

December 5, 2017

Ms. Vicki Halmen,
Water and Wastewater Manager
Ipswich Utilities Department
272 High Street, P.O. Box 151
Ipswich, MA 01938

Re: Favorability of Lynch Property for New Source of Municipal Water Supply

Dear Vicki:

As you requested, AECOM has compared the potential new groundwater supplies investigated in 2016 and 2017, and it is our opinion that the Lynch Property is the most favorable location for a new supply. AECOM recommends that the Town take the necessary steps to permit the Lynch Property for a new source of municipal water supply under the Massachusetts Department of Environmental Protection (DEP) New Source Approval process. We are preparing a Consulting Services Agreement for New Source Approval for the Town's consideration.

Five possible well sites were identified and considered:

- Lynch Property, possible new source
- Test Well (TW) 1-16, possible Browns replacement well, 15 feet SE of Browns Well
- TW 2-16, possible Browns replacement well, 250 feet south of Browns Well
- Project Adventure Site, possible new source
- Pony Express Site, possible new source

Lynch Property Favorability

The attached table is a side-by-side comparison of these sites. The main advantages of the Lynch Property are as follows:

- Potential yield of 300 to 400 gpm;
- 99% water-level recovery after an 8-hour pumping test;
- Low levels of iron (0.03 milligram per liter, mg/L) and manganese (0.001 mg/l). The Massachusetts Secondary Maximum Contaminant Levels (SMCLs) are 0.30 mg/L for iron and 0.05 mg/L for manganese;
- Levels of synthetic organic compounds (SOCs), volatile organic compounds (VOCs), radon gas, radionuclides, and priority-pollutant metals, all tested in August 2016, either not-detected or well below applicable drinking water limits;
- Zone I largely (about 90%) owned/controlled by the Ipswich Water Utilities Department; and
- Relatively remote from human activity; recharge area contains State Forest.

Lynch Property Concerns

AECOM notes the following water-quality concerns with the Lynch Property:

- Elevated levels of both sodium (104 mg/L) and chloride (122 mg/L). The applicable drinking water standard for sodium (Massachusetts Drinking Water Guideline) is 20 mg/L. This standard is a guideline, and not enforceable. For chloride the SMCL is 250 mg/L. Sodium and chloride levels in this range are normally associated with the use of roadsalt. The Town should investigate the use of roadsalt and roadsalt-runoff patterns in the recharge area of the Lynch Property.
- Elevated levels of nitrate (3.0 mg/L), compared to the Massachusetts Maximum Contaminant Level (MMCL) of 10 mg/L. Elevated nitrate is commonly associated with septic systems and agricultural activities, both of which are present in the recharge area of the Lynch Property. The Town should investigate surrounding areas for potential sources of nitrate.

AECOM has reviewed the DEP database for sodium in Massachusetts drinking waters for the years 2015 - 2017, and found that many public water systems have sodium levels well above the 20 mg/L guideline. Though the sodium standard of 20 mg/L is a guideline and therefore unenforceable, DEP still plays a role. When sodium exceeds 100 mg/L, DEP asks for more frequent monitoring of sodium. When it exceeds 200 mg/L, DEP asks the PWS to evaluate water-treatment processes, such as the addition of sodium hypochlorite and sodium hydroxide, and perhaps identify ways of reducing sodium. By regulation, sodium test results must be reported to the local Board of Health and the Massachusetts Department of Public Health so that local medical professionals may be informed on behalf of their patients with high blood pressure.

If you have any questions, please do not hesitate to contact me at 978-905-2180.

Very truly yours,
AECOM



Douglas DeNatale, P.G., Senior Hydrogeologist
Project Manager

CC: Stephen DeFrancesco, AECOM
Don Chelton, AECOM

**Comparison of 2016/2017 Test Well Sites
For Potential New Water Supply
Ipswich, Massachusetts**

Location	Test Pumping Rate, gpm	Specific Capacity, gpm/ft	Water-Level Recovery	Potential Well Yield, gpm	Iron, mg/L	Mn, mg/L	Sodium/Chloride, mg/L	Nitrate-N, mg/L	Comments
Browns Well	NA	> 50	NA	400	0.01-0.08	0.10-0.97			2014-15 water quality
TW 1-16, 15 ft SE Browns Well	64 (4 hrs)	54	91% (after 2 hrs recovery)	400	0.04	0.001	70/137	0.6	Possible replacement well location
TW 2-16, 250 ft south of Browns Well	94 (4 hrs)	181	44% (after 2 hrs recovery)	400, continuous yield uncertain	< 0.02	0.0004	60/110	0.7	Sluggish drawdown and recovery. For 2-hr pumping, 2-hr recovery = 81%; Zone I cannot be acquired.
Lynch Property	171 (8 hrs)	50 (includes interference effects of 4 pumping wells)	99% (after 8 hrs recovery)	300 - 400	0.03	0.001	104/122	3.0	Pumping test conducted under severe drought conditions; 90% of Zone I owned by Water Department
Project Adventure	191 (4 hrs)	20 - 30 (interference effects, 3 pumping wells)	83% (after 4 hrs recovery)	500 + continuous yield uncertain	< 0.02	< 0.002	63/134	1.5	Only 25% of Zone I owned by Town
Pony Express	125 (3 hrs)	208	77% (after 3 hrs recovery)	700, continuous yield uncertain	1.53	1.97	26/29	< 0.1	Sluggish recovery. 100% Zone I acquisition or easement required. High Fe and Mn

Drinking Water Standards, as follows:

Massachusetts Maximum Contaminant Level (MMCL); Secondary Maximum Contaminant Level (SMCL); MA Drinking Water Guideline (DWG):

MMCL for Nitrate = 10 mg/L; SMCL for Fe = 0.3 mg/L; SMCL for Mn = 0.05 mg/L; SMCL for Chloride = 250 mg/L; DWG for Sodium = 20 mg/L