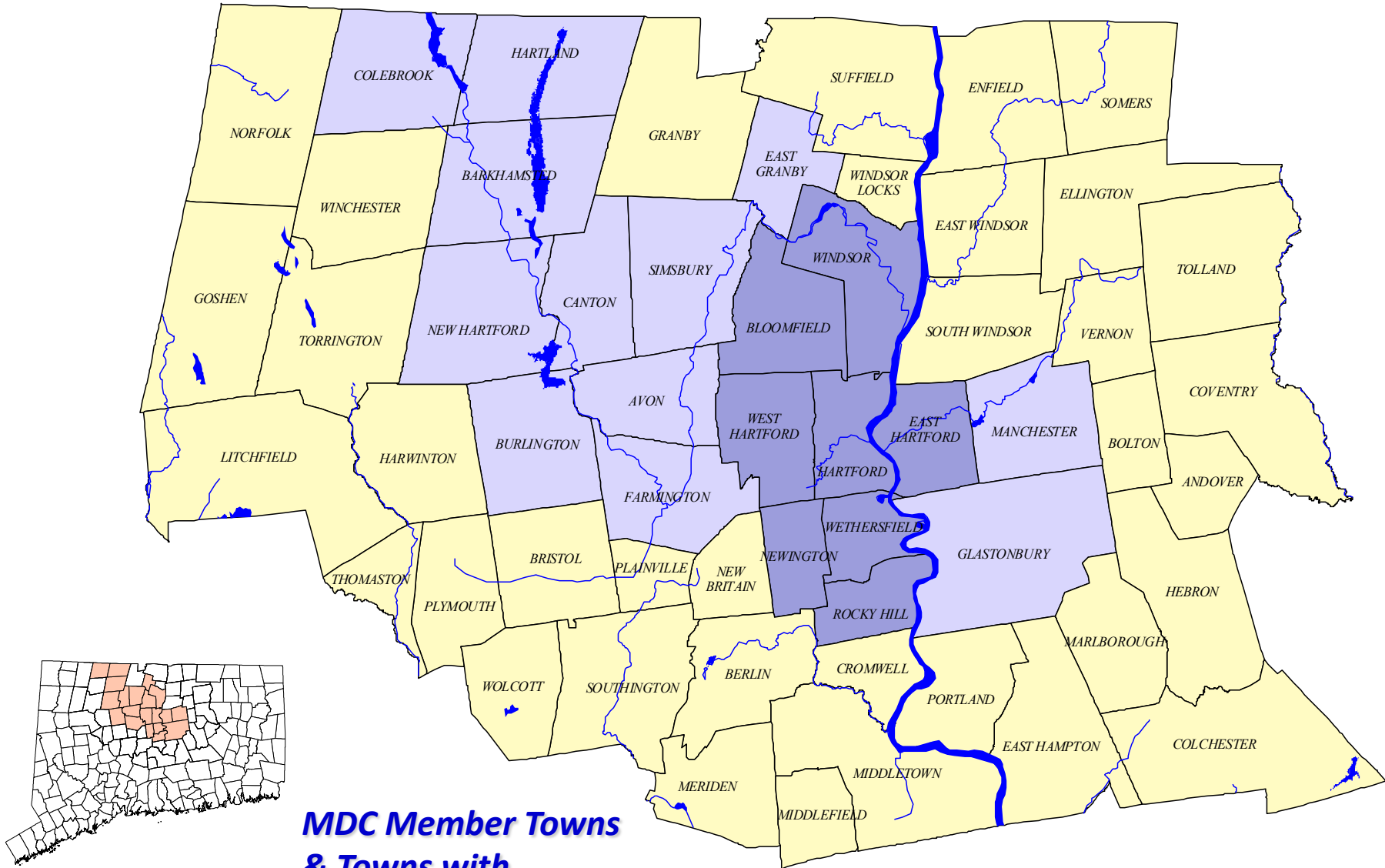


Regional Management of Water Resources

The Metropolitan District
2011



The Metropolitan District



**MDC Member Towns
& Towns with
Property Ownership**

The District is Created

- Municipalities supported the idea of **regional cooperation** but not annexation.
- Initial draft to form a **district included a multitude of responsibilities**: water distribution and sewer collection as well as transportation networks, zoning, building permits and inspections, health management.
- Heavy political debate and lobbying eventually led to the approval of several towns to form a **common water and sewer agency** with a base population of over 180,000.
- **Finally in 1929, through an Act of Legislature, the Hartford Water Works becomes the Metropolitan District.**
- Chartered as a “Municipal Corporation” with Broad Regional Authorities and Responsibilities enacted under State Statute.

Charter Provisions

- Provide and Maintain Water Supply
- Serve Towns within 20 miles of the Capitol
- Provide and Maintain Sewer Systems
- Construct and Maintain Highways
- Construct and Maintain Public Works facilities, including Solid Waste facilities
- Construct Hydroelectric facilities
- Provide Recreation
- Acquire Real Estate
- Collect Taxes and Issue Debt

Member Towns

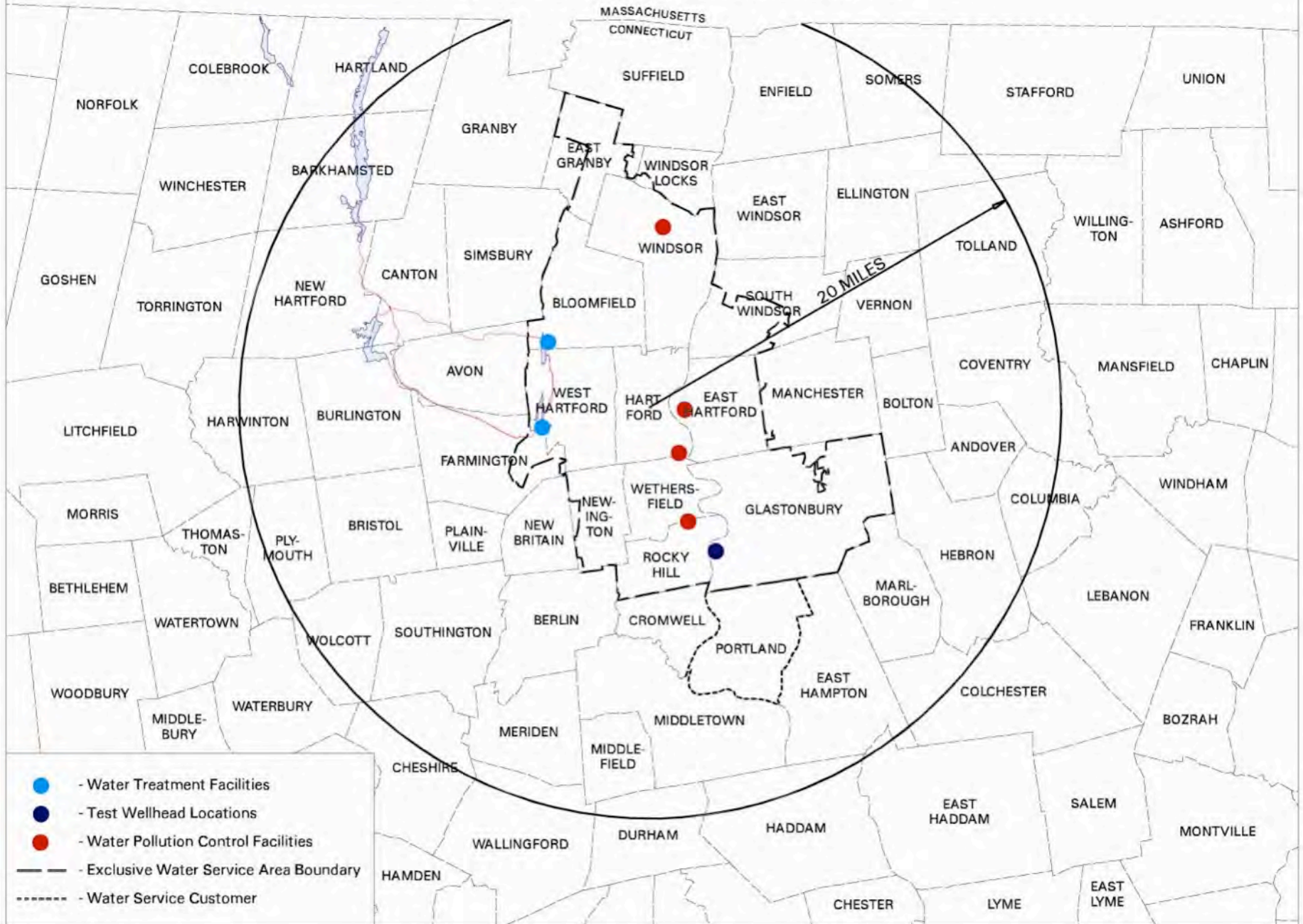
Serve Eight Member Towns in the Greater Hartford Area:

- Hartford
- West Hartford
- Bloomfield
- Newington
- Wethersfield
- Windsor
- Rocky Hill
- East Hartford

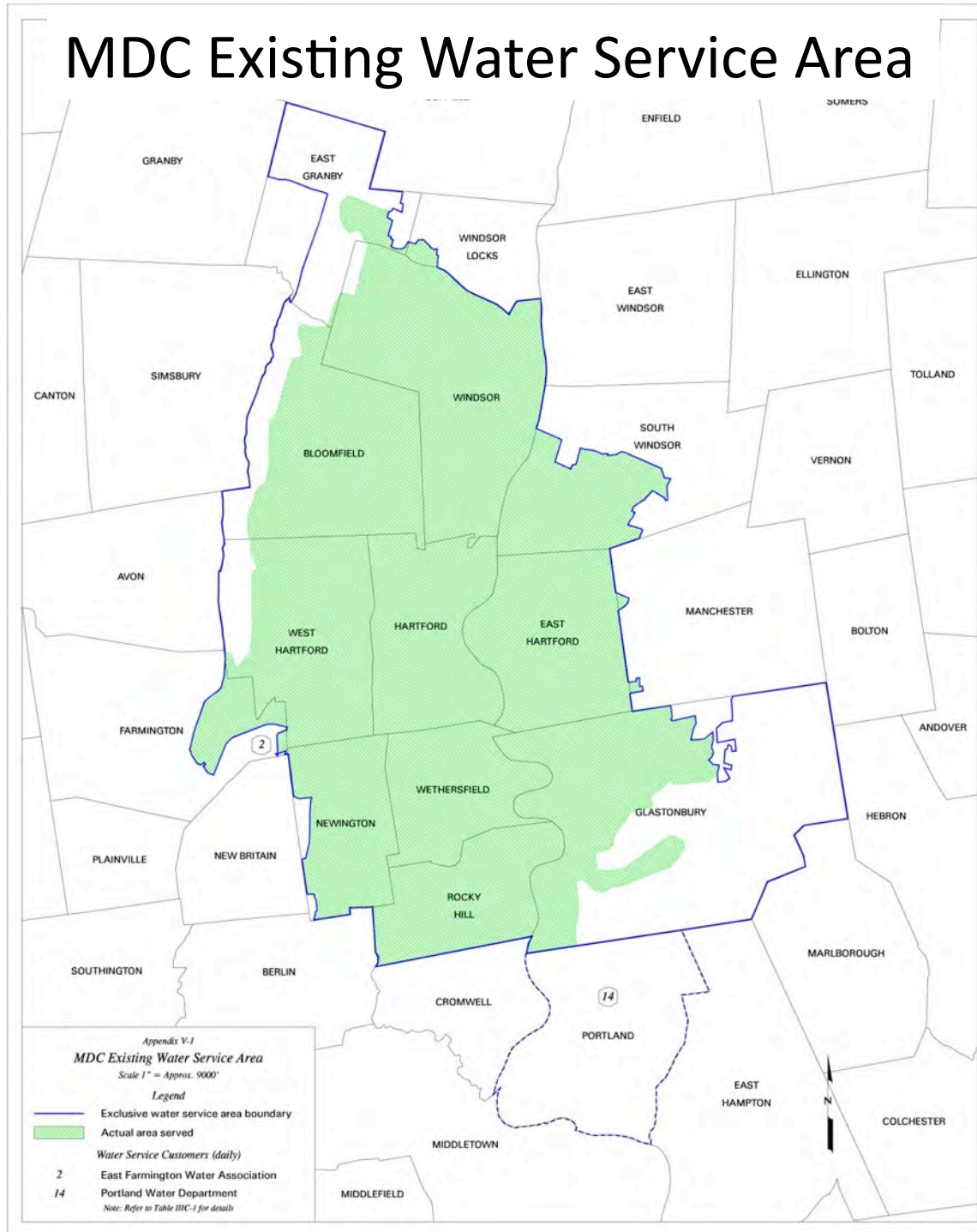
Water Service to Portions of:

- South Windsor
- East Granby
- Farmington
- Glastonbury
- Portland

The Metropolitan District Sources, Facilities and Service Limits



MDC Existing Water Service Area



Appendix V-1
MDC Existing Water Service Area
 Scale 1" = Approx. 9000'

Legend

- Exclusive water service area boundary
- Actual area served

Water Service Customers (daily)

- 2 East Farmington Water Association
- 14 Portland Water Department

Note: Refer to Table III-C-1 for details

MDC Current Services

- **Water Treatment & Supply**
 - Barkhamsted Reservoir Capacity: 30.3 billion gallons
 - Nepaug Reservoir Capacity: 9.5 billion gallons
 - Miles of Pipe: 1,570
 - Pump Stations: 17
 - Customers: 101,000
 - Water Treatment Facilities: 3
 - Land Space: 31,000 acres of property in CT and MA, of which 28,000 acres are watershed lands
- **Water Pollution Control**
 - Facilities: 4
 - Miles of Pipe: 1,197
 - Pump Stations 67
 - Number of Customers: 107,000; Population 375,000
- **Hydroelectric Facilities**
 - Facilities: 2 on the West Branch of the Farmington River
- **Household Hazardous Waste Collection**
 - Offered each spring and fall at numerous sites in member and non-member towns
- **Mid Connecticut Project**
 - Solid Waste Processing transforming 2500-4000 Tons / Day of Municipal Solid Waste into a Refuse Derived Fuel which is utilized as a combustible fuel in the adjacent Power Plant.
- **Recreation**
 - MDC supply areas and open space support many recreational activities
- **Riverfront Maintenance**
 - MDC maintains over 80 acres of riverfront parklands and 4 miles of riverside trails

Water Supply



Barkhamsted Reservoir

THE NEPAUG RESERVOIR



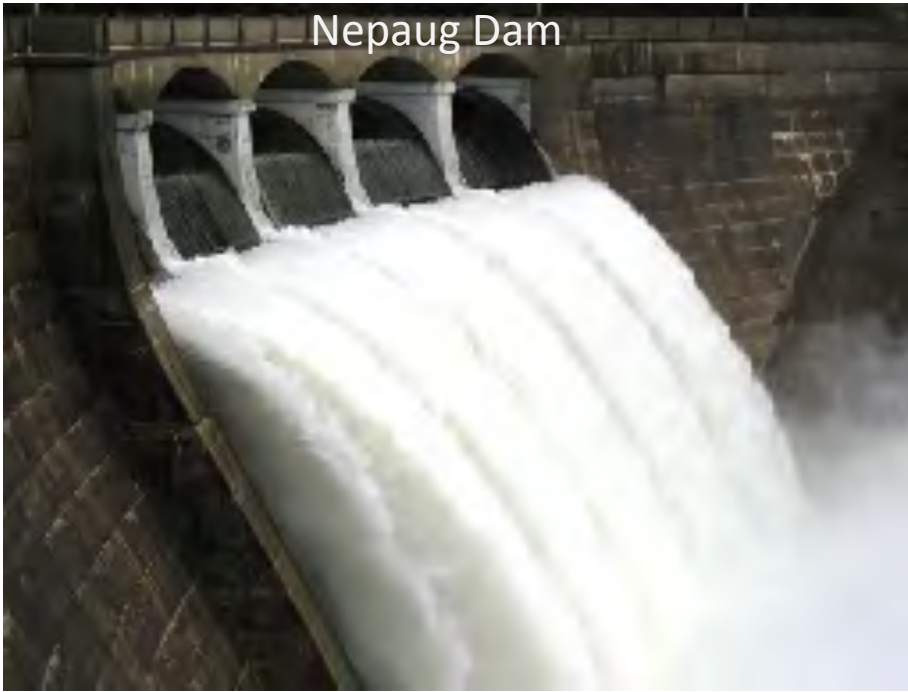
Saville Dam Gatehouse



Saville Dam



Nepaug Dam



Reservoir 2, West Hartford



Barkhamsted Reservoir
Spillway Channel



Saville Dam Gatehouse

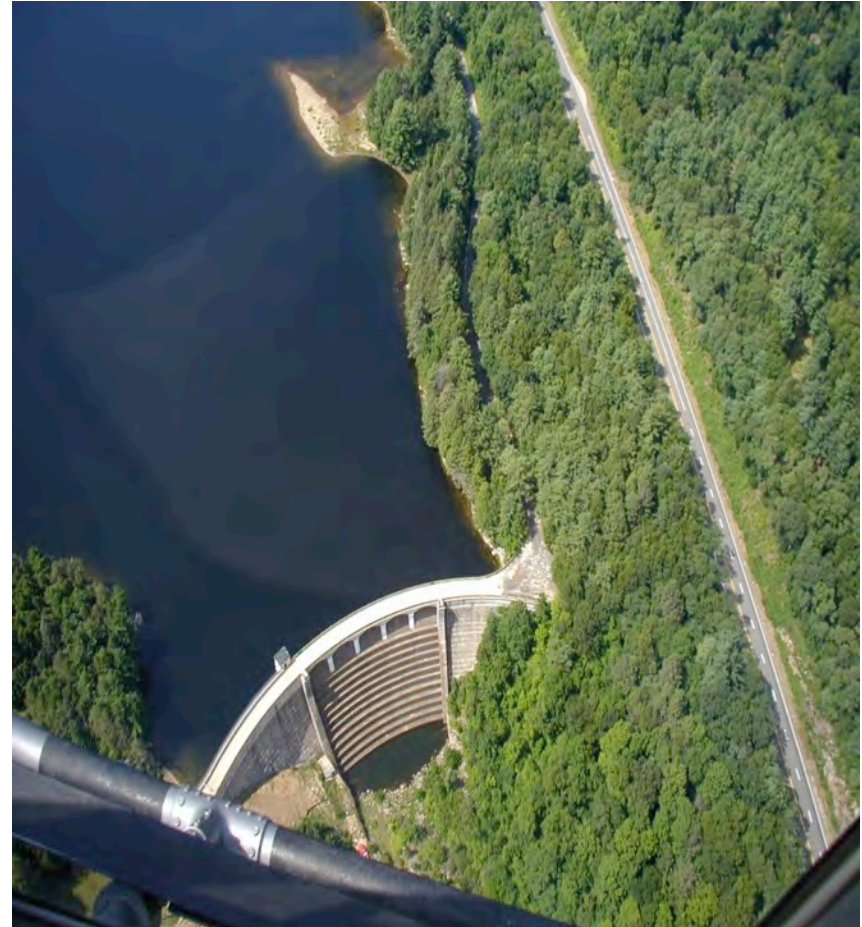


Reservoir 6, West Hartford, CT

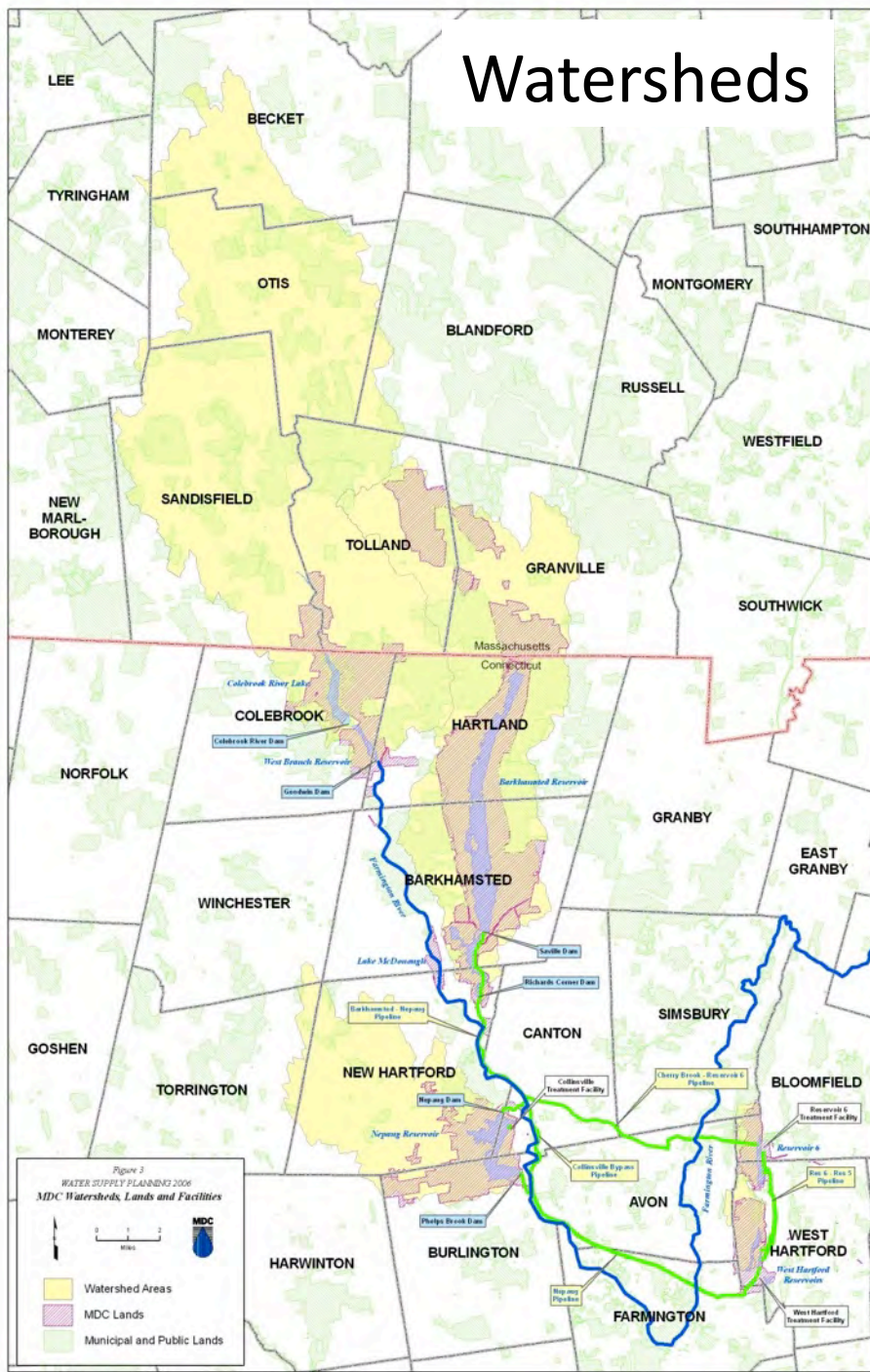


Dam Construction Dates

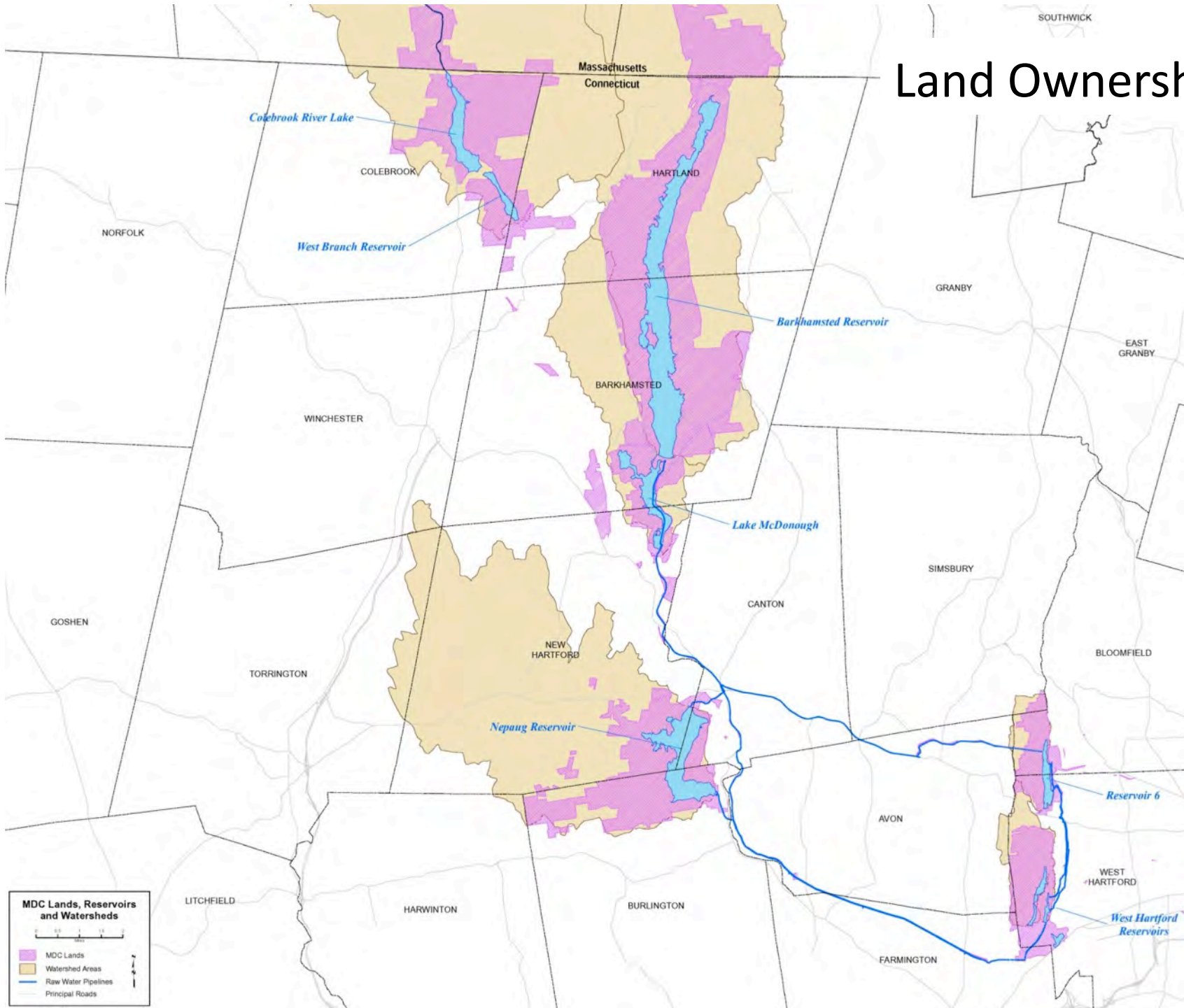
- **Nepaug Reservoir ~ Nepaug Dam**
Concrete gravity dam (650 feet long and maximum height of 156 feet above bedrock) built 1914-1917.
- **Nepaug Reservoir ~ Phelps Brook Dam**
Earth embankment dam (1,200 feet long and 65 feet high) with concrete corewall constructed 1914-1917.
- **Nepaug Reservoir ~ East Dike**
Earth embankment dam (650 feet long and 27 feet high) with concrete corewall constructed 1915-1917.
- **West Hartford Reservoirs ~ 1, 2, 3, 5 & 6**
Earthen dams constructed between 1864-1895.
- **Lake McDonough**
Richard's Corner Dam, built in 1915. Also known as the Compensating Reservoir.
- **Saville Dam**
Built in 3 phases; Earth embankment dam (1,950 feet long and 137 feet high) with concrete corewall constructed 1933-1940.
- **Goodwin Dam –West Branch Reservoir**
“Hogback” dam, built 1955-1960. Authorized in 1949, giving the District the ability to regulate flow in the Farmington River.
- **Colebrook River Dam**
U.S. Army Corps of Engineers dam, built in 1969.



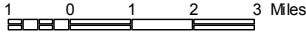
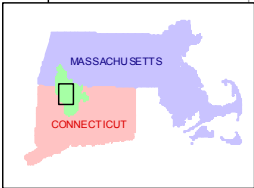
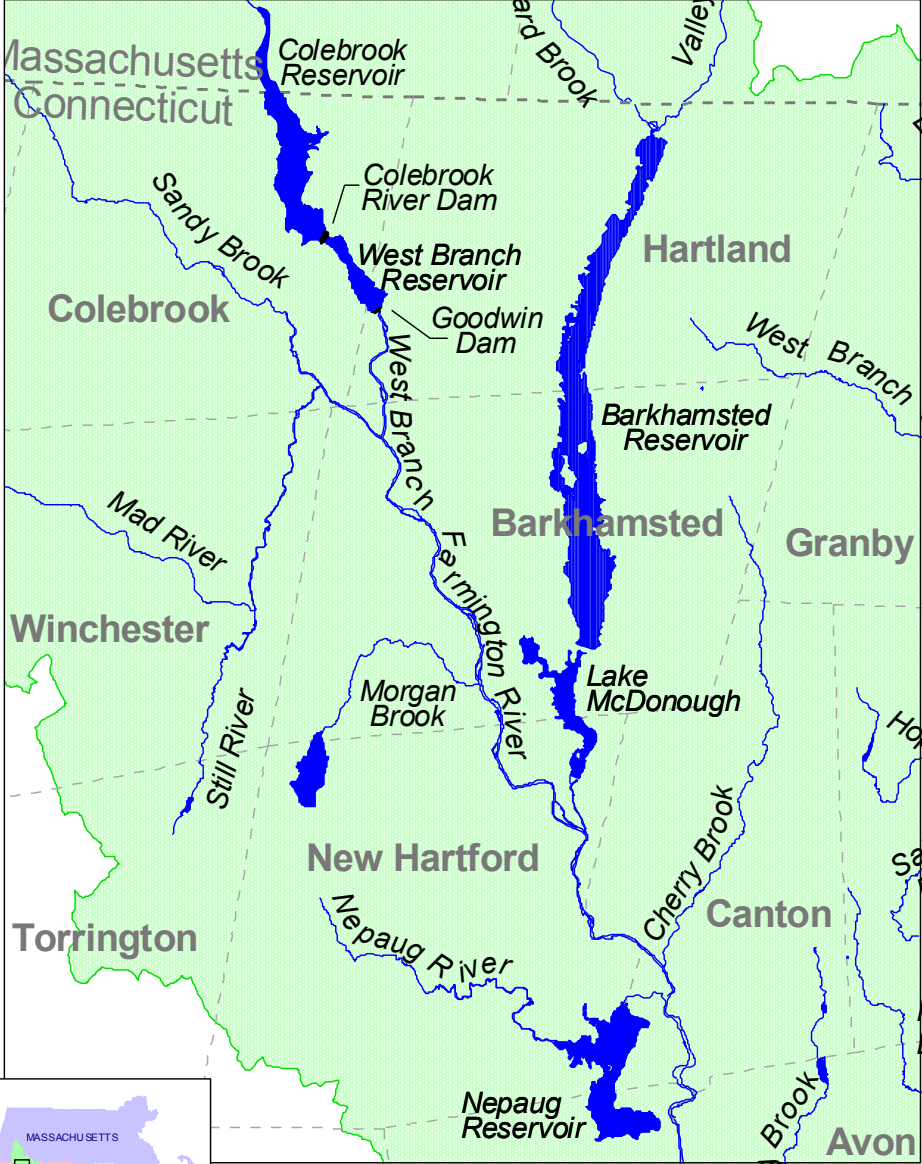
Watersheds



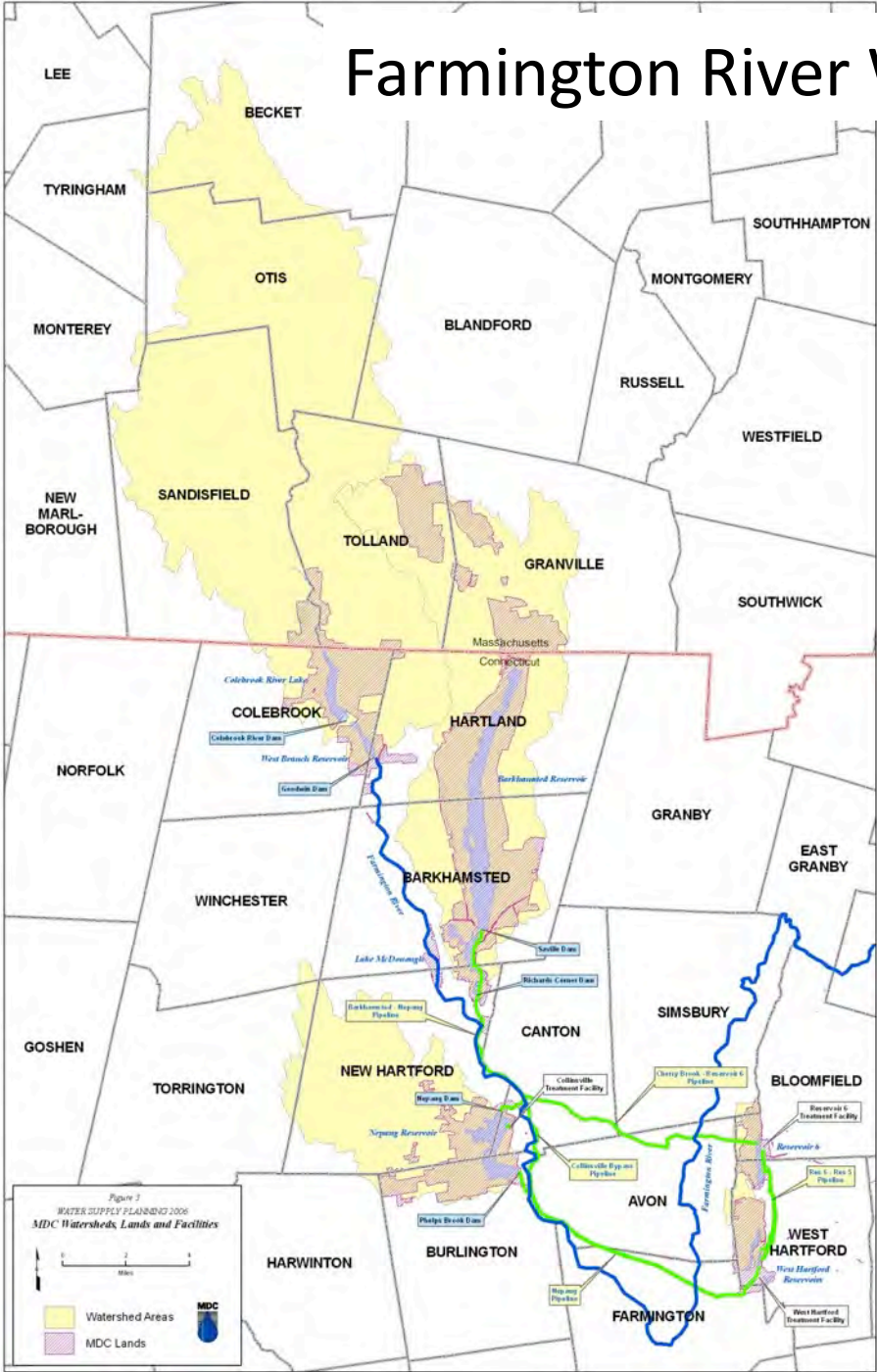
Land Ownership



The Farmington River Watershed



Farmington River Wild and Scenic



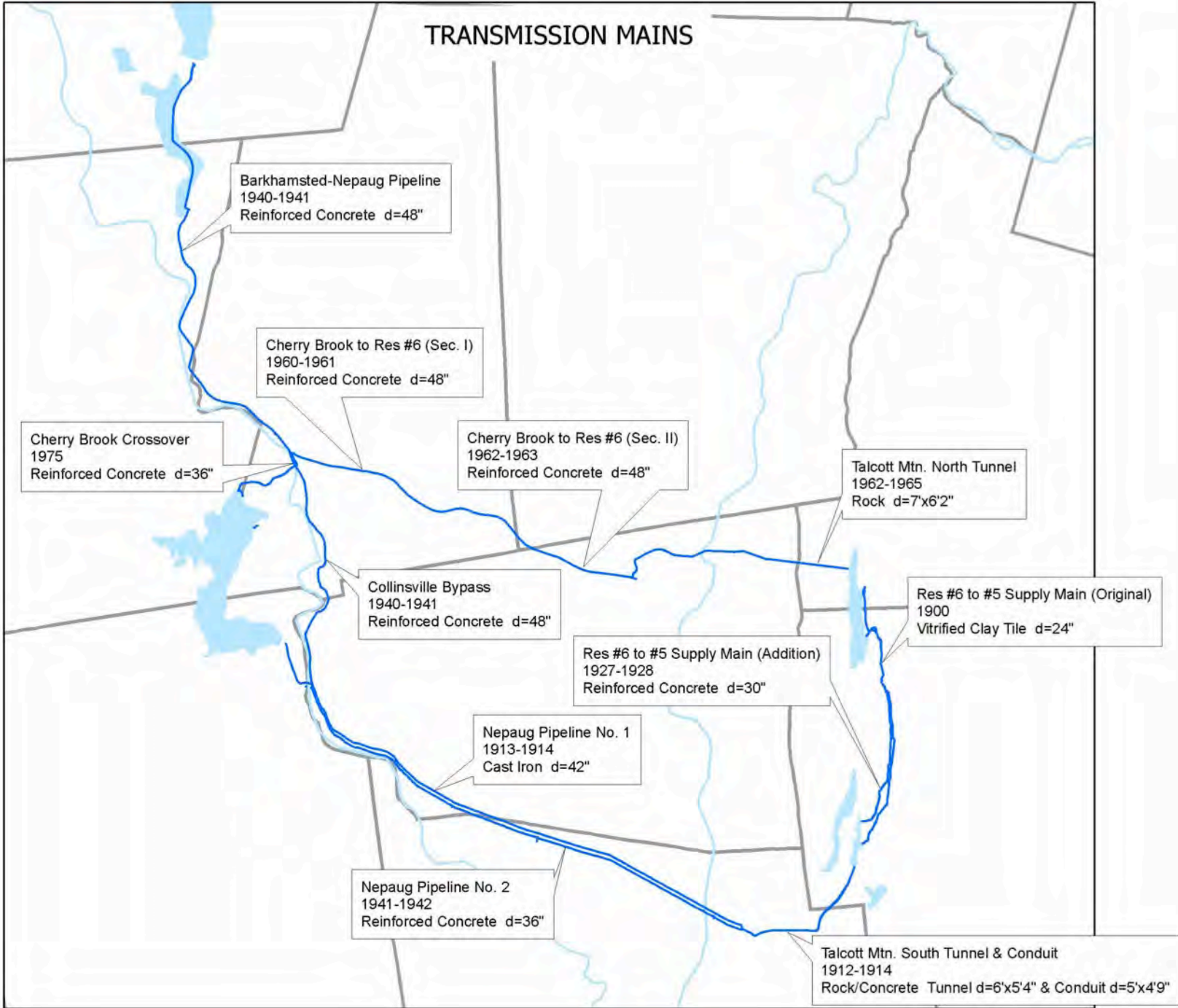
Wild and Scenic River



Farmington River



TRANSMISSION MAINS



Water Asset Management

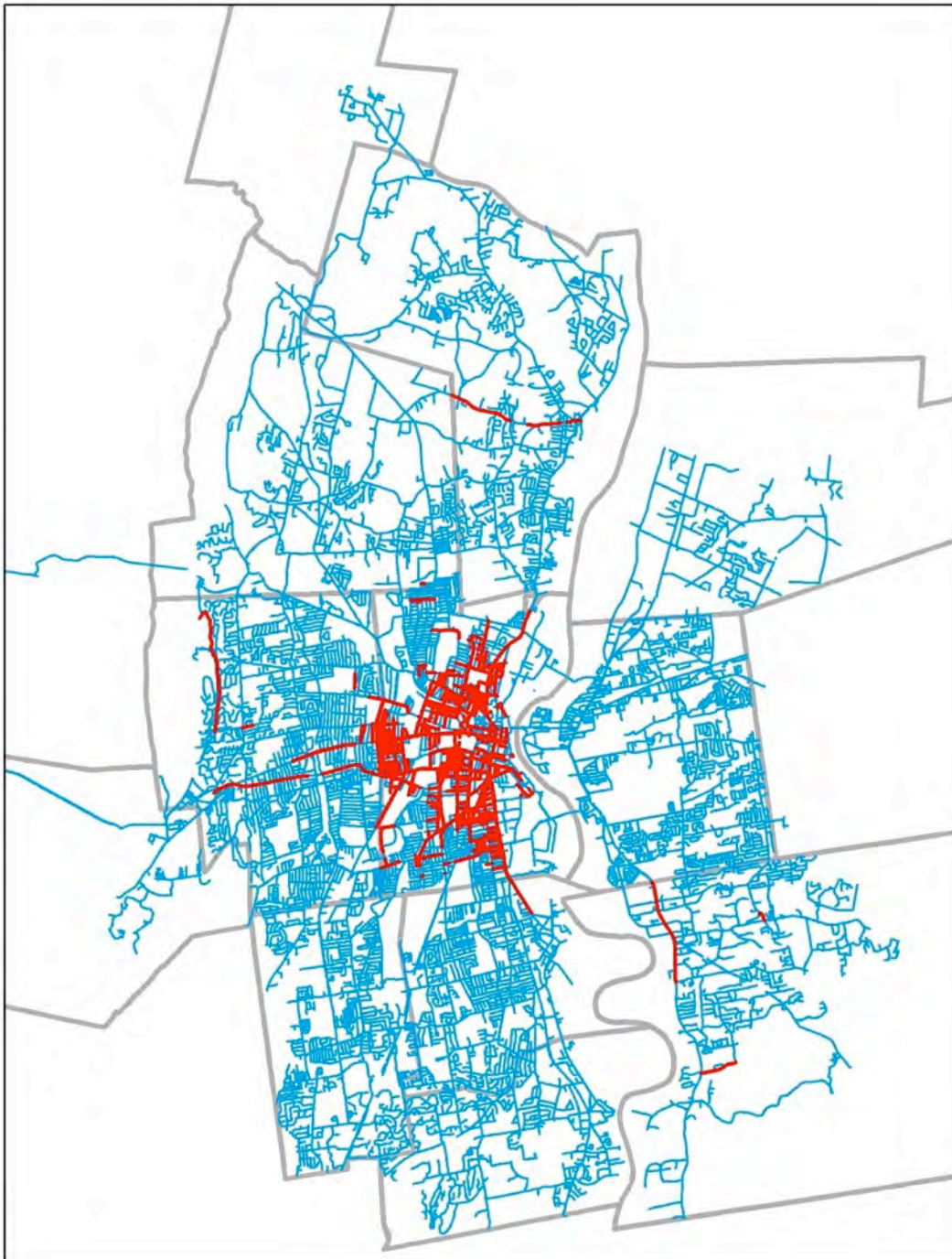
- West Hartford WTP
- Reservoir 6 WTP
- Distribution System
 - 1,570 Miles of water mains
 - 17 Pump Stations (+ 1 under construction)
 - 20 Storage Tanks (+ 1 under construction)

A map showing the water main infrastructure of the Metropolitan District of Columbia (MDC). The map features a dense network of blue lines representing water mains, overlaid on a light blue background with brown outlines of city blocks and a larger brown outline of the district boundary. The network is most concentrated in the central urban area and extends outwards to the edges of the district. A large body of water is visible on the right side of the map.

District owns and operates about 1570 Miles of water mains having an avg. age of 56 years.

Avg. age= (sum of length x age)/ 1570

MDC Water Main Infrastructure



Water Mains
Installed Before
1909

105.15 Miles

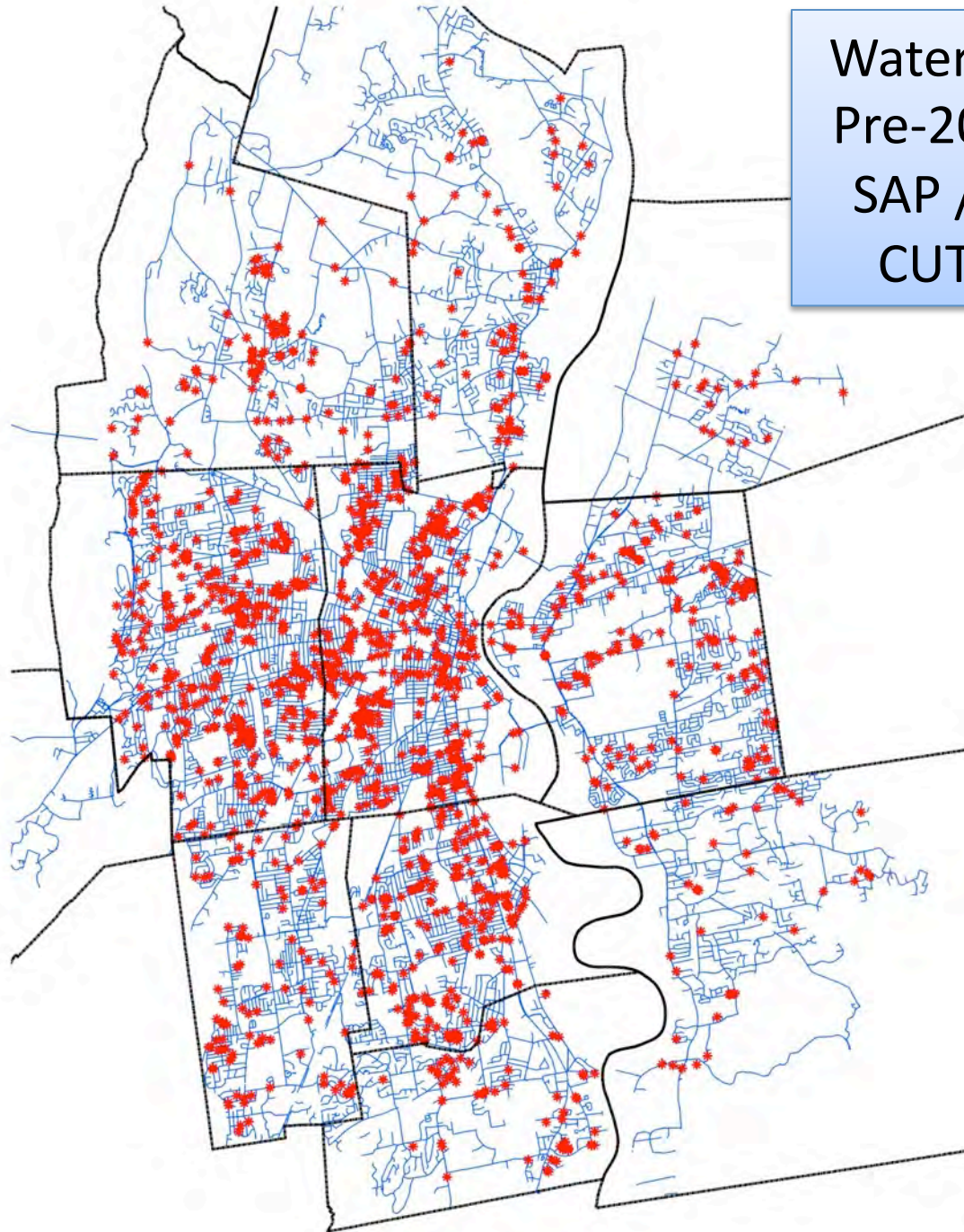
Diameter	Miles
4	1.61
6	42.66
8	14.83
10	6.85
12	11.13
16	12.27
20	6.45
21	0.03
24	3.08
30	5.90
36	0.33
42	0.01

Hartford

Miles of MDC Pipe in Hartford:
Water Main = 279.22 miles
Sanitary = 218.95 miles
Storm = 90.47 miles



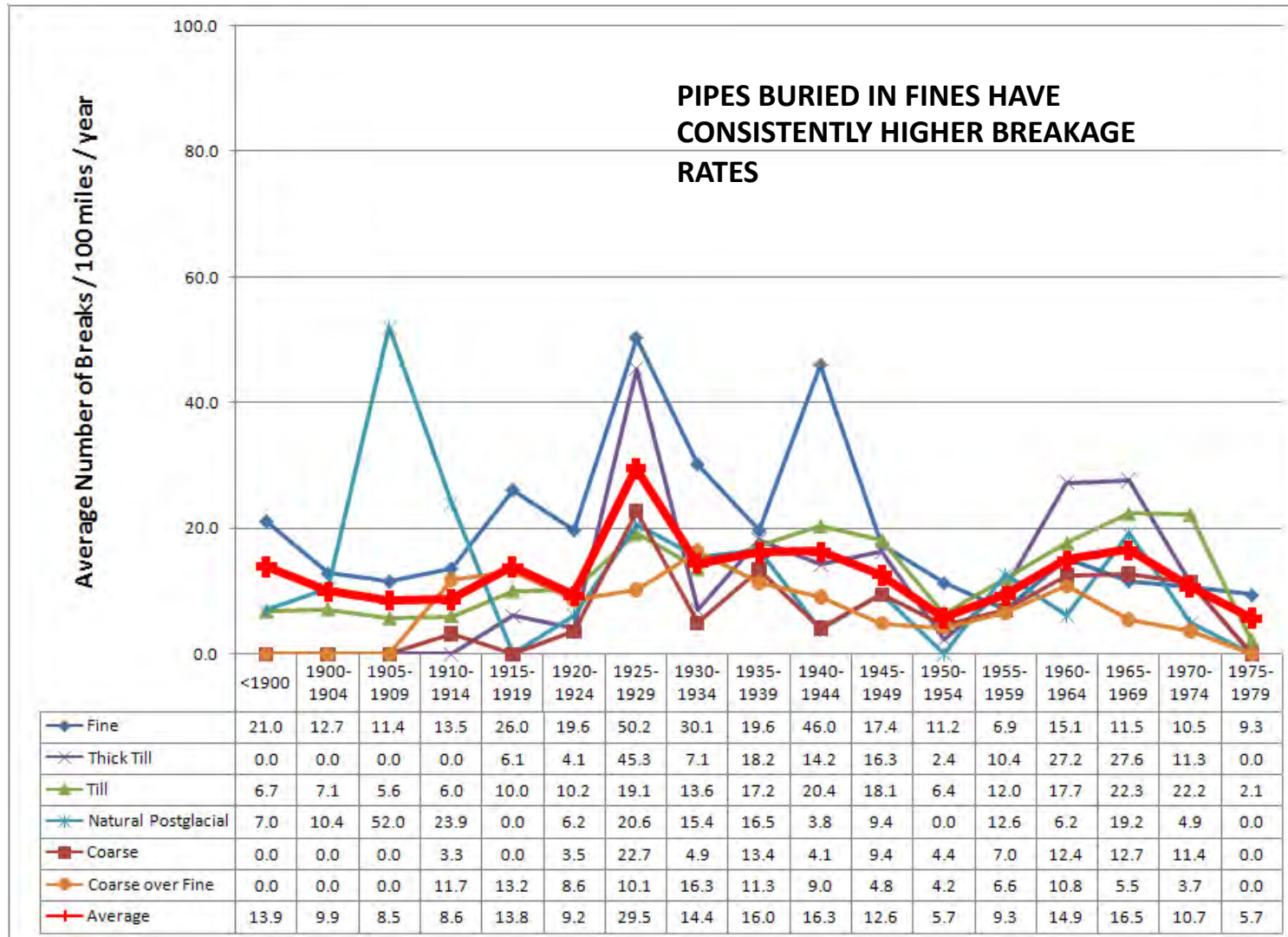
Water Main Breaks
Pre-2008 based on
SAP / PAVEMENT
CUTS REPORTS



Pipe Class Analysis Results

Class #	Pipe Class Description	# Breaks	Length (mi)	Avg # Breaks / 100mi / yr	% Total
1	Cast Iron:<1925:4-6:<>Fine	53	42.0	12.6	2.7%
2	Cast Iron:1925-1949:4-6:<>Fine	118	55.9	21.1	3.6%
3	Cast Iron:<1925:4-6:Fine	136	39.1	34.7	2.6%
4	Cast Iron:1925-1949:4-6:Fine	97	16.2	59.7	1.1%
5	Cast Iron:<1925:8:<>Fine	34	39.0	8.7	2.5%
6	Cast Iron:1925-1929:8:<>Fine	55	15.0	36.7	1.0%
7	Cast Iron:1930-1949:8:<>Fine	130	86.9	14.9	5.7%
8	Cast Iron:<1925:8:Fine	53	30.4	17.4	2.0%
9	Cast Iron:1925-1949:8:Fine	147	43.1	34.1	2.8%
10	Cast Iron:<1925:>=10:Fine	54	47.4	11.4	3.1%
11	Cast Iron:1925-1949:>=10:Fine	59	24.6	24.0	1.6%
12	Cast Iron:<1950:>=10:<>Fine	79	128.4	6.2	8.4%
13	Cast Iron:1950-1959:<10	205	201.4	10.2	13.1%
14	Cast Iron:1950-1959:>=10	31	69.7	4.4	4.5%
15	Cast Iron:>1959:4-6	93	26.0	35.7	1.7%
16	Cast Iron:>1959:8	334	190.9	17.5	12.5%
17	Cast Iron:>1959:>=10	54	114.2	4.7	7.5%
18	Ductile Iron	44	239.4	1.8	15.6%
19	Unknown / Other	27	38.5	7.0	2.5%
20	Reinforced Concrete	18	54.1	3.3	3.5%
21	Concrete	9	30.1	3.0	2.0%
Total		1828	1532.4		100.0%

Breakage Rate by Soil Type

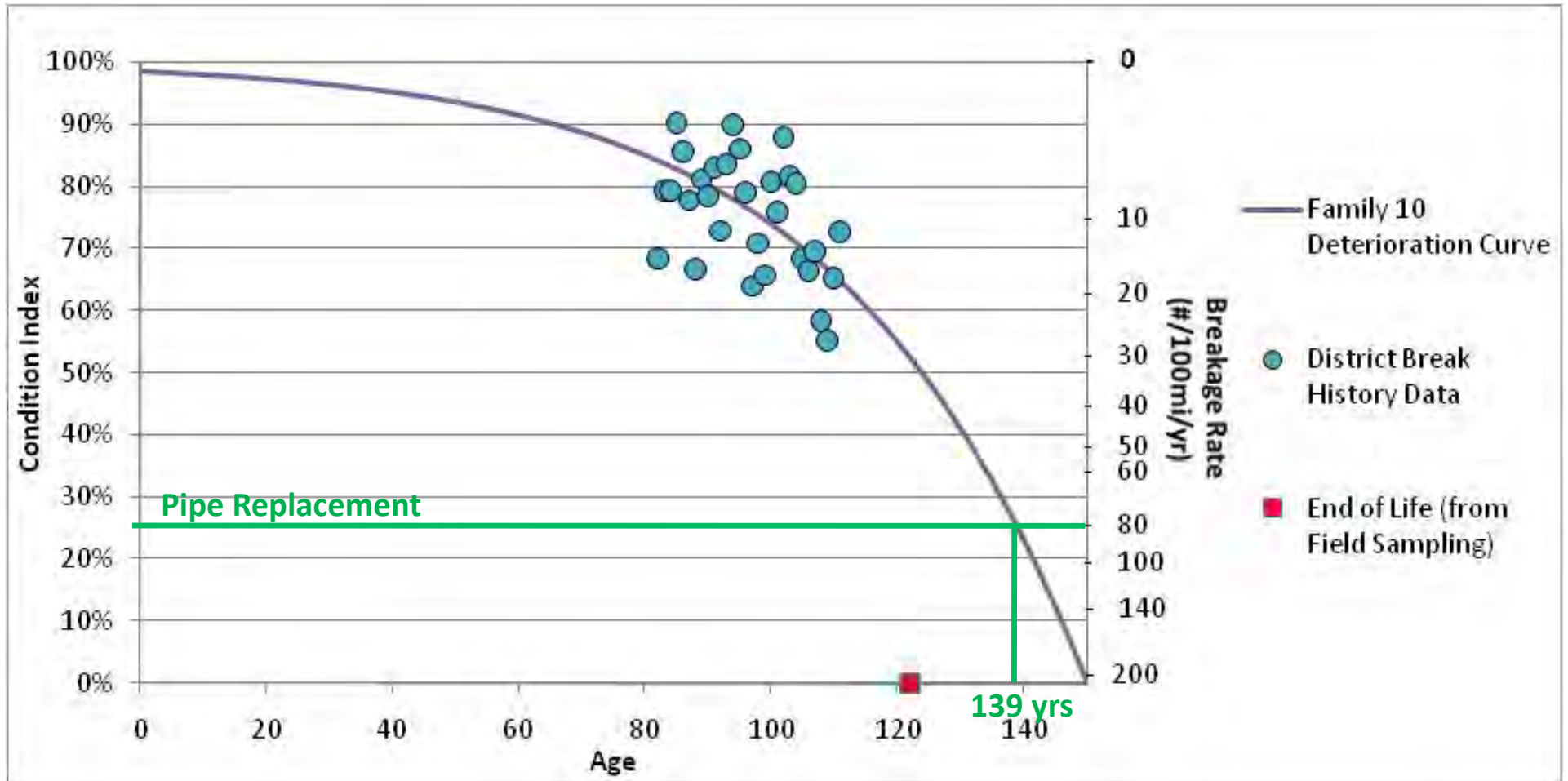


MODEL CONFIGURATION

- The Asset Model calculates a priority ranking for each asset based on the following indices:
- Physical Integrity Index (PII): Sampling, Behavior, Repairs
- Function Integrity Index(FII): Pressure, Fire flow, Quality.
- Socio-economic Impact index(SII): flow, traffic, critical users, problem locations
- Overall Pipe Index = $PII \times FII \times SII$
- Accelerating Pipe Intervention based on paving

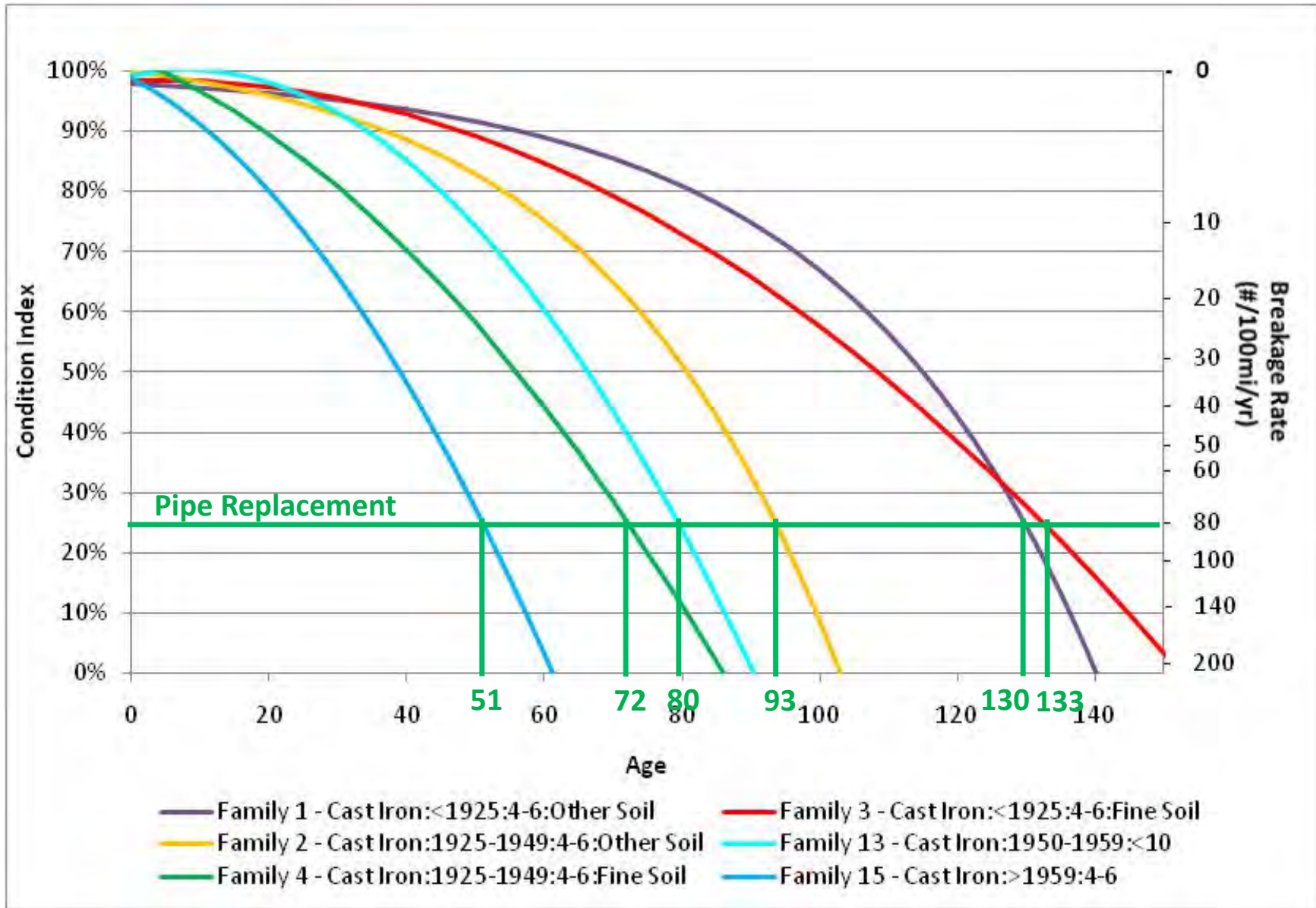
Family 10

Cast Iron:<1925:≥10:Fine Soil

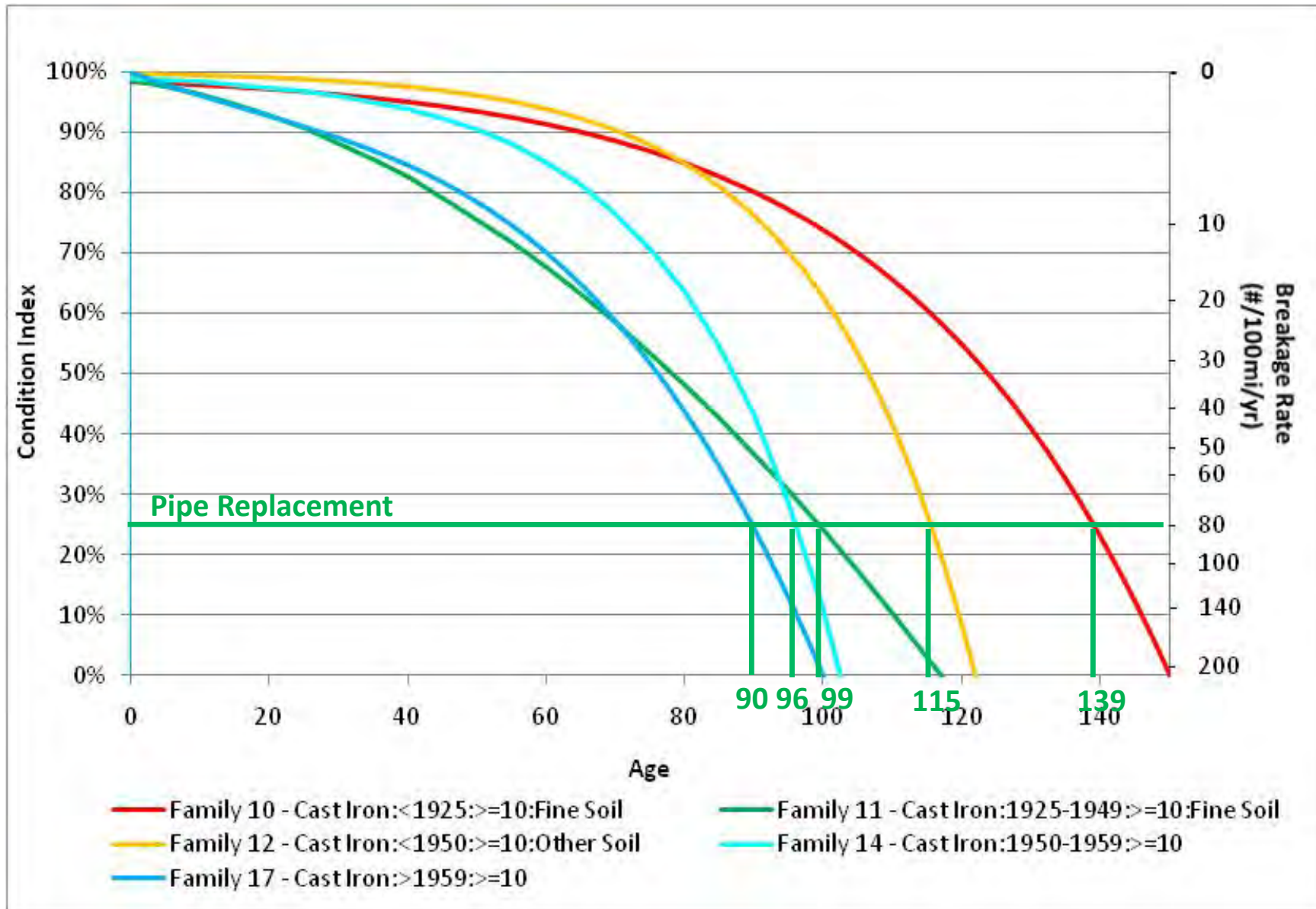


Pipe Deterioration Curves

(4in – 6in Cast Iron)



Pipe Deterioration Curves (≥ 10 -in Cast Iron)



Model Results: Current Condition Analysis



- PII=0-0.25 (6%)
- PII=0.25-0.50 (11%)
- PII=0.50-0.75 (35%)
- PII=0.75-1 (47%)

Miles of Main Replacement

Table 4-2:

Unlimited Budget, Main Replacement Scenario Miles of Main Replacement

TOWN	LINEAR MILES PER TOWN						TOTAL CIP
	PHASE 1 (Years 1 - 5)	PHASE 2 (Years 6 - 10)	PHASE 3 (Years 11 - 15)	PHASE 4 (Years 16 - 25)	PHASE 5 (Years 26 - 35)	PHASE 6 (Years 36 - 45)	
Hartford	65.8	12.8	14.5	36.4	47.0	31.1	207.7
West Hartford	37.4	14.2	14.0	55.5	61.3	24.2	206.6
East Hartford	14.4	7.3	8.4	33.0	55.1	16.9	135.1
Wethersfield	15.7	6.3	2.1	17.4	39.6	12.5	93.6
Newington	13.8	4.8	2.9	19.9	31.9	14.8	88.1
Bloomfield	10.3	4.0	2.9	13.6	23.6	11.5	65.9
Windsor	9.8	3.9	3.4	13.3	30.5	18.7	79.6
Rocky Hill	6.5	3.0	3.6	5.6	12.9	9.4	41.1
Glastonbury	6.4	2.1	1.8	9.2	19.0	12.3	50.8
South Windsor	3.4	1.0		1.8	7.6	4.2	18.1
East Granby					0.05		0.05
Farmington	1.1		4.1	0.4	1.9	1.6	9.1
Raw Water Towns	0.5		3.9	0.04	0.0		4.4
Total	185.2	59.4	61.6	206.2	330.5	157.3	1,000

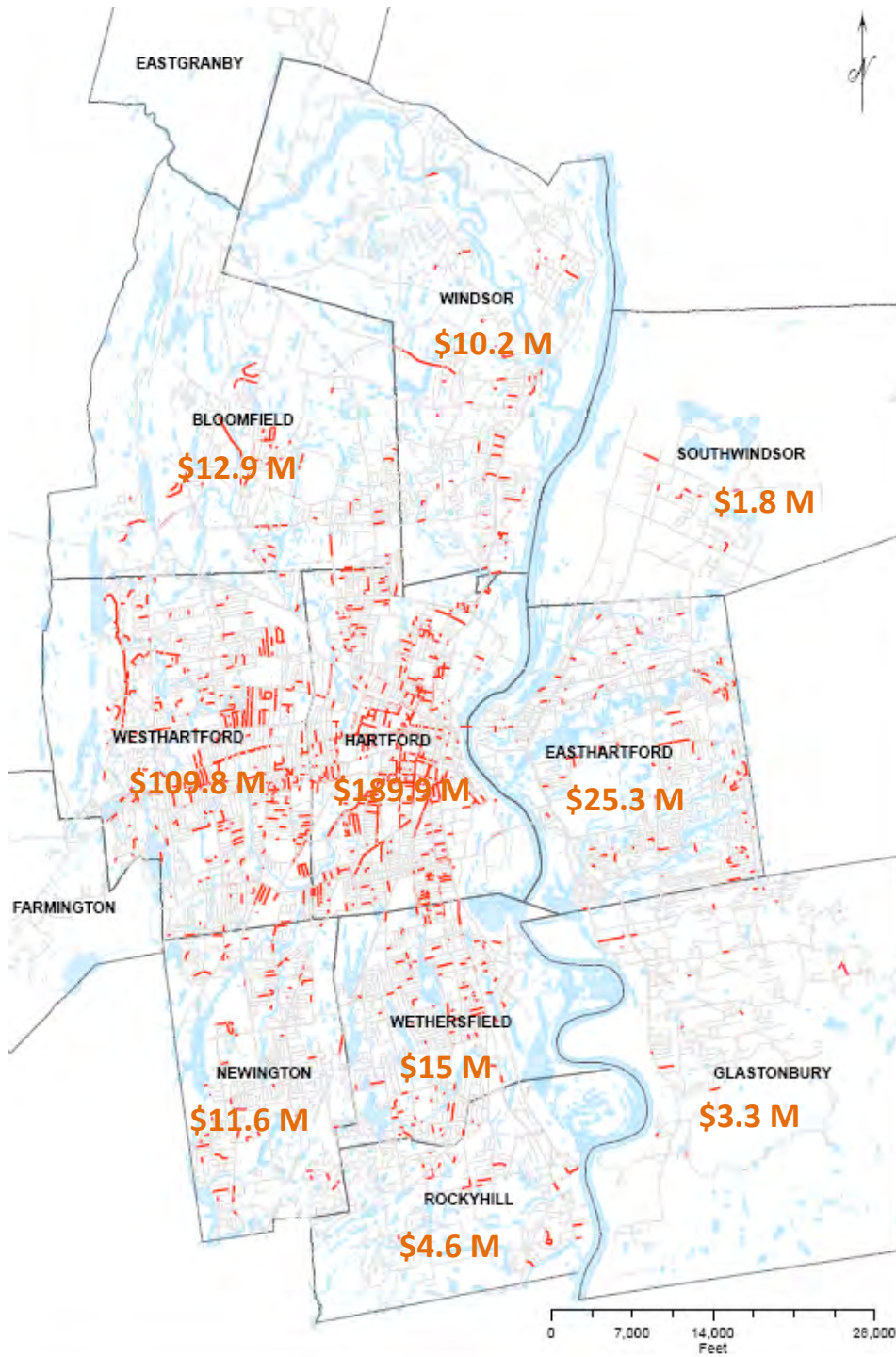
CIP Model Results Unlimited Budget – Scenario 1

COST BY TOWN AND PHASE

**Table 4-1:
Unlimited Budget, Main Replacement Scenario Costs by Town and Phase**

TOWN	COST PER TOWN						TOTAL CIP
	PHASE 1 (Years 1 - 5)	PHASE 2 (Years 6 - 10)	PHASE 3 (Years 11 - 15)	PHASE 4 (Years 16 - 25)	PHASE 5 (Years 26 - 35)	PHASE 6 (Years 36 - 45)	
Hartford	\$235,642,000	\$43,231,000	\$51,031,000	\$129,321,000	\$166,896,000	\$115,398,000	\$741,519,000
West Hartford	\$100,964,000	\$37,517,000	\$36,068,000	\$151,491,000	\$155,608,000	\$61,125,000	\$542,773,000
East Hartford	\$39,818,000	\$17,699,000	\$20,197,000	\$79,927,000	\$135,812,000	\$43,554,000	\$337,007,000
Wethersfield	\$23,514,000	\$9,360,000	\$2,891,000	\$24,219,000	\$59,059,000	\$19,941,000	\$138,984,000
Newington	\$21,549,000	\$7,428,000	\$4,234,000	\$27,456,000	\$45,845,000	\$23,408,000	\$129,920,000
Bloomfield	\$18,630,000	\$6,276,000	\$5,916,000	\$20,709,000	\$35,476,000	\$17,846,000	\$104,853,000
Windsor	\$15,353,000	\$5,988,000	\$5,520,000	\$19,115,000	\$45,095,000	\$28,527,000	\$119,598,000
Rocky Hill	\$10,324,000	\$4,511,000	\$5,254,000	\$8,234,000	\$19,130,000	\$14,903,000	\$62,356,000
Glastonbury	\$10,579,000	\$3,341,000	\$3,459,000	\$13,407,000	\$27,683,000	\$18,228,000	\$76,697,000
South Windsor	\$17,160,000	\$1,646,000		\$2,789,000	\$11,556,000	\$6,538,000	\$39,689,000
East Granby					\$69,000		\$69,000
Farmington	\$2,068,000		\$18,953,000	\$575,000	\$4,474,000	\$2,707,000	\$28,777,000
Raw Water Towns	\$2,562,000		\$18,150,000	\$43,000			\$20,755,000
Grand Total	\$498,163,000	\$136,997,000	\$171,673,000	\$477,286,000	\$706,703,000	\$352,175,000	\$2,342,997,000

Figure 4-1 illustrates the relative cost contribution of each town to the overall CIP. Projects in Hartford, West Hartford, and East Hartford comprise 69% of the total cost.

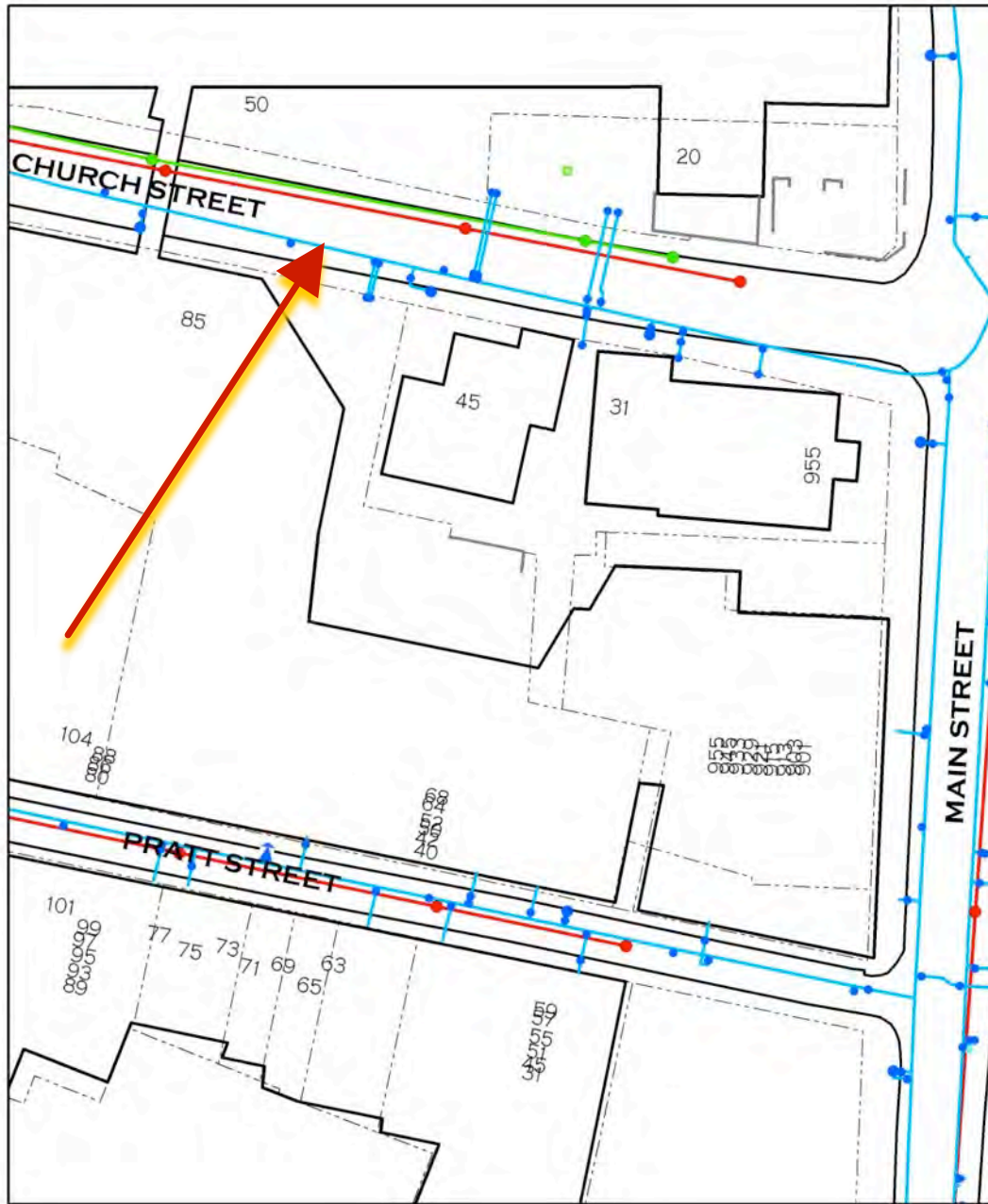


Phase 1 (Years 1 - 5)

Unlimited Budget Scenario

Main Replacement Locations

- \$385 Million (77 M / Year)
- 147 Miles (29.4 Miles/ Year)



Field	Value
OBJECTID	2513
Shape	Polyline M
GroupID	MDC-500-01-C3599-R-00001T00099.5
GROUPID_1	MDC-500-01-C3599-R-00001T00099.5
TOWN	Hartford
DIAMETER	16
INSTALLATIONYEAR	1854
WATERPIPERESULTS_RP_LENGTH	742
STREET	CORPORATE CTR
ADDRESSFROM	00001
ADDRESSTO	00099
CORROSIIVITY	- Unknown -
FIREFLOWPROBLEM	- Unknown -
SYSTEM	TREAT
REHABTYPE	Not rehabilitated
REHABYEAR	<null>
MATERIAL	Cast Iron
MODELPRESSURE	95
PRESSUREPROBLEM	- Unknown -
ACCESSPROBLEM	- Unknown -
SOILTYPE	Fine
SUGGESTEDIAMETER	<null>
SUGGESTEDINTERVENTION	
SUGGESTEDYEAR	<null>
CFCC	4
CSOSEPARATIONAREA	
FLOWRATE	207
CSOYEAR	<null>
PAVEYEAR	<null>
CRITICALFACILITY	- Unknown -
WATERQUALITYPROBLEM	- Unknown -
FII	1
PII	0
SII	0.7
BREAKAGERATE	<null>
PIIBREAKAGE	<null>
PIIBEHAVIOR	0
FLOWPROBLEMINDEX	1
PRESSUREPROBLEMINDEX	1
QUALITYPROBLEMINDEX	1
SIIPROBLEMATICLOCATION	1
SIUSER	1
PIISAMPLING	<null>
CORROSIIVITYINDEX	1
MODIFIEDPIIBEHAVIOR	0
SIIFLOW	1
SIITRAFFIC	0.7
PRIORITYINDEX_CCA	0
PIIBEFORRE_IMPROVEMENT	0
IMPROVEMENT_TYPEPREDICTIVE	Replacement
Cost	577000
SIMULATIONYEAR	2009
PRIORITYINDEX_REPLACEMENT	0
FAMILY	CI <1925 >=10in Fine
FINALCALCULATEDYEAR_SII_MODIFIED	2009
FINALCALCULATEDYEAR_CSO_PAVE_CONSIDERED	2009
CSO_PAVE_CONSIDERED	NONE
Shape_Length	742.338759
Phase	1

Waste Water

- Hartford WPCF
- East Hartford WPCF
- Poquonock WPCF
- Rocky Hill WPCF
- 1,197 Miles of Sewer

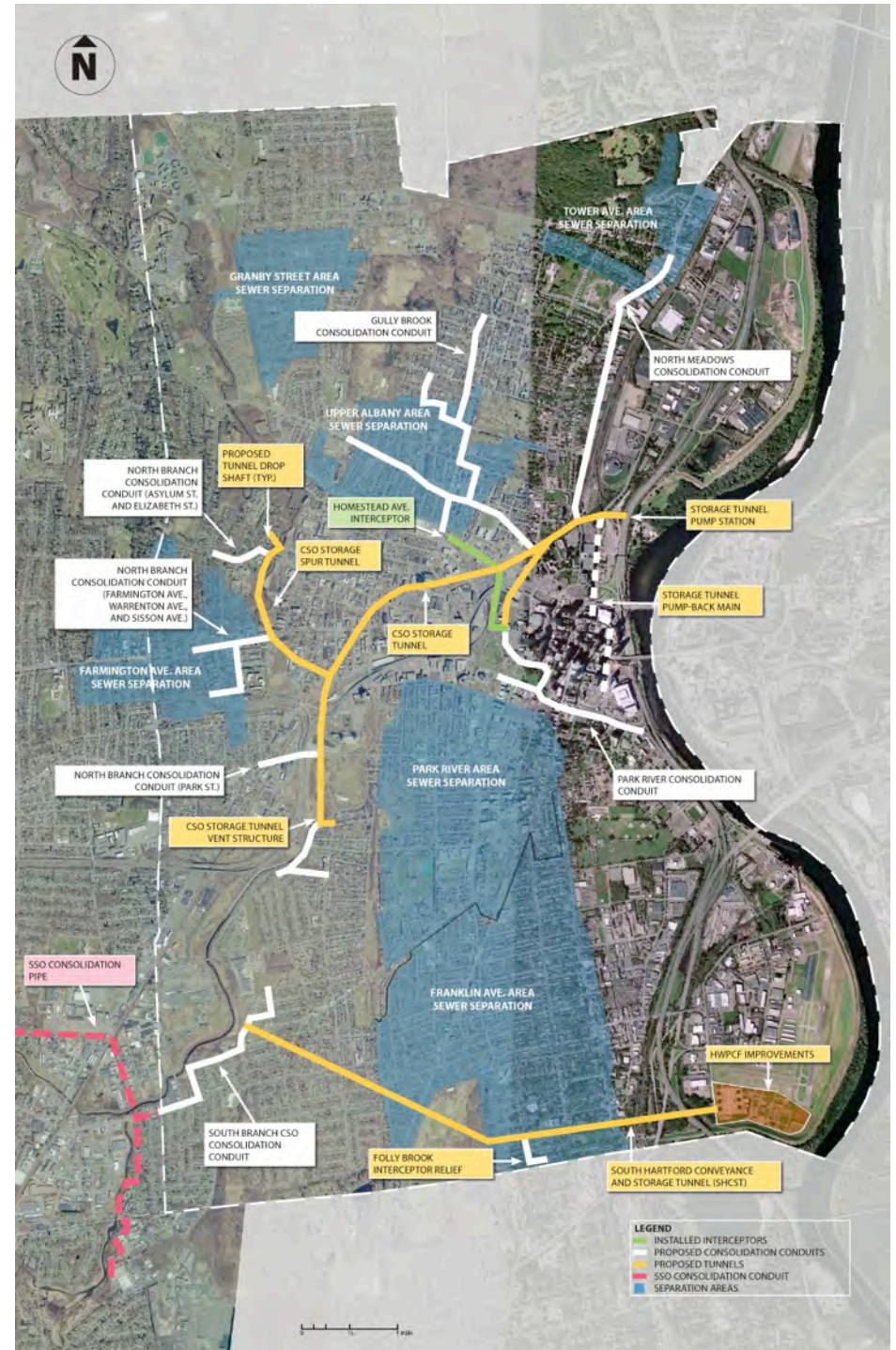


Clean Water Program

- Combined Sewer Overflows (CSOs) (Consent Order)
- Basement Backups
- Sanitary Sewer Overflows (SSOs) (Consent Decree)
- Nitrogen Removal (N General Permit)

COST - \$1.6 Billion (2006 dollars)

Clean Water Program Projects



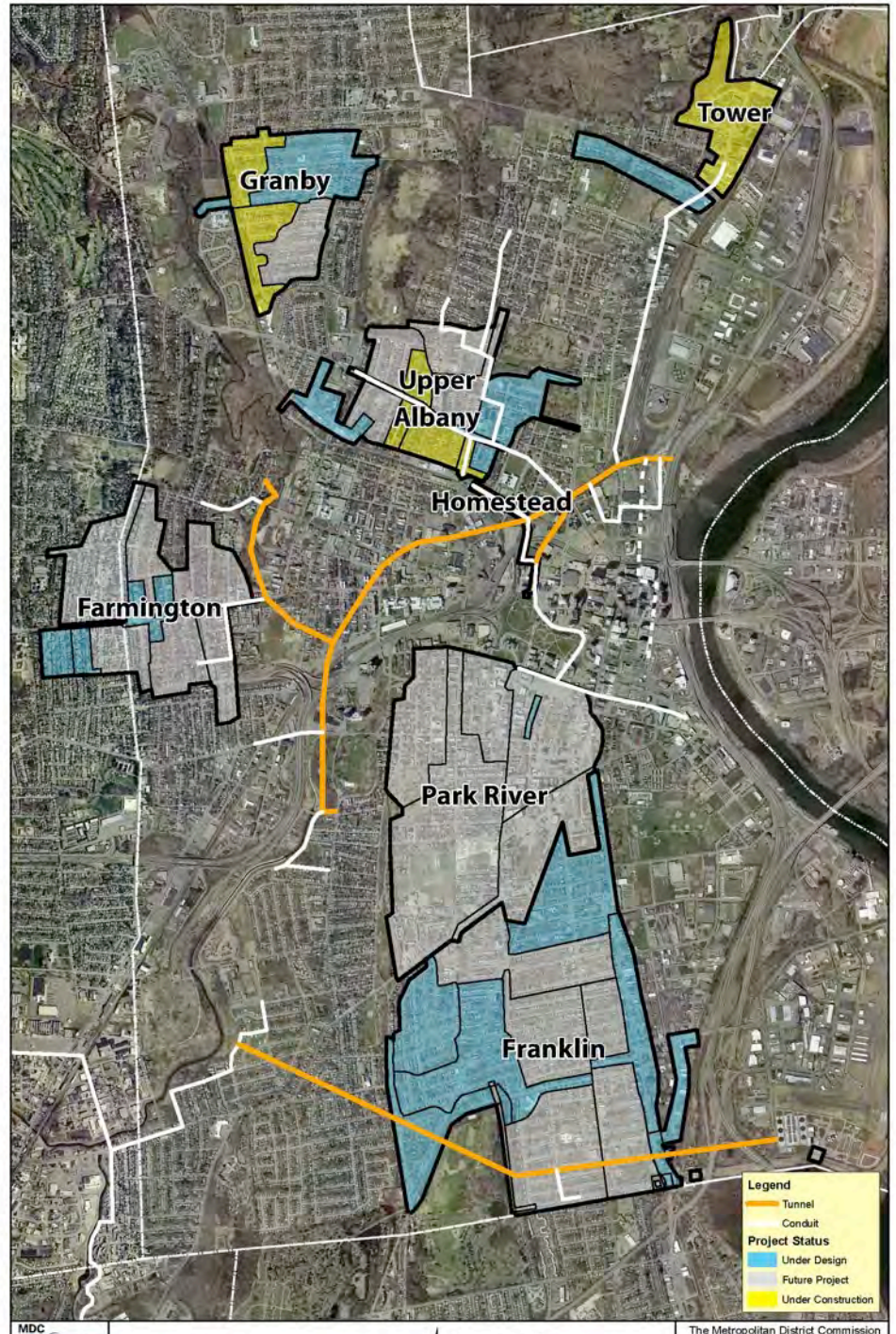
Existing HWPCF Site



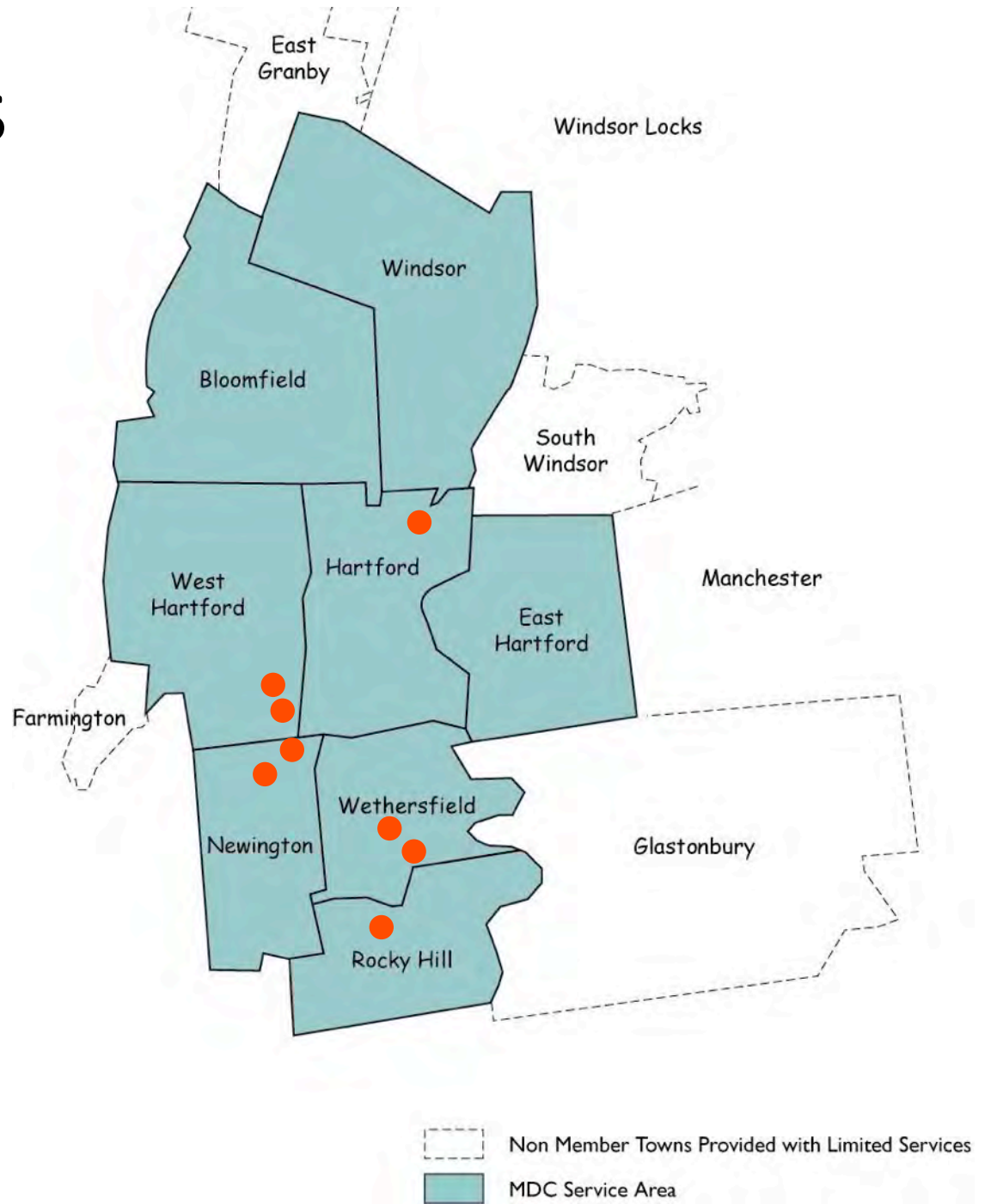
Separation Areas

5 Areas

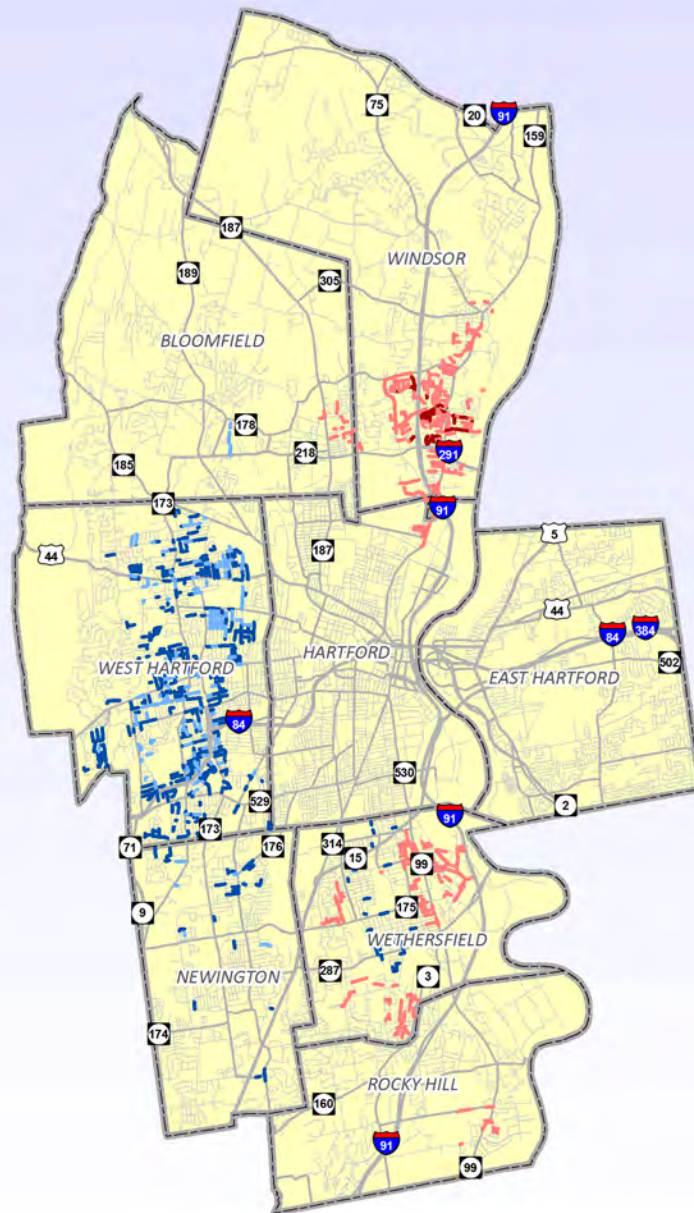
- Preliminary Designs are complete
- 5 Active Construction Projects
- 15 Active Design Projects



SSO Locations



**Completed
and
Ongoing Lining
(as of December 2009)**



Legend

Pipe Lining Status

2008-44

— Completed

— In Construction

2008-63

— Completed

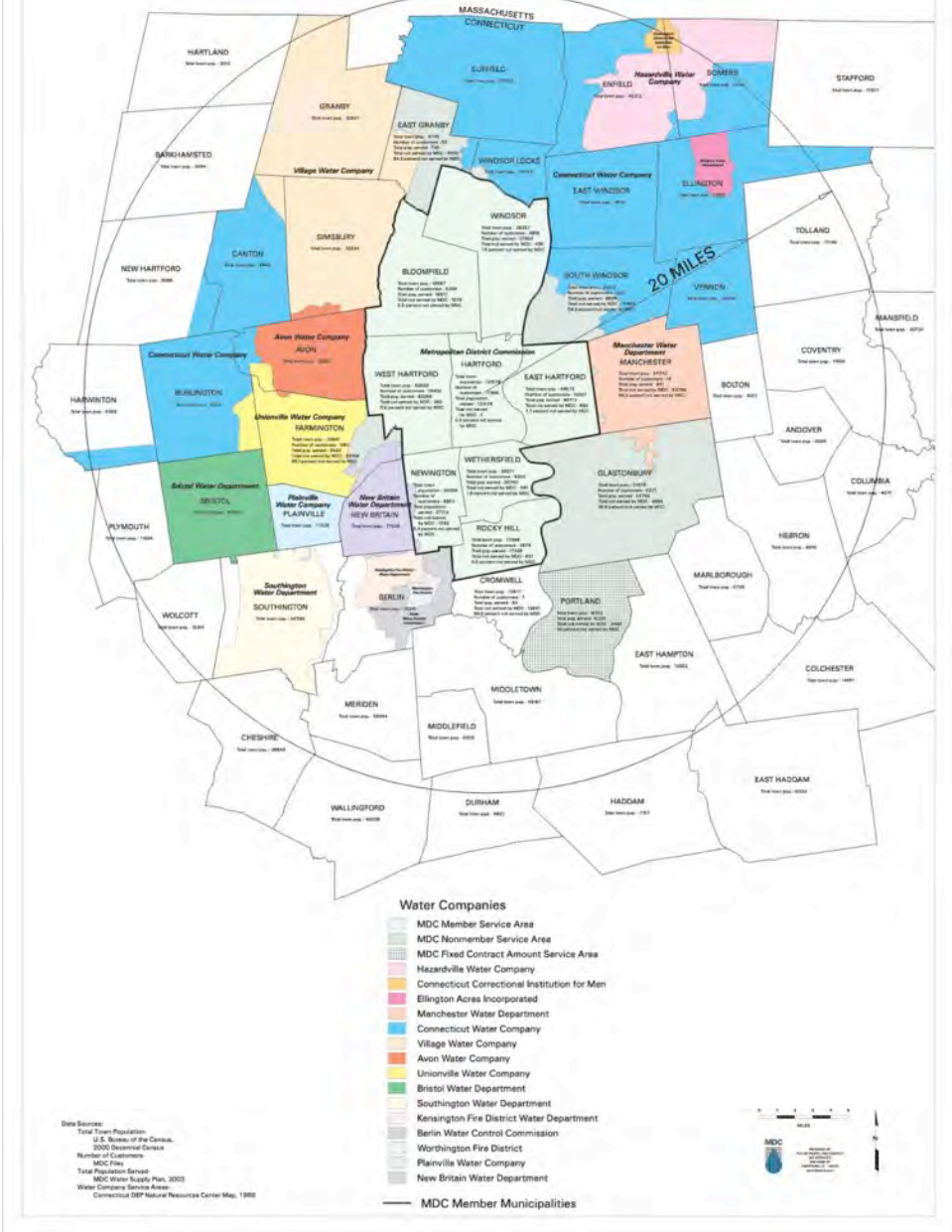
— In Construction

Regional Challenges



Water Supply

The Metropolitan District and other Connecticut Public Drinking Water Systems (Not all water providers are shown)



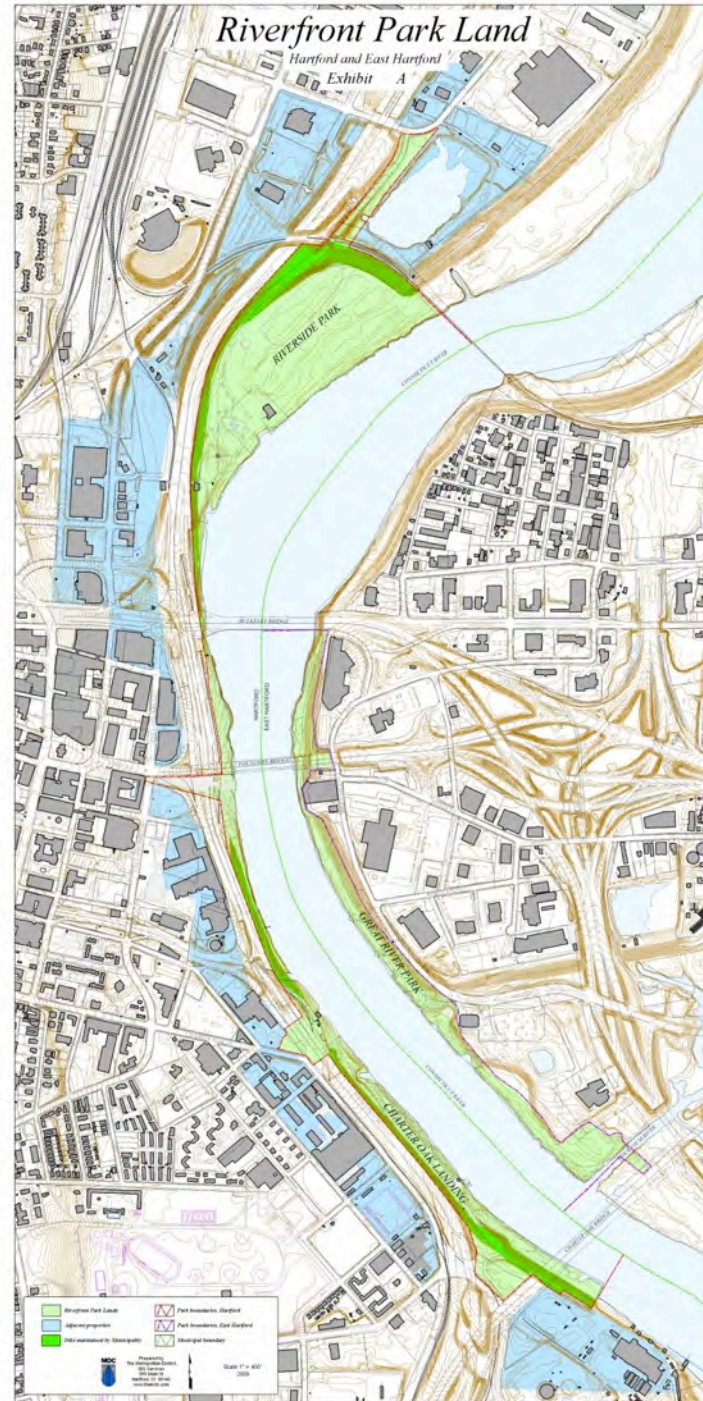
Water
Quality



Water Quality
(N)
CT River

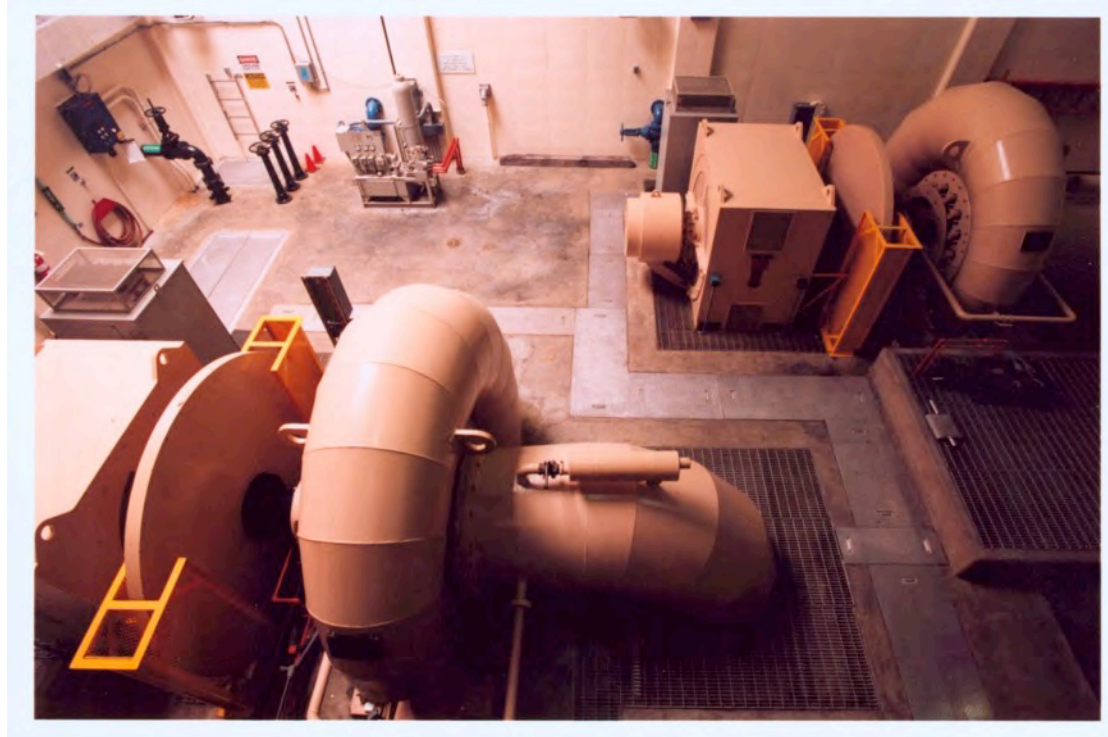
Storm Water

RECREATION



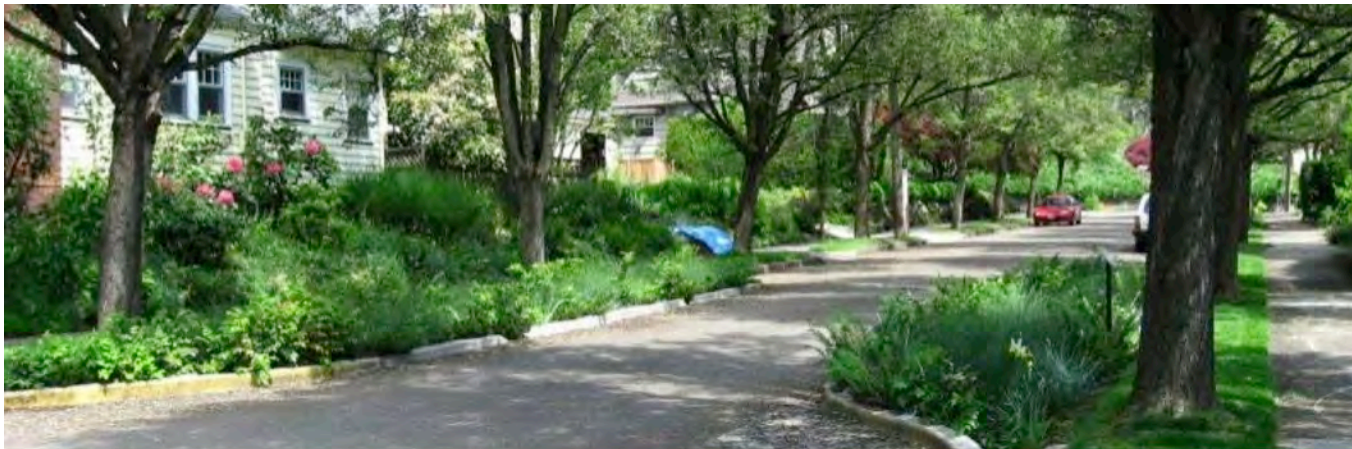
Riverfront Recapture

ENERGY



- Mid CT
- HydroElectric
- Heat Recovery

Green Infrastructure





Questions?

