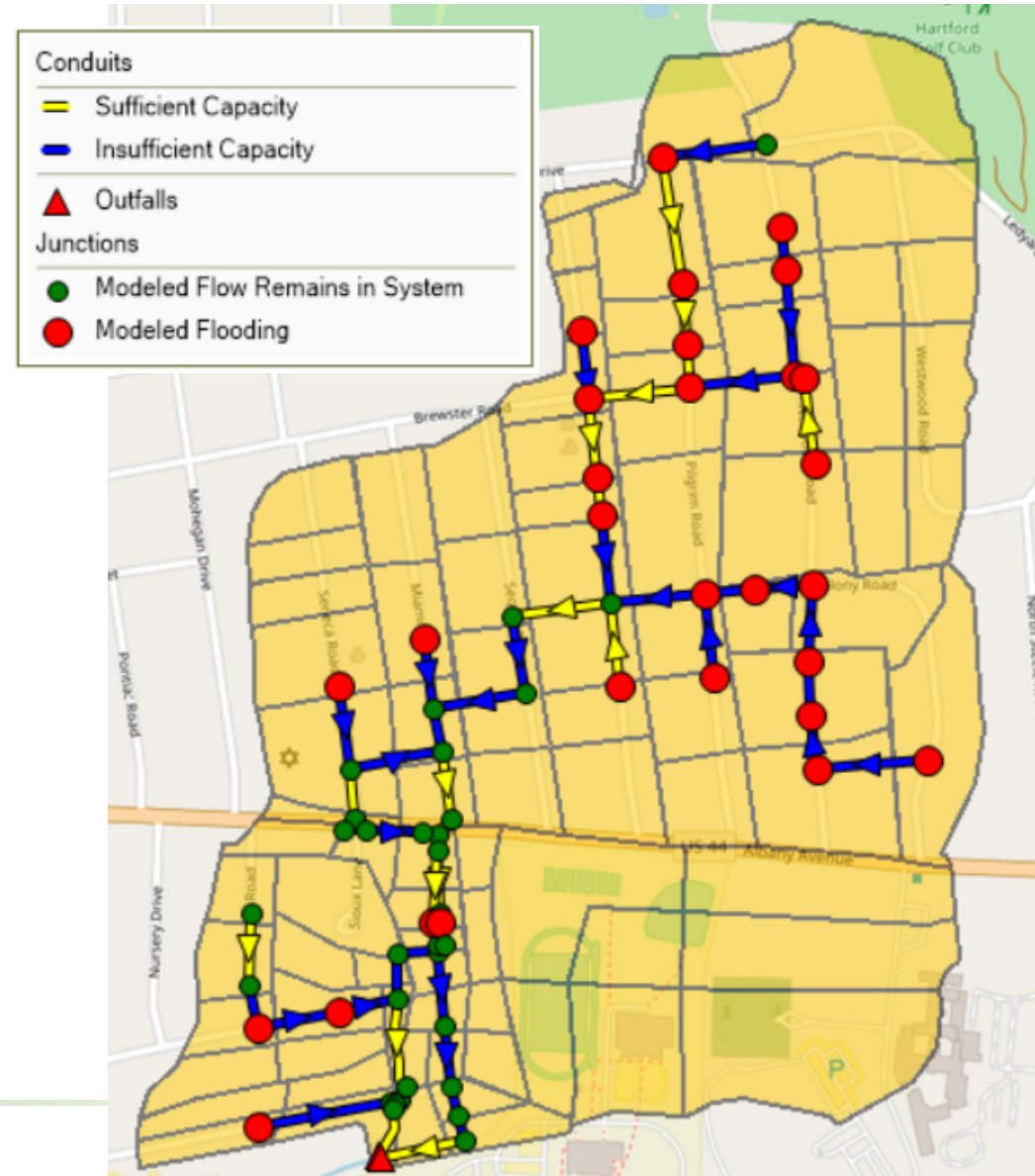
## Area 5 – St Joseph's Tributary

### Existing Conditions

10-year Storm – 10% Occurrence

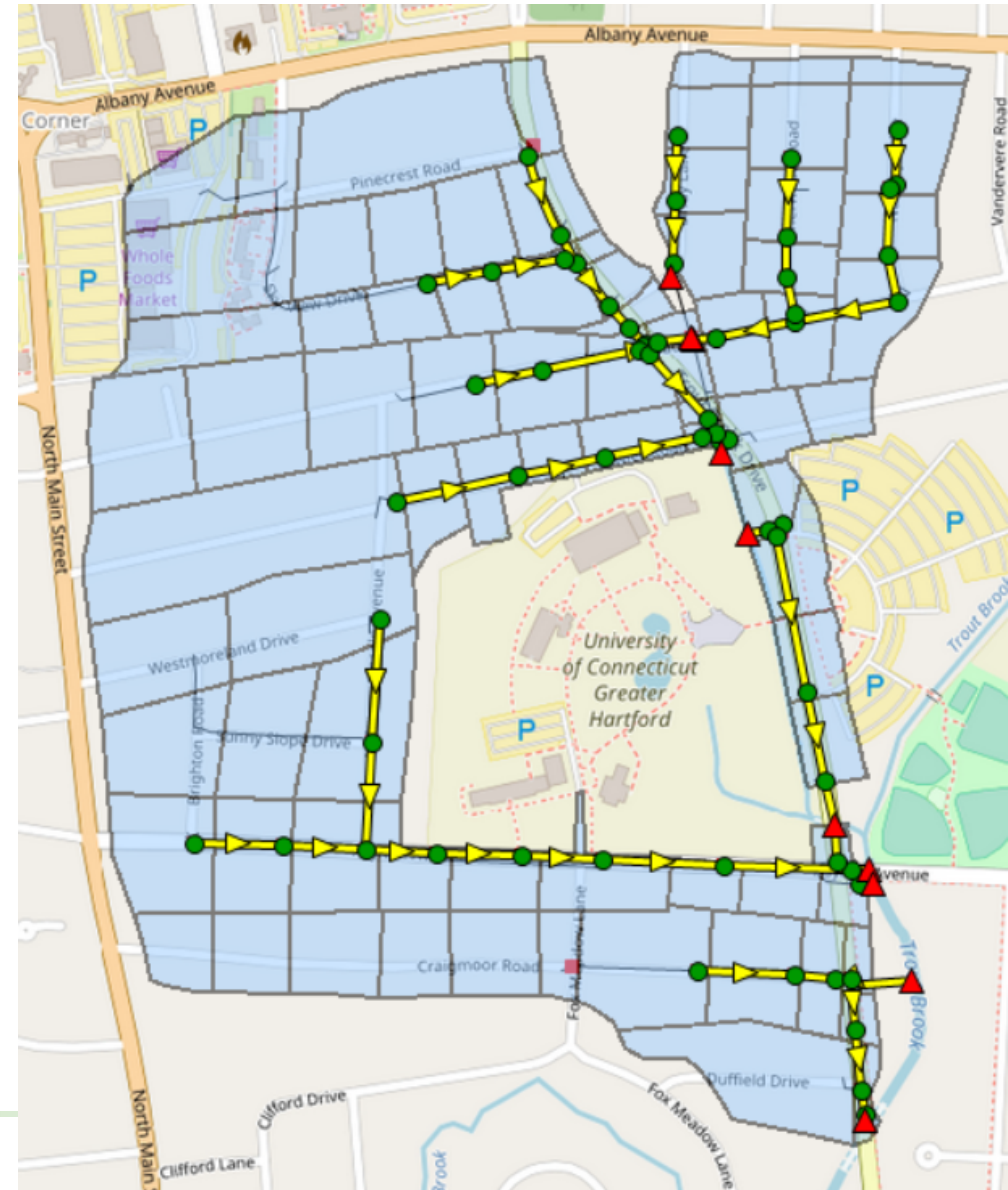
Significant flooding along:

- Brainard Road
- Sequin Road
- Norwood and Colony Roads
- Wiltshire Lane
- Haynes Road
- Lawler Road



## Area 6 - Overview

- Total area: 143 acres
- 10 drainage systems

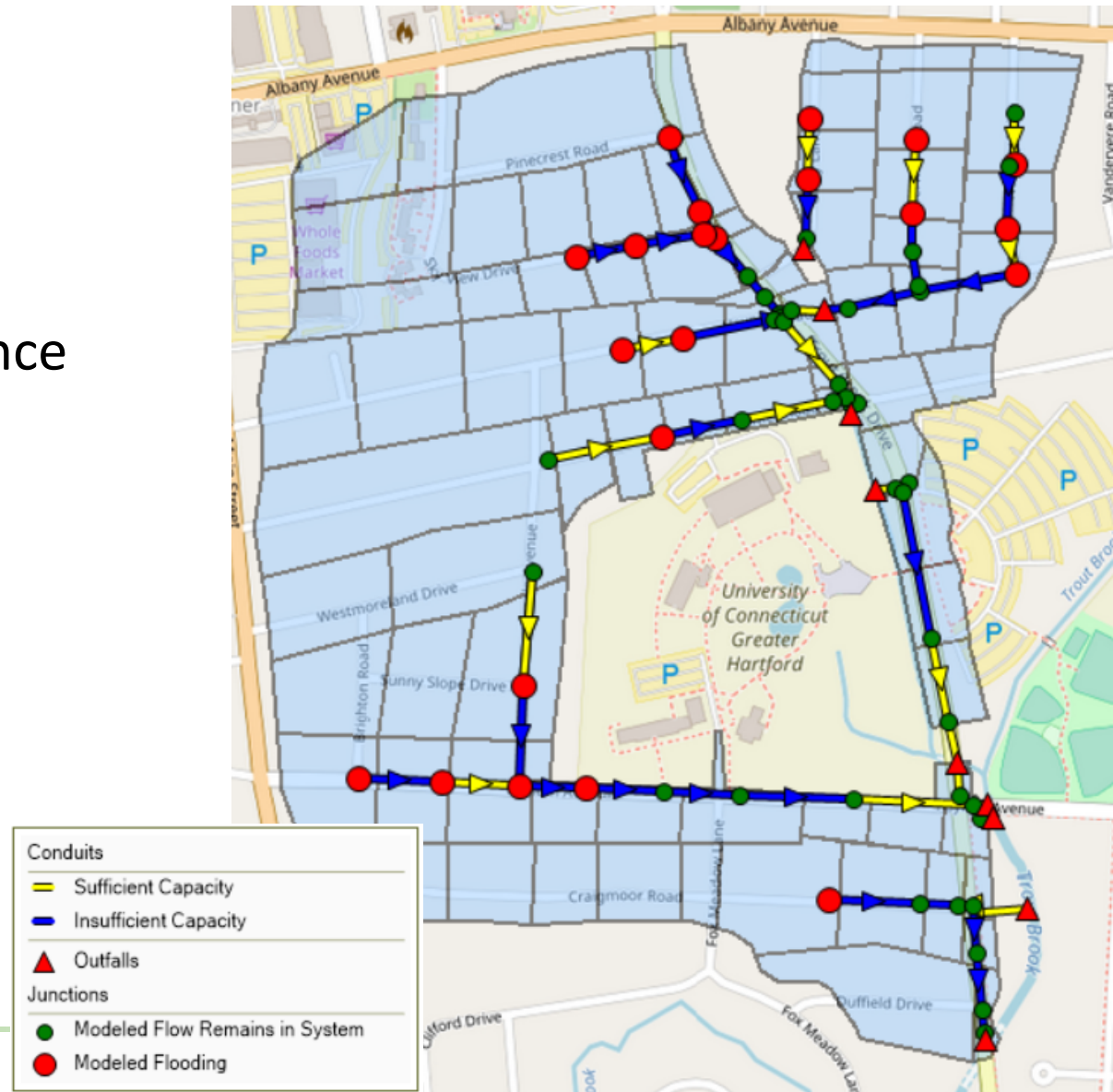


## Area 6 – Trout Brook Drive

Existing Conditions  
10-year Storm – 10% Occurrence

Significant flooding along:

- Craigmoor Road
- Asylum Avenue
- Trout Brook Drive
- Lawler Road
- Haynes Road
- Lindy Lane





# Drainage Systems with Modeled Flooding

| Area | Outfall                  | Location                                | 10-yr<br>Design<br>Storm | Tropical<br>Storm Lee | 2018<br>Storms | August<br>2019<br>Storm |
|------|--------------------------|---|--------------------------|-----------------------|----------------|-------------------------|
| 4    | OF-3836-4                | <b>North Main Street (North)</b>        | √                        | √                     | √              | √                       |
| 4    | OF-3836-5                | North Main Street (South)               |                          |                       |                |                         |
| 4    | OF-3232-1                | <b>Linbrook Road (West)</b>             | √                        |                       |                |                         |
| 4    | OF-3836-3                | <b>Arundel Avenue</b>                   | √                        | √                     | √              | √                       |
| 5    | OF-3141-3<br>OF-3141-4   | <b>St. Joseph's Tributary</b>           | √                        | √                     | √              | √                       |
| 6    | OF-3251-1                | <b>Lindy Lane</b>                       | √                        |                       |                |                         |
| 6    | MH-2601-003              | <b>Haynes Road (East)</b>               | √                        |                       |                | √                       |
| 6    | OF-3141-1                | <b>Lawler Road (West)</b>               | √                        | √                     | √              | √                       |
| 6    | MH-3141-001              | Lawler Road (East)                      |                          |                       |                |                         |
| 6    | OF-5641-4                | Trout Brook Drive at UConn (North)      |                          |                       |                |                         |
| 6    | OF-5641-9                | Trout Brook Drive at UConn (Middle)     |                          |                       |                |                         |
| 6    | OF-5641-10               | Trout Brook Drive at UConn (South)      |                          |                       |                |                         |
| 6    | OF-0181-6                | <b>Asylum Avenue and Lincoln Avenue</b> | √                        | √                     | √              | √                       |
| 6    | OF-0181-7                | Asylum Avenue at Trout Brook Drive      |                          |                       |                |                         |
| 6    | OF-5641-17<br>OF-5641-19 | <b>Craigmoor Road</b>                   | √                        |                       |                |                         |

## Private Inflow Removal

- Approximately 600 total buildings have been identified for private inflow disconnections within all three project areas (shown in green)
- Private inflow to sewer should be disconnected
- Several areas within Areas 4 and 5 have not had building inspections by MDC
- Could be additional properties that have not been inspected



# Collector Drainage Systems

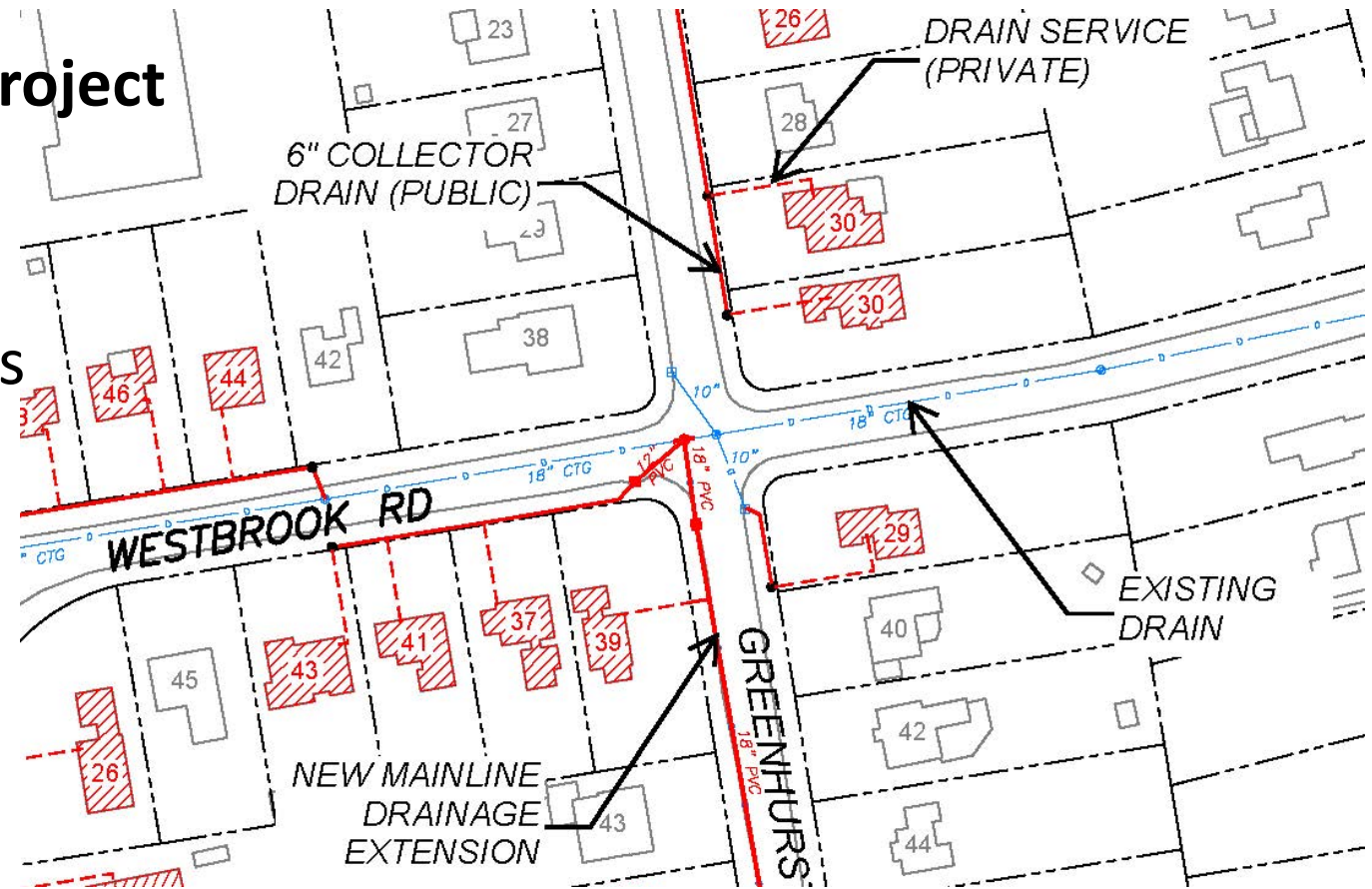
## Greenhurst Road Project

Existing Drains

Drainage Extensions

Collector Drains

Drain Services





# Recommendations

# Drainage Model Development

- Used the computer models to design storm drain improvements
- Designed storm drain system to convey a 10-year design storm without flooding
- Developed recommendations for drainage system improvements and collector drains



# Drainage System Prioritization

## **Tier 1 – High Priority**

- Areas with documented flooding and modeled flooding during the 10-year storm and historical events

## **Tier 2 – Moderate Priority**

- Modeled flooding during 10-year storm and historical events

## **Tier 3 – Low Priority**

- Modeled flooding only during the 10-year storm event

# Phase 1 - Prioritization Recommendations

| Area | Outfall                   | Location                         | Alternative |   |   | Tier |
|------|---------------------------|----------------------------------|-------------|---|---|------|
|      |                           |                                  | 1           | 2 | 3 |      |
| 4    | OF-3836-4                 | North Main Street (North)        | √           |   |   | 2    |
| 4    | OF-3232-1                 | Linbrook Road (West)             | √           |   |   | 3    |
| 4    | OF-3836-3                 | Arundel Avenue                   |             |   | √ | 1    |
| 5    | OF-3141-3 and OF-3141-4   | St. Joseph's Tributary           | √           |   |   | 1    |
| 6    | OF-3251-1                 | Lindy Lane                       | √           |   |   | 3    |
| 6    | MH-2601-003               | Haynes Road (East)               | √           |   |   | 2    |
| 6    | OF-3141-1                 | Lawler Road (West)               | √           |   |   | 1    |
| 6    | OF-0181-6                 | Asylum Avenue and Lincoln Avenue | √           |   |   | 2    |
| 6    | OF-5641-17 and OF-5641-19 | Craigmoor Road                   | √           |   |   | 3    |

# Tier 1 – Lawler Road

| Proposed Pipe (in) | Pipe Length (lf) |
|--------------------|------------------|
| 18                 | 200              |
| 24                 | 1,000            |
| 30                 | 300              |
| 36                 | 200              |
| 42                 | 400              |
| 48                 | 400              |
| <b>Total</b>       | <b>2,500</b>     |





# Tier 1 – St Joseph's Tributary

| Proposed Pipe Size (in) | Pipe Length (lf) |
|-------------------------|------------------|
| 18                      | 1,200            |
| 24                      | 2,100            |
| 30                      | 1,800            |
| 36                      | 300              |
| 42                      | 400              |
| 48                      | 800              |
| 54                      | 3,300            |
| <b>Total</b>            | <b>9,900</b>     |



# Tier 1 – Arundel Avenue

| Proposed Pipe Size (in) | Pipe Length (lf) |
|-------------------------|------------------|
| 15                      | 500              |
| 18                      | 600              |
| 24                      | 1,400            |
| 30                      | 800              |
| 36                      | 2,900            |
| 42                      | 300              |
| 48                      | 700              |
| 54                      | 1,600            |
| 60                      | 1,200            |
| <b>Total</b>            | <b>10,000</b>    |





# Costs

# Drainage Study Phase 1 – Drainage Systems

## Project Costs

| Area | Outfall  | Location               | Recommendations     | Tier      |
|------|----------|------------------------|---------------------|-----------|
| 1    | 5641-022 | FEAT Trunk Line        | \$25,700,000        | 1A, 1C, 2 |
| 2    | 5641-007 | Fern Street East       | \$4,200,000         | 1C        |
| 2    | 5641-001 | Milton Street          | \$7,800,000         | 2         |
| 2    | 5641-12  | Ballard Drive          | \$300,000           | 3         |
| 3    | 3681-001 | Montclair Drive        | \$300,000           | 1B        |
| 3    | 0731-001 | Linbrook Road          | \$1,100,000         | 1B        |
| 3    | 3261-001 | Linnard Road           | \$2,300,000         | 2         |
| 3    | 2547-001 | Clifford Cross Country | \$600,000           | 2         |
| 3    | 1981-009 | Fern Street West       | \$800,000           | 2         |
| 3    | 1091-001 | Clifford Drive         | \$300,000           | 3         |
| 3    | 3321-002 | Loomis North           | \$271,000           | 3         |
| 3    | 3321-003 | Loomis Central         | \$60,000            | 3         |
| 3    | 3321-001 | Loomis South           | \$277,000           | 3         |
|      |          | <b>TOTAL COST</b>      | <b>\$44,008,000</b> |           |

# Drainage System Phase 1 – Collector Drains

## Project Costs

| Outfall       | Location                     | Private I/I<br>Removal<br>Buildings | Collector<br>Drain (Lf) | Drain<br>Extensions<br>(Lf) | Drain<br>Structure<br>(Each) | Total Costs <sup>1</sup> |
|---------------|------------------------------|-------------------------------------|-------------------------|-----------------------------|------------------------------|--------------------------|
| 5641-022      | FEAT - Trunk line            | 292                                 | 15,281                  | 3,303                       | 21                           | \$5,392,000              |
| 5641-007      | Fern Street East             | 87                                  | 5,615                   | 1,789                       | 12                           | \$2,346,000              |
| 5641-001      | Milton Street                | 129                                 | 7,872                   | 1,614                       | 15                           | \$2,758,000              |
| 5641-12       | Cross Country System Area 2  | 35                                  | 2,106                   | 641                         | 3                            | \$853,000                |
| 3681-001      | Montclair Drive              | 9                                   | 350                     | 0                           | 0                            | \$77,000                 |
| 0731-001      | Linbrook Road                | 8                                   | 645                     | 0                           | 0                            | \$141,000                |
| 3261-001      | Linnard Road                 | 45                                  | 2,489                   | 1,700                       | 8                            | \$1,586,000              |
| 2547-001      | Clifford Drive Cross Country | 4                                   | 256                     | 0                           | 0                            | \$56,000                 |
| 1981-009      | Fern Street West             | 26                                  | 1,440                   | 332                         | 2                            | \$521,000                |
| 1091-001      | Clifford Drive               | 4                                   | 256                     | 0                           | 0                            | \$56,000                 |
| 3321-002      | Loomis North                 | 0                                   | 0                       | 0                           | 0                            | \$0                      |
| 3321-003      | Loomis Central               | 0                                   | 0                       | 0                           | 0                            | \$0                      |
| 3321-001      | Loomis South                 | 0                                   | 0                       | 0                           | 0                            | \$0                      |
| <b>Totals</b> |                              | <b>639</b>                          | <b>36,309</b>           | <b>9,379</b>                | <b>61</b>                    | <b>\$13,786,000</b>      |

# Drainage Study Phase 2 – Drainage Systems

## Project Costs

| Area                      | Outfall                   | Location                   | Alternative 1        | Tier |
|---------------------------|---------------------------|----------------------------|----------------------|------|
| 4                         | OF-3836-4                 | North Main Street (North)  | \$4,300,000          | 2    |
| 4                         | OF-3232-1                 | Linbrook Road (West)       | \$170,000            | 3    |
| 4                         | OF-3836-3                 | Arundel Avenue             | \$33,200,000         | 1    |
| 5                         | OF-3141-3 and OF-3141-4   | St. Joseph's Tributary     | \$27,200,000         | 1    |
| 6                         | OF-3251-1                 | Lindy Lane                 | \$300,000            | 3    |
| 6                         | MH-2601-003               | Haynes Road (East)         | \$2,100,000          | 2    |
| 6                         | OF-3141-1                 | Lawler Road (West)         | \$5,800,000          | 1    |
| 6                         | OF-0181-6                 | Asylum and Lincoln Avenues | \$4,600,000          | 2    |
| 6                         | OF-5641-17 and OF-5641-19 | Craigmoor Road             | \$1,000,000          | 3    |
| <b>TOTAL PROJECT COST</b> |                           |                            | <b>\$117,670,000</b> |      |

# Drainage Study Phase 2 – Collector Drains

## Project Costs

| Area          | Location                   | Private I/I Removal Buildings | Collector Drain (Lf) | Drain Extensions (Lf) | Drain Structure (Each) | Total Costs <sup>1</sup> |
|---------------|----------------------------|-------------------------------|----------------------|-----------------------|------------------------|--------------------------|
| 4             | North Main Street (North)  | 62                            | 3,815                | 1,500                 | 8                      | \$1,757,800              |
| 4             | Linbrook Road (West)       | 3                             | 215                  | 0                     | 0                      | \$46,800                 |
| 4             | Arundel Avenue             | 260                           | 15,780               | 5,230                 | 21                     | \$6,617,800              |
| 5             | St. Joseph's Tributary     | 164                           | 9,865                | 1,360                 | 8                      | \$2,992,500              |
| 6             | Lindy Lane                 | 2                             | 90                   | 0                     | 0                      | \$19,600                 |
| 6             | Haynes Road (East)         | 39                            | 1,770                | 1,310                 | 5                      | \$1,181,100              |
| 6             | Lawler Road (West)         | 39                            | 2,540                | 780                   | 3                      | \$1,026,600              |
| 6             | Asylum Ave and Lincoln Ave | 24                            | 1,380                | 260                   | 1                      | \$458,200                |
| 6             | Craigmoor Road             | 16                            | 920                  | 1600                  | 5                      | \$1,164,400              |
| <b>Totals</b> |                            | <b>609</b>                    | <b>36,375</b>        | <b>12,040</b>         | <b>51</b>              | <b>\$15,264,800</b>      |

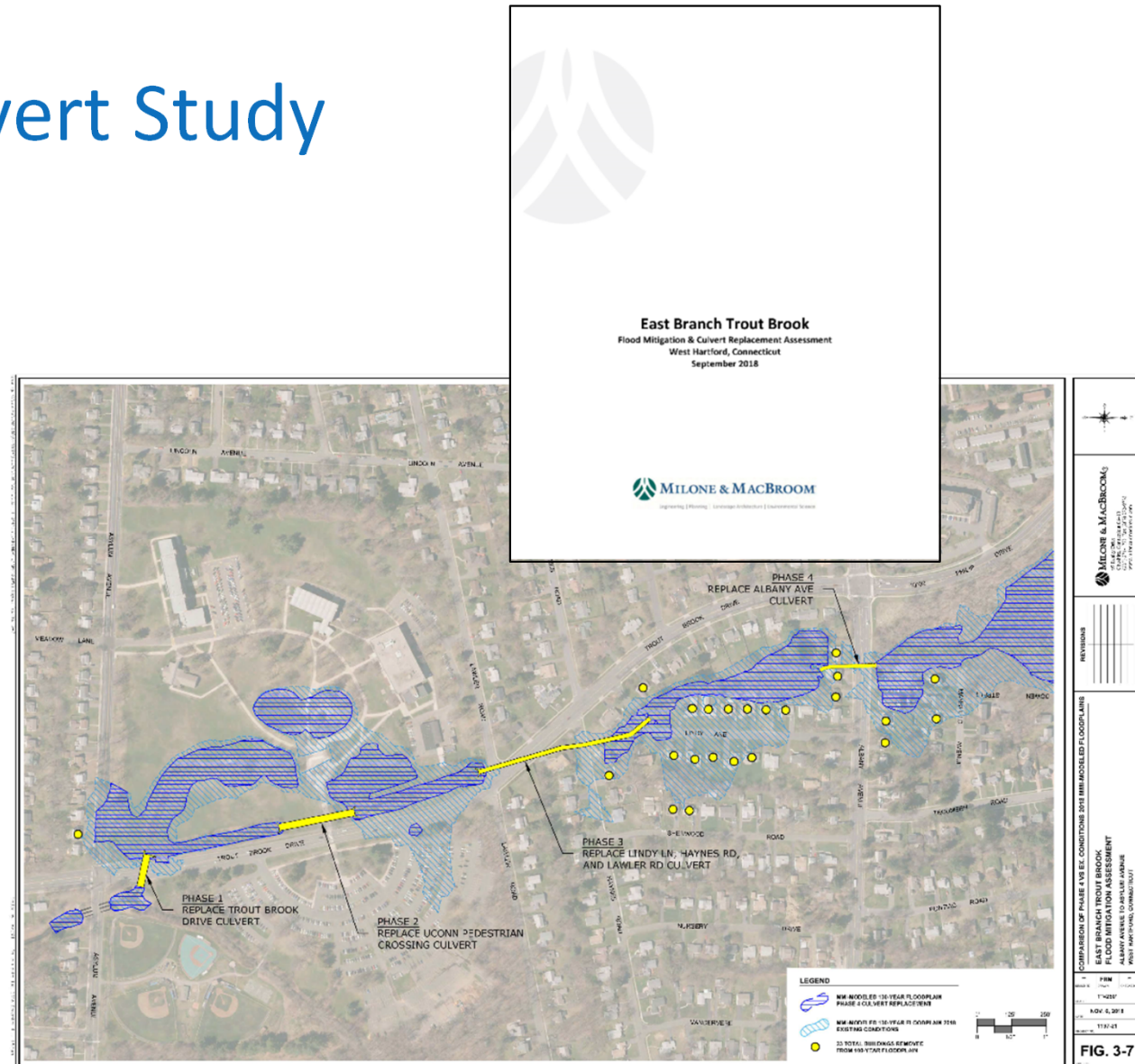


## Prioritization: Phase 1 and 2



# Trout Brook - Culvert Study

- September 2018 – Milone & McBroom (now SLR)
- Evaluated four culverts along Trout Brook
- Proposed culvert replacements:  
Trout Brook Drive  
UConn Pedestrian  
Lawler/Haynes/Lindy  
Albany Avenue



# Tier 1 Project Area Summary

| Outfall                                     | Location                                      | Project Area | Pipe Replacements    | Collector Drains    | Drain Extensions   | Private Disconnects | Study |
|---|---|--------------|----------------------|---------------------|--------------------|---------------------|-------|
| <b>Tier 1A – Pipe Capacity Improvements</b> |   |              |                      |                     |                    |                     |       |
| OF-5641-022                                 | FEAT (Alternative 2)                          | 1            | \$23,800,000         | \$3,324,000         | \$2,068,000        | \$5,928,000         | P1    |
| OF-5641-007                                 | Fern Street East                              | 2            | \$4,200,000          | \$1,222,000         | \$1,125,000        | \$1,767,000         | P1    |
| OF-3681-001                                 | Montclair Drive                               | 3            | \$300,000            | \$77,000            | -                  | \$183,000           | P1    |
| OF-0731-001                                 | Linbrook Road                                 | 3            | \$1,100,000          | \$141,000           | -                  | \$163,000           | P1    |
| OF-3836-003                                 | Arundel Avenue (Alternative 3)                | 4            | \$33,200,000         | \$3,432,200         | \$3,185,700        | \$5,278,000         | P2    |
| OF-3141-003<br>OF-3141-004                  | St Joseph's Tributary (Alternative 1)         | 5            | \$27,200,000         | \$2,145,700         | \$846,800          | \$3,329,200         | P2    |
| OF-3141-001                                 | Lawler Road (West)                            | 6            | \$5,800,000          | \$552,500           | \$474,200          | \$791,700           | P2    |
| Culvert                                     | Trout Brook Drive                             | 6            | \$1,008,000          | -                   | -                  | -                   | SLR   |
| Culvert                                     | UConn Pedestrian Crossing                     | 6            | \$1,476,000          | -                   | -                  | -                   | SLR   |
| Culvert                                     | Lawler Avenue, Trout Brook Drive, Haynes Road | 6            | \$2,852,000          | -                   | -                  | -                   | SLR   |
| Culvert                                     | Lindy Lane                                    | 6            | \$555,000            | -                   | -                  | -                   | SLR   |
| Culvert                                     | Albany Avenue                                 | 6            | \$1,656,000          | -                   | -                  | -                   | SLR   |
| <b>Tier 1 Projects Total</b>                |   |              | <b>\$103,147,000</b> | <b>\$10,894,400</b> | <b>\$7,699,700</b> | <b>\$17,439,900</b> |       |

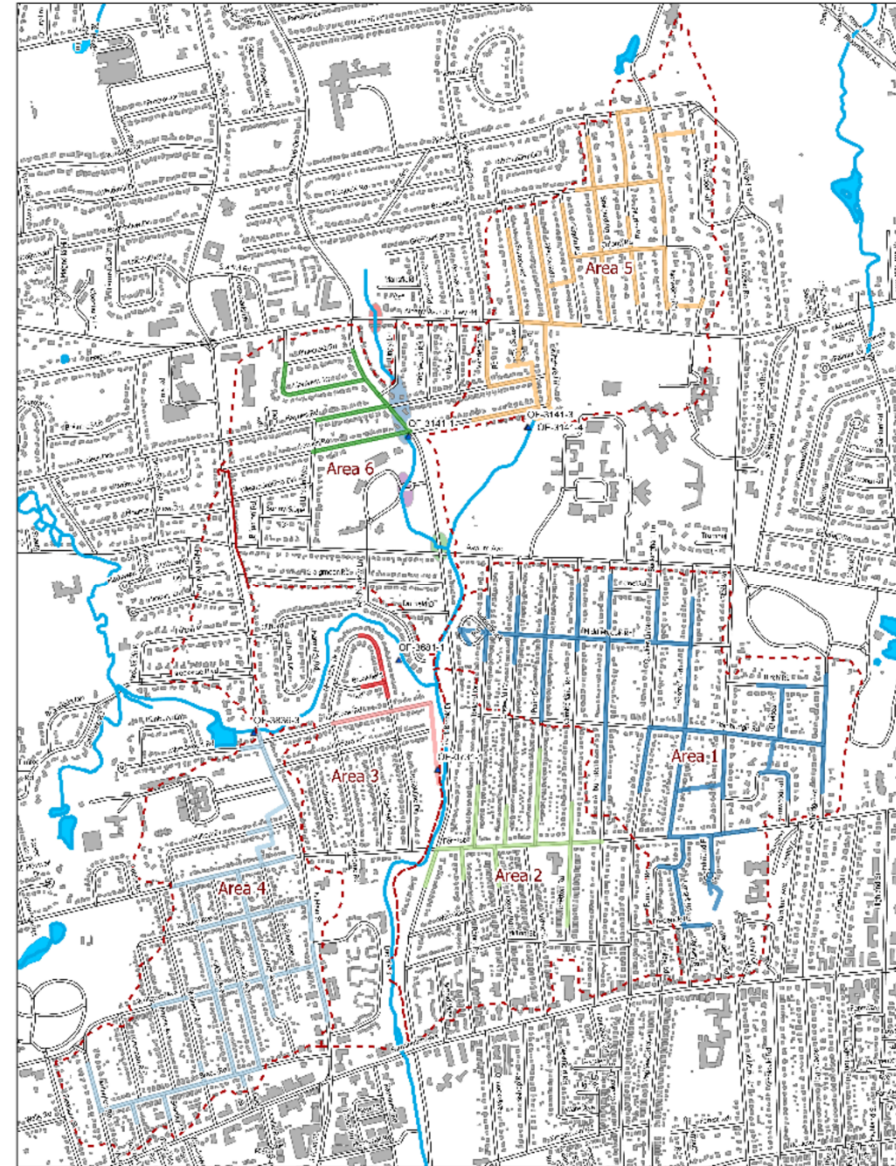
# Tier 1 Projects

Seven Drainage system improvement projects:

- Area 1 – FEAT Area (blue)
- Area 2 – Fern Street East (light green)
- Area 3 – Montclair Drive (red)
- Area 3 – Linbrook Road (pink)
- Area 4 – Arundel Avenue (light blue)
- Area 5 – St Joseph's Tributary (yellow)
- Area 6 – Lawler Road West (green)

Five culvert replacement projects:

- Trout Brook Drive (green oval)
- UConn Pedestrian Culvert (purple oval)
- Lawler Road & Haynes Road (blue oval)
- Lindy Lane (blue oval)
- Albany Avenue (rose oval)





## Next Steps

# Next Steps

Phase 2 Public Meeting in October (Areas 4, 5, and 6)

Groundwater Study – Area 3

Begin Drainage Systems Design – Areas 1, 2, 4, 5 and 6

- FEAT
- Fern Street East
- Arundel Avenue
- St Joseph's Tributary
- Lawler Road West

Begin Culvert Replacement Design

- Trout Brook Drive Culvert
- UConn Pedestrian Culvert
- Lawler Road / Lindy Lane

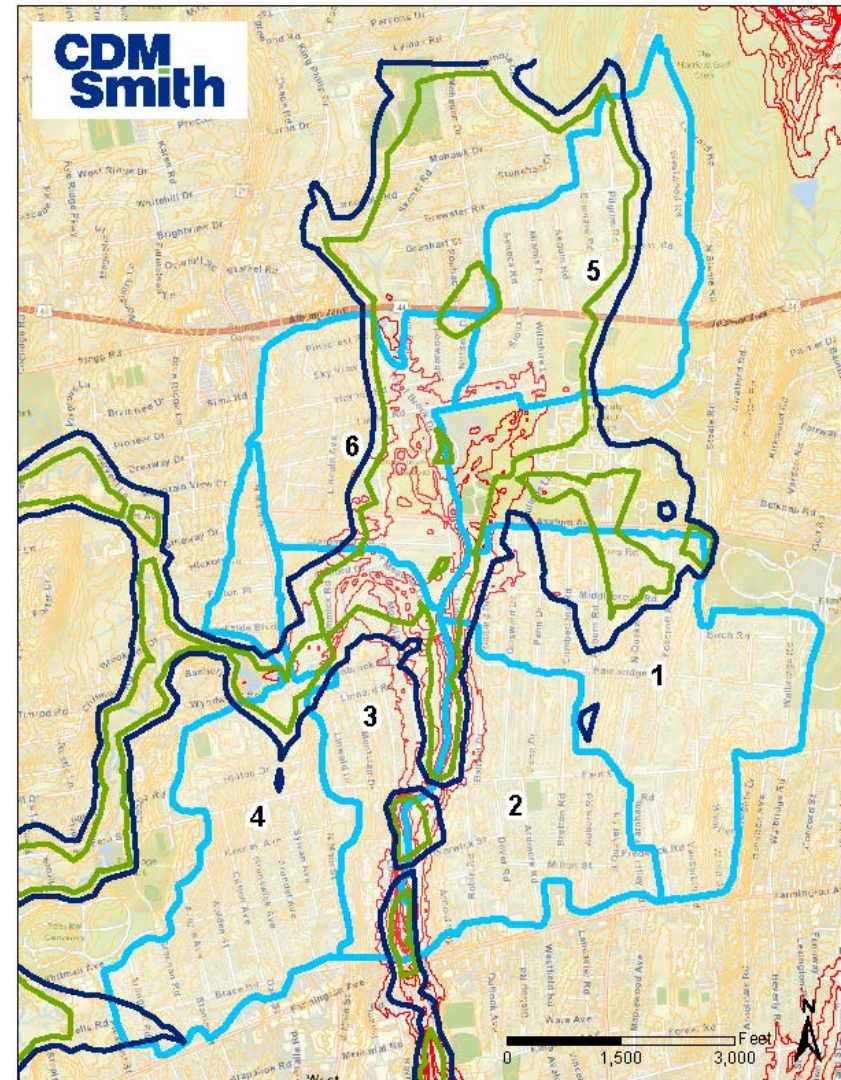
Grant and Funding Opportunities

Ongoing MDC Coordination for House Inspections and Collector Drains



# Groundwater Study

- Depth to groundwater is very shallow within 5 feet of ground surface
- Area 3:
  - Approximately 85 houses with 5 feet
  - Approximately 90 houses with 10 feet
- The project areas are located within a regional low elevation point
- Groundwater study in Area 3 has been authorized by the Town



# Schedule

- Groundwater Study: Finished in Spring of 2022
- Initial Drainage System Design: Finished in Winter of 2022/2023
- Initial Culvert Design: Finished in Winter of 2022/2023
- Construction begin: As early as Spring 2023
- Phased construction over next 20+ years based on Town funding

# Questions and Contacts

## QUESTIONS??

### Contacts:

#### West Hartford:

**Duane J. Martin, P.E.**

Town Engineer

Department of Community Development

Engineering Division

860.561.7539

**Julie A. Viera, P.E.**

Civil Engineer II

860.561.7542

#### CDM Smith:

**Joseph L. Laliberte, P.E., PMP, BCEE**

Vice President

**Cynthia A. Baumann, P.E., PMP, CFM**

Sr. Project Manager

CDM Smith

77 Hartland Street, Suite 201, East Hartford, CT 06108

o: 860.808.2277

### Project webpage:

<https://www.westhartfordct.gov/town-departments/engineering/storm-water-management>