Proposed Treatment of Topsfield's Water Supply

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Introduction

- Topsfield's Water Supply
- Our problem – elevated manganese levels
- What solutions were considered?
- Recommendation
- Costs and benefits
- Discussion

Topsfield's Supply

- Quantity
  - Enough for 20 years or more
- Quality:
  - New public health concerns
  - Manganese levels vary
    - Regularly exceeds aesthetic threshold (0.05 mg/L)
    - Has exceeded health thresholds (0.3 mg/L)

What is Manganese?

- Naturally-occurring mineral in water, soil and air
- Present in many common foods including infant formula
- Essential nutrient in our diets
- Found in both surface water and groundwater
- Found in proximity to iron
- Found throughout Massachusetts and the US

What have you Observed?

Manganese Staining Examples

Elevated Manganese leads to:

- Aesthetic problems
  - Staining of fixtures, laundry
  - Water color and taste
- Public Health concerns
  - Some studies suggest:
    - Impairment in young children
    - Neurotoxin at high concentrations

MassDEP Manganese (Mn) Health Advisory (HA) Levels

Target Population	Exposure Period	Health Advisory
General population	Lifetime	0.3 mg/L
General population	10-day	1 mg/L
Infants and children less than 1 years of age	< 10 days	0.3 mg/L
	(Address within 10 days; sooner if possible).	

Note: At Mn concentrations greater than 0.3 mg/L, parents are advised to use bottled or treated water for their young children, in particular to make formula .

Options Researched

- Interconnection
  - With neighboring systems
  - Massachusetts Water Resource Authority (MWRA)
- Decentralized Treatment
  - Treatment facility at each source
  - Greensand filters on every service connection
- Retain and treat our wells
  - Greensand Filtration
  - Membrane Filtration

Interconnections

- With neighboring systems
  - Adjacent towns unwilling/unable to supply water
  - High cost of reaching Beverly-Salem connection
- Massachusetts Water Resources Authority
  - High entrance fee ($5 million)
  - Long distance to run dedicated pipeline ($20 million)

Decentralized Treatment

- MassDEP allows point-of-entry devices
  - Devices must be approved by MassDEP
  - Town must own, maintain & control devices
  - Town must have legal authority to enter premises for testing and maintenance.
  - Large customers become consecutive water systems, increasing testing & administrative burden.

Treat our wells

- Greensand Filtration
  - Least expensive filtration alternative
  - Easiest to operate
    - Removes dissolved & suspended Manganese
    - Allows better management of chlorine levels
- Membrane Filtration
  - More difficult to operate than greensand
  - Operators need higher certification, spend more time at plant
  - More costly to run

Option Selected

- Build Centralized Greensand Treatment Facility
  - Able to lower Manganese levels (< 0.05 mg/L)
  - Better finished product provided to consumer
  - Easiest and least expensive filtration type to operate
  - No increase in staff required
  - Provides compliance with Groundwater Rule
  - Protects against potential Surface Water Treatment Rule requirements

Location Selected

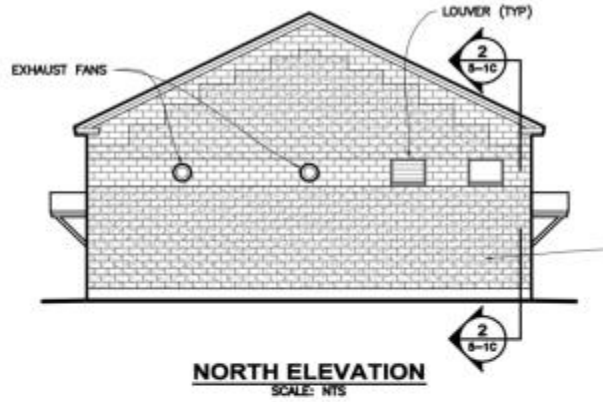
- Public Works Facility
  - Small amount of uplands at existing sources
  - Site already developed for similar purpose
  - No taking of land for building required
  - Minimal permanent impact on nearby residents and neighbors

Manganese Treatment

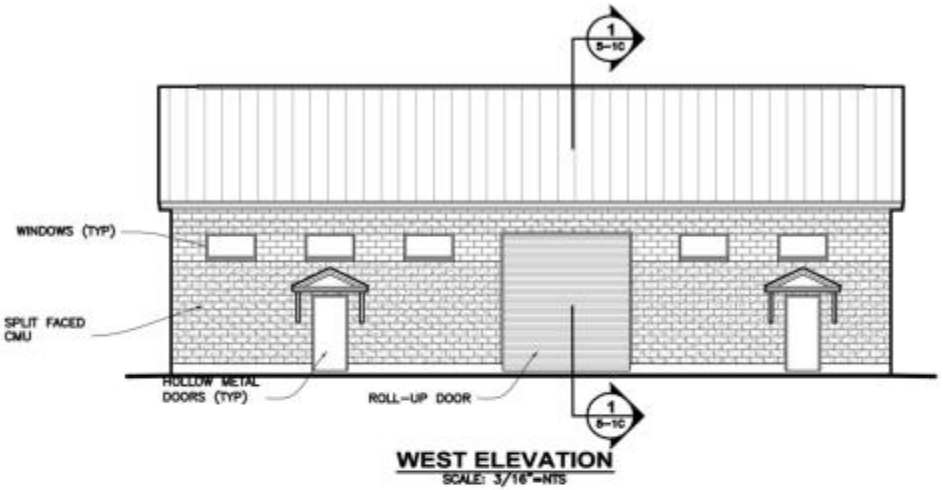
Manganese Removal Filters

Manganese Removal Facility

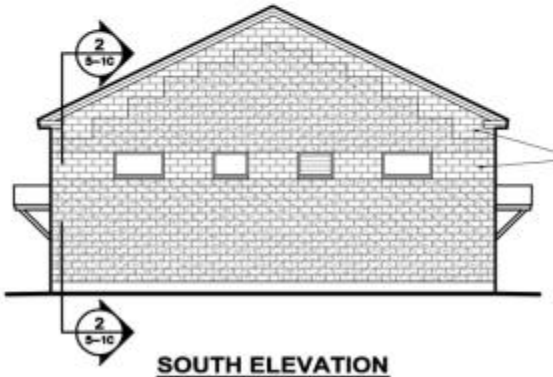
Concept Plan



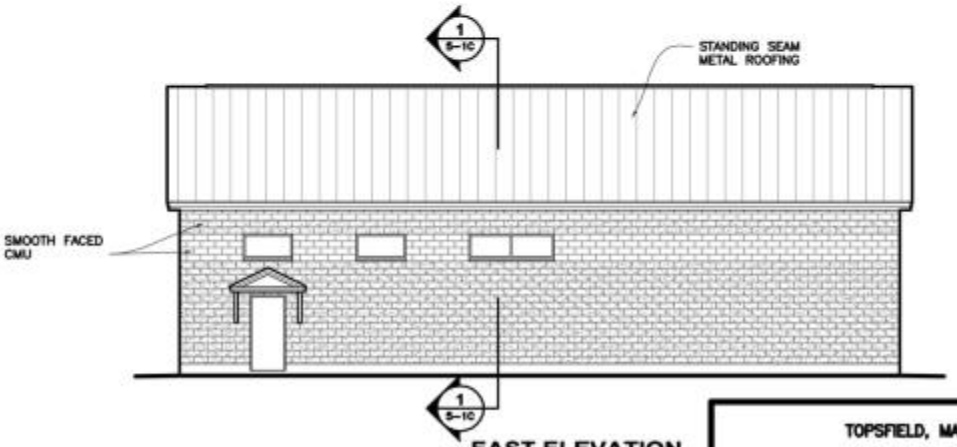
NORTH ELEVATION
SCALE: NTS



WEST ELEVATION
SCALE: 3/16"=NTS



SOUTH ELEVATION
SCALE: NTS



EAST ELEVATION
SCALE: NTS

TOPSFIELD, MA
CONCEPT ARCHITECTURAL BUILDING PLAN

PROJ NO: 12514A | DATE: AUG 2012 | FIGURE: 5-1B

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Benefits of Project

- Meet MassDEP regulations
- Reduce health risk from elevated manganese
- Improve water quality
- Retain local control
- Good water supply helps preserve property values

What Will this Project Cost?

- Projected capital cost including design & construction
  - $7.25 million
- May 2014 Town Meeting request $800,000
  - Owner's Project Manager
  - Design
  - Pilot testing
  - Permitting
  - Bidding

What are the cost impacts?

Project	Amount	Bond Payment (Year 1 of 20)	Budget Increase	Average Annual Bill Increase
Design	$800,000	$72,000	7.5%	$41
Construction Including 2% inflation (FY2017)	$6.45 million	$580,543	60.5%	$330
Estimated Total	$7.25 million	$652,543	68%	$371

Bond and cost estimates based on a 20-year loan with 4% interest rate and equal principal payments each year. Interest paid each year based on outstanding principal and will diminish as bond reaches maturity.

Budget Increase and Average Annual Bill Increase based on adding costs to FY2014 budget.

Discussion

Thank you!

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