Tylerville Center
Water Supply Alternatives Evaluation

Public Hearing, Scoping Meeting and Presentation

June 21, 2017

Connecticut Department of Energy and Environmental Protection

AECOM

Agenda

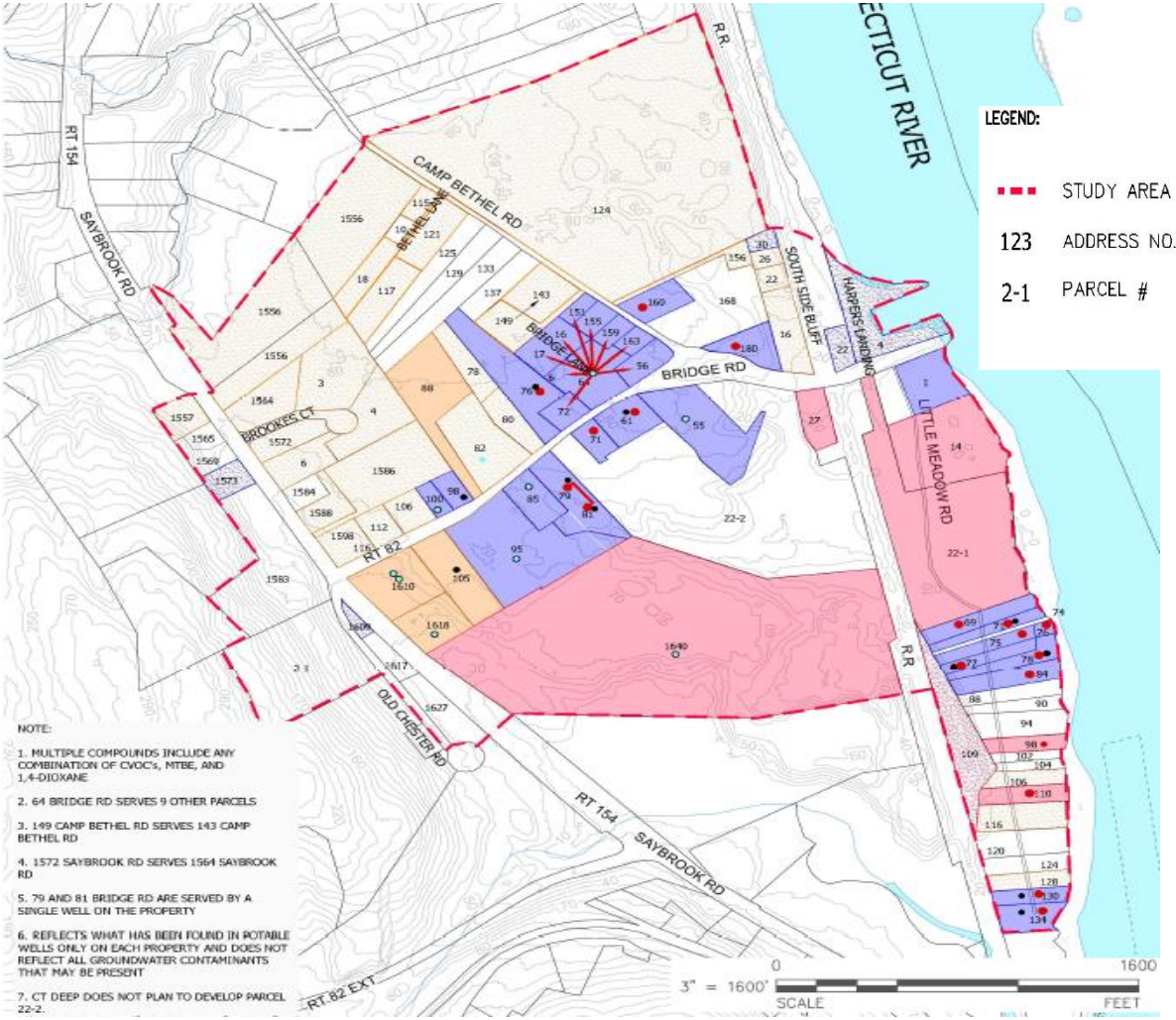
- Water Supply Alternatives Evaluation Report
  - Project Background
  - Study Area
  - Groundwater Impacts
  - Regulatory Criteria
  - Evaluation of Alternatives
  - Selected Alternative
  - Costs
- Path Forward
- Public Comments and Q&A

Project Background

- Pollution of potable wells first identified in late 1970s/early 1980s
  - Chlorinated solvents, MTBE, 1,4-dioxane
  - CT DEEP groundwater monitoring program
- Carbon filter systems and bottled water provided where needed to approximately 18 homes
  - 5 commercial properties also affected
- Pollution has persisted
- CT DEEP investigation/enforcement on-going
- CT DEEP commissioned water supply alternatives evaluation in accordance with RCSA 22a-471-1

Tylerville Study Area

Tylerville Study Area – Impacted Properties By Contaminant



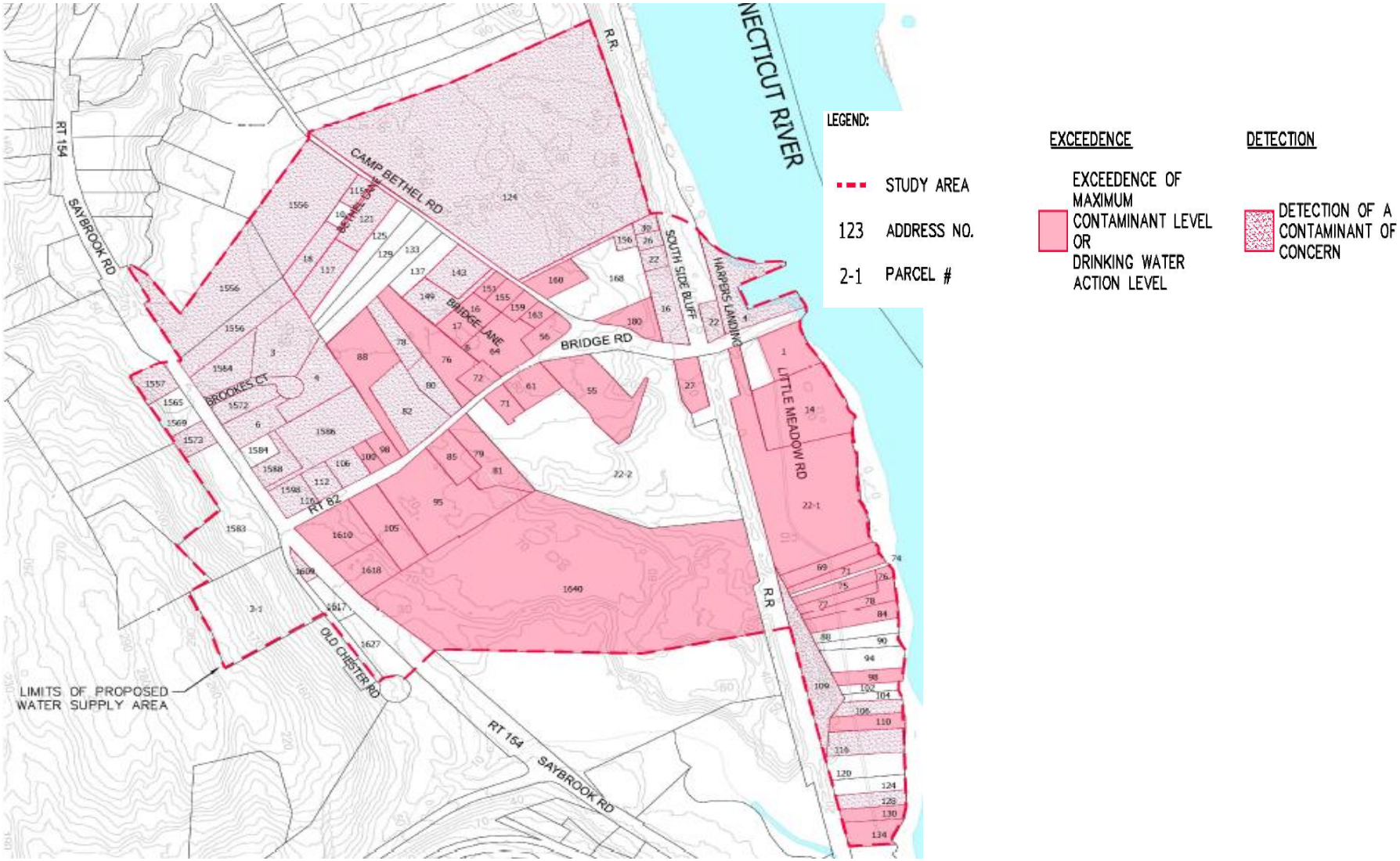
Study Area and Groundwater Impacts

- Study area limits
  - 99 properties, mixed land uses zoned for residential, commercial and industrial activities
- Complex geology and hydrogeology
- Pollution present in overburden and bedrock groundwater
- Groundwater flow generally east/southeast toward the Connecticut River
  - Pollution migration is a function of bedrock fracture geometry and hydraulic conditions
    - ➢ Unpredictable
- Ongoing hydrogeologic study

Study Area and Groundwater Impacts

- Multiple documented release areas
- Contaminants of concern include:
  - Chlorinated volatile organic compounds
  - 1,4-dioxane
  - MTBE
  - Naturally occurring arsenic – recently identified
- Pollution present in overburden and bedrock water supply wells

Study Area and Groundwater Impacts



Regulatory Criteria

- CT DPH Drinking Water Action Levels
- US EPA Maximum Contaminant Levels

Parameter	US EPA MCL (µg/L)	CT DPH Drinking Water Action Levels (µg/L)	CT DPH Showering/Bathing Action Levels (µg/L)
1,4-Dioxane	~	3	50
MTBE	~*	70	~
1,1,1-Trichloroethane	200	200	~
Tetrachloroethene	5	5	~
Trichloroethene	5	1	~
1,1-Dichloroethene	7	7	~
Cis-1,2-Dichloroethene	70	~	~
Trans-1,2-Dichloroethene	100	~	~
1,1-Dichloroethane	~	25	~
Vinyl chloride	2	0.5	~

*US EPA does not currently have an MCL for MTBE, but advises for a 20-40 µg/L limit for smell and taste.

Identification and Evaluation of Water Supply Alternatives

Identification of Water Supply Alternatives

1. Development of Community Water Supply
   - Installation of well and distribution piping network
2. New Individual Wells
3. Individual Water Treatment Systems
   - Granular Activated Carbon (GAC) treatment
   - Monitoring and maintenance
4. Extension of Connecticut Water Company (CWC) Distribution System
   - Connection to existing system in Town of Chester
   - CWC to provide all monitoring and maintenance

Water Supply Alternatives – Screening Process

- Effectiveness in protecting human health
- Reliability
  - Short and long term
- Ability to implement
  - Planning, design, construction, operation
- Cost
  - Capital cost
  - Monitoring and maintenance

Water Supply Alternatives – Rejected Alternative

1. Development of Community Water Supply

- Protection of human health
  - Uncertain due to many unknowns
- Reliability
  - Potentially reliable if adequate source was identified and developed
- Implementation uncertainty
  - Source property identification and acquisition
  - Supply yield and quality uncertainty
  - Existing pollution plume migration somewhat unknown
  - Would require development and operation of community water supply source and distribution system
- Cost
  - Similar to other alternatives considered

Water Supply Alternatives – Rejected Alternative

2. New Individual Wells

- Protection of human health
  - Extremely uncertain due to presence of pollution plume
  - Routine water sampling still needed to ensure water is potable
- Reliability
  - Uncertain due to presence of pollution plume
- Implementation uncertainty
  - Existing pollution plume in overburden and bedrock would likely impact new wells
- Cost
  - Would be less than other alternatives if individual water treatment systems were not required

Detailed Evaluation of Remaining Water Supply Alternatives

3. Individual Water Treatment Systems

- Installation and/or continued use of granular activated carbon (GAC) treatment systems
  - At all study area properties
  - Standard (dual stage) – 84 locations
  - Enhanced (three stage) – 15 locations
    - 1,4-dioxane
  - Bottled water to be provided to properties with 1,4-dioxane issues

Detailed Analysis – Individual Water Treatment Systems

- Protection of human health
- Reliability
  - Protective and reliable if no 1,4-dioxane, assuming adequate monitoring and maintenance
  - Bottled water still needed for wells with 1,4-dioxane
- Ability to implement
  - Standard installation process
- Consistent with Town Plans of Conservation and Development (POCD) and State C&D Plan
- Connecticut Environmental Policy Act (CEPA)
  - Short-term construction impacts, long-term limited
  - Unlikely to require full CEPA evaluation

Detailed Analysis – Individual Water Treatment Systems

- Future contamination potential
  - Overburden and bedrock groundwater pollution
  - Complexity of hydrogeology and plume characteristics
- Public acceptance
  - Likely problematic
- Cost
  - Capital cost - $700,000
  - Net present value of operation, monitoring and maintenance (20 years) - $3,860,000
- Implementation schedule
  - Approximately 6 months

Water Supply Alternatives – Detailed Analysis

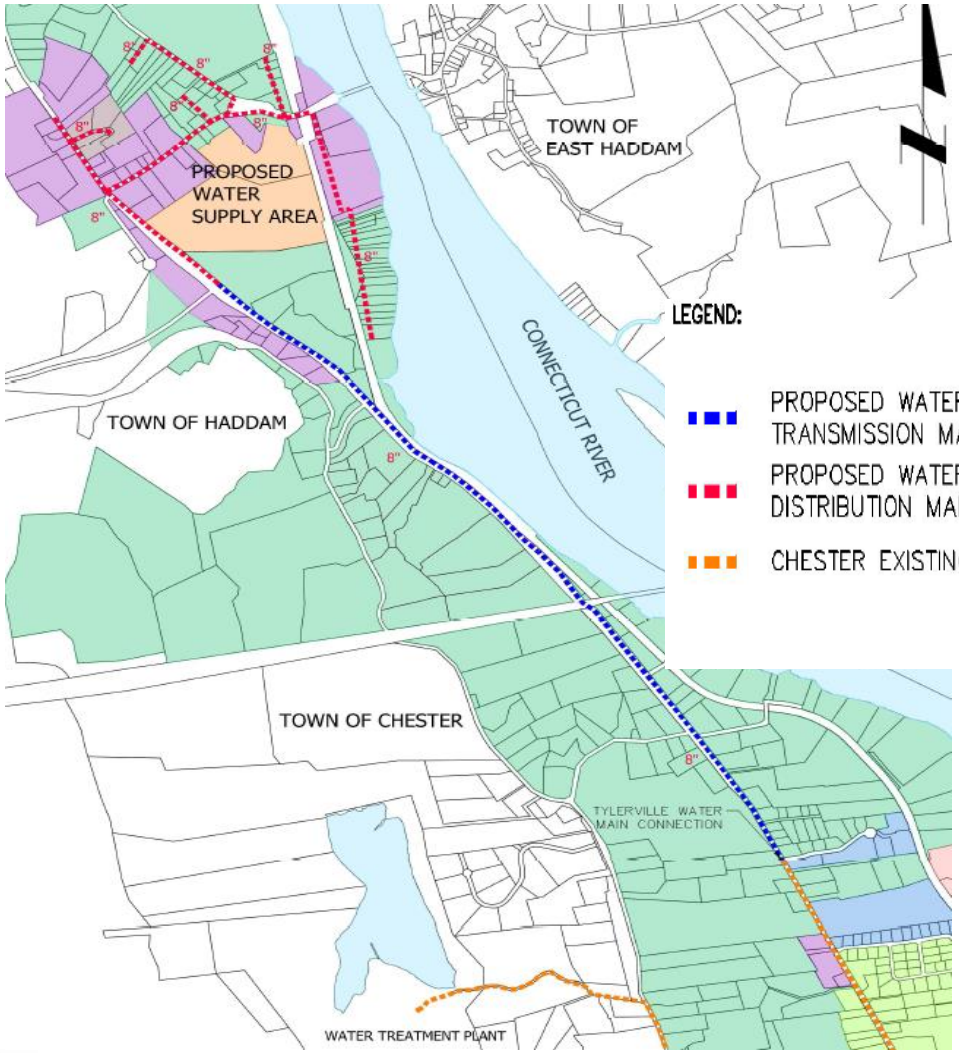
4. Connection to Existing CWC Water Distribution System in Town of Chester

- Water demand calculations and main sizing
  - Study area
  - Water main corridor (Haddam/Chester)
  - Future potential demand
    - ➢ Fire protection

Water Demand Calculations			
Method	**Total Average Daily Demand (Gallons Per Day)**	**Maximum Daily Flow (Gallons Per Day)**	**Peak Hourly Demand (Gallons Per Minute)**
AECOM Existing Demand	73,789	100,041	340
AECOM Maximum Development	119,488	168,197	570

Detailed Analysis – Connection to CWC System

Base layout: 8-inch diameter water main



LEGEND:

- PROPOSED WATER TRANSMISSION MAIN
- PROPOSED WATER DISTRIBUTION MAIN
- CHESTER EXISTING WATER MAIN

LAND USE/ZONING

- RESIDENTIAL (R-1)
- RESIDENTIAL (R-2)
- COMMERCIAL (C-1)
- INDUSTRIAL (I-1)
- RESEARCH/LIGHT MANUFACTURING (RLM)
- WATERFRONT DESIGN DISTRICT (WDD2)
- WATER
- HIGH DENSITY RESIDENTIAL OVERLAY

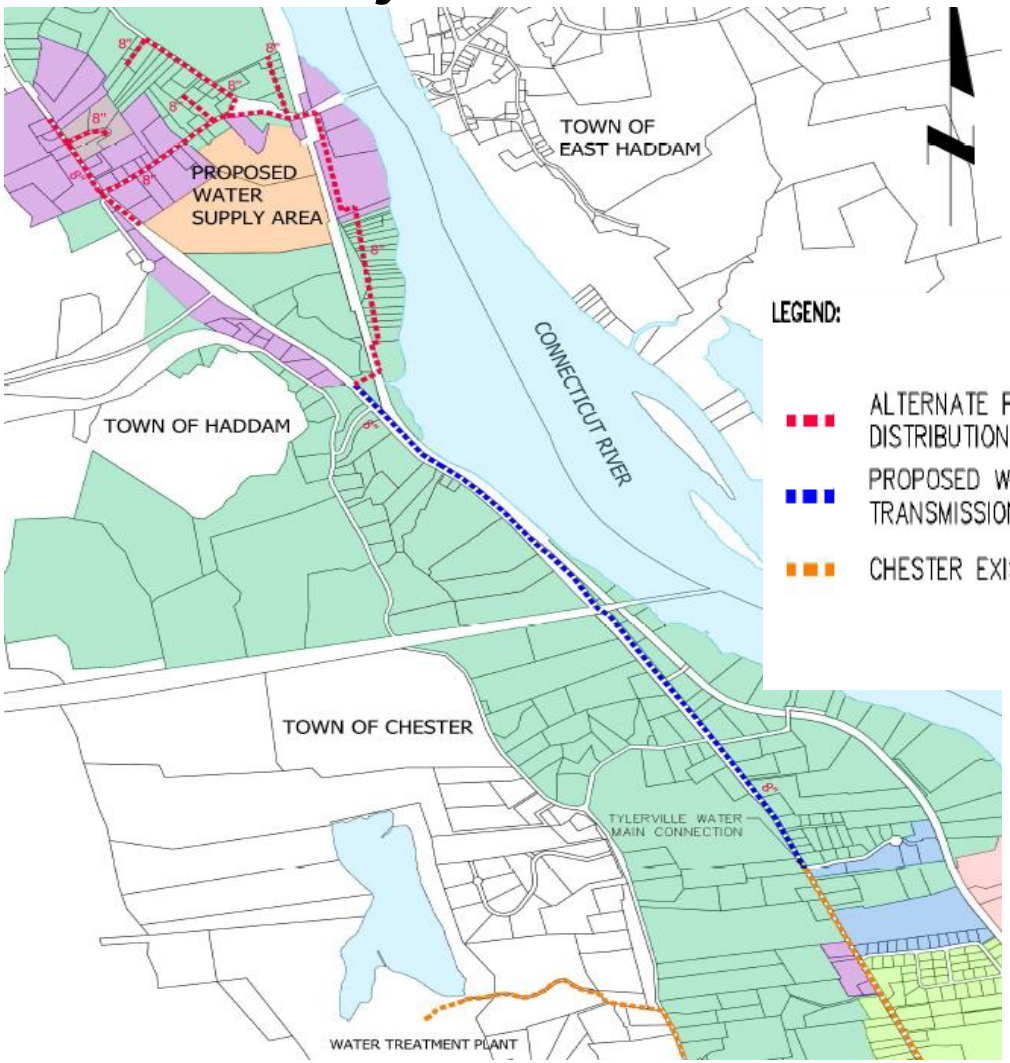
Detailed Analysis – Connection to CWC System

Base layout: 8-inch diameter water main

Water Main Extension Proposed Water Supply Area – Base Layout (8-Inch)		
Section	**Pipe Diameter (in.)**	**Length (ft)**
Route 154 – Chester	8	4,082
Route 154 – Haddam	8	8,863
Route 82 (Bridge Road)	8	2,735
Little Meadow Road	8	3,368
Camp Bethel Road and Bethel Lane	8	1,550
Bridge Lane	8	450
South Side Bluff	8	750
Brookes Court	8	510
	Total Length	22,308

Detailed Analysis – Connection to CWC System

Alternate layout: 8-inch diameter water main



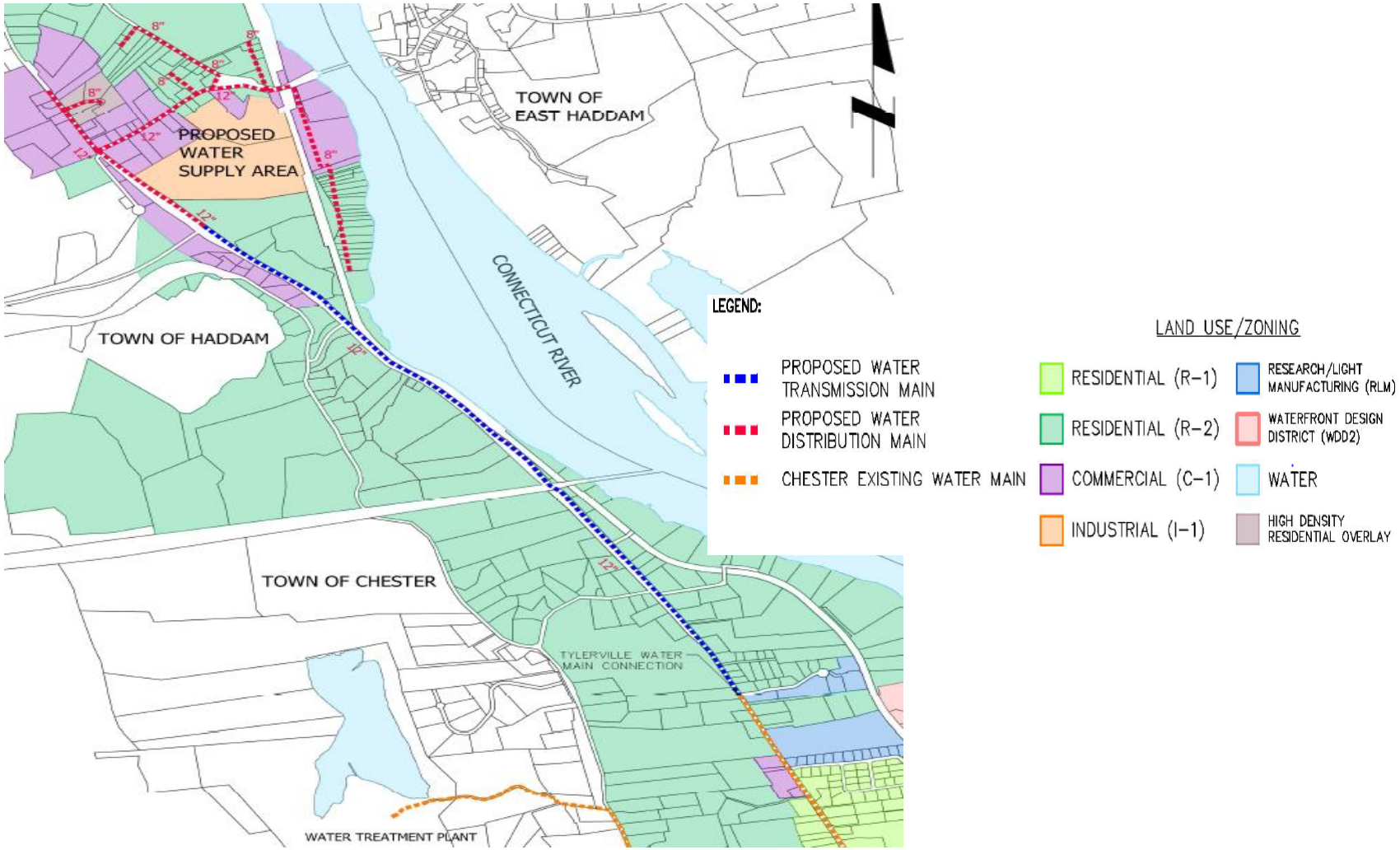
Detailed Analysis – Connection to CWC System

Alternate layout: 8-inch diameter water main

Water Main Extension Proposed Water Supply Area – Alternate Layout (8-Inch)		
Section	**Pipe Diameter (in.)**	**Length (ft)**
Route 154 – Chester	8	4,082
Route 154 – Haddam	8	5,618
Route 82 (Bridge Road)	8	2,735
Little Meadow Road	8	4,668
Camp Bethel Road and Bethel Lane	8	1,550
Bridge Lane	8	450
South Side Bluff	8	750
Brookes Court	8	510
	Total Length (ft)	20,363

Detailed Analysis – Connection to CWC System

Base layout: 12-inch diameter water main



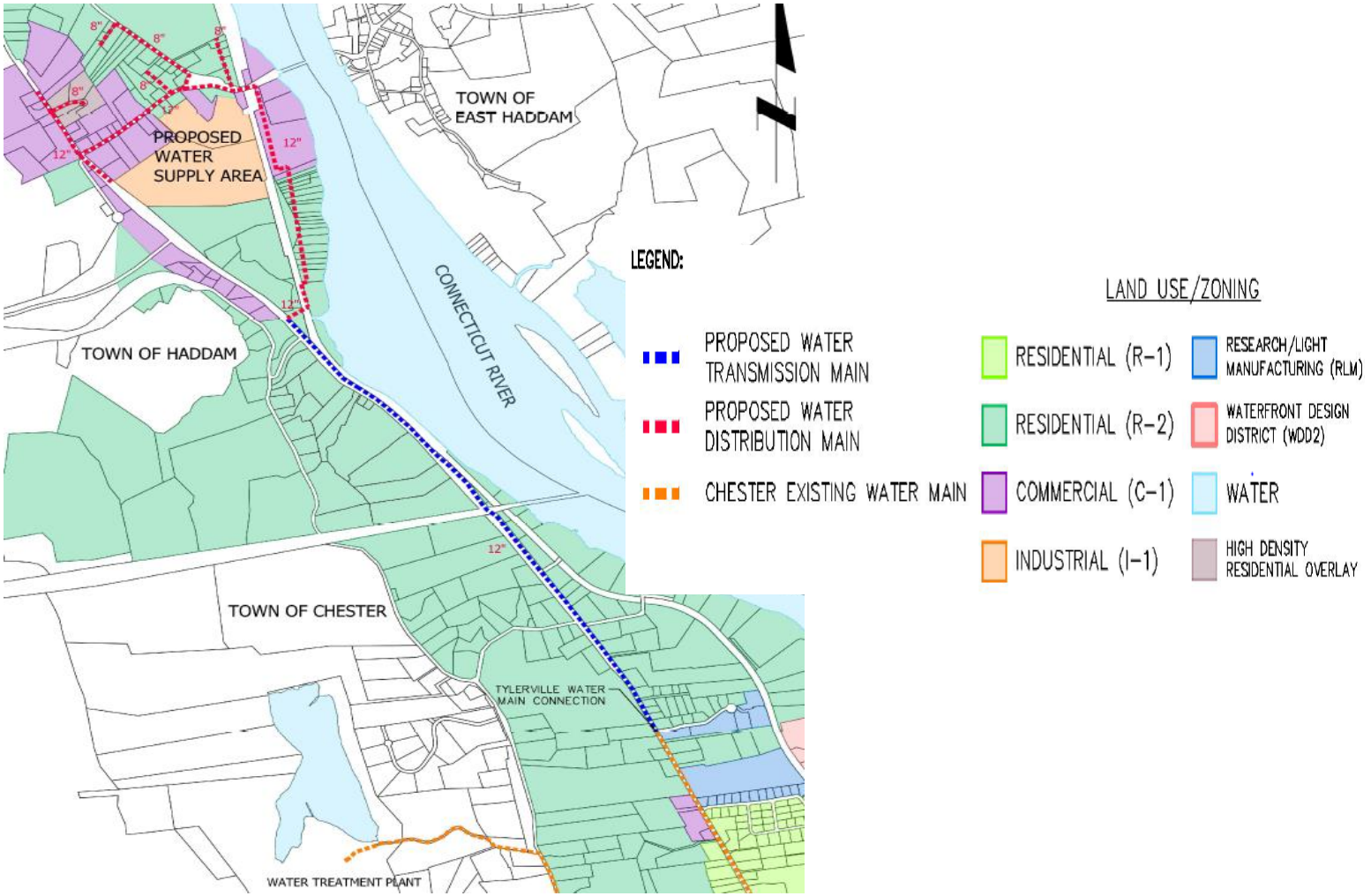
Detailed Analysis – Connection to CWC System

Base layout: 12-inch diameter water main

Water Main Extension Proposed Water Supply Area – Base Layout (12-Inch)		
Section	Pipe Diameter (in.)	Length (ft)
Route 154 - Chester	12	4,082
Route 154 – Haddam	12	8,863
Route 82 (Bridge Road)	12	2,735
Little Meadow Road	8	3,368
Camp Bethel Road and Bethel Lane	8	1,550
Bridge Lane	8	450
South Side Bluff	8	750
Brookes Court	8	510
	Total Length	22,308

Detailed Analysis – Connection to CWC System

Alternate layout: 12-inch diameter water main



Detailed Analysis – Connection to CWC System

Alternate layout: 12-inch diameter water main

Water Main Extension Proposed Water Supply Area – Alternate Layout (12-Inch)		
Section	**Pipe Diameter (in.)**	**Length (ft)**
Route 154 – Chester	12	4,082
Route 154 – Haddam	12	5,618
Route 82 (Bridge Road)	12	2,735
Little Meadow Road	12	4,668
Camp Bethel Road and Bethel Lane	8	1,550
Bridge Lane	8	450
South Side Bluff	8	750
Brookes Court	8	510
	Total Length (ft)	20,363

Detailed Analysis – Connection to CWC System

Water Quality Study – Fall 2016

- Study conducted to simulate potential water quality delivered to Tylerville area
- Evaluation of Disinfection Byproducts (DBPs)
  - Extension of CWC system will increase water age and lower chlorine residual within Study Area
  - Need to balance disinfection and DBPs
  - Worst case condition is typically in the fall when water use drops, and source water still warm
- CWC model used for hydraulics and water quality simulation
- Water samples collected at treatment plant and dosed with different amounts of chlorine to measure residual chlorine and DBP formation

Detailed Analysis – Connection to CWC System

Water Quality Study – 2016

- Findings
  - Low organic finished water reduces potential for DBP issues
  - Slight increase in chlorine dosing required at treatment plant, within acceptable regulatory limits
  - Possible need to flush water main to reduce DBPs when conditions warrant
  - Frequency/duration would be determined by CWC

Detailed Analysis – Connection to CWC System

- Protection of human health
- Reliability
  - Greatest degree of protection and reliability
- Fire protection
  - CWC system would provide some level of fire protection flows
    - Assuming fire hydrants and associated valves are installed
- Ability to implement
  - Standard installation process

Detailed Analysis – Connection to CWC System

Capital Costs

Estimated Capital Costs for Public Water Main Alternatives		
Alternative	***8-inch Main***	***12-inch Main***
Base Layout	**$7,225,900**	**$7,789,900**
Alternative Layout	**$6,768,900**	**$7,396,900**
Fire Protection (hydrants)	**$225,200**	**$232,400**

Detailed Analysis – Connection to CWC System

Users Costs and Fees

Estimated Costs for Public Water Service for End Users		
Property Type	***Residential***	***Commercial***
Service Turn On (one time)	**$43.00**	**$43.00**
Basic Service Charge (per month)	**$25.87**	**$82.81**
Water Usage (per 1,000 gallons)	**$7.907**	**$6.920**

- All fees are as approved by Connecticut Public Utilities Regulatory Authority (PURA)
- Typical residential annual cost – approximately $600

Detailed Analysis – Connection to CWC System

Municipal Fire Protection Cost

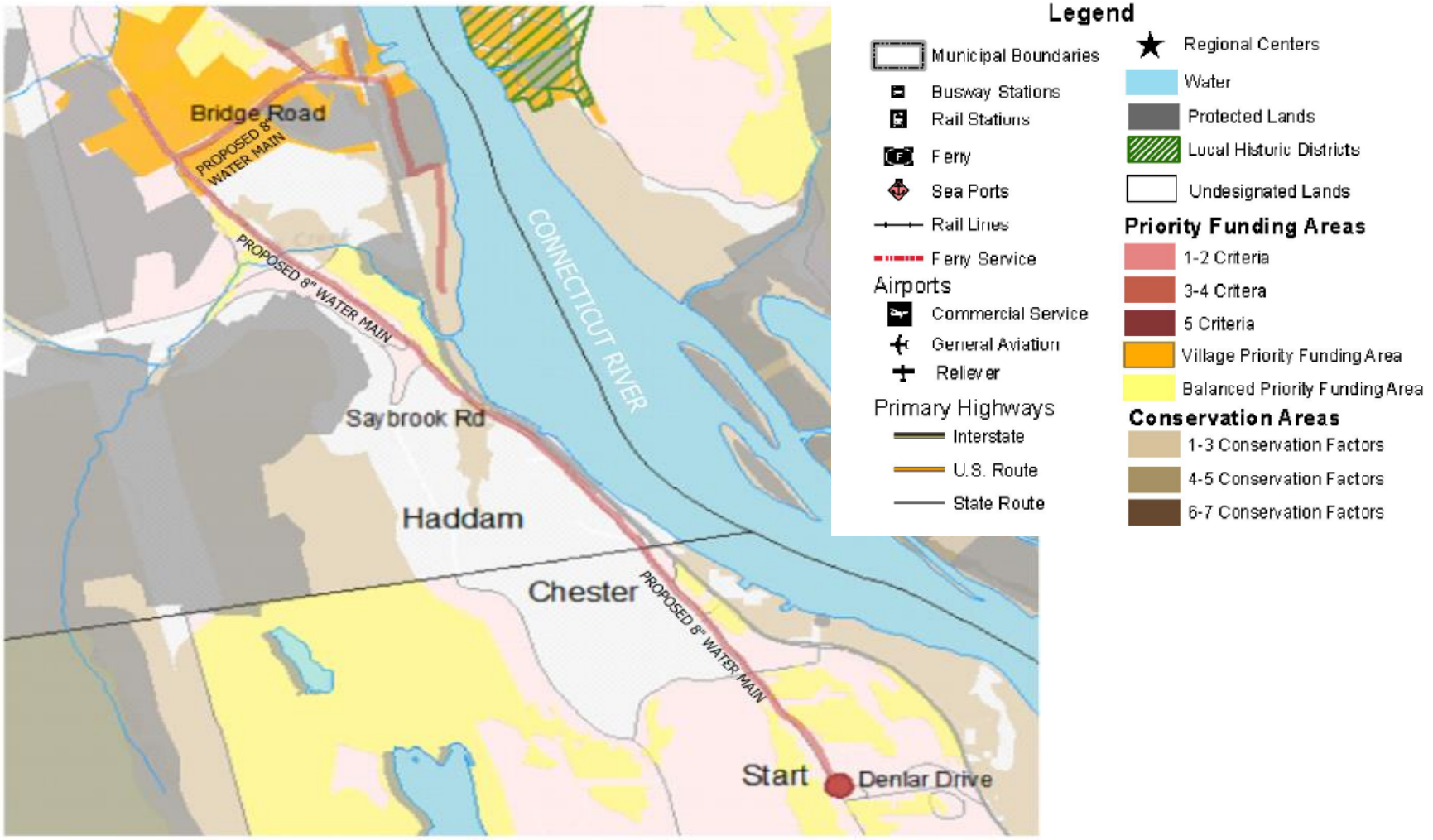
Estimated Monthly Costs for Public Fire Protection		
Service Fee	***Town of Chester***	***Town of Haddam***
Hydrant charge ($18.80/hydrant/month)	**$75 (4 hydrants)**	**$395 (21 hydrants)**
Linear foot charge ($0.09522/lf/month)	**$390**	**$1,735**
Total Monthly Cost	**$465**	**$2,130**

Detailed Analysis – Connection to CWC System

- Base layout, 8-inch alternative consistent with Haddam and Chester POCDs
- Connecticut Conservation and Development Policies Plan (C&D)
  - Extension of CWC system into Study Area consistent but exception may be required for areas outside Study Area (Route 154 corridor)
  - 12-inch main may not be consistent with C&D Plan
    - Additional capacity may trigger EIE requirement
  - Locational Guide Map
    - Used in aiding decision making for state funded projects

Detailed Analysis – Connection to CWC System

Connecticut C&D Plan Locational Guide Map



Detailed Analysis – Connection to CWC System

- Connecticut Environmental Policy Act (CEPA)
  - CT DEEP will determine (after public scoping) if Environmental Impact Evaluation (EIE) is required
- Future contamination potential - None
  - Overburden and bedrock groundwater pollution
  - Complexity of hydrogeology and plume characteristics
  - Pollution likely to persist for many years
  - Connection to CWC system will eliminate exposure

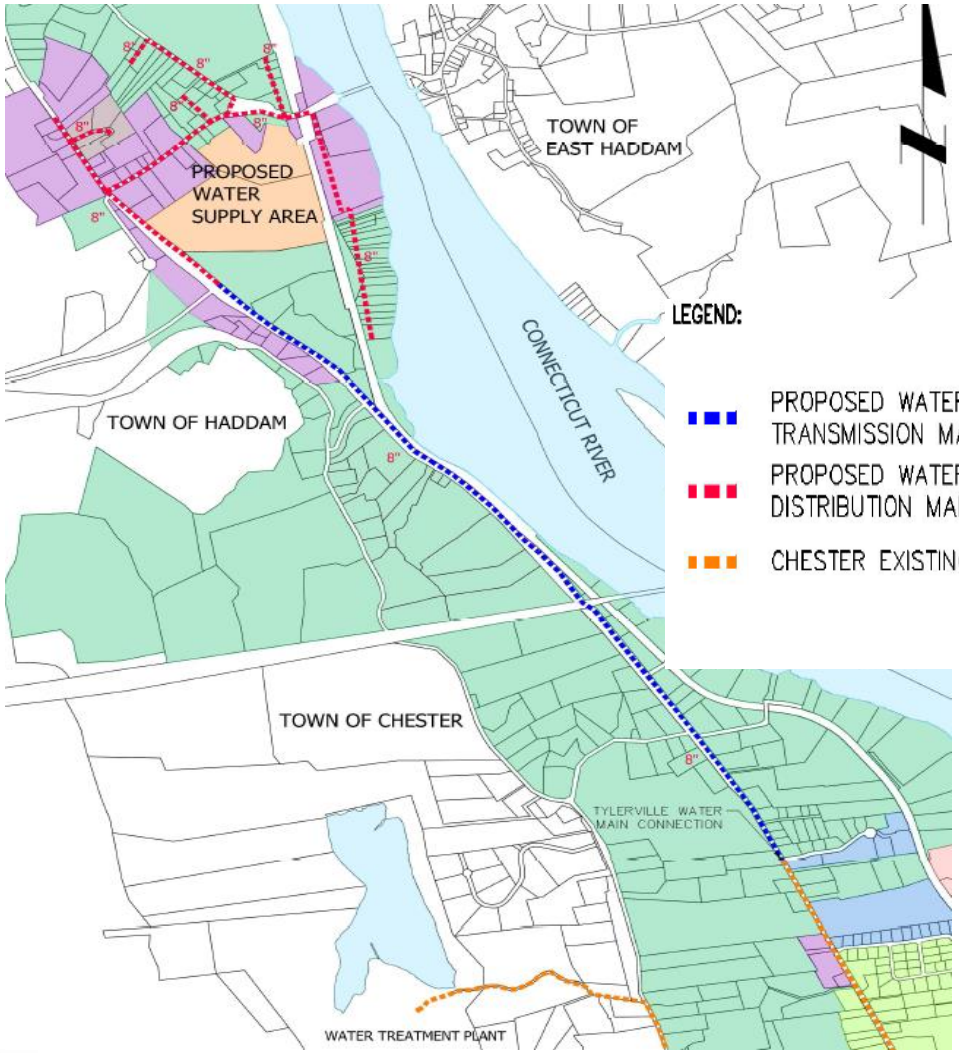
Detailed Analysis – Connection to CWC System

- Public acceptance
  - Likely widely accepted
- Implementation schedule
  - Approximately 12-18 months for design & construction
  - Assumes EIE is not required

Selected Water Supply Alternative

Selected Alternative – Connection to CWC System

Base layout: 8-inch diameter water main



LEGEND:

- PROPOSED WATER TRANSMISSION MAIN
- PROPOSED WATER DISTRIBUTION MAIN
- CHESTER EXISTING WATER MAIN

LAND USE/ZONING

- RESIDENTIAL (R-1)
- RESIDENTIAL (R-2)
- COMMERCIAL (C-1)
- INDUSTRIAL (I-1)
- RESEARCH/LIGHT MANUFACTURING (RLM)
- WATERFRONT DESIGN DISTRICT (WDD2)
- WATER
- HIGH DENSITY RESIDENTIAL OVERLAY

Selected Alternative – Connection to CWC System

Base Layout: 8-inch main

- Calculated water demand within CWC Margin of Safety
- Provides potable water to Study Area properties
- Most feasible, long-term alternative
- Provides some level of fire protection
  - Assumes fire hydrants and associated valves are installed – Towns' discretion
- Consistent with Haddam and Chester POCDs

Selected Alternative – Connection to CWC System

Base Layout: 8-inch main

- Consistent with Connecticut C&D Plan
  - Project focus is to provide potable water to Study Area (within Village PFA)
  - Transmission main from connection point in Town of Chester to Study Area
  - Property connections along dedicated transmission main to be allowed only if a public health need is determined by local health department, CT DPH, CT DEEP

Selected Alternative – Connection to CWC System

Base Layout: 8-inch main

- Project Funding
  - 2011 State Bond Commission - $2,100,000 award
  - CT DEEP to request balance of selected alternative capital cost - $5,125,900
- Unallowable Costs
  - Fire hydrants
  - Increased cost for 12-inch main
  - Permits

Path Forward – Estimated Timeframe

- Public comments accepted through July 10, 2017
- Finalize Alternatives Evaluation Report, considering public comments received
  - Comments will be addressed in report and in appendix to final document
- CT DEEP to request balance of funding for project from Bond Commission – Summer-Fall 2017
- Town of Haddam to enter into Consent Order with CT DEEP in order to receive funding
- Finalize design plans – Winter 2017/2018
- Begin construction – Late 2018

Thank You

Shannon Pociu
Environmental Analyst 3
Remediation Division
Connecticut Department of Energy and Environmental Protection
79 Elm Street
Hartford, Connecticut 06106

shannon.pociu@ct.gov
860.424.3546