

Norfolk Water System Subdivision Review

Subdivision Name: Lakeland Farms Townhouse Community

Owner: Lakeland Farms, Inc.
84 Cleveland Street
Norfolk, MA 02056

Engineer: Andrews Survey & Engineering, LLC
104 Mendon Street
Uxbridge, MA 01569

Reviewed By: Stephen C. Olson, P.E.

Date: June 7, 2016

At the request of the Norfolk Department of Public Works, Environmental Partners Group, Inc. has completed an assessment of the future potential water system hydraulics associated with the proposed Lakeland Farms Townhouse Community development. This development is located in the northeastern area of Norfolk at 84 Cleveland Street, Assessors Map 15, Block 54, Parcel 43. This assessment is based on plans prepared by Andrews Survey & Engineering, Inc. dated April 19, 2016.

Water Demand

The proposed Lakeland Farms Townhouse Community development consists of townhouse units. The following table summarizes the estimated water usage for the development based on information from the Town's recent DEP Annual Statistical Reports (ASR).

Usage Scenario	Calculation	Estimate Usage
Average Day Demand (ADD)	154 gpd / residential service x 40 Units	6,160 gpd
Maximum Day Demand (MDD)	2.2 x ADD	13,552 gpd
Peak Hour Demand (PHD)	2 x MDD	27,104 gpd

Static Pressure Requirements

Water distribution system static water pressure refers to the pressure in a main when there is no water flowing and reflects the water level in the storage tank(s). Based on DEP Guidelines and

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Policies for Public Water Systems, the normal working pressure in the distribution system should be approximately 60 pounds per square inch (psi) and not less than 35 psi. The hydraulic grade line (HGL) for the Norfolk water system fluctuates between 365 feet (USGS Datum) when the tanks are full to 355 feet when the water level in the tanks is down 10 feet. In order to maintain a minimum pressure of 35 psi at a HGL of 365 feet, a water customer must be connected to the water system at an elevation no higher than 284 feet (USGS datum). Elevations greater than 284 feet will result in static pressures less than the DEP required pressure of 35 psi.

A review of the plans provided with the proposed Lakeland Farms Townhouse Community development indicates that the proposed dwellings will meet minimum DEP pressure requirements (average day demands). During typical water system operations, the HGL of the Norfolk water system will drop 10 feet. Based on this operating level, the proposed dwellings will experience pressures from 36 to 43 psi (based on approximate proposed elevations). It should be noted that to comply with the Plumbing Code, any installation where the static head pressure exceeds 80 psi, whether the excess is constant or intermittent the homeowner will be required to install a PRV (pressure reducing valve) to limit the water pressure.

Fire Flow Requirements

In accordance with DEP Guidelines and Policies for Public Water Systems, water systems shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow (including when fighting a fire). Using this constraint, the Norfolk water system hydraulic computer model was used to calculate the available fire flow at the proposed hydrant in the back of Lakeland Farms Townhouse Community. Based on the proposed distribution system network with 8-inch piping, the available fire flow was calculated to be approximately 990 gpm with 20 psi residual pressure. A schematic diagram of the modeled network is provided in Figure 1. Fire flow guidelines set forth by the Insurance Services Office (ISO) for one and two family dwellings are summarized in the following table:

ISO Needed Fire Flows (one and two family dwellings)

Distance between Dwellings (feet)	Needed Fire Flow (gpm)
Greater than 100	500
31 – 100	750
11 – 30	1000
Less than 10	1500

Based on the proposed residential spacing of the development, the project represents a fire flow requirement of 1,000 gallons per minute (gpm). The modeling results raise questions on the availability of adequate fire flow for the proposed subdivision.

Water System Materials

All water system materials shall be as per DPW specifications (latest version). Water mains to be 8-inch ductile iron pipe, class 52, conforming to AWWA C150 and AWWA C151, push on type joints with gaskets conforming to AWWA C111, double cement lined inside conforming to AWWA C104, and asphalt seal coated outside (coal tar coated outside conforming to AWWA 203 in areas where groundwater levels are above the pipe laying depth). All pipe fittings shall be ductile iron, class 350 mechanical joint conforming to AWWA C153. All fittings shall be restrained with Megalug Series 1100. Water mains shall have a minimum of five feet of cover. All gate valves shall be US Pipe Metroseal 250 or American Flow Control Model AFC2500 resilient wedge seated valves conforming to AWWA C-509, open left. Hydrants shall be American Darling (American Flow Control) B62B open right, conforming to AWWA C-502 (Dry Barrel Hydrants) and painted red.

Water service pipe shall be 1” polyethylene tubing, PE4710 with tracer wire. Copper tubing shall not be used. Corporation valves shall be Mueller 300 ball type with Mueller “CC” inlet thread and pack joint connection outlet. Curb stops shall be Mueller Mark II Oriseal Curb Valve Model P-15219N.

All material specifications shall be submitted to the Norfolk DPW for review and approval prior to installation.

Pressure Testing and Chlorination

Water mains shall be tested at minimum of 150 psi or 150% of the static pressure (whichever is greater) for a minimum of two hours. Water mains will have an allowable leakage determined by the DPW. Water mains shall be chlorinated as per AWWA standards with a minimum of 48 hours of contact time. Water mains shall be flushed until chlorine has been eliminated and sampled for total coliform by the DPW. The main shall be tested again after 24 hours of contact time with non-chlorinated water by the DPW.

Distribution System Piping

The water system of the proposed townhouse community was also reviewed for discontinuities, looping, valve, and hydrant placement. The water main should not be located under any sidewalks or concrete pads (with the exception of hydrant laterals). Detailed comments on the plans are attached. Please review them and respond accordingly. Shutdowns shall be limited to 4 hours and shall be coordinated with the Town’s Department of Public Works.

Recommendations

It is questionable whether the Norfolk water distribution system may be able to provide acceptable pressures to the Lakeland Farms Townhouse Community development. The pressures and flows in the development are hampered by elevation and the pressure during peak hour demand is expected to drop below the 35 psi threshold established by DEP. It is not anticipated that they will fluctuate significantly during high usage periods given the nearby 12-inch diameter ductile-iron water main and water storage tank in the area. In addition, the hydraulic modeling results indicate that the Norfolk water system may not be able to provide fire flows typically considered adequate for this development. Actual fire flow requirements for the development should be confirmed by the developer. It may be beneficial to perform hydrant flow testing near this development to confirm the accuracy of the model before a decision is made to allow or refuse the development as it is currently proposed.

The Lakeland Farms Townhouse Community development will increase the water system demand for the Town of Norfolk by approximately 6,160 gpd representing approximately 5% of the new services that the system can support through 2029 under the Town’s existing Water Management Act

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permit, as described in EPG's 2014 Water Supply Assessment report. As described in the 2014 Report, EPG recommends that the Town continue to pursue development of a new water supply source to meet projected future demands and minimize Norfolk's dependence on existing interconnections with the communities of Wrentham and Franklin.

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