
TO:	Eric McPhee, CT DPH	DATE:	5/3/2017
FROM:	Mariusz Jedrychowski, P.E.	PROJECT NO.:	13675A
SUBJECT:	Response to OPM Comments Concerning the Notice of Scoping for the Town of Guilford Mulberry Point Water Main Extension (REVISED ON 08/15/17)		

We have reviewed the comments provided by the Office of Policy and Management (OPM) concerning the Notice of Scoping for the Town of Guilford Mulberry Point Water Main Extension dated October 21, 2016, and offer the following responses:

OPM: The scoping notice references a “feasibility study report of the project area”, which appears to be a 12/2011 feasibility report and 8/2012m supplement available from the town’s website. We have not attempted to read the entire report, but the water main extension described there would serve nearly twice as many homes as the project described by DPH. The difference appears to be that much of the adjacent Indian Cove is now excluded from the project. Why was that area removed and has the 2011 feasibility report been updated to re-evaluate options for providing water to a smaller water service area? Is there a possibility that the proposed system will also serve the Indian Cove neighborhood in the foreseeable future?

The Indian Cove Association was part of the original water main extension study area and was included in the original water main design and feasibility study prepared by Luchs engineering. In 2013, after much debate, the residents of Indian Cove, voted by a small margin, not to participate in the water main extension project, citing reasons of potential infrastructure damage caused by watermain trenching, uncertainty of assessment and hook up costs and not a widespread problem with water quality. Withdrawal by the ICA forced the remaining two associations to look for another entry point for bringing the water main into the remaining service areas of Tuttle and Mulberry Point. A new entry point for the water main was established through an easement agreement on the Fisher property which is located between the existing water main on Sachems Head Road and Lower Road. By using this property for watermain access the residents of the Lower Road association could also participate in the watermain extension project.

OPM: Appendix D of the 2011 feasibility report is a “Septic System Impact Investigation”. That document predicts that the new water supply will lead to increased water consumption, placing a greater burden on existing septic systems. Appendix D also proposes a number of steps to limit the expected impacts on neighborhood septic systems and proposes that septic systems be corrected as a condition of properties being connected to the proposed water system. How will those recommendations be implemented?

See Attachment A for the most recent study conducted by the Town to investigate any impacts to septic systems.

OPM: The 2011 feasibility study assumed that the 270 homes under consideration at that time would require 130,000 gallons of water per day, or 370 gallons per day per household. What was the basis for that daily usage rate – it seems higher than typical indoor water use, but potentially is too low if there is significant outdoor water use. How does that amount compare with summer and winter usage for homes in similar neighborhoods? If water conservation requirements are imposed as recommended in Appendix D, how much less water would be required per household and would that reduced demand, in conjunction with the smaller number of homes to be served, make other water supply options feasible?

According to Craig Patla from the Connecticut Water Company on average they have used and historically seen 55 gallons per capita per day (gpcd) in Guilford and similar neighboring communities. This is an equivalent to 141.35 gallons per home per day on average based on 2.57 people per household in Guilford based on Census data. The total average estimated water demand for the 145 homes is 20,500 gallons per day and a maximum daily demand 40,500 gallons per day based on a MDD/ADD ratio of 2.

OPM: The scoping notice says: “The water main has been minimally sized to meet the demands for domestic water use and satisfy fire protection requirements specified by the Town Fire Marshall for the intended service area.” How much smaller could piping be if not for the fire protection requirements specified by the Fire Marshall? How does the fire department currently handle fire protection for this and other neighborhoods lacking public water? Has the current approach proven to be inadequate? According to the cost estimate included in the 2011 feasibility report, the original systems to serve 270 homes was to include 15,730 ft of 8” main and 5,030 ft of 12” main. Such a main would hold ~71,000 gallons of water, or 260 gallons per home. Given the lengthy line necessary to reach from CT Water’s existing system, the amount will likely be even higher for the smaller system that is proposed now. During periods when the neighborhoods population and/or per household water use are reduced, are there any health implications of having so much water stored in large diameter mains?

Current fire protection measures are accomplished by providing 10,000 gals of water on a combination of tanker, pumper and ladder trucks for delivery to Mulberry, Tuttle’s Point and Indian Cove Associations. Each time a fire alarm activated the fire trucks roll out to the neighborhoods carrying the required amount of water for fire protection. The Fire Marshall supports the watermain extension project to improve firefighting capabilities. See attached letter from the Fire Marshall.

REVISED PARAGRAPH (8/15/17)

The 30 % Preliminary Design Drawings provided by Luchs Consulting Engineers–shows the proposed system will serve 145 homes including approximately ~~3,000~~ 5,900 ft of 12” main and ~~10,000~~ 7,370 ft of 8” main. Such a main would hold approximately ~~43,800~~ 54,091 gallons of water,

or about 373 gallons per home. The turnover rate for water stored in the main was calculated to be about ~~2.14~~ 2.64 days based on an average day demand and ~~1~~ 1.31 days based on a maximum day demand, which should not pose any anticipated health risks. The turnover rate was calculated using the water usage of 55 GPCPD provided by Connecticut Water, and an average home occupancy of 2.57 people taken from US Census data for Guilford. See REVISED attached calculations. The design will include blow off hydrants at the dead end mains for periodic water main flushing.

OPM: While it appears that many of the homes to be served are at a relatively high elevation, proposed design has the water main crossing an especially low area along Daniels Ave to reach the neighborhoods. Similarly, the line delivering water to the Tuttle's Point neighborhood must cross an especially low area along Tuttle's Point Road. Guilford's Community Coastal Resiliency Plan says this about Tuttle's Point Road: Tuttle's Point Road is increasingly vulnerable to storm surges as well as future daily inundation. The report discussed a desire to elevate a number of Town roads, but it mentions the possibility of leaving Daniels Ave at its existing grade. Given the uncertainties regarding the future of those roads, what other options are available that can avoid installing water mains through low areas? Now that the system will not serve the Indian Cove neighborhood, it should be possible to avoid the low area along Daniels Ave. Doing so would avoid constraining the town's future options regarding that road.

Daniel Avenue was reconstructed and stabilized against storms following damage from the last Hurricane but there are no immediate plans to raise the road at this point. The Tuttle's Point causeway road between Mulberry Point and Tuttle's Point was raised significantly this past winter.

TO:	File	DATE:	5/3/2017
FROM:	Mariusz D. Jedrychowski, PE	PROJECT NO.:	
SUBJECT:	Attachment A: Mulberry Point Septic System Impact Study		

The following memorandum was prepared in collaboration with the Town of Guilford Health Department to evaluate the potential impacts to private septic systems caused by the water main extension project.

The Connecticut Public Health Code regulates both septic system design and activities related to building conversions, additions and changes in use. The Code does not categorize the connection of a dwelling to public water as a waste-water promoting change-in-use necessitating the evaluation or upgrading of septic system capacity. Conversely, the addition of a bedroom to a residential dwelling is considered a change-in-use which is recognized by the Public Health Code to likely increase water usage on account of the potential increase in household occupancy load. The addition of bathrooms, the installation of dishwashers, and garbage grinders are not recognized as activities increasing water usage. Although there are no documented studies that indicate residential water usage increases following a home connection to a public water supply, water usage for non-consumable purposes such as lawn watering, automobile washing or pool filling could increase. These activities are unlikely to affect the operation of septic system.

The assumption that extending public water into a residential neighborhood will result in septic system failures and ground water pollution has not been confirmed by any real examples. An inquiry to the Connecticut Department of Environmental and Energy Protection (DEEP) revealed that no documented community-based examples exists that definitively establishes a connection between the extension of public water into communities served by private wells and the subsequent development of wide-spread septic system failures. A local example which supports this claim can be observed in the Madison neighborhood of Garnet Park, an older established shore line community of 30 homes surrounded by coastal wetlands. To address water quality issues related to salt water intrusion a water main was extended into this neighborhood in 1997. According to information provided by the Madison Health Department, no wide-spread septic system failures occurred in the Garnet Park neighborhood following connection to public water.

According to the Connecticut Water Company and other private and municipal water providers, water usage has steadily declined in Connecticut and across the country as building codes call for more water efficient plumbing fixtures, homeowners purchase energy and water efficient appliances, household sizes change, and customers have a greater conservation ethic. Water conserving appliances such as dishwashers, low-volume flush toilets and reduced flow shower heads can be installed to decrease water total daily water use.

A recent evaluation of existing septic system capacities in the Mulberry and Tuttle Point area revealed that most are functionally sufficient in size to accommodate typical household wastewater discharge flows. Current septic system design capacity is conservatively based upon a maximum daily wastewater flow of 150 gallons per day per bedroom. This flow rate assumes a double occupancy per bedroom with a per capita water use rate of 75 gallons per person (50 gallons per person plus a 1.5 safety factor =75 gals.) A new two-bedroom house would therefore require a leaching system sized to accommodate 300 gallons per day, a three-bedroom house would require a 450 gallons capacity system and a four-bedroom house would require 600 gallons per day capacity. Actual household waste water flow is more likely to be proportional to the occupancy of a house, 1 person household produces maximum flow of 75 gpd, +2 people-150 gpd, 3 people-225 gpd and 4 people-300 gpd. In general, due to the use of water conservation plumbing fixtures water industry has seen a decrease in average wastewater discharge per person to as low as 51 to 66 gpd for a household of 3 to 5 as reported in the "Wastewater Engineering Treatment and Reuse" by Metcalf & Eddy, 4th Edition. Recent water data provided by the Connecticut Water Company for Guilford and neighboring communities shows a historical water use rate of 55 GPCPD. Assuming that approximately 90 percent of this water use is converted into wastewater, the data confirms the decrease in average wastewater discharge described by Metcalf & Eddy.

As part of a visual survey conducted by the health department in summer of 2015 a sanitary walkover in the Mulberry Point neighborhoods did not reveal the presence of any failed or overflowing septic systems. Septic systems which have failed in the past in Mulberry Point area have been successfully repaired through the use of newer, advanced-capacity leaching materials which provide greater infiltrative surface area in a smaller construction footprint. In the event that public water is extended into the Mulberry Point area and the homeowner completes a water service connection, additional lot area, formerly occupied by the 75 ft. well protective sanitary radius, will become available to repair a septic system if it becomes necessary. Any failing private septic system remains the responsibility of the owner to correct and must be repaired in accordance with the public health code whether or not the homeowner connects to public water. Implementation of septic repairs is regulated by the Connecticut Public Health Code and remains in the jurisdiction of the local health department. The water extension will improve water supply needs as well as serve as an important step in addressing wastewater management needs when a future septic system repair is completed.

During the completion of the Preliminary Engineering Study by Luchs Engineering, consideration was given in Appendix D for implementation of controls intended to negate the potential impact to septic systems as a result of extending public water into the proposed service area. The most applicable considerations, as concluded in the consultant's summary, were the implementation of proper land use controls, public education and periodic Town inspections. As recommended by the consulting engineer, Luchs Engineering in December 14, 2015 correspondence, no additional septic system analysis of the study area is needed.

Land use controls currently exist as a combination of Public Health code and local zoning regulations. The Public Health Code regulates the development or change in use of property with respect to its potential increase in wastewater production. An increase in bedroom capacity or

habitable space among homes on small lots with limited septic area is carefully regulated by health departments through the application of the Public Health Code.

Property land area and suitability of soil are evaluated with each proposed change in use to ensure that wastewater generated from the proposed change in use can be adequately dispersed on site without producing deleterious environmental effects.

Inspections of septic systems for failures or overflows along shoreline areas are a component of the Water Pollution Control Authority sewer avoidance program. Repairs of older septic systems that are substandard with respect to current Public Health Code design capacities and setback requirements have been successfully completed. Septic repairs on small lots, where design standards cannot be met, are subjected to current design standards in an attempt to gain maximum effective leaching area and maximum separation distances between the bottom of leaching systems and the restrictive layers of ground water or ledge rock. Owners of repaired substandard sized septic systems are issued a Permit-to-Discharge which identifies the reduced design flow capacity and identifies the set-back exceptions granted. This process allows the property owner to be aware of any water use restrictions or conservation measures associated with septic system use.

Education on the proper care and maintenance of septic systems is accomplished by the WPCA through periodic mailing of septic tank pump out reminder notices and septic system maintenance information to homeowners.

In follow-up to a request from the Connecticut Department of Public Health to update the status of current well water quality in the study area, additional well water samples were collected from selected wells in February 2016. Water test results within the Mulberry Point study area indicated that ground water quality has been affected by brackish water infiltration and wastewater by-products such as nitrates and bacteria. Historic water samples collected as far back as 2002 from other wells in the study area revealed the presence of similar elevated wastewater contaminants. Comparing the recent sample results to typical background levels of nitrate, sodium and chloride found in Guilford private wells located outside of the study area indicates that ground water contamination is present at higher levels in the Mulberry Point area. The sampling data is not, by itself, used to validate or repudiate an evaluation of a study area. It is one of several components which, when taken as a whole, are used to reach conclusions about the status of an area.

Construction of sections of the proposed water main within the regulated setback areas of inland or coastal wetland resources will be subjected to review and approval by wetland agencies. Installation of proper erosion and sedimentation control measures will be required in order to prevent any runoff or damage of wetland areas.

Selected examples of septic system discharge capacities in Mulberry and Tuttle Point

Address	Bedrooms	Septic tank Cap.(gal.)	Septic system (sq.ft.)	Capacity (gpd)**
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62 Tuttle Pt Rd	2	1000	375	300
110 Tuttle Pt Rd	3	1000	454	412
117 Tuttle Pt Rd	2	1000	186	149
12 Rock Ln	3	2000	375	341
23 Rock Ln	4	1250	925	840
25 White Top Ln	1	1000	375	150
22 Faulkner Dr	3	1250	625	568
4 Faulkner Dr	2	750	120	96
7 Highland St	4	1250	680	600
5 Meriden	3	1000	633	575
14 Meriden	2	1000	Unknown	unknown
612 Mulberry Pt Rd	2	750	302	242
624 Mulberry Pt Rd	3	1000	495	450
648 Mulberry Pt Rd	2	1000	359	288
672 Mulberry Pt Rd	2	1000	568	454
724 Mulberry Pt Rd	3	1500	540	493
760 Mulberry Pt Rd	3	1000	607	551
773 Mulberry Pt Rd	2	1000	285	228
783 Mulberry Pt Rd*	2	1000	140	112
789 Mulberry Pt Rd	1	1000	Unknown	unknown
805 Mulberry Pt Rd	2	1000	925	740
835 Mulberry Pt Rd	2	1250	375	300
9 Marshall Ave*	2	750	270	216
27 Marshall Ave	3	1000	495	450
38 Marshall Ave	3	800	318	289
52 Marshall Ave	4	750	Unknown	unknown
65 Marshall Ave	3	1000	483	439
139 Marshall Ave	2	1000	349	279
175 Marshall Ave	3	2000	441	400
19 Ruth Ln	2	900	190	152
27 Ruth Ln	2	1000	408	326
18 Brown St	2	750	375	300
33 Decatur Av	3	1000	497	451
690 Decatur Av	5	1000	144	145

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72 Decatur Av	3	2000	862	783
101 Decatur Av	4	750	402	365
122 Lower Rd	4	1250	708	600

*seasonal occupancy

** Gallon per day calculation determined by using ratio of Public Health Code standard discharge rate of 150 gals per bedroom to square footage of leaching area.

Example: for 3 bedroom house 450 gpd discharge permitted for a 495 sq ft leaching system.

for 2 bedroom house 300 gpd discharge permitted for a 375 sq ft leaching system

MDJ 8-15-17

BY ~~Will Edgerlin~~ DATE ~~5/3/17~~

CHCKD. BY _____ DATE _____

PROJECT Guilford Water Main Extension

BOOK NO. _____

5,930 ft

7,370

12" Water Main ~ ~~3,000 ft~~ (2,900 ft)

8" Water Main ~ ~~10,000 ft~~ (10,300)

$L = 3,000 \text{ ft} \rightarrow 5,930 \text{ ft}$
 $L = 3,000 \text{ ft} \times 12 \text{ in} = 36,000 \text{ in} \rightarrow 71,160 \text{ in}$
 $3,930 \text{ ft}$

$L = 10,000 \text{ ft} \rightarrow 7,370 \text{ ft}$
 $L = 10,000 \text{ ft} \times 12 \text{ in} = 120,000 \text{ in} \rightarrow 88,440 \text{ in}$
 $7,370 \text{ ft}$

$A = \pi r^2 = \pi (6")^2$
 $A = 113.1 \text{ in}^2$

$A = \pi r^2 = \pi (4")^2$
 $A = 50.3 \text{ in}^2$

$V = 113.1 \text{ in}^2 \times 71,160 \text{ in} = 8,048,196 \text{ in}^3$

$V = 120,000 \text{ in} \times 50.3 \text{ in}^2$
 $V = 6,036,000 \text{ in}^3 \rightarrow 4,448,532$

$V = 4,071,600 \text{ in}^3 \rightarrow 1 \text{ ft}^3$
 $V = " \times 1728 \text{ in}^3$
 $V = 2,356 \text{ ft}^3 \rightarrow 4,658 \text{ ft}^3$

$V = " \times \frac{1 \text{ ft}^3}{1728 \text{ in}^3}$
 $V = 3500 \text{ ft}^3 \rightarrow 2,1574 \text{ ft}^3$

$V = 2,356 \text{ ft}^3 \times 7.48 \frac{\text{gal}}{\text{ft}^3}$
 $4,658 \text{ ft}^3$

$V = 3500 \text{ ft}^3 \times 7.48 \frac{\text{gal}}{\text{ft}^3}$
 $2,1574$

$V = 17,623 \text{ Gal}$

$V = 26,180 \text{ gal}$ 19,253 gal

$V = 34,838 \text{ gal}$

Total $V = 43,800 \text{ gal}$ 54,091 gal

145 homes
55 gpcd
2.57 people/home
(census)

$145 \times 55 \times 2.57$
 $= 20,500 \text{ gal/day (usage)}$

54,091 gal

Turn over = $\frac{43,800 \text{ gal}}{20,500 \text{ gal/day}}$

Turn over = 2.14 days 2.64 days • Without Irrigation



THE OLD STONE HOUSE

GUILFORD FIRE DEPARTMENT
390 Church Street
Guilford, Connecticut 06437

Telephone (203)453-8056
(203)453-8057
Facsimile (203)453-8005

May 4, 2017

Bruce Wittchen
Office of Policy and Management
450 Capitol Ave., MS #54ORG
Hartford, CT 06106

Re: Town of Guilford – Mulberry Point Water Main Extension

Dear Mr. Wittchen:

The Guilford Fire Department currently provides water for fire protection to the Mulberry and Tuttle Point residents through the use of two pumper-tanker fire trucks and other response apparatus. The proposed Mulberry Point water main extension would allow for installation of fire hydrants and sufficiently sized water mains to provide fire protection service to 145 homes in the project area.

The extension of public water mains for fire protection services into the Mulberry and Tuttle Point neighborhoods is supported by the Guilford Fire Department.

Sincerely,
Charles E. Herrschaft Jr.
Charles E. Herrschaft Jr.
Guilford Fire Chief