WHITE POND CITIZENS STUDY COMMITTEE

FINAL REPORT
May 2012

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Executive Summary

Purpose:

The purpose of this investigation was to ascertain whether Maynard had sufficient water resources looking out into the future 10, 25, 50 and 100 years.

Goal:

Take an inventory of current and potential resources evaluate each and determine needs, growth, risks and any other parameters that could affect a continuous reliable source of clean, potable water for town residents.

Methods:

A committee of citizens from various backgrounds was established, an engineering firm was hired to provide technical assistance. The committee spent a year looking at the situation from many aspects: history, tours, technical, alternatives, previous studies, MAPC (Metropolitan Area Planning Council) growth projections, potential MWRA (Massachusetts Water Resources Authority) membership, among others.

The committee interviewed both current and past DPW superintendents.

The committee made every attempt to quantify each of the parameters and enter them with a score into a decision matrix. This minimized the potential of justifying a pre-conceived idea and the effects of dominating personalities.

Parameters evaluated:

Current Capacity	Water Quality (Discoloration, Cosmetic)
Growth Projections	Potential Contamination
Supply Balance	Potential Equipment Failure
State Regulations	Potential Well Failure
Water Quality (Health)	Watershed Concerns (at each source)
Cost of Operation	Cost of Development
Ancillary Requirements	Routing of Piping
Permitting	Surface Water vs. Well Water vs. Combination

Tests Performed:

- An Engineering study was performed to evaluate the capability of all current resources and what potential additional resources could be developed.
- Test borings on the efficacy of developing a new well site.

Observations:

- Town is heavily dependent on Rockland Ave. wells where a failure could bring down the entire system.
- Technology and Management of Water Treatment Operations do not use latest best practices.
- No performance metrics used on individual sites for optimization of maintenance and operating costs.
- Water quality (health) was very good, Water quality (cosmetic) is problematic
- Future requirements for growth can easily be offset by minimal conservation (low flush toilets, etc.).

- Some wells cannot be operated at designed capacity due to water quality issues limiting their use for emergency backup.

Conclusion & Main Recommendation:

The existing system has adequate capacity for current needs but is at significant risk. There is inadequate reserve capacity to handle an emergency situation. Should something happen to an existing source for whatever reason, the Town wells would not be able to supply the Town. The system should be expanded to provide adequate reserve capacity for maintenance and emergencies.

There are several potential options for increasing reserve capacity:

- White Pond,
- Additional treatment and capacity at Old Marlboro Road,
- An additional well at Green Meadow,
- Development of a new well at White Pond and
- Development of new wells in other areas.

It is the Committee's finding that only the development of an expanded treatment plant at Old Marlboro Road or the development of White Pond as a water supply source with a surface water treatment plant are realistic options for the Town.

Out of these two choices, we were not able to pick a clear "winner" as they both have limitations to their strong showing. White Pond is more expensive and Old Marlboro Road Well could have potential supply and color issues.

Therefore it is our recommendation that the Town take a multi-path approach in pursuing the option that best applies to the Town's needs. While this may cost slightly more in evaluation and engineering costs, it is clearly offset by a substantial savings in time. The committee feels that time is not on our side and this issue should be dealt with in an expeditious manner.

The recommended path is:

- Start the process of permitting with the federal and state government for easements for a supply pipe from White Pond to the Town border,
- Conduct jar tests to determine method and type of pilot tests at both sites,
- Conduct pilot tests to characterize water quality and supply at both sites,
- Obtain a project cost estimates for each option to within a +/- 15% range,
- Begin process by allocating monies at fall 2012 Town Meeting using $80,000 from available unused prior study authorization.

Other Recommendations:

Town should upgrade management techniques for the water system using performance metrics. This can be done through a restructure of the current department or using an outside firm similar to what is being done with the Sewer system.

Notes:

Additional details of recommendations in the full report.

BACKGROUND

Department of Public Works (DPW) Superintendent Jerry Flood requested a study of Maynard's water sources which was voted at Town Meeting in the fall 2010. Jerry's reason for this study was grounded in the fact that Maynard relies exclusively on its wells to supply all of its water. He wanted to ensure a safe, adequate, good quality supply of water for today's needs and those of the future which would allow for unforeseen events and regular maintenance of the wells. The Board of Selectmen, following approval by Town Meeting (TM) of Fiscal Year 2011 (FY11) budget expenditure from the Water Enterprise Annual Expense, Article #4, ordered a study of the town's water sources, both active and potential. As part of that study, an RFP was issued, the engineering firm of Woodard and Curran was hired and the White Pond Citizens Study Committee (WPCSC) was formed. (see Mission, page 9). Both these entities have been working independently and jointly since Feb 2011. Attached to this report please find the final Woodard and Curran (W&C) report with their recommendations.

While we have included an extensive history of Maynard's water in the Appendix, page 38, a quick mention here may help the reader understand how we have arrived where we are today in regards to the town's water supply. In the late 1880's our town forefathers procured the rights to White Pond through an act of the legislature. The Town then constructed a pipeline to bring the water to town and to the treatment plant on Winter St. This pipeline was replaced in the early 1940's. In the 1990's, TM decided to discontinue the use of White Pond (WP) and to rely exclusively on wells for our water. This was due to the Clean Water Act and new restrictions placed on surface water used as a town's water supply. Currently, the town has three well locations: Old Marlboro Rd. (OMR), Green Meadow (GM) and Rockland Ave. (RA).

On page 7, please find a map of our current seven wells in these three locations and White Pond. In Table 2 and Figure 2, you will then see a chart of our water usage from 1979-2010.

Maynard has a long history of supplying ample, good quality potable water to its residences and businesses. It began with the acquisition of White Pond back in 1888 and completion of the water distribution system in 1889. Since that time there have been many additions, changes, and other improvements to the system including the wells added for diversity and insurance against catastrophe. As a result of the Federal Clean Water Act of 1977 the use of White Pond discontinued in the 1990's and the town switched over completely in 2002 to well-water sources.

Description	Well 1 (3)	Well 2 (1)	Well 3 (1A)	Well 4 (4)	Well 5 (2)	Well 6 (3)	Well 7 (5)
Location	Old Marlboro Rd			Green Meadow	Rockland Ave.		
Max Permit	1090K gpd (gallons per day)						
Max Yield (Mechanical Pumping Capacity)	580K gpd	500K gpd		650K gpd	619K gpd	382K gpd	504K gpd
Permit	870K gpd			380K gpd	465K gpd	287K gpd	379K gpd
Effective Yield (Average Flow Rate)	-0- [Color]	140K gpd		240K gpd	300K gpd	300K gpd	170K gpd

Table 1

In 1995, the Massachusetts Department of Environmental Protection (MassDEP) revised the surface water drinking standards for the Commonwealth of Massachusetts. As of 1994, treatment of drinking water at White Pond consisted of disinfection only. This revision of the drinking water standards resulted in a directive from MassDEP to provide additional surface water treatment for drinking water from White Pond.

Across the country there were many communities that also had to cease using surface water unless they conformed to the treatment regulations put forth by the Clean Water Act.

As prudent managers of our resources and following a long tradition of stewardship, the Selectmen established our committee, The White Pond Citizen's Study Committee (WPCSC), to review the evolution of our water system to be sure that the Town can adequately continue to supply the Town residents and businesses now and in the future.

This report honors that stewardship and details our approach to studying our resources and making recommendations for its continuity.

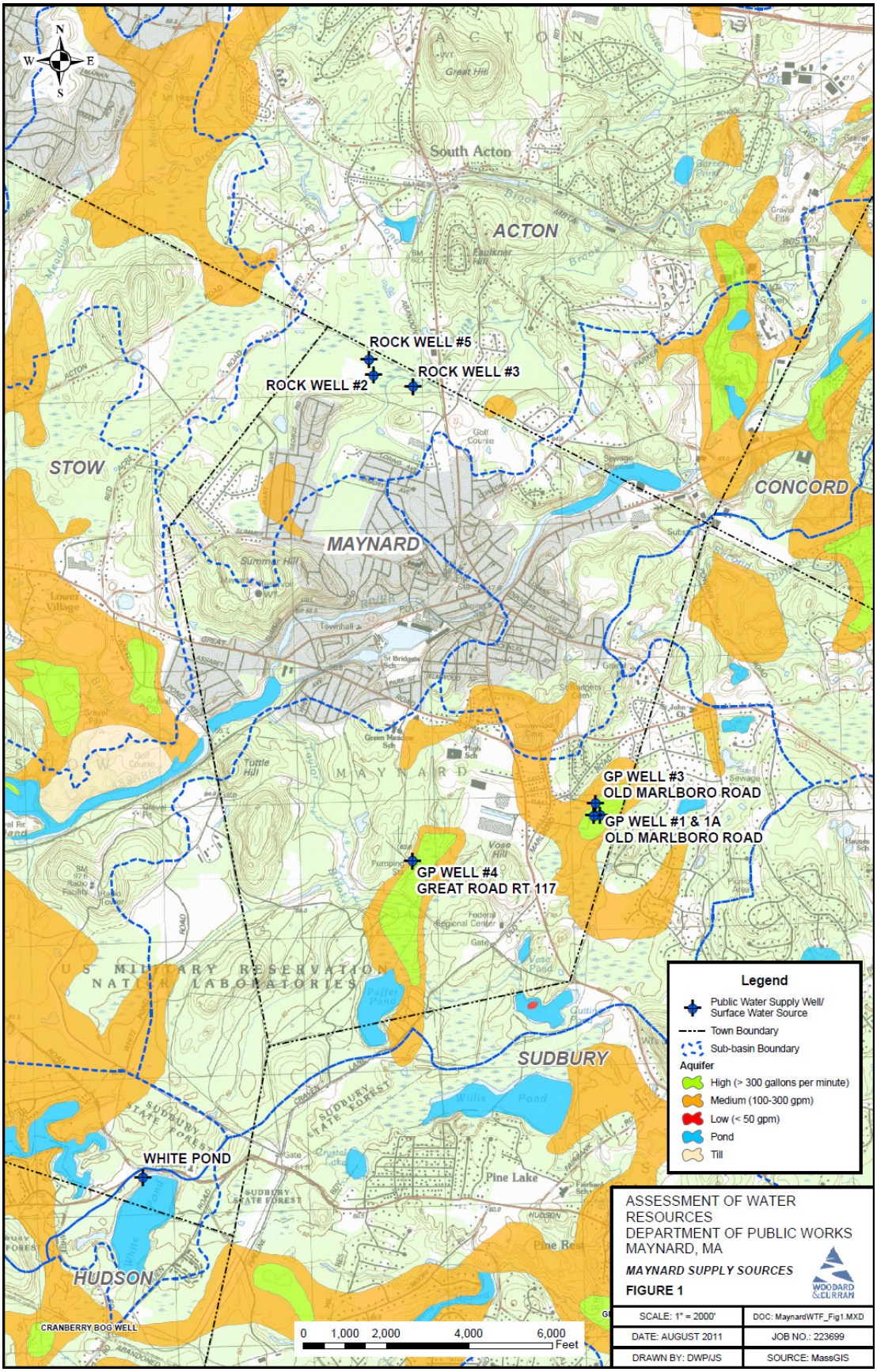

ACTON
South Acton
ROCK WELL #5
ROCK WELL #3
ROCK WELL #2
STOW
CONCORD
MAYNARD
GP WELL #3
OLD MARLBORO ROAD
GP WELL #1 & 1A
OLD MARLBORO ROAD
GP WELL #4
GREAT ROAD RT 117
SUDBURY
WHITE POND
HUDSON
CRANBERRY BOG WELL
Legend
Public Water Supply Well/ Surface Water Source
Town Boundary
Sub-basin Boundary
Aquifer
High (> 300 gallons per minute)
Medium (100-300 gpm)
Low (< 50 gpm)
Pond
Till
0 1,000 2,000 4,000 6,000 Feet
ASSESSMENT OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
MAYNARD, MA
MAYNARD SUPPLY SOURCES
FIGURE 1
WOODARD & CURRAN
SCALE: 1" = 2000'
DOC: MaynardWTF_Fig1.MXD
DATE: AUGUST 2011
JOB NO.: 223699
DRAWN BY: DWP/JS
SOURCE: MassGIS

Figure 1

	Thousands of Gallons													1000 Gallons per
	January	February	March	April	May	June	July	August	September	October	November	December	Total Annual	Day
1979	40,232	35,218	38,081	36,173	41,346	50,035	53,455	47,812	41,766	41,058	37,664	38,961	501,801	1,374.8
1980	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1981	38,226	33,089	34,255	33,667	38,499	42,489	42,926	44,145	36,584	33,559	33,386	32,775	443,600	1,215.3
1982	35,675	30,634	34,145	31,474	35,892	33,787	42,284	38,577	35,572	37,170	30,596	30,772	416,578	1,141.3
1983	29,543	25,600	28,133	28,137	31,049	34,620	40,353	33,998	33,704	29,599	29,980	28,587	373,303	1,022.7
1984	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1985	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1986	28,901	25,425	28,517	28,452	31,828	32,330	33,224	28,942	28,732	24,939	24,990	24,990	341,270	935.0
1987	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
1988	28,408	26,673	28,997	27,116	31,089	40,864	36,951	33,322	29,759	27,627	26,377	27,215	364,398	998.4
1989	24,957	24,313	25,167	22,717	31,114	25,768	31,072	35,185	28,204	31,633	24,239	28,913	333,282	913.1
1990	28,384	23,343	21,945	23,374	31,866	30,517	37,947	29,286	28,644	31,509	26,470	28,551	341,836	936.5
1991	26,501	24,715	25,180	31,511	29,157	31,848	44,069	28,695	28,998	32,313	24,895	31,533	359,415	984.7
1992	17,671	14,192	18,397	15,996	20,091	38,099	31,946	33,541	21,290	16,661	15,141	19,255	262,280	718.6
1993	15,067	15,841	19,324	17,140	17,384	39,448	30,964	29,463	19,215	18,687	20,738	13,452	256,723	703.4
1994	14,895	15,716	24,471	24,112	30,428	33,619	36,019	37,229	30,941	26,610	29,559	25,929	329,528	902.8
1995	24,722	24,753	24,034	24,634	31,938	31,395	36,738	40,486	29,603	31,349	24,493	23,133	347,278	951.4
1996	26,996	25,642	28,054	26,932	29,899	36,253	37,952	34,494	29,094	25,854	26,005	25,203	352,378	965.4
1997	25,657	23,056	26,197	25,601	32,040	28,978	41,504	39,324	30,406	29,062	24,014	26,562	352,401	965.5
1998	25,187	24,525	26,748	26,153	33,552	34,985	37,754	37,798	33,990	28,279	25,371	25,295	359,637	985.3
1999	23,334	23,833	29,274	25,678	30,763	50,643	29,022	34,295	27,099	24,751	31,898	23,883	354,473	971.2
2000	31,817	25,081	25,785	36,426	45,981	46,137	32,416	19,875	30,724	25,575	25,207	29,075	374,099	1,024.9
2001	26,030	25,009	25,337	40,599	35,861	37,016	33,741	28,874	28,597	22,891	20,738	24,882	349,575	957.7
2002	26,959	24,862	27,297	28,102	34,205	33,779	35,355	39,731	27,387	20,957	20,523	20,449	339,606	930.4
2003	23,528	20,596	22,975	20,937	24,594	27,096	29,884	25,857	22,066	20,456	19,848	19,510	277,347	759.9
2004	18,062	20,726	23,306	24,146	26,972	30,173	29,453	28,587	25,600	23,412	23,085	24,918	298,440	817.6
2005	24,513	22,069	23,080	23,514	24,524	30,021	32,821	34,087	27,341	27,158	23,262	21,436	313,826	859.8
2006	24,321	21,868	21,584	22,036	25,784	26,018	28,874	29,251	23,946	23,221	21,759	24,750	293,412	803.9
2007	26,951	22,191	23,479	21,852	25,809	28,521	30,646	32,330	30,093	26,126	22,983	24,629	315,610	864.7
2008	22,366	19,743	24,197	24,997	27,172	30,979	30,236	28,015	27,218	23,680	22,858	23,697	305,158	836.0
2009	24,807	24,836	29,994	27,215	29,515	31,218	28,190	30,466	29,343	28,380	25,790	25,443	335,197	918.3
2010	25,142	24,941	30,465	30,022	34,771	32,321	33,944	32,465	27,284	25,534	21,988	23,519	342,396	938.1
2011	22,628	19,351	25,841	23,707	25,791	27,258	30,232	26,968	23,599	22,740	22,070	23,602	293,787	804.9

Table 2

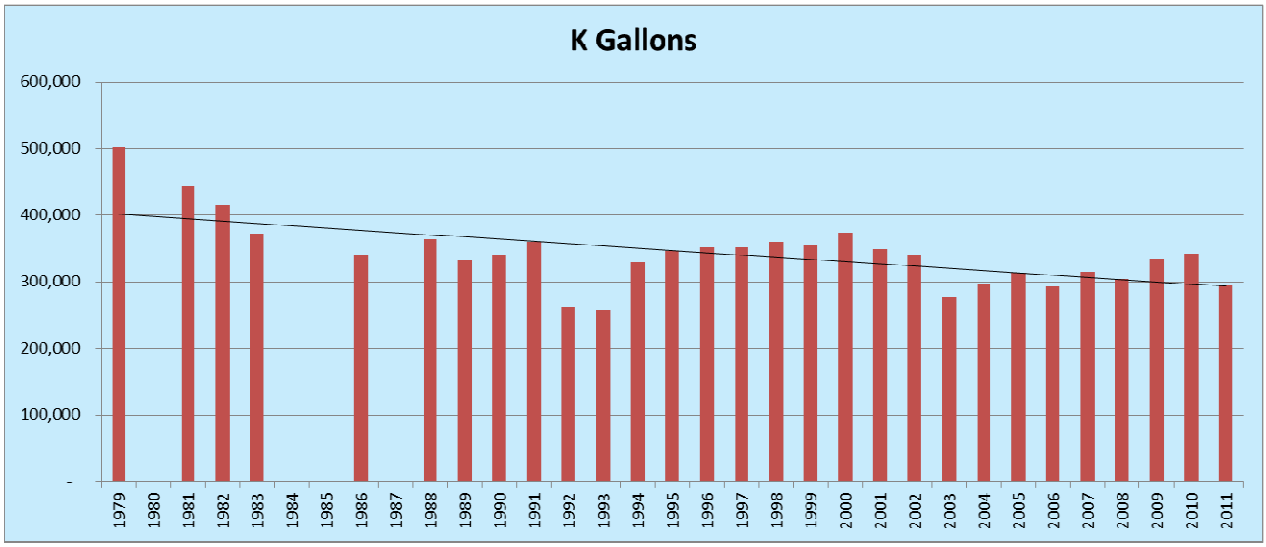


Figure 2

For a more expansive history of the water system please see Appendix, page 38.

PURPOSE

The Selectmen established the WPCSC to look at the current sources of the water supply and make recommendations, if any, on how to assure that the Town can continue the current level of service and out into the future.

Given the history, evolution, and now the expectations of the Town's residents and businesses for a continuing supply of ample good quality water, we set about reviewing all aspects of the current system so that we could understand how the sources of water fit into the overall system of supply. While our name seems to imply concentration on the viability of White Pond, our charter from the Selectmen was much broader and involved contracted engineering support to look at all possible sources of water.

Specifically, the purpose of this investigation was to ascertain whether Maynard had sufficient water resources looking out 10, 25, 50 and 100 years and how it would meet its obligations to the Town's residents and businesses as well as its legal obligations under State and Federal Clean Water Regulations.

Mission Statement

> *"**White's Pond Citizen's Study Committee (WPCSC)** is a citizen comprised ad hoc body appointed by the Maynard Board of Selectmen. It will be initially set at five (5) voting member with a Chairman appointed by the Board of Selectmen.*
> *The committee will be tasked with facilitating the success of the study being conducted by the engineering firm of Woodard and Curran. This will include meeting with, advising and conveying public input from various constituencies to the firm, the Board of Selectmen and the Town Administrator when relative and appropriate.*
> *The WPCSC will be asked to deliver a narrative or written report or recommendation to the Board of Selectmen upon completion of the engineering sturdy. A final report on this matter should be available for the annual town meeting 2011 and the WPCSC may be requested to participate in the report back to Town Meeting.*
> *The Board of Selectmen reserves the right to expand the size and scope of the committee if deemed necessary and voted by the Board. The Board of Selectmen reserves the right to appoint associated non-voting members and or invite participation from neighboring communities if they deem it appropriate and beneficial."*

GLOSSARY

Water

Water covers 70.9% of the Earth's surface, and is vital for all known forms of life. On Earth, 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps, a small fraction in other water bodies. Only 2.5% of the Earth's water is freshwater, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products.

Water on Earth moves continually through the hydrological cycle of evaporation and transpiration (evapotranspiration), condensation, precipitation, and runoff, usually reaching the sea. Evaporation and transpiration contribute to the precipitation over land.

Safe drinking water is essential to humans and other life forms. Access to safe drinking water has improved over the last decades. Studies have shown there is a clear correlation between access to safe water and GDP per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. Water also plays an important role in the world economy, it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transportation.

Water is a chemical substance with the chemical formula H_2O. A water molecule contains one oxygen and two hydrogen atoms connected by covalent bonds. Water is a liquid at ambient conditions.

Potable Water

Drinking water or potable water is water pure enough to be consumed or used with low risk of immediate or long term harm. Over large parts of the world, humans who have inadequate access to potable water and use sources contaminated with disease, pathogens or unacceptable levels of toxins or suspended solids, leads to widespread acute and chronic illnesses and is a major cause of death and misery in many countries. Reduction of waterborne diseases is a major public health goal in all countries.

Water has always been an important and life-sustaining drink to humans and is essential to the survival of all organisms. Excluding fat, water composes approximately 70% of the human body by mass. It is a crucial component of metabolic processes and serves as a solvent for many bodily solutes. The United States Environmental Protection Agency in risk assessment calculations assumes that the average American adult ingests 2.0 liters (~2.1 quarts) per day.

In Maynard (as in all Massachusetts municipal water systems), the water supplied to households, commerce and industry is all of drinking water

standard, even though only a small proportion is actually consumed or used in food preparation.

Graywater

Gray water gets its name from its cloudy appearance and is wastewater generated from domestic activities such as laundry, dishwashing, and bathing, which can be recycled on-site for uses such as landscape irrigation and constructed wetlands.

Some definitions of graywater include water from the kitchen sink. Greywater differs from water from toilets which is designated sewage or blackwater to indicate it contains human waste.

Distilled Water

Distilled water is water that has many of its impurities removed through distillation. Distillation involves boiling the water and then condensing the steam into a clean container. Distilled water has virtually no taste due to its lacks of dissolved minerals.

Bottled distilled water can usually be found in supermarkets or pharmacies, and home water distillers are available as well.

Di-ionized Water

Deionized water, also known as demineralized water, is water that has had its mineral ions removed, such as sodium, calcium, iron, copper, chloride and bromide. However, deionization does not significantly remove uncharged organic molecules, viruses or bacteria.

Ground water

Water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from rain and from melting snow and ice and is the source of water for aquifers, springs, and wells. The upper surface of groundwater is considered the water table.

Surface Water

Surface water is water collecting on the ground or in a stream, river, lake, wetland, or ocean. Surface water is naturally replenished by precipitation and watershed runoff and naturally lost through discharge to evaporation and sub-surface seepage into the groundwater.

The field of hydrometry is used to characterize surface water quality:

Class 1 is extra clean, fresh surface water resource used for conservation, not necessarily required to pass through water treatment process, and requiring only an ordinary process for pathogenic destruction and ecosystem conservation where basic organisms can breed naturally.

Class 2 is very clean, fresh surface water resource used for consumption, which requires ordinary water treatment process before use, for aquatic organism of conservation, fisheries, and recreation.

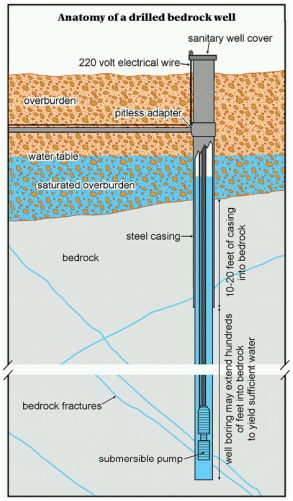
Class 3 is medium clean, fresh surface water resource used for consumption, but requires passing through an ordinary treatment process before use, for agriculture.

Class 4 is fairly clean, fresh surface water resource used for consumption, but requires a special water treatment process before use, for industry.

Class 5 is the source which is not classified in class 1-4 and used only for navigation.

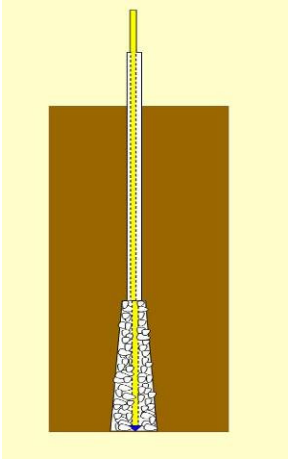
Bed rock well

Bedrock well is drilled into bedrock, tapping the cracks in the rock that carry water. A Bedrock well can be anywhere from 100' to 500' deep and at times more. The well requires casing and a pump to bring the water to the surface. Monitoring of the water flow is performed to ensure adequate water. Bedrock Wells are also called Artesian Wells.



Gravel pack wells

Two general types of gravel packing are used: 1) the uniform grain-size pack and 2) the graded grain-size pack. The first has in recent years been widely accepted, especially when manufactured screens are used, in which the opening sizes can - be controlled. A shaft is drilled down to the water table where a wider cone is created. Gravel is inserted down into the cone followed by a water pipe. In the first case the water pipe has a screen attached at the end to prevent the infiltration of sand. In the second case layers of sand and gravel are built up to prevent the infiltration of sand. Gravel pack wells are usually much shallower than bedrock wells, typically 18 to 50 feet but can be as deep as 600'.



Drawdown

In any well, under non-pumping conditions, the level at which the water resides in the well is known as the static water level. When the pump is started, the water level will drop to a new level known as the pumping level, and this level is a function of the pumping rate. The difference between the static water level and the pumping level is referred to as the drawdown.

OTHER TERMS:

BOS	Board Of Selectmen
CWRSF	Clean Water State Revolving Fund
DEC	Digital Equipment Corporation
DPW	Department of Public Works
FY	Fiscal Year
GM	Green Meadow Well

GDP	Gross Domestic Product (a measure of economic activity)
GPD	Gallons Per Day
MAPC	Metropolitan Area Planning Council
MassDEP	Massachusetts Department of Environmental Protection
MGD	Million Gallons Per Day
MGL	Massachusetts General Laws
MWRA	Massachusetts Water Resources Authority
OMR	Old Marlboro Road Well
RA	Rockland Ave. Well
RFP	Request For Proposal
SOW	Scope Of Work
TM	Town Meeting
SCADA	Supervisory Control And Data Acquisition
USGS	United States Geological Survey
W&C	Woodard and Curran (Engineering Firm)
WMA	MassDEP's Water Management Act
WP	White Pond (Surface Water)
W.P.A.	Works Projects Administration
WPCSC	White Pond Citizens Study Committee
WRC	Massachusetts Water Resources Commission

METHODS USED:

A committee of citizens from various backgrounds was established and an engineering firm was hired by the Town to provide technical assistance. The committee spent over a year looking at the situation from many aspects:

1. Review of Regulations

   There are numerous state and federal regulations which all municipal water suppliers must adhered to. For evaluating potential sources, we limited our research to three main topics:

   (1) a stated goal of 65 GPD per person for Massachusetts communities [with additional capacity for industry, business, etc.];

   (2) the requirement of a primary protective zone of 400 feet around any ground water source, and;

   (3) the further consideration of the Federal Clean Water Act of 1977 which requires treatment of virtually any source that Maynard would develop.

2. Review of Status

   The Town of Maynard currently has three main active water sources and one inactive emergency backup source [White Pond untreated would require a boil water order]. The active water resources are three separate well fields located in various parts of the Town. The following section presents each of the four major water resources within the Town of Maynard.

   a. Rockland Avenue - The largest producing well field is the Rockland Avenue Well field along Rockland Avenue near Route 27 on the Town border with Acton. This well field consists of three wells which went on line in 2000. These wells are known as "deep rock wells" as they extend to a depth of approximately 450 feet below the ground surface into bedrock. These wells have a combined average flow-rate pumped per day of 0.77 MGD (770,000 GPD).

   b. Old Marlborough Road – A well field along Old Marlborough Road near the Town border with Sudbury situated between Parker Street (route 27) and Great Road (Route 117). The OMR well field consists of three wells installed circa 1963. These wells extend down to 35 feet below the ground surface and are referred to as gravel packed wells, as the well screen or inlet is surrounded by packed pea stone or gravel. The pumps for these wells are rated to pump approximately 580,000 gallons per day. These wells currently only pump at an average rate of 140,000 GPD as a result of discoloration.

   c. Green Meadow Well – A single well with treatment facility is located approximately one half mile behind the Fowler Middle School along the border of the Assabet Wildlife Refuge. This well was installed circa 1975 and extends down to 72 feet below the ground surface. Similar to OMR, this well is also a gravel packed well. The pumping capacity for this well is 650,000 gpd however, high concentrations of iron and manganese in the ground water require additional down time and maintenance lowering the total output of this well to approximately 240,000 GPD (although state certified to 380,000 GPD).

d. White Pond – Since the decommissioning of the pond as an active source of potable water in 1995, White Pond has served as an emergency source of water capable of supplementing the Town's need for drinking water and fire protection should a catastrophic failure of one or more of the other sources occur. Though offline, White Pond is still a viable water supply option, however, due to current water treatment standards, water supplied from the pond would only be usable for fire protection. Potable use of the water would require individuals to boil the water or a temporary facility would be required to treat the pond water for the time this source was in use.

3. Tours,

   The committee arranged a tour of all of the well sites, the pond, water storage tanks and water treatment facilities. This proved to be very useful in our evaluations as we were able to link the physical facilities with the data accumulated from past studies, the engineer's report and our own investigations. (see Power Point presentation in Appendix, page 42 & web address http://www.townofmaynard-ma.gov/documents/wpsc-water-supply-photo-tour.pdf).

4. Technical,

   a. Difference in wells, i.e. bedrock at Rockland Ave. (one of only three such wells in Mass.) with all the rest being shallow gravel pack wells.

   b. Since the 1960's, the Town of Maynard drilled over 200 test wells throughout the Town. Seven of those test well produced acceptable quantities of water and are the seven active wells discussed herein.

   c. Reviewed the potential events and failure modes for each of the wells, treatment facilities and the pond.

   d. We looked at the different potential technologies that could be used by either the surface water option or by increasing the capacity by using ground water (wells) which included Membrane filtration technology such as:

      i. microfiltration
      ii. ultrafiltration
      iii. nanofiltration
      iv. reverse osmosis
      v. electrodialysis
      vi. electrodialysis reversal

   e. Besides the engineering study done by W&C, we looked at the potential of additional test wells including the newly acquired Golf Course and potentially joining the Massachusetts Water Resources Authority (MWRA).

5. Review of previous studies,

   a. Town Meetings in the past have authorized many engineering studies of water sources.

b. In order to understand the continuity of the system and not to duplicate work previously performed we created a subcommittee to research existing reports in the DPW office archives and the Water Asset Study of 2004. A listing of those report can be found in Appendix, page 76).

6. Metropolitan Area Planning Council (MAPC) growth projections,
   a. The committee contacted the MAPC to obtain current and projected population information for the town. This information was ascertain if population change was anticipated and if a significant change in Maynard's population in the future and what, if any, effect, all this might have on our need for additional water (See Appendix, page 57).

7. MWRA potential among others.

8. Interviewed current and past DPW superintendents & town officials, residents. (See Appendix, page 69).
   a. Assistance from Jerry Flood (DPW Superintendent),
   b. Walter Sokolowski & Tom Sheridan (former DPW Superintendents),
   c. Anne Marie Desmarais (former Selectwoman),
   d. Mike Sullivan (Town Administrator).

9. W&C Coordination (attended many meetings)
   a. Provided W&C with historical and resident perspective regarding water resources and infrastructure. Provided a conduit to the engineering consultant to provide community feedback.
   b. Gantt Chart for project monitoring.
   c. SOW.

10. Decision Matrix

    In order to keep from just giving a group of personal opinions, the committee attempted to qualify and quantify what seemed to be the most important concerns and considerations. We did this in an Excel Spreadsheet Matrix where various parameters were established and each parameter received an importance value. We then individually quantified a value score for each parameter. The composite score lead us to our recommendations. (The complete matrix is presented in the Appendix, page 94).

11. Engineering report from W&C (See page 111).

TESTS PERFORMED:

An engineering study was performed by Woodard and Curran, the Town's consultant, to evaluate the capability of all current resources and what potential additional resources could be developed. All physical tests were performed by the engineering firm, Woodard & Curran, including test borings on efficacy of developing a new well site at White Pond. Details of those tests can be found in the Engineer's report in the Appendix page 111. They also provided a conceptual level cost estimate.

While the committee is comfortable with the quality of the engineer's work, we have concerns about the scope of the work they performed.

- No detail to ROM costs so no good financial understanding of options.
- Unfortunately, the committee didn't feel like it received answers to questions as promised in the beginning interviews with W&C. One specific concern was a 300% increase in the cost estimate for White Pond development between the preliminary report and the final report with no explanation. We are still waiting for an answer as we feel the jump from $9 million to $16 million deserves a more detailed explanation.

The Committee also went back and looked at all previous engineering studies for continuity, perspective and understanding of the bigger picture.

EVALUATIONS & OBSERVATIONS BY SUBJECT:

Current Capacity

The Town's current water supply consists of two gravel packed well fields (Old Marlboro and Green Meadow) and one deep rock well field (Rockland Ave.). The Town used a combined average daily consumption for 2010 of 938,000 GPD. The Town is permitted to withdraw an average of 1,090,000 GPD under the Massachusetts Water Management Act. See Appendix, page 111 Section 2 for more details.

As previously mentioned, Maynard has over 200 test wells drilled over a number of years. The breath and scope of these past investigations along with the 400 foot, Zone 1 buffer requirement left only 2 general locations to locate new wells, the newly acquired golf course and the area around White Pond.

In general, the Town of Maynard produces water that is of good quality; however, this water is, with the exception of Rockland Ave., produced at a significantly reduced rate to maintain that good quality.

The capacity of the Rockland Ave. facility is very large compared to other available sources. As such, reduced water production from the Rockland Ave. facility places additional strain on the remaining two well fields. To maintain water quality, these well fields currently produce significantly less water than their capacity. At this time, the Old Marlborough and Green Meadow wells can not produce quality water at a sufficient rate to maintain water levels in the Town's water storage tanks, as excessive pumping from these sources results in discolored water. A situation similar to this occurred several years ago, where the Town purchased water on an emergency basis from Acton due to 3 of 7 wells being down. If a similar situation should occur, the Town could not supply users if Rockland Ave. went offline. Purchase of water from other communities or implementation of other alternatives to provide water during emergency situations may result in high costs due to cost premiums associated with immediate need for water for drinking and fire protection and short time frame to implement these alternate plans.

Water Quality (Discoloration, Cosmetic) (from Appendix, Section 2, page 72)

At the Old Marlborough Road well field, the water pumped from wells No. 1 and 1A experiences significant discoloration. This discoloration is a result of tannins from decaying matter. This discoloration is more pronounced during periods of heavy pumping, consequently, Well No. 1 and 1A are presently only operated at approximately 25% of the rated capacity and Well No. 3 is offline. For proposed recommendations at Old Marlboro Road Wells, see Appendix, Section 5.2 page 111.

Green Meadow Well No. 4 requires frequent cleaning due to clogging of the well screen with iron and manganese. The clogging of the well screens prevents the well from pumping at its rated capacity and requires the well to be shut down annually for maintenance reducing the well's overall production capacity. It should be noted that iron and manganese are frequently present in groundwater and these constituents are found in water in all of the Town's wells and the water is adequately treated to remove them.

For a discussion on proposed treatment alternatives at White Pond, see Appendix, Sections 4.4.1 and 4.4.2. starting at page 111.

Iron & Manganese exists in all our wells but is currently being adequately treated.

Water Quality (Health)

With proper treatment/filtration, all water sources under consideration are fully potable. The Town tests the municipal water supply daily and provides a report to ratepayers annually.

Growth Projections

The Town of Maynard is not expected to grow significantly over the next 20 years. In 2008 Maynard's population was 10,182 and the projection for 2035 is 11,449. See Methods in Appendix, page 57 for more information.

MetroFuture 2035 Update
Projected Population, Households, and Group Quarters by Municipality
MAPC Region (101 Municipalities)
March 8, 2011

POP = Total Population
HH = Households
POPinHH = Population living in Households
POPinGQ = Population living in Group Quarters (dormitories, barracks, correctional facilities, etc)

Municipality	Maynard	Acton	Hudson	Stow	Sudbury
POP 2000	10,433	20,331	18,113	5,902	16,841
HH 2000	10,433	20,331	18,113	5,902	16,841
POPinHH 2000 (CTPS 7_23_07)	4,292	7,495	6,992	2,082	5,504
POPinGQ 2000 (CTPS 7_23_07)	10,422	20,189	17,985	5,873	16,647
Est Pop 2008 (CTPS 01_22_10)	11	142	128	29	194
Est HH 2008 (CTPS 01_22_10)	10,182	20,797	19,597	6,446	17,207
Est POPinHH 2008 (CTPS 01_22_10)	4,680	8,066	7,763	2,203	6,086
Est POPinGQ 2008 (CTPS 01_22_10)	10,171	20,629	19,469	6,443	16,972
HH 2010	11	168	128	3	235
POPinGQ 2010	4,593	8,305	8,412	2,811	6,304
POPinHH 2010	11	168	128	3	235
TotPop 2010	10,675	21,137	19,937	7,585	17,569
HH 2020	10,686	21,305	20,065	7,588	17,804
POPinGQ 2020	4,770	8,778	8,866	3,001	6,724
POPinHH 2020	11	168	128	3	235
TotPOP 2020	10,739	21,869	20,009	7,804	18,170
HH 2030	10,750	22,037	20,137	7,807	18,405
POPinGQ 2030	5,116	9,287	9,552	3,109	7,243
POPinHH 2030	11	168	128	3	235
TotPOP 2030	11,205	22,730	20,689	7,846	19,081
HH 2035	11,216	22,898	20,817	7,849	19,316
POPinGQ 2035	5,230	9,455	9,778	3,145	7,413
POPinHH 2035	11	168	128	3	235
TotPOP 2035	11,449	23,140	21,170	7,939	19,531
HH Chg 2010_2035	11,460	23,308	21,298	7,942	19,766
POPinGQ Chg 2010_2035	637	1,149	1,366	334	1,109
POPinHH Chg 2010_2035	-	-	-	-	-
TotPOP Chg 2010_2035	773	2,003	1,233	353	1,962
%HH Chg 10_35	14%	14%	16%	12%	18%

Table 3

a. MAPC data is based on build-out.

b. Low build out (see data sheet) – Based on available open space, current land use, and MAPC projections, the Town of Maynard will not grow significantly in the next 25 years. As nearly 100 percent of the Town is currently served by the Maynard water system, the

Town does not face expansion of the system as a result of a large subdivision of open space. Most of the projected growth for the Town of Maynard is a result of an infilling of existing lots or increases in population density, i.e. apartment complexes, Town houses as opposed to single family houses. This increase in population is offset by the departure of manufacturing in the Town that once consumed large volumes of water. The attached data sheet presents the projected increase in population through 2035.

c. Population thru 2035 is estimated to be approximately 11449 from the current 10750.

d. Population increases in Stow also considered low. Population projections for Stow are similar to the Town of Maynard, however, for different reasons. While Stow maintains ample open space and sub-dividable land, they do not provide public water or public sewer, the zoning within the Town of Stow requires significantly larger minimum lot sizes to allow for private wells and private wastewater disposal fields. Stow's recent water woes also contribute to this lack of population growth.

e. There is concern for the future of the source of Rockland Ave. well field as it might be impacted by Acton's growth and Stow's if it should exceed MAPC projections.

f. Population increases in Acton and Sudbury will be considerable per MAPC.

In order to understand Maynard's water needs we have looked at Maynard's consumption over the past 30 years (see Table 2).

a. During our study, Clock Tower Place (CTP) was granted some re-zoning allowing up to 500 apartments. This would have a substantial impact on any reserves built into the system to cover emergencies. The Town average at present is approximately 100 GDP per person. The State has established a goal of 65 GDP per person. If we use the State's 65 gpd per person x 2 people per apartment (on average) x 365 days x 500 units then we have additional usage at 23.7 million gallons. The Town is currently using 382 million gallons of water annually. That represents a 6.2 percent increase that was not considered in MAPC's build out estimates discussed earlier. Our estimate ranges from 6% to a max of 12%. As comparison, peak demand at the time of DEC was approximately 1.3 Million gallons per day. Potential of repeat is virtually non-existent.

b. There was discussion of a small brewery locating in Maynard. We did not feel that the water use of a micro-brewery would be that significant and did not put that into our calculations.

c. The impact of the "Smart Growth Initiatives" should have little or no effect on water use in Maynard.

Future requirements for growth can easily be offset by minimal conservation (low flush toilets, low flow shower heads, etc.). Massachusetts Department of Environmental Protection (MassDEP) determines the amount of water the Town may use. This is accomplished by a water withdrawal permit which is issued to the Town every 10 years. Currently and for the foreseeable future, the town wide withdrawal limit is expected to remain at 1.09 million gallons per day, however, MassDEP is continually pushing communities to become more efficient with water use. It is anticipated that at some point in the future, the Town's water withdrawal permit may be reduced.

Potential Contamination

The three groundwater well fields are protected from accidental contamination by the Zone I requirements that require no development occur within 400 feet of the wells. White Pond, if it were brought on line as a water supply source, is located near Hudson Road in Stow. Potential contamination sources [not planned for treatment] that would adversely affect the pond include salt runoff from the roadway as well as oil and grease drips from the vehicles, and catastrophic events such as gasoline tanker truck spills. Surface water supplies are adversely affected more quickly by drought conditions.

Supply Balance

The Town of Maynard's water supply is heavily dependent on the Rockland Ave. deep rock well field which provides a majority of the Town's water. If one of the well fields should fail or be out of commission for an extended time, the Town would not likely be capable of maintaining water levels in the Summer Hill water storage tanks with water that is not discolored. It should be clear that the Town could likely provide water that is suitable for consumption, however, water from Old Marlborough Road well field would experience discoloration at the higher pumping rate required to maintain water levels.

Though groundwater and surface water are regulated differently, they are inter-related. As noted previously, surface water is more quickly affected by drought or precipitation when compared to groundwater which is slower to drawdown under drought and recovers more slowly after precipitation, however, effective management of our water resources requires both be managed effectively to ensure continued quality product.

> Surface and ground water are two separate entities, so they must be regarded as such. However, there is an ever-increasing need for management of the two as they are part of an interrelated system that is paramount when the demand for water exceeds the available supply (Fetter 464). Depletion of surface and ground water sources for public consumption (including industrial, commercial, and residential) is caused by over pumping. Aquifers near river systems that are over pumped have been known to deplete surface water sources as well. Research supporting this has been found in numerous water budgets for a multitude of cities.[1]
>
> Response times for an aquifer is long (Young & Bredehoeft 1972), however, a total ban on ground water usage during water recessions would allow surface water to better retain levels required for sustainable aquatic life. By reducing ground water pumping, the surface water supplies will be able to maintain their levels, as they recharge from direct precipitation, runoff, etc.[2]

The above two paragraph reinforce the policy that diversity of water production sources is beneficial. This would give Maynard a more stable water supply.

Town Meetings in the past have authorized many engineering studies of water sources and wells but not many of the recommendations from these studies have been implemented especially those concerning OMR. This study considered those findings and recommendations.

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[1] Applied Hydrogeology, Fourth Edition by C.W. Fetter

[2] R.A. Young and J.D. Bredehoeft Digital simulation for solving management problems with conjunctive groundwater and surface water systems from Water Resources Research 8:533-56

In addition to balancing supply of drinking water production, flexibility in the system must be available to perform routine maintenance on the well and treatment infrastructure. This maintenance requires the well infrastructure being maintained to be removed from service and rely on the remaining wells during that time. Under current conditions, should Rockland Ave. well field or treatment facility be removed from service, the other wells cannot provide water of the quantity and quality.

The final components of balancing the water use of the Town are the Seasonal water bans. Seasonal water bans are enacted annually to maintain water use levels below the limits assessed by MassDEP for annual water use or to protect the water supply during drought. The typical level 1 water ban is enacted by the Board of Selectmen as Water and Sewer Commissioners late each spring which limits water rate users to outdoor watering on odd/even days. As stated previously, this ban is driven by water consumption limits during the historically driest period of the year. (see Appendix, page 109).

Potential Equipment Failure

As a single point of distribution the treatment plant at Rockland Ave. services a single well field of 3 individual wells. Should the plant go down for more than three days, there is not enough redundancy in the system to supply the Town's needs. As a result of a lightning strike and failure of the filtration plant some years ago, the Town had to import water from Acton. If that had not been available the Town would have had to take water from White Pond under an emergency edict and boil our water before use.

Above we discussed that the other wells could not make up for an out of service Rockland Ave. well, so then what would be other factors that could cause failure of Rockland Ave. wells? Some potential causes are:

1) Earthquake could re-orient water flow to the well (very low probability – high impact),
2) Contamination from a severe surface chemical spill (low probability – high impact),
3) Contamination from a migrating underground plume (low probability – high impact),
4) Treatment plant offline for several days [covered by backup sources for example the two storage tanks on Summer Hill] (moderate probability, low impact),
5) Treatment plant offline for extended period [insufficient backup source] (moderate probability – moderate to high impact),
6) Well drying up (very low probability – high impact).

State Regulations Watershed Concerns

Protective Zone Status for Wells is not an issue as most of our existing wells have our 400-foot buffer in each as required by Zone I regulation. Those wells that do not have a full buffer are protected by wetlands and conservation areas that limit the potential for development that may threaten the wells.

Obtaining and maintaining the Protective Zone for the Pond is more difficult. There are limits on what property could be obtained by the Town for protection because there is already significant development in the area. Hudson Road and Bruen Road border the pond on the north and eastern sides of the White Pond. There is also a housing development east of the Pond. Some type of mitigation would probably be required, either thru more rigorous filtration or some type of containment.

.

Regional water consortium

The committee was interested in pursuing a regional water consortium as a possible method to reduce development costs by sharing those costs with neighboring Towns that also have an interest in developing water resources. This was also one of the issues the Selectmen asked the committee to address. Unfortunately, Town Counsel made a legal determination that the Town did not have the right to offer this option to surrounding towns. As a result, the Committee did not pursue a regional alternative; however, the Board of Selectmen may pursue regionalization or cost/product sharing in the future.

This is an issue that we felt is not in our purview and rightly belongs to the Selectmen. Should the Town ultimately decide to develop White Pond, the Town may wish to get a different legal opinion or approach the legislature about modifying the grant of the White Pond resource.

One note of caution is that if the legislature is asked to modify the grant to allow for us to enter into a regionalization plan, the Town could lose control of the resource altogether. Continued non-use of WP might lead to loss of the rights to WP in the future.

You can review town counsel's written legal opinion in the Appendix, page 65.

There is some precedence for sharing some of the White Pond resource with other entities. For example the Town has a 50 year agreement in place with the Mass Fire Academy.

As a side note, consideration of a Treatment plant situated at WP rather than in Town would allow for possible sale of water to other municipalities in the future if approved by Legislature.

Routing of Piping for White Pond Surface Water Supply

Four routes were reviewed by Woodard and Curran in the report in Appendix, Section 4. Page 111. Environmental and easement constraints are discussed in Section 4.1.1 and shown in Figure 4.

Other Routing options

In order to keep costs to a minimum, we looked at alternative pipe routings whose distance savings might offset other costs. In addition to variants of following White Pond Road, we looked at two other routings. One would be across Fish and Wildlife land, over FEMA-owned Tuttle hill and hook into the current water system at Track Rd. The other possibility would be to come across F&W using a path following Winterberry Rd. In this case, the treatment plant for White Pond water would be located near the OMR treatment plant – a much shorter route.

None of the alternative routing options proved practical as both would require Archeological studies that would delay the project and increase other costs beyond the savings. Additionally, FEMA is predisposed against these possibilities. Working against their wishes would again raise costs (legal and political capital) and delay implementation.

Permitting

Woodard and Curran researched available records and no available documentation granting Maynard easement access from White Pond to Maynard was found.

White Pond Surface Water Treatment: In order to construct and maintain the piping from White Pond in Stow to the Maynard town line, easements would need to be obtained from the Town of Stow, the Department of Conservation and Recreation (DCR) and the Assabet River National

Wildlife Refuge. These easements would require permitting as shown on Table 6 of the Woodard and Curran Report. Table 6 also shows easements and permits required within the Town of Maynard. Additional permitting would be required beyond obtaining the easements as shown in Table 6.

Water has not been drawn from WP since circa 2002. During this time ownership of the land that the Town would need to cross with pipes has changed and now involves working with multiple agencies, state and federal such as Fish and Wildlife, FEMA, Etc.

It will now be necessary to obtain easements from these agencies. Initial inquiries seemed encouraging but further research and legal expertise will be required and will require significant time.

Old Marlboro Road Well Capacity and Treatment: Regulatory permitting for the color treatment building include state and local permits as shown in Table 8 of the Woodard and Curran Report.

If the MassDEP changes the regulations/requirements to meet an updated or new withdrawal permit every water district in the state would be in the same boat so the committee does not think that is likely to happen.

Sustainability and Conservation Methods

Other sources such as rain water collection.

Ground water recharging.

Low flush toilets.

Other water conservation techniques

Example of Technology

The Town of Lincoln's surface water treatment system uses a Siemens membrane system. These systems apparently have a high start up cost but are very robust in that it should need minimum attention for 8-10 years. They did indicate that they shut down the ground water system during the summer and use only surface water. On an annual basis they estimate the usage is 80% surface water and 20% ground water and that the water quality is considerably better using surface water.

Financial

Grants and Financial Assistance

1. The Drinking Water State Revolving Fund (DWSRF) is a federal-state financing mechanism that subsidizes water quality improvement projects that are undertaken by local governments. The standard term is 10-20 years and an interest rate of 2%. There is also the possibility of a zero percent rate if the project meets additional requirements. The program will operate with approximately $100-125 Million in annual financing. The committee believes the Town would be eligible for that additional financial assistance.

We looked at all the current operating information and the Town seems to be running the operation on a pay-as-you-go situation with little planning for future replacement costs of the source or distribution infrastructure. Limited data was provided for the Table 4 so the only information from which to make a decision was the rate structure calculation done by W&C some years ago. Although the table shows that the equipment is beyond its expected life, the equipment

is functional and continues to be maintained. However, as part of a master plan the table should be completed and used as a guide for future expenditures.

Desc	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7	White Pond	Concrete Tank	Steel Tank
Location	Old Marlboro Rd			Green Meadow	Rockland Ave.			Stow	Summer Hill	
Max Permit	1090K gpd (gallons per day)									
Gross Yield	580K gpd	500K gpd		650K gpd	465K gpd	287K gpd	379K gpd	720K gpd	1500K Gallons	3000K Gallons
Effective Yield	-0- [Color]	280K gpd		220K gpd	465K gpd	287K gpd	379K gpd	0 gpd		
Type	Gravel 30 ft deep			Gravel 72 ft deep	Bedrock			Surface Water		
Date Put in Service	1973	1973	1980	1980	2002	2002	2002	1888	1889	1972
Expected life[3]	25	25	25	25	25	25	25	25	50	50
Retirement Date								1991		
Remaining Life (years)										
Replacement or rehab cost									500K	500K
Life of Replacement										
Operational Cost (annual)										
Percent uptime (days/month)										
Operational cost/gal										
OH Gallons %										
PM Schedule										
Repair History										

NO DATA AVAILABLE FROM DPW RECORDS

Table 4

Notes:

1. Gpd = gallons per day
2. Kgpd = thousand gallons per day
3. OH = Overhead
4. PM = Preventative Maintenance

Cost of Operation (in 2011 dollars)

Estimated operation and maintenance costs for the three recommended options in Woodard and Curran's report (Appendix, starting at page 111) are:

White Pond Surface Water Treatment: $250,000/year,

Old Marlboro Well Color Treatment: $150,000/year,

Well No. 4 – New Well Source Development at Green Meadow: $125,000/year .

Cost of Development (in 2011 dollars)

[3] This is for the infrastructure only.

Estimated Design and Construction Cost for the three recommended options in Woodard and Curran's report (Appendix, page 111) are:

White Pond Surface Water Treatment: $14,375,000 (treatment plant at White Pond & associated piping),

White Pond Surface Water Treatment: $16,100,000 (treatment plant in Maynard & associated piping),

Old Marlboro Well Color Treatment: $3,908,425,

Well No. 4 – New Well Source Development at Green Meadow: $3,137,550.

One can find background cost information about the water system in the Appendix, page 91. We took what appears to be two typical Sewer & Water bills (Table 5 & Table 6) and took out the sewer portion and calculated in projected impact of each of the three options presented by the Engineering firm in their report. We used the amounts projected by the engineering report [though the committee believes they are on the high side].

Cost Comparisons – Typical Bills: Because of the staggered rates based on quantity used, we calculated the yearly amounts to avoid distortion that shorter periods would create. Columns 2, 3 & 4 show the current charges. Columns 5, 6 & 7 show the projected charges should the Town vote to choose the White Pond option. The annual cost would increase from $973.77 to $1,305.91 or an increase of $332.14 for the year or an increase of about a cup of coffee per day at $0.91.

The second grouping in Table 5 uses the same logic and shows the Old Marlboro Road improvement at $1,084.48 for the year which is an increase of $110.71 or $0.30 per day. Columns 5,6 & 7 shows the upgrade to the Green Meadow well at $1,062.34 or $88.57 extra per year, a $0.27 daily extra charge.

4-Dec-11

Comparison of Current Water/Sewer Costs and Proposed Water Improvement Options

	Current (2011)			Add White Pond (increase water costs by 90%)		
	Total Water Cost	Total Sewer Cost	Water/Sewer Bill	Total Water Cost	Total Sewer Cost	Water/Sewer Bill
1st Quarter Bill	$98.14	$159.84	$257.98	$186.47	$159.84	$346.31
2nd Quarter Bill	$94.52	$154.51	$249.03	$179.59	$154.51	$334.10
3rd Quarter Bill	$83.37	$138.08	$221.45	$158.40	$138.08	$296.48
4th Quarter Bill	$93.01	$152.29	$245.31	$176.73	$152.29	$329.02
		Annual Cost	$973.77		Annual Cost	$1,305.91
		Ave. Daily Cost	$2.67		Ave. Daily Cost	$3.58
					Percent Increase	**34%**
					Dollar Increase Annually =	$332.14
					Increase per day =	$0.91
					Total Per Day =	$1.92

	Improve Old Marl. Wells (increase water costs by 30%)			New GM Well (increase water costs by 24%)		
	Total Water Cost	Total Sewer Cost	Water/Sewer Bill	Total Water Cost	Total Sewer Cost	Water/Sewer Bill
1st Quarter Bill	$127.58	$159.84	$287.42	$121.69	$159.84	$281.53
2nd Quarter Bill	$122.88	$154.51	$277.39	$117.21	$154.51	$271.72
3rd Quarter Bill	$108.38	$138.08	$246.46	$103.37	$138.08	$241.46
4th Quarter Bill	$120.92	$152.29	$273.21	$115.34	$152.29	$267.63
		Annual Cost	$1,084.48		Annual Cost	$1,062.34
		Ave. Daily Cost	$2.97		Ave. Daily Cost	$2.91
		Percent Increase	**11%**		**Percent Increase**	**9%**
		Dollar Increase Annually =	$110.71		Dollar Increase Annually =	$88.57
		Increase per day =	$0.30		Increase per day =	$0.24
		Total Per Day =	$1.31		Total Per Day =	$1.25

Table 5

Table 6 is similar to Table 5 as a typical bill but slightly less money.

4-Dec-11

Comparison of Current Water/Sewer Costs and Proposed Water Improvement Options

	Current (2011)			Add White Pond (increase water costs by 90%)		
	Total Water Cost	Total Sewer Cost	Water/Sewer Bill	Total Water Cost	Total Sewer Cost	Water/Sewer Bill
1st Quarter Bill	$77.64	$129.65	$207.29	$147.51	$129.65	$277.16
2nd Quarter Bill	$92.41	$151.40	$243.82	$175.58	$151.40	$326.99
3rd Quarter Bill	$82.76	$137.20	$219.96	$157.25	$137.20	$294.45
4th Quarter Bill	$76.73	$128.32	$205.05	$145.79	$128.32	$274.11
		Annual Cost	$876.11		Annual Cost	$1,172.70
		Ave. Daily Cost	$2.40		Ave. Daily Cost	$3.21
					Percent Increase	**34%**
					Dollar Increase Annually =	$296.59
					Increase per day =	$0.81
					Total Per Day =	$1.72

	Improve Old Marl. Wells (increase water costs by 30%)			New GM Well (increase water costs by 24%)		
	Total Water Cost	Total Sewer Cost	Water/Sewer Bill	Total Water Cost	Total Sewer Cost	Water/Sewer Bill
1st Quarter Bill	$100.93	$129.65	$230.58	$96.27	$129.65	$225.92
2nd Quarter Bill	$120.13	$151.40	$271.54	$114.59	$151.40	$265.99
3rd Quarter Bill	$107.59	$137.20	$244.79	$102.63	$137.20	$239.82
4th Quarter Bill	$99.75	$128.32	$228.07	$95.15	$128.32	$223.47
		Annual Cost	$974.97		Annual Cost	$955.20
		Ave. Daily Cost	$2.67		Ave. Daily Cost	$2.62
		Percent Increase	**11%**		**Percent Increase**	**9%**
		Dollar Increase Annually =	$98.86		Dollar Increase Annually =	$79.09
		Increase per day =	$0.27		Increase per day =	$0.22
		Total Per Day =	$1.17		Total Per Day =	$1.12

Table 6

Management

Technology and Management of Water Treatment Operations do not use latest best practices.

There are no performance metrics used on individual sites for optimization of maintenance and operating costs.

The committee could not obtain all the information it requested. While we were free to search out any information, little information was supplied. For example, the committee requested on several occasions for the data of the different treatment facilities to estimate relative cost of operation among the different facilities. This info is supposedly sent electronically to the state but was never provided to the committee. Additionally, when we asked the engineers for explanations of the differences between their preliminary report and their final report, we never received a clarification from W&C and management told us that the contract was closed. These issues remain unanswered.

There was no ability in the water department to describe operational costs and inaccurate records from town reports were unable to be verified or corrected. There are no performance metrics other than water quality records mandated by the state which were not received by the committee.

Decision Matrix

Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	phase plan 2
1,262.4	1,580.9	1,562.2	1,364.8	1,227.6	1,032.9	1,217.4	899.6	938.2	-

Table 7

a. The decision matrix is composed of two sections. In section one, we evaluated the different criteria and gave each criterion an importance value from one to five (with one as the lowest) by each member and then the average was calculated and sent to section two. In section two, each member ranked the different sources on a scale of one to five (one being the lowest) for each of the listed criteria. This gave us a quantified value for each person's opinion.

b. Because some people grade low and others higher, we also normalized the results to create a score for each option (raw data is in line one and normalized data is darker shaded in line two).

c. We used this matrix for each member to explain why they chose each value so that we could have a factual and unemotional discussion on each item or the importance of each item. This created an iterative process where members modified their scores based on the reasons and facts discussed. The final of 10 iterations is in the Appendix, page 94.

The committee made every attempt to quantify each of the parameters and enter them with a score into a decision matrix. This removed justifying a pre-conceived idea and the effects of dominating personalities.

CONCLUSIONS:

The existing system has adequate capacity for current needs with all well fields operating, even at less than maximum output. However, should one or more of the well fields fail or become temporarily unavailable, there is inadequate reserve capacity to handle an emergency situation longer than three days. Should there be a failure of an existing source for whatever reason, the Town's existing water supply infrastructure would not be adequate to supply the Town. The system should be expanded to provide adequate reserve capacity and system redundancy for maintenance shutdowns and emergencies.

As we discovered the Town does have an ample supply of water available to meet its needs. This is especially true as the Town drives towards the goal of 65 GPD. However, if the Town loses a well for any reason it cannot meet the needs without having a "backup" supply available.

With the exception of the Rockland Ave. wells, our other wells cannot operate at peak efficiency due to color and odor problems when the wells are pumped beyond a certain capacity. If, therefore, something happens to the Rockland Ave. wells the Town would be unable to meet Maynard's daily water needs.

There are several potential options for increasing reserve capacity:

- Surface Water Treatment at White Pond,
- Additional pre-treatment at Old Marlboro Road,
- An additional well at Green Meadow,
- Development of a well at White Pond and
- Development of new wells in other areas.

Locating the treatment plant at or near the town garage is not feasible because the land behind the garage is now conservation land.

We reviewed a map of the town to see what additional locations could meet the Zone I requirement of 400' from any existing development. The map showed very few possible sites and many of those had already been tested in previous studies. The only exception was the Country Club where the geology did not show any promise.

It is the Committee's finding that only the development of the well at Old Marlboro Road with an expanded treatment plant and the development of White Pond with a surface water treatment plant are realistic options for the Town.

Out of these two choices, we were not able to pick a clear "winner" as they both have limitations to their strong showing. White Pond is more expensive and Old Marlboro Road well could have potential supply and color issues.

The committee chose not to include Woodard and Curran's recommendation to install a new water supply well at the Green Meadow Well and Treatment facility. This well was not recommended as the existing well is maintenance intensive as a result of high iron and manganese levels in the water at that location. While the Green Meadow Treatment facility has additional un-used treatment capacity, the potential cost per gallon and maintenance downtime is not appealing. We feel the cost / benefit of investing in the GM well or to develop Well #4 as past

investments here have not paid off. This well has proven to be problematic in its continuing water quality.

Under a long term emergency condition, an additional well at Green Meadow could be installed in a relatively short time. While over the long term, an additional well at this location would require significant resources, a new well could be used for a period of time while a new source was constructed or upgraded. This would be relatively inexpensive compared to the Town purchasing water from a neighboring town's water operation.

Regarding a well located at White Pond, W&C reported that there was not enough space as there is a 4 acre requirement. We are not sure if this is space for onsite disposal system and lagoon. We asked if the 4 acre requirement could be reduced with an available sewer connection and reduced emergency only lagoon. Also, could transmission pumping be reduced to one instance and gravity flow to an in-Town site? It was determined that it could not.

Ultimately, the issue of siting of a well at White Pond was impractical due to the 400' buffer requirement limiting potential locations at the site. Also, the wells would have to be greater than 150' from the pond leaving little area to drill. Test wells at those locations pumped less than required. All things considered, it was removed as a viable option.

We agreed we need to determine, once and for all, whether it's possible to improve both the quantity and quality of water from OMR using new technologies to remove color. This well could provide an adequate supply but after pumping to a certain number of gallons color appears.

If the decision is made to locate the water treatment plant in town, consideration of the Tobin land being transferred from Conservation Commission to the town in order to locate the plant there thus saving money is unrealistic.

Four routes were reviewed by Woodard and Curran in the report in Appendix, Section 4, starting at page 111. Route 2 was recommended and is shown in Figure 3. Woodard and Curran researched available records and no available documentation granting Maynard easement access from White Pond to Maynard was found. Environmental and easement constraints are discussed in Section 4.1.1 and shown in Figure 4.

Regarding construction of piping from White Pond, Woodard and Curran recommends open cut methods since it is less expensive than trenchless technologies and there are no water bodies or wetlands to cross. See Section 4.1.2 and Figure 5.

We determined that trenchless is not applicable as the current pipe is 8 inches in diameter and it looks like a 12 inch pipe would be needed. It was suggested that the Town consider a 15 inch pipe to reduce resistance and lower pumping energy costs. Normally trenchless is used when the replacement pipe is approximately the same diameter as the original.

Fish & Wildlife have verbally stated that White Pond Road could be used. There is one section of the old pipe route that is off the road and the Town would not be allowed to follow the old pipe. The Town must follow the road the entire way. They consider the road to be "disturbed ground" and would not be subject to all of the current regulations. Any route across "non-disturbed ground" would be subject to all new regulations including archeological investigations.

The Town is in the unique position to have an ample amount of water resources available to it. The State Legislature granted the use of White Pond to Maynard back in the 19th century.

With the long term outlook for water in the United States moving toward crisis levels, even in the Northeast (although somewhat further out), there could and probably will be pressure to reclaim White Pond for another Town. If Maynard does not show any interest in developing it, we could lose this resource to another entity.

The committee feels that this should be a serious concern for the Town and that we need to take some action to prevent losing this valuable resource. There are several things that the Town can do to show its intent to maintain this resource for the Town.

Start the process of permits and easements across 3rd party land as described in the previous section (as recommended by the Committee)

Start the Phased study recommended by W&C as modified by the Committee's recommendations. At the end of the study, there should be enough information to determine how the Town would like to proceed. (Also recommended by the Committee)

- Continue as is and hope for the best,
- Develop White Pond as a surface water resource solely for the Town of Maynard,
- Use the surplus capacity to sell water to surrounding Towns with legislative approval,
- Approach the legislature about developing the resource on a regional basis.

Water quality (health) was very good; Water quality (cosmetic) is problematic. The quality of the water obtained from the Town's various well fields has been of good quality with green sand filtration and disinfection. The Town provides a summary annually to the water rate payers.

The Committee has concluded, after study and observation, of our present water department, that the department needs assistance to apply best practices to their daily operations, including on-going appropriate training for all staff. Further, consideration should be given in order to ensure accountability and improve efficiency, to contracting a management company to operate the water department in much the same way that the sewage treatment is being handled.

While Green Meadow was included in the WC report, the Committee felt that there was not enough capacity at that site to address the principle issue of capacity. This site has been problematic in the past due to yield and coloration requiring high maintenance. There are very high concentrations of iron and manganese.

In order to be thorough we looked at all potential sources including joining the MWRA. However, the amount of money to develop a pipeline, join the group and the current rates were so enormous that this option was discarded.

RECOMMENDATIONS:

Expansion of Water Sources

It is the recommendation of this committee that the Town undertake a multi-phase approach to increase the Town's water supply redundancy and aesthetic quality of the Town's drinking water. While the evaluation and engineering costs are slightly higher under the proposed approach, these preliminary costs will reduce the potential of spending additional money for construction of multiple treatment options and/or changes in treatment technologies. It is anticipated that the redundancy of the water supply would permit Town staff more flexibility in operation of the various water supply wells and treatment facilities. This efficiency may result in an operational and maintenance savings over time. While there is no anticipated condition that would result in a failure of one or more of the water supply well fields or treatment facilities, the committee believes that the costs associated with an unanticipated failure of any component (such as buying water from a neighboring community or costs occurring as a result of a severe water ban) warrant making these improvements within the next two years.

The use of a phased approach to providing the Town of Maynard with a second water source capable of providing redundant, sufficient source of drinking water optimizes the time to completion and the time value of money. This approach is the first step to intelligently selecting appropriate upgrades to meet the Town's goal of redundancy of water supply. The three components include the following:

The committee recommends the following steps be undertaken to address the Town's lack of redundancy regarding its water supply:

- Conduct preliminary "jar" tests with water from both Old Marlborough Wells and White Pond to determine the constituents in each. Based on the constituent components of the water samples, appropriate treatment technologies and methodologies can be selected and implemented for pilot testing at each site.
- Conduct pilot tests at each site.
    - Pilot Water Treatment Study for Old Marlborough Road Wells – The pilot study at Old Marlborough Road wells will test various water treatment technologies to remove the tannins that resulted in safe, yet discolored drinking water observed under heavy pumping. These scaled down mobile treatment systems will each receive water pumped from the Old Marlborough Road wells with tannin discoloration. The water will be treated by the various treatment systems under a variety of conditions, time periods, tannin concentrations, and flow rates to determine the effectiveness of each treatment system. Through the pilot test, samples of untreated and treated water will be tested frequently.
    - Pilot Water Treatment Study for White Pond – The pilot study at White Pond will include employing various potential water treatment technologies to treat water from White Pond. Each of the water treatment technologies is a scaled down version of the treatment system that could be employed at a treatment facility. These tests of each of the treatment technologies allow the operators to determine the effectiveness of the various technologies, chemical use, maintenance requirements, cost to operate the system.

Samples of untreated and treated water will be analyzed at regular intervals throughout the pilot study to observe conditions.

- Based on the results of pilot testing, a report presenting a summary of the results will be provided along with project cost estimates for each option including capital and operational estimates.
- Begin process by allocating monies at 2012 Fall Town Meeting. ($80,000 from an unused prior study authorization may be available.)
- Begin the process of permitting with the federal and state government for easements for a supply pipe from White Pond to the Town border.
- We are recommending that we proceed simultaneously with the testing at OMR and begin the process to obtain the easements to WP. Though the Town has had the rights to water at WP since 1888 by an Act of the Legislature, Maynard doesn't have a viable delivery system as the two older water delivery systems from the pond to Maynard (1889 and 1941) are inadequate. Also, the Town does not have documented easements for these two old pipelines. As getting proper easements could be a lengthy process, getting started soon would be advantageous regardless of whether White Pond is used or not.

Authorizing our approach to determine whether any of the new treatment technologies might improve the OMR well will determine finally whether any more resources should be expended at this site.

Permitting

Concurrent with the pilot testing, it is recommended that the Town obtain legal land easements from Town of Stow, the Department of Conservation and Recreation (DCR) and the Assabet River National Wildlife Refuge for the existing and proposed alignment for the water supply pipes from White Pond to the Town's distribution system. While throughout the years, the Town has maintained an access agreement, obtaining land easements for the pipe alignment will guarantee the Town the right to access this land and install and maintain the temporary or permanent water supply and/or effluent pipe between the DPW garage on Winter Street and White Pond. As some of the land requested for easement in Maynard is considered conservation land, the Town will require a ruling by the legislature to release the land for use by the Town.

In addition to obtaining land easements for the pipe alignment, the Town should begin the permitting process required to allow White Pond to be used as a water supply, for locating of the treatment facility, and other permits required by local, state and federal government.

We included permitting in our recommendations as we believe it prudent to begin the process to obtain all the easements, rights and legislative approvals necessary to ensure access to WP for future use of this invaluable resource for future generations. This will ensure our rights to this site and would allow for sale of water to other towns if the town decides to pursue this option.

Management

In addition to the recommendations above regarding redundancy of water supply, the committee found that the Town is more re-active than pro-active in managing its water system & resources. It is strongly recommended that Maynard create or update a Water System Master Plan that looks

out over many years and sets forth milestones for continuous improvement. We also recommend that on the short term that the Town improve other aspects of the operation and record keeping for our water supply infrastructure:

Upgrade management techniques for the water system using performance metrics. This can be done through a restructure of the current department or using an outside firm similar to what is being done with the Sewer system.

The Town should establish a training curriculum for all water department personnel.

Improve record keeping – Measures should be installed to better monitor water production and usage within the Town of Maynard. Some of these improvements include the following:

Additional SCADA (supervisory control and data acquisition) capabilities to calculate and document water production and usage as well as observing water pressure within the system.

Improve Maintenance and conditions of the water treatment plants, both cleanliness and safety. OSHA standards, while not a requirement for the Town, should be adopted. We recommend that the Board of Selectmen, acting as DPW Commissioners, or the Facilities Director conduct regular inspections of our water treatment facilities.

Legal

The Town should review the agreement with the Mass Fire Academy. There was a Town Meeting vote accepting a 50 year agreement to provide water to Fire Academy from WP that established compensation by the state and set maximum usage rates and fees. We do not believe this is being done.

Other

The Town should continue to adopt water conservation measures to achieve the state goal of 65 gallons per day per resident.

APPENDIX:

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APPENDIX I – 1st Mtg Goals & Objectives

GOAL = IS WATER EXPANSION WORTHWHILE?

1. WHERE DO WE STAND?
2. FUTURE NEEDS – REALISTIC (WATER VOLUME)
3. WELL HISTORY + ISSUES.
4. INDUSTRIAL LOAD FUTURE POTENTIAL
5. MAX WITHDRAWAL FROM WHITE'S POND
6. CURRENT COST PER FT^3 (CAPITAL + OPERATIONAL)
7. IMPACT ON EXISTING INFRASTRUCTURE
8. WHAT NEW INFRASTRUCTURE.
9. ZONE STATUS FOR WELL + POND.
10. WHAT GRANTS ARE AVAIL FOR BOTH WELLS + POND.
11. LEGAL + CONTROL ISSUES OF REGIONAL
12. STATUTES ON INTERMUNI AGREE
13. WHY POND VS OTHER ALTERNATIVES
14. WHAT OUTSIDE DEMAND RISKS LOSS OF PROPERTY

15. WHAT SURPLUS % IS COMFORTABLE RISK?
    WHAT IS COMFORTABLE TO SELL IN %?
16. EMERGENCY SALES ONLY?
17. QUALITY, RELIABILITY, SUPPLY
18. OBLIGATION TO SECURE PERIMETER W/FENCE
19. INVITE WALTER / TOM S FOR INFO
20. IMPACT OF TECHNOLOGY
21. PENDING REGULATION.
22. INVITE GERRY + WATER DEPT FOREMAN. (14th)
23. TRAINING AND SKILL SET FOR ONGOING OPERATION.
24. STAFFING

APPENDIX II - History

Taken from the Maynard Historical Society newsletter dated January 2011
History of the Maynard Water Department
By Eva V. Fidanza, 1966

Reprinted From the Maynard Historical Society Archives

As the population increased in Maynard, the need of a water system became a necessity, and a committee was appointed reporting that an adequate supply of pure water could be obtained by securing White Pond, about three miles to the south. Application was made to the legislature and although objection was made by Sudbury parties, a bill was passed May 25 1888; giving Maynard the rights to the pond and leave to issue thirty-year bonds. Thomas Hillis, Thomas Naylor, and Frank W. Nyman were chosen Water Commissioners who made a contract with Howland and Ellis to put in a system with reservoir for $70,000. Trouble broke out in the fall of 1888, and the work stopped. A suit against the town was brought by Howland. Friction developed among the commissioners, one of whom brought suit against the town. Backed by the authority of the town, Thomas Hillis and Thomas Naylor continued the work; Naylor taking full charge of the construction, its completion being accomplished in 1889 and bonds for $125,000 issued. The town won the lawsuits which dragged on for several years at a cost of $30,000.

The reservoir on Pompositticut Hill is 199 feet above Ben Smith's Darn. It is 22 feet deep, 113 feet in diameter, and holds 1,500,000 gallons of water; the pressure being 90 points on Main St. Extensions have been made each year and the construction costs stood at that time at $213,500. The water flows by gravity to the receiving wells and then is pumped to the reservoir or directly into the mains.

In 1929,) land was purchased from the Independent Ice Company and from George Snyder, which gave the town control of most of the land borderin[g] White Pond. The property of the Ice Company of about 125 acres was bought for $8,500; the land from Andrew and George Snyder about two acres at a cost of $500. The property was posted to the effect that it was the water supply of the Town of Maynard and trespassing was forbidden. At a special meeting, an act was proposed which would make water bills a lien on property, but it was rejected at the meeting.

In 1930 the house on the Snyder property was taken and the house which was on the property of the Ice Company, together with about ten acres of land, was sold. In 1932, voters accepted the act which made the water rates a lien on property. At the March meeting, the town appropriated $17,000 for a new pumping plant for the pumping station. After considering different types and visiting a number of plants, it appeared that a diesel engine and centrifugal pump were the proper units to install.

In 1935, three lots of the White Pond property, which did not border on the pond, where not necessary to protect the water supply, and were transferred to the State Department of Conservation to be made part of a state forest. There are about 51 acres in these three lots and the state paid the town $256.25. The fiftieth report of this department was issued in 1938, the first being in March 1890 for the year 1889. There were three Works Projects Administration (W.P.A.) projects being carried on by this department.

In 1941, before applying for a W.P.A. project for the new force main to White Pond, it was necessary to send a copy of the original "Act to Supply the Town with Water" to the W.P.A. office. Unable to find the full text of the act, Mr. Avery Steele, Representative, was requested to secure copies for the town. These copies were secured and Mr. Steele presented the town with an attested copy of the original act. Mr. Steele had this copy framed and it is displayed in the office of the Water Department.

On May 1, 1941, Orrin R. Bosworth, engineer at the old pumping station, was retired on pension. Due to the war, he was retained to operate the station in case of a breakdown. The United States Government took over a large area of land in Maynard and Stow, which takes in the greater part of both pipelines from the pumping station in Maynard to White Pond. This was taken after the new line was laid. The gravity line was discontinued and a force main put in from Winter Street, through what is now the Ammunition Depot, to White Pond. A pumping station was installed at White Pond.

May 26, 1944, Mr. Christopher Wilson died. He had been a member of the Water Board since his election in March 1929. He was replaced by Mr. George Weaving who was appointed to serve the remainder of Mr. Wilson's term.

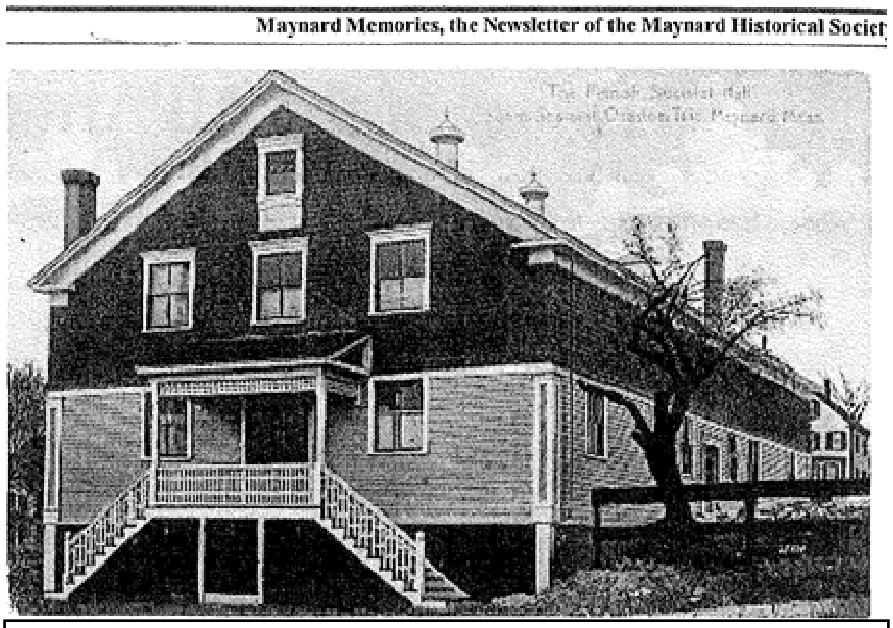
In 1946, Mr. William Naylor had to retire according to rules of the pension system. At his suggestion, one was chosen to act as Superintendent. At a meeting held in April, Mr. Peter T. Peterson was appointed. In December, Mr. Peterson was appointed to the position of Superintendent and Water Registrar by the Water Commissioners and a Superintendent of Sewer by the Sewer Commissioners.

On October 30, 1951, the observation tower at the reservoir was completely' destroyed by fire. In 1952, the voters of the town voted to place the Water Department under Public Works, thereby eliminating the Water Commissioners: Gavin Taylor who served on the Board since 1910, Edward Boulden since 1945, and James J. Bakun since 1946.

In 1953, Mr. Albert Raitanen was selected by the Board of Public Works to be Superintendent. The Board was comprised of Gerald Nee, Arthur F. Croft, and James J. Bakun.

On August 19, 1955, the devastating hurricane "Diane" struck the northeast, and poured a deluge of torrential rains upon the countryside. This storm moved so fast that no accurate forecast or probable effects could be made. Most of the Public Works force were called out and kept on a "stand-by status" in case they were needed. The Department was mostly concerned about the darn in Hudson because if this dam had let go, the Hudson Light and Power Station would be out and power for the White Pond pumping station is supplied by Hudson. The storm damaged the retaining wall on Walnut Street due to fast-flowing water. Walls on upstream and downstream sides of the Mill Street Bridge were damaged. A washout under abutments of the Walnut Street Bridge occurred. The Sudbury Street Bridge had settled and cracked so badly it was declared unsafe for more than four tons and posted to that effect. Seven hundred and fifty meters were out of operation.

Since Public Works was organized a short four years ago. Three different men have served as Superintendent. During 1956, Mr. Peter T. Peterson resigned as Superintendent to enter a private business. Mr. Gerald Nee, one of the original organizers of Public Works and a former chairman of the Board, was appointed in July as Superintendent.



Finnish Socialist Hall, Parker Street, Maynard
(Photo from the Maynard Historical Society Archives at: http://collection.maynardhistory.org/)

A search for a new water supply was brought out in 1957 which was considered a must. D. L. Maher Company of Woburn drove test wells off Old Marlboro Road, and with the recommendation of the State Department of Health, an eight-day pumping test was held at the most likely spot. This test proved that the water in that area was not adequate to supply the town with its minimum requirements.

In March of 1958, the Superintendent of the Department, Gerald Nee, resigned. Mr. Lauri Wick, the Highway foreman was appointed acting Superintendent. Most highly qualified engineering personnel interviewed would not accept the job because of the salary. It was then decided to seek an administrator trained in municipal public works, finance, and law. This resulted in the appointment of Donald A. Lent of Maynard, a man with over thirty years experience and education in this field. The annual report of the Public Works for 1959 stated it should seek a registered professional engineer who is technically trained in public works. They feel he could render valuable assistance to all departments, especially the Planning Board. The present Board of Public Works is John J. Tobin, Raymond J. Sheridan, and Michael Barilone.

The search continues for an underground water supply and is now in the hands of the General Court and the Town of Stow. This came about in 1961 when an act of legislature passed, allowing the Town of Maynard, through its Public Works and the Town of Stow, through its Board- of Selectmen, to enter into agreement to jointly search for ground water in the Town of Stow. The agreement was signed and ground rules set by both Boards.

In 1962, the water search with Stow produced nothing as far as Maynard was concerned and it was decided to discontinue it. Maynard has had meetings with the Town of Sudbury Water District Commissioners to see what could be worked out with them for obtaining water. The results were not enlightening.

At the end of 1964, a second survey was made of land off Old Marlboro Road. A test well was drilled by Robert Quirk which, after the water was passed by the State Department of Health, the

town began pumping from. During the test period of six months, between July 20 and December 13, 63,672,600 gallons of water were pumped, for which the town paid Quirk $100 per million gallons.

In December 1965, the Board of Public Works, on advice of the engineer, requested and received two months extension from the owner of the land, which provided for the pumping of water until March 20.

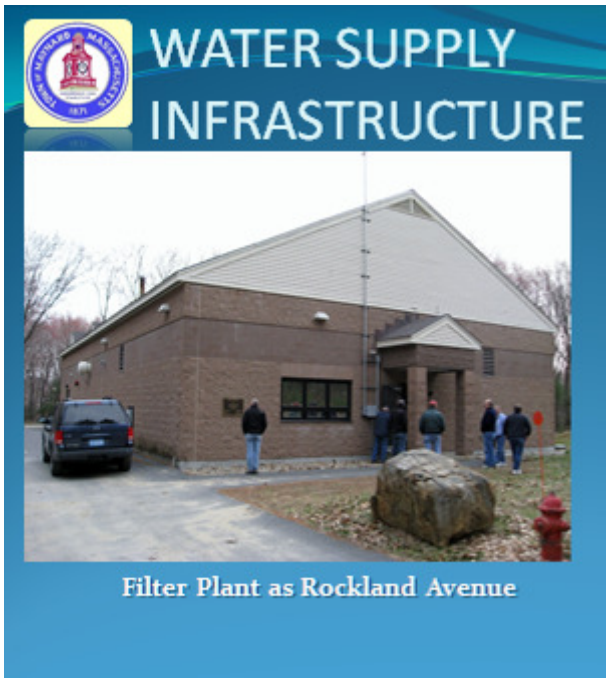
At the same time, R. Quirk proposed that they lease it for a year at $20,000. This proposal is to come up at the Town Meeting on March 7, 1966.

Continuing history compliments of this committee:
DPW Superintendent Jerry Flood requested a study of Maynard's water resources which was voted at Town Meeting in fall 2010 .Selectmen then formed the WPCSC (see attached documents).Superintendent Flood's reason for this study was grounded in the fact that Maynard relies exclusively on its wells to supply all of its water needs. He wants to ensure a safe, adequate supply for today's needs and for the future which allows also for unforeseen circumstances and regular maintenance of the wells. Therefore, a contract was awarded to Woodard and Curran and the WPCSC was appointed and both entities have been working independently and jointly since February 2011. Attached to this WPCSC report please find the entire engineering report and recommendations as well as other documentation researched for this project.

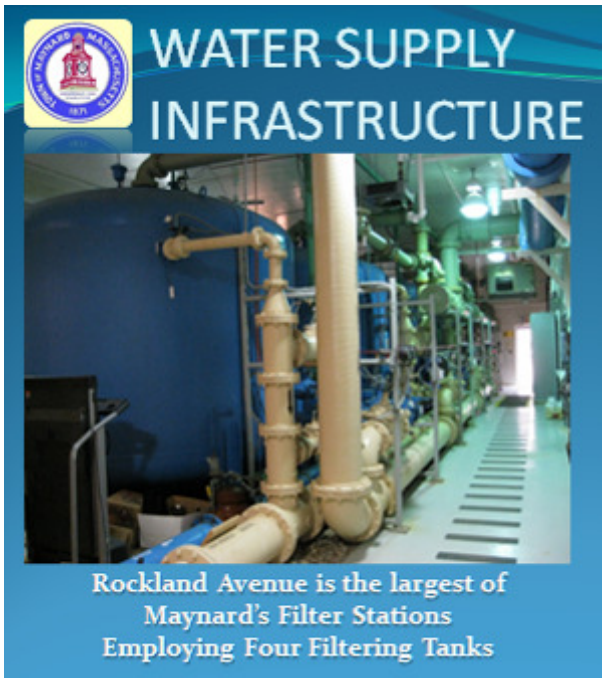
- In 1888 an act of the legislature secured the rights to White Pond for Maynard and water pipes were laid across what is now Fish and Wildlife land and a pumping station built to provide Maynard with water.
- In 1942 new pipes were laid along White Pond road for a force main system to replace the original, older pipes. Maynard relied on White Pond until the mid 1990's for its water.
- In 1961 there was another act of the legislature which allowed Maynard and Stow to jointly search for water but this search was discontinued in 1962 after no adequate supply was found.
- In 1964 the first well was developed at Old Marlboro Rd.(OMR).
- In 1999 because of health concerns about water supplied from White Pond and more stringent state requirements Maynard voted to develop wells to provide its water and several wells have come on line for that purpose.
- Wells 1,1a and 3 @ OMR 1964,
- Well 4 @ Green Meadow 2002,
- Wells 2,3 and 5 @ Rockland Ave. 2002,
- The Rockland Ave. Wells are bedrock wells, one of only three such wells in Massachusetts.

The other wells at OMR and Green Meadow are the more shallow gravel packed wells. The water from these wells has presented color problems over the years and also must be treated regularly for iron and manganese limiting the amount of water that can be drawn before these issues become a problem. Because of this we rely on the wells at Rockland Ave. for most of our water. Because of this we are looking into the possibility of locating other sources of water from wells or ground water sources in case we cannot draw water from the existing wells.

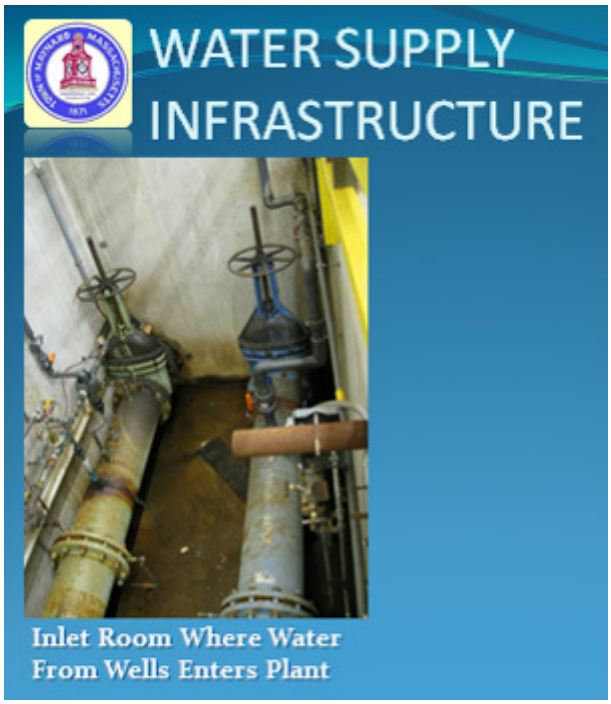
APPENDIX III – Photo Tour



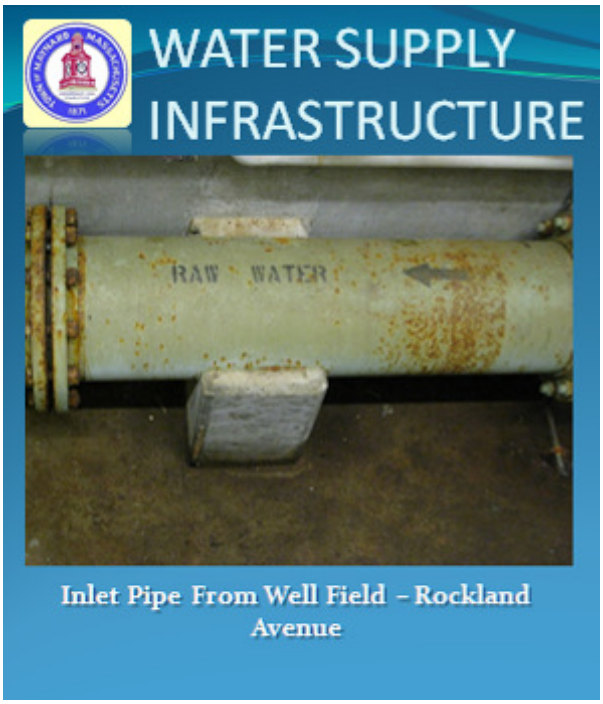
Filter Plant as Rockland Avenue



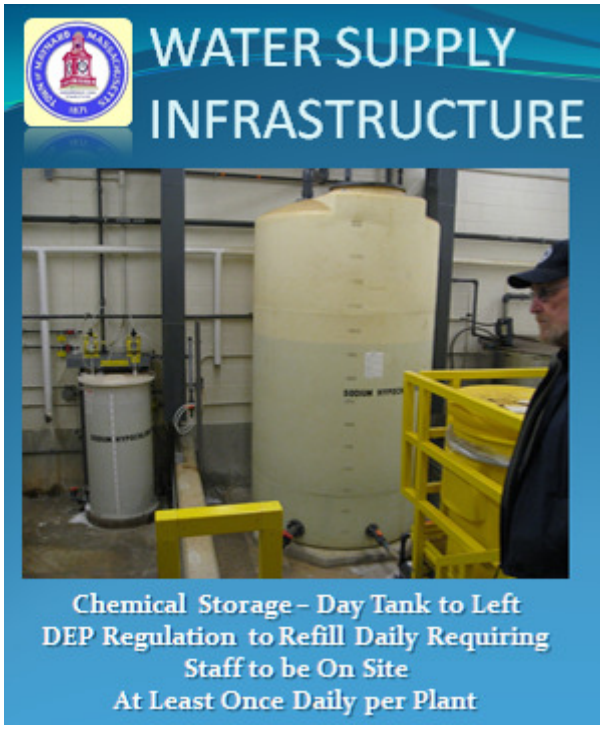
Rockland Avenue is the largest of Maynard's Filter Stations Employing Four Filtering Tanks



Inlet Room Where Water From Wells Enters Plant

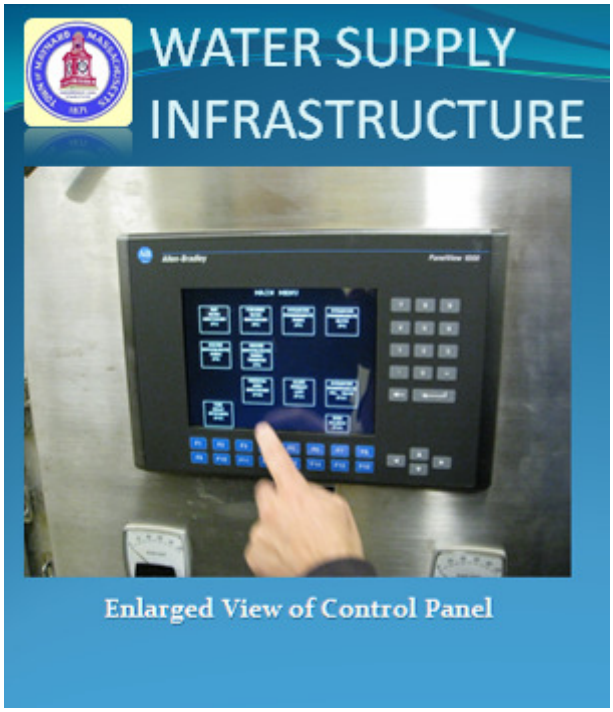


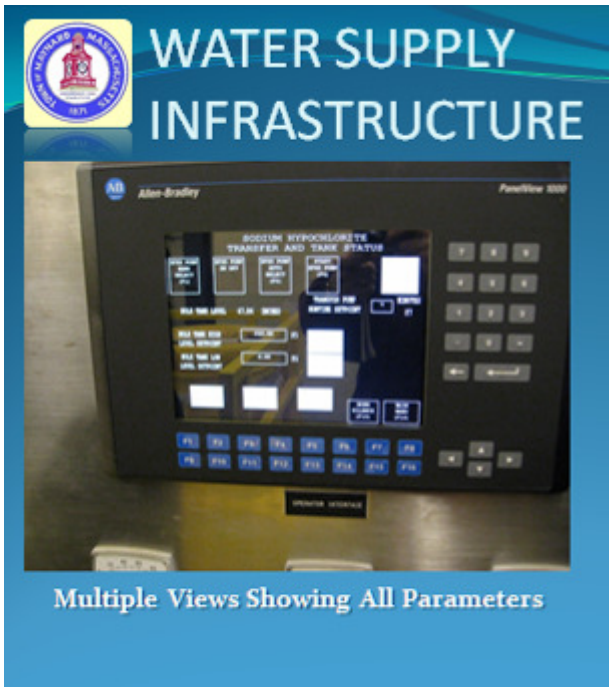
Inlet Pipe From Well Field – Rockland Avenue

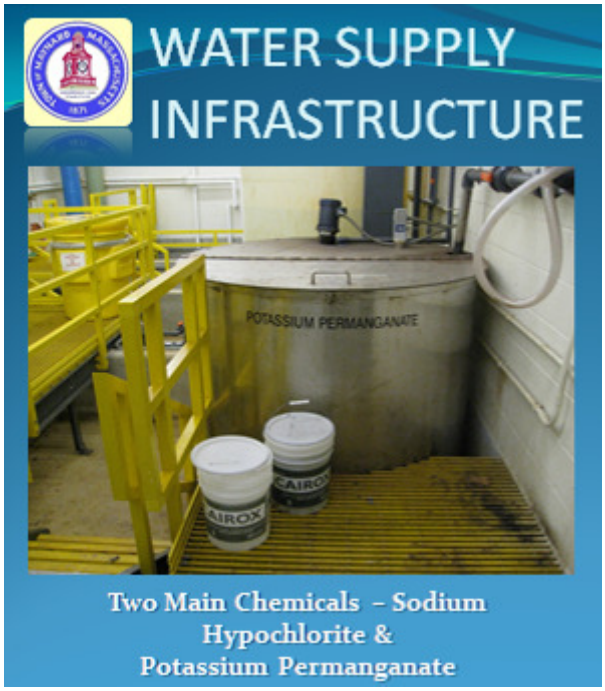

WATER SUPPLY
INFRASTRUCTURE
Chemical Storage – Day Tank to Left
DEP Regulation to Refill Daily Requiring
Staff to be On Site
At Least Once Daily per Plant

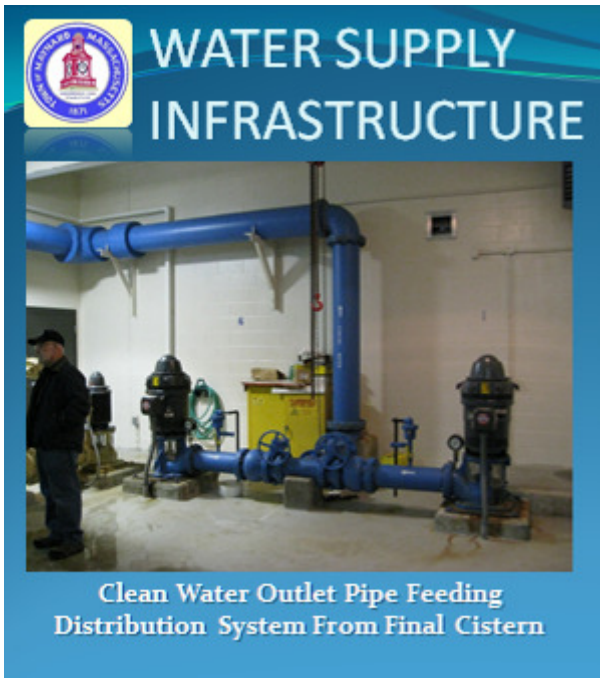
WATER SUPPLY
INFRASTRUCTURE
Day Tank for
Potassium Permanganate

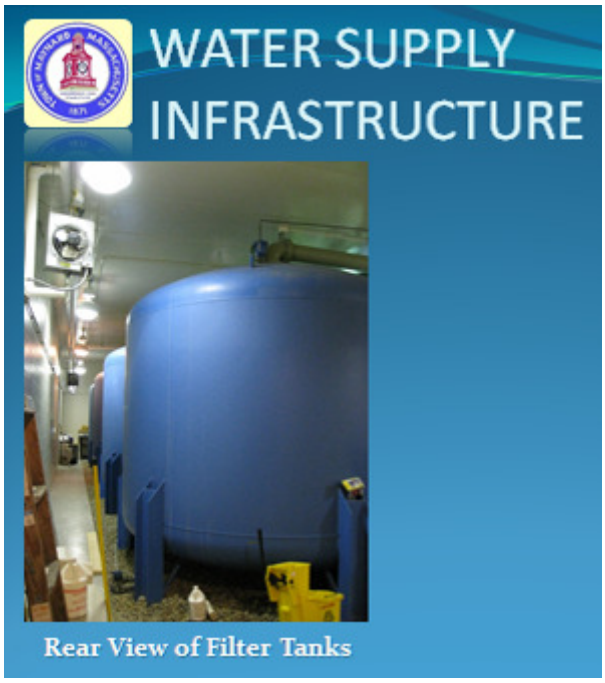
WATER SUPPLY
INFRASTRUCTURE
Computerized Control
Panel for Filters

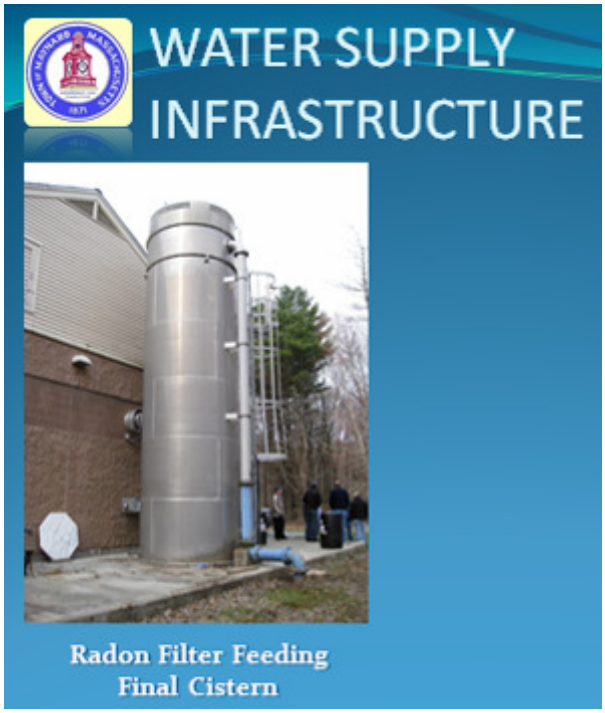

WATER SUPPLY
INFRASTRUCTURE
Enlarged View of Control Panel

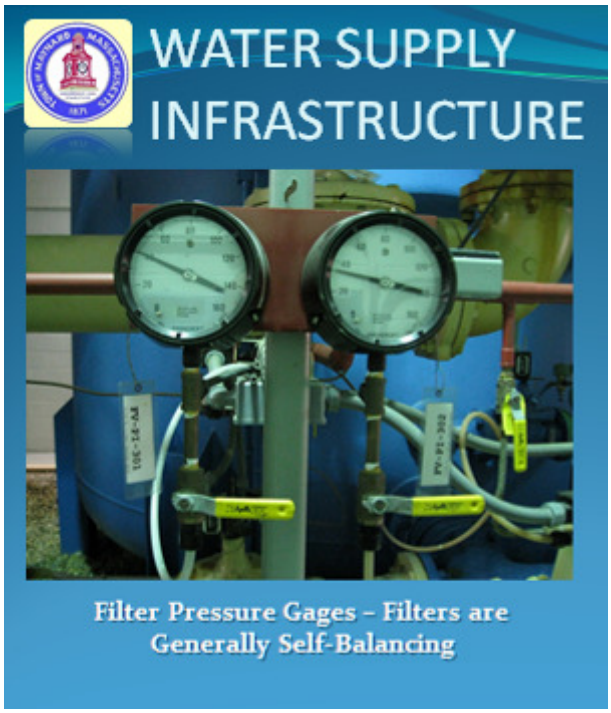

WATER SUPPLY
INFRASTRUCTURE
Allen-Bradley
Multiple Views Showing All Parameters

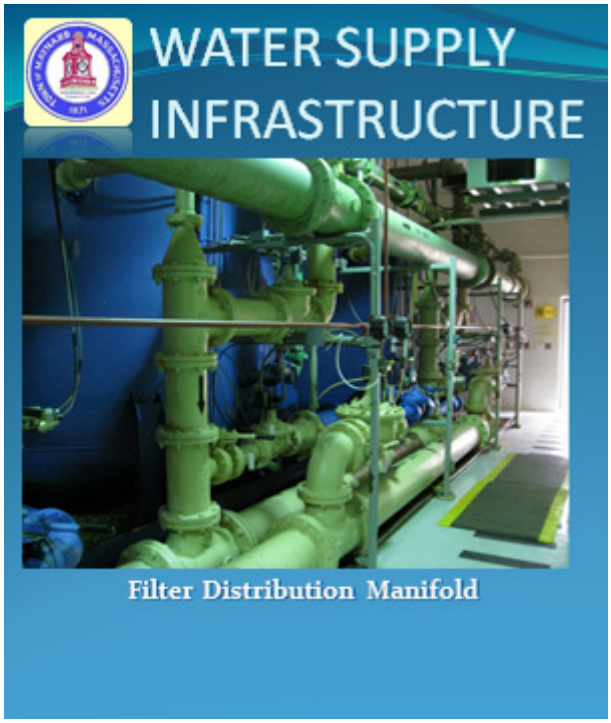

WATER SUPPLY
INFRASTRUCTURE
POTASSIUM PERMANGANATE
AIROX
Two Main Chemicals – Sodium
Hypochlorite &
Potassium Permanganate


WATER SUPPLY
INFRASTRUCTURE
Clean Water Outlet Pipe Feeding
Distribution System From Final Cistern

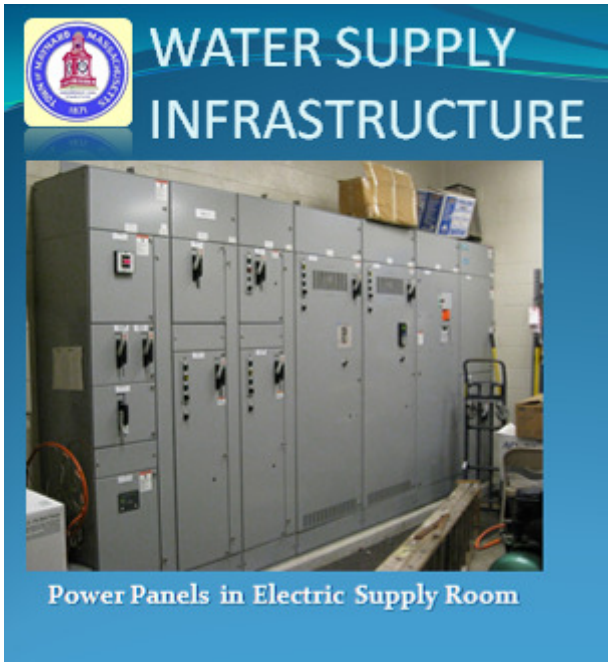

WATER SUPPLY
INFRASTRUCTURE
Rear View of Filter Tanks

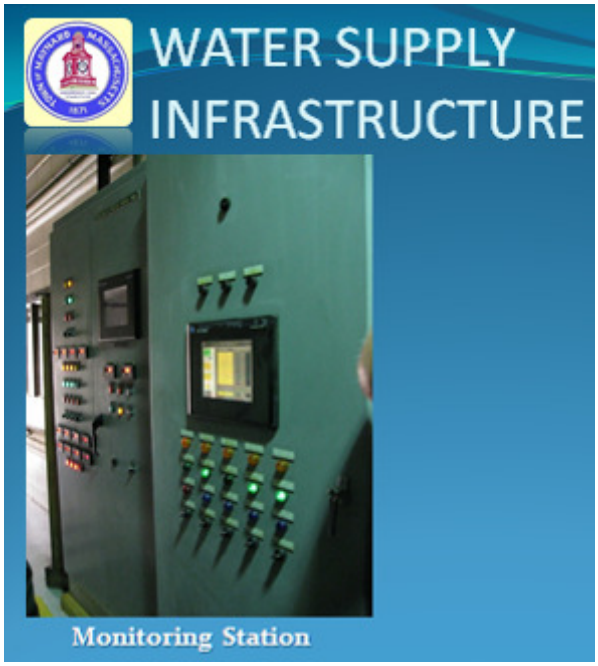

WATER SUPPLY
INFRASTRUCTURE
Radon Filter Feeding
Final Cistern

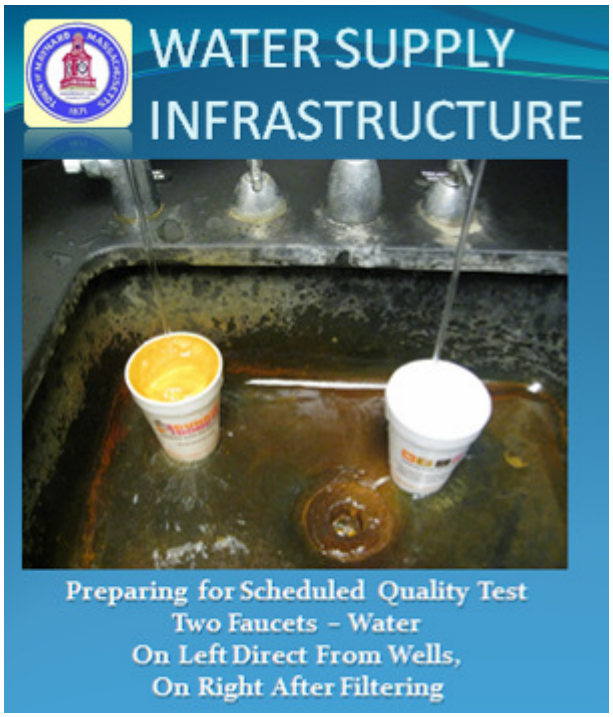

WATER SUPPLY
INFRASTRUCTURE
Filter Pressure Gages – Filters are
Generally Self-Balancing

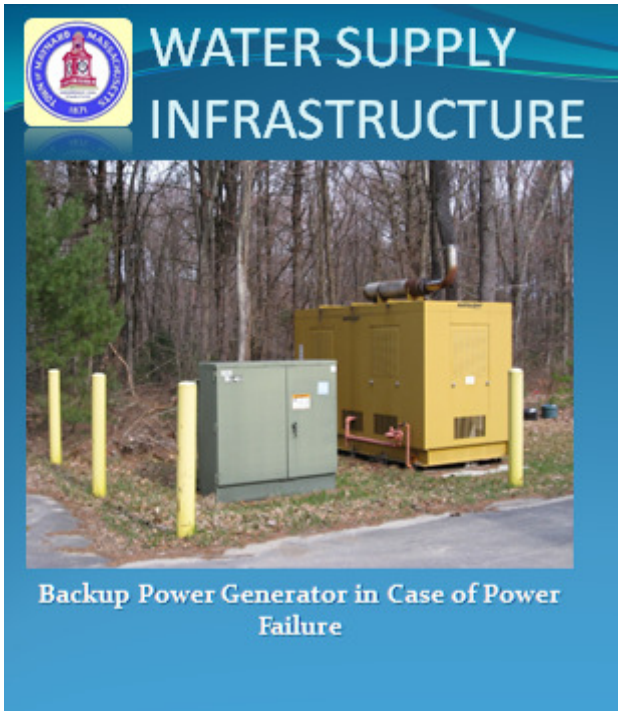

WATER SUPPLY
INFRASTRUCTURE
Filter Distribution Manifold

WATER SUPPLY
INFRASTRUCTURE
HydroRanger
Gage Monitoring Back-
flush Effluent to Sewer
System


WATER SUPPLY
INFRASTRUCTURE
Power Panels in Electric Supply Room

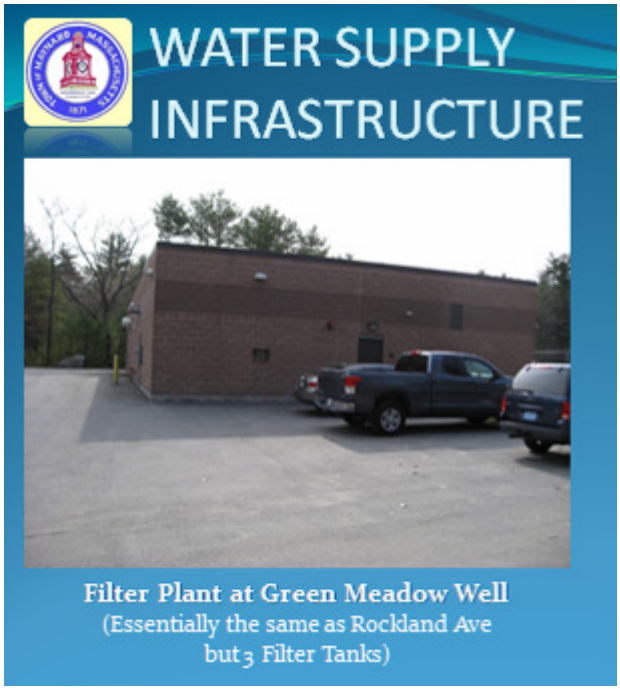

WATER SUPPLY
INFRASTRUCTURE
Monitoring Station

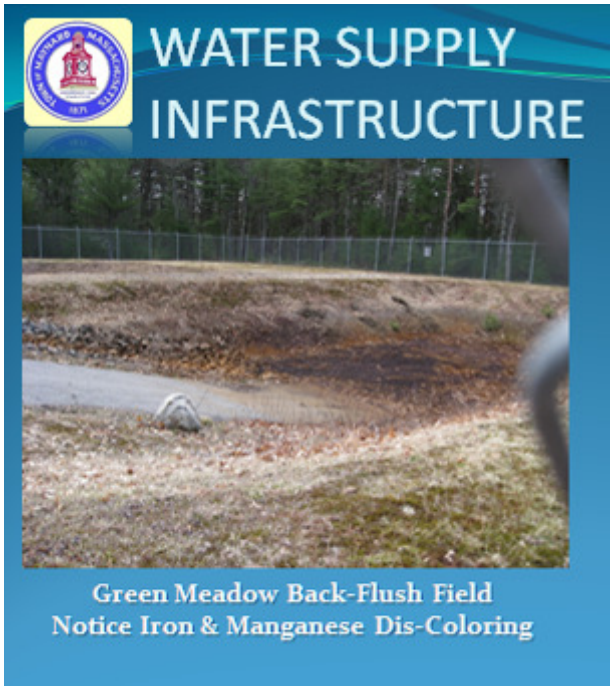

WATER SUPPLY
INFRASTRUCTURE
Preparing for Scheduled Quality Test
Two Faucets – Water
On Left Direct From Wells,
On Right After Filtering

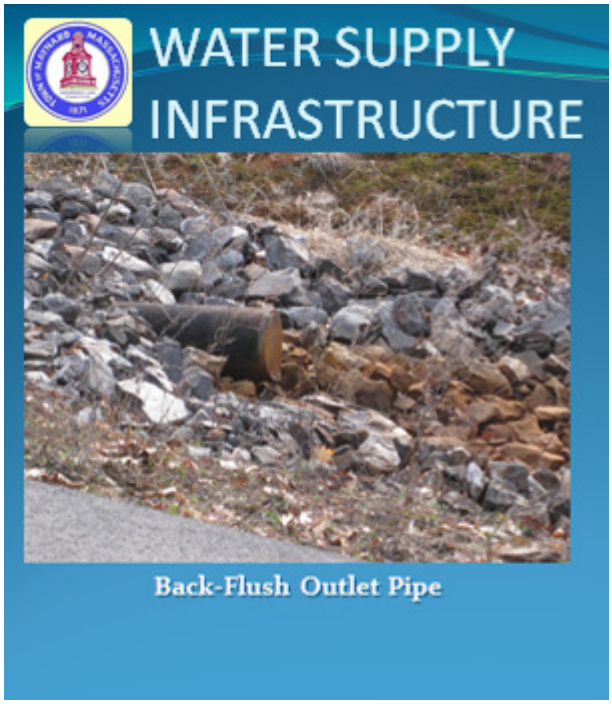

WATER SUPPLY
INFRASTRUCTURE
Backup Power Generator in Case of Power
Failure

WATER SUPPLY
INFRASTRUCTURE
Concrete Storage Tank on Summer Hill
Provides Steady Water Pressure
Throughout Town
Via Gravity

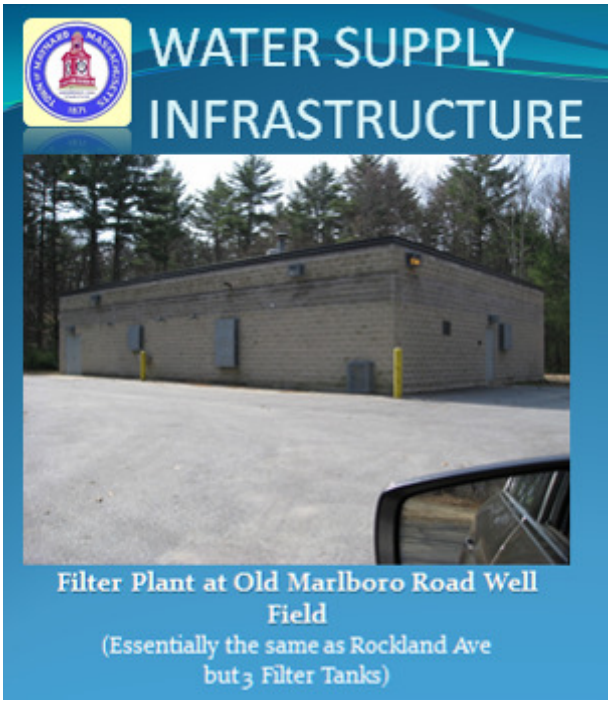
WATER SUPPLY
INFRASTRUCTURE
Steel Storage Tank on Summer Hill
At Same Elevation & Tied to Concrete
Tank Providing Three Day Emergency
Supply


WATER SUPPLY
INFRASTRUCTURE
Filter Plant at Green Meadow Well
(Essentially the same as Rockland Ave
but 3 Filter Tanks)

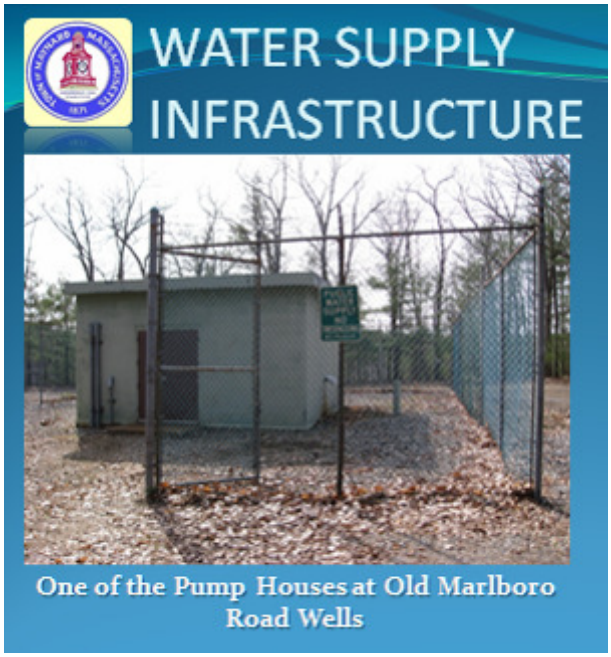

WATER SUPPLY
INFRASTRUCTURE
Green Meadow Back-Flush Field
Notice Iron & Manganese Dis-Coloring



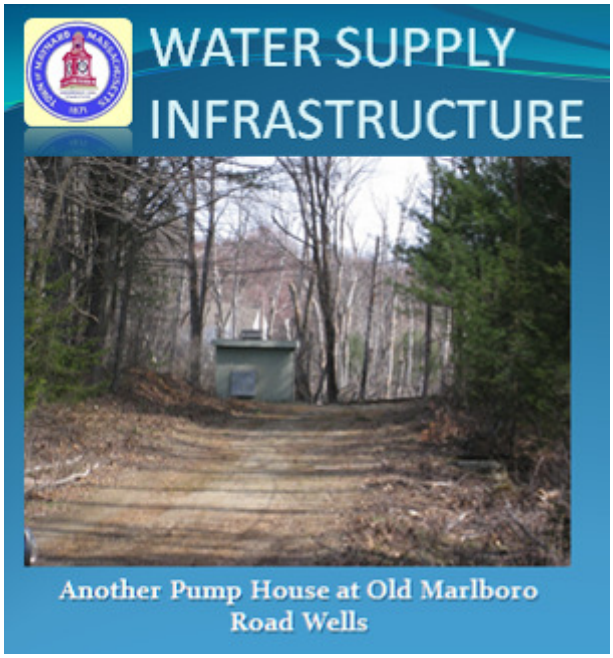
Back-Flush Outlet Pipe



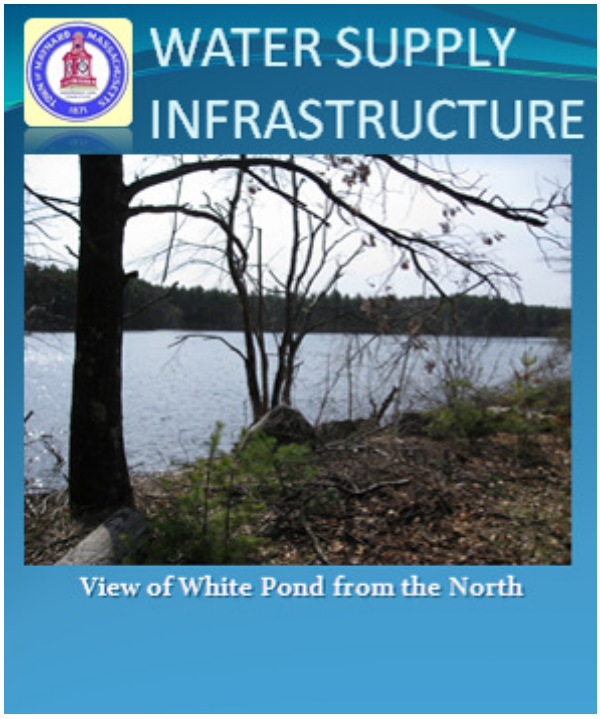
Filter Plant at Old Marlboro Road Well Field
(Essentially the same as Rockland Ave but 3 Filter Tanks)

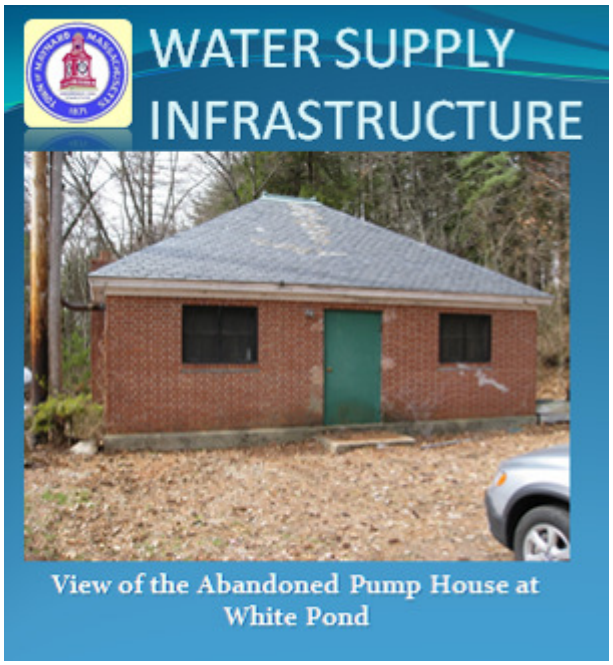


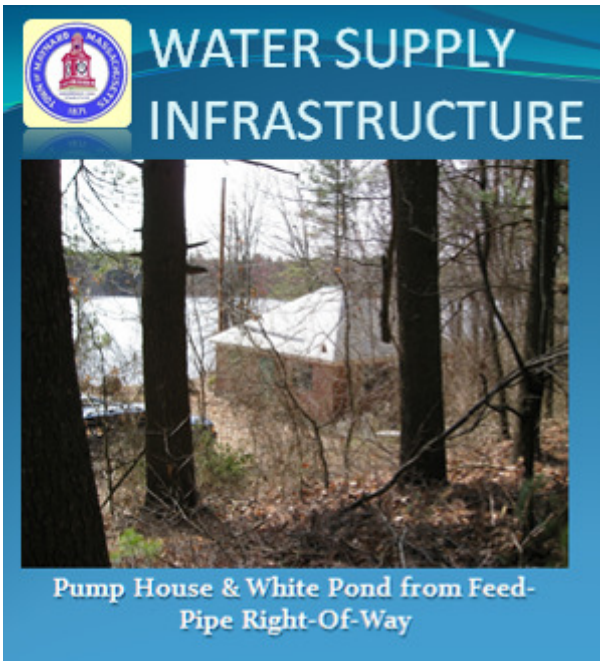
One of the Pump Houses at Old Marlboro Road Wells



Another Pump House at Old Marlboro Road Wells







For Complete Power Point presentation, please go to:

http://www.townofmaynard-ma.gov/documents/wpsc-water-supply-photo-tour.pdf

APPENDIX IV – Bid Request

OFFICE OF THE

DEPARTMENT OF PUBLIC WORKS

MUNICIPAL BUILDING, 195 MAIN STREET

MAYNARD, MASSACHUSETTS 01754

TELEPHONE: 978-897-1017

FAX: 978-897-7290

Assessment of Water Resources

The Town of Maynard is seeking qualified firms to submit a RFP with a separate cost proposal on the feasibility, including cost estimates, on adding Whites Pond in Hudson into our drinking water system.

Project Overview

The Town of Maynard currently has adequate ground water sources to meets its present demand. The Town has three (3) well fields located in separate quadrants of the community. The Town has the water rights to Whites Pond in Hudson and preliminary studies conducted in the mid 1990 indicate we would have a capacity of 650,000 to 750,000 gallons per day from Whites Pond.

Some of the main items which need to be addressed include:

1. Replacement of existing pipe line through Federal Land controlled by US Fish and Game. Also evaluate other options that are feasible. Include cost estimates for each.
2. Cost and feasibility of building a treatment plant for surface water either at site in Hudson or at a site in Maynard. Include cost estimates for plants at both sites and an analysis of operation costs for each alternative.
3. Evaluate water treatment options including a cost analysis on each option
4. Feasibility of developing wells on site to eliminate additional treatment for surface water. Cost comparison for both including all cost associated with well drilling.
5. Relocation of existing pump house or location of pump house and treatment plant at White Pond if that option is accepted. Existing pump house was under 3 feet of water during spring rains this year.
6. Availability of Federal or State funding to complete project.
7. Analysis the possibility of selling excess capacity to Hudson or Sudbury. Include any infrastructure cost, estimated income, and positive and negative impacts of Maynard's ability to supply its requirements in the event of a catastrophic failure of its existing well fields.
8. Evaluate the possibility of a cost sharing proposal in having Hudson or Sudbury share in the cost of plant construction. How would this impact Maynard's percentage of the pumping capacity. What other factors should Maynard consider before entering into an agreement with another community.
9. Provide estimated time line for design, construction, costs and permitting by DEP and other regulatory agencies.
10. Evaluate and cost comparison of investing in existing resources.
11. Stow has also expressed interest in obtaining a limited quantity of water — they will cover cost of infrastructure in Stow. Analysis additional operational, and maintenance cost associated with additional infrastructure in Stow for an estimated 11,000 gallon per day. What is Maynard's obligation to supply water to properties located along a water line in Stow.

1. Proposals will be accepted at the Town of Maynard, Department of Public Works, 195 Main Street, Maynard, MA 01754, until **August** 24, **2010(i)t,** 11:00AM. Four (4) copies of the Proposal are required. The Proposal envelope must be sealed and clearly marked Assessment of Water Resources. Cost proposals must be in a separate envelope clearly marked Cost Proposal for Assessment of Water Resources.
2. Award date. Award will be made within twenty (20) days after Proposal opening unless otherwise stated in the specifications or the time for award is extended by mutual consent of all parties. All Proposals submitted shall be valid for a minimum period of forty-five (45) calendar days following the date established for acceptance.
3. If any changes are made to this RFP, an addendum will be issued, Addenda will be mailed or faxed to all bidders on record as having requested the RFP.
4. Questions concerning this RFP, must be submitted in writing to: Jerry Flood, Superintendent of Public Works, 195 Main Street, Maynard, MA 01754 on or before August 12,2010 Questions may be delivered, mailed, or faxed. Written responses will be mailed, or faxed to all Proposers on record as having requested the RFP
5. The Town of Maynard reserves the right to reject any and all Proposals and to waive any informality in Proposals received whenever such rejection or waiver is in the Town's best interest.
6. The Town of Maynard will not be responsible for any expenses incurred in preparing and submitting Proposals. All Proposals shall become the property of the Town of Maynard.
7. Responders must be willing to enter into the Town of Maynard's standard form of contract that will include the scope of services description of this RFP.
8. The Tax Compliance Certification and the Certificate of Non-Collusion must be included with the bid response. The Proposal must be signed by the authorized individual(s). The foul's are attached.
9. The Town of Maynard is an Affirmative Action/Equal Opportunity Employer. The Town encourages bids from qualified MBE/DBE/WBE firms.

Submission Requirements

In order to comply with the minimum evaluation criteria for this project, Proposers are required to submit bids with the following information:

1. Name, address, email address, and telephone number of lead consultant or lead firm(s) and principal contact person;
2. Signature on the submission of an individual duly authorized to sign the submittal on behalf of the firm;
3. Listing of insurance coverage is required, including professional liability insurance. Evidence will be required by contract execution;
4. Cover letter stating that the Proposer has read, understood, and will comply with the requirements and conditions contained in this RFP and signed by an authorized representative for the firm who will act as a contact person during the selection process.

5. Qualifications and experience of team members: List the qualifications of all team members who will be involved in the project. Include copies of resumes. Detailed statement demonstrating that the Proposer meets at least the minimum evaluation criteria;
6. Narrative of the qualifications and history of the firm(s) in working on similar projects;
7. Clear and detailed description of the proposed work plan, approach, methodology and staffing plan for the project. Describe and quantify all deliverables;
8. Narrative of similar work on at least three specific projects, indicating which team member was involved in the work;
9. Three references and contact information from similar projects;
10. Include schedule of tasks in proposal and completion date.
11. Completed Non-Collusion Certification and Tax Compliance Certification, attached to this RFP.

Selection Criteria

Minimum Evaluation Requirements

The Town will receive Proposals prepared by interested proposers. Four copies of each Proposal must be delivered to the Department of Public Works Office no later than the due date and time. The Town reserves the right to reject any and all proposals received.

Proposers furnishing proposals that meet criteria will be reviewed.

The Submission Requirements for this project include:
1. Proposals must include examples of similar work on at least three other projects including assessment of conditions
2. Proposals must include at least three references on similar work.
3. Experience of principals assigned to the project
4. Completeness' of addressing main items in proposal
5. Evidence of insurance coverage must be satisfactory, including professional liability insurance.

The Department of Public Works will negotiate a final contract price with the most appropriate Proposer.

Each firm submitting bids should submit four copies to:

Dorothy Portnoy, DPW
Maynard
Town Building 195 Main Street
Maynard, MA 01754

The Town of Maynard reserves the right to reject any and all proposals and to accept a proposal deemed to be in the best interest of the Town. The Town may adjust the final price in discussion with the selected Proposer.

APPENDIX V – Scope of Work

Woodard & Curran will complete the following services under this Agreement with the Client.

1 Kickoff meeting with DPW

a Develop a meeting agenda with input from the DPW, and coordinate and attend a kickoff meeting to review the goals of the DPW for this study. This meeting will ensure that the study results meet the objectives of the DPW.

b Throughout the course of the project meet with the DPW to provide periodic updates on the current status of the project to ensure that we are proceeding on our initial goals and to determine/discuss if any adjustments/corrections are necessary.

2 Review previous studies

a Review previous studies including the pilot studies and basis of design reports previously completed for the proposed White Pond water treatment plant, water system master plans, Comprehensive Wastewater Resources Management Plans, DEP Annual Statistical Reports of water usage, water conservation plans and practices, MAPC and master plan population projections, Zone II and other hydrogeologic studies.

3 Replacement of existing transmission main

a Evaluate options to replace the existing transmission main including conventional open cut methods and/or trenchless technologies. Trenchless technologies, generally more expensive than open cut methods, will be evaluated as an option to minimize disruption to adjacent environmentally sensitive areas, which exist along the transmission main route.

b Develop and evaluate up to three alternative routing options for transporting water from White Pond to the Maynard water distribution system.

c Prepare cost estimates for each of the options evaluated.

d Contact the U.S. Fish & Wildlife Service to obtain their input on the replacement options for the White Pond transmission main.

e Provide a recommendation for the White Pond transmission main replacement and routing.

4 Siting Evaluation

a Evaluate two options for siting the proposed White Pond water treatment facility. One option will be to locate the facility adjacent to White Pond in Stow and the second option will be to locate the facility at a site in Maynard. The evaluation will consider the following;

® Land Ownership

- Cost, including land purchase
- Land Size
- Availability of Utilities; electric, gas, phone, and sewer
- Proximity to wetlands and other environmentally sensitive areas
- Depth to ground water and bedrock, if known
- Topography
- Site access/proximity to existing road network
- Proximity to residences

5 Relocation of existing pump house

a Evaluate the feasibility of relocating the existing pump house to a higher elevation on the existing site. The evaluation will also include the feasibility of relocating the existing intake pipe from the pond and setting it at a lower elevation to provide for additional storage capacity within the pond.

6 Evaluation of water treatment options

a Review the pilot data and results, and the basis of design report to evaluate the reports recommendations with consideration of current regulatory requirements including the Long Term 2 Enhanced Surface Water Treatment Rule and the Stage 2 Disinfection Byproducts Rule.

b Develop preliminary life-cycle cost (capital and operation and maintenance) estimates for implementation of a new treatment facility for White Pond. The preliminary cost estimates will include capital construction costs for a new intake structure, raw water pumping, treatment facility building and treatment equipment, finish water pumping, backwash water handling, and new transmission main to serve the existing distribution system. The preliminary operations and maintenance costs will include chemical costs, electrical cost, maintenance and labor. The capital and operation and maintenance costs will be estimated by updating the costs presented in the 1994 Basis of Design Report.

7 Feasibility of developing wells onsite

a Complete a geophysical exploration (seismic refraction) to determine the saturated thickness of unconsolidated materials at suitable locations near White Pond.

b Complete subsurface exploration at White Pond including installation of a pair of 2-1/2 inch diameter test wells, performing a 2 hour pumping test and at the conclusion of the pumping test performing water quality testing in accordance with MassDEP guidelines for test wells. The purpose of this task will be to assess the suitability of the area surrounding White Pond as a ground water supply source in terms of quantity and treatment requirements.

c Based on the subsurface exploration, develop cost estimates for developing a groundwater source at White Pond.

8 Evaluate and cost comparison of investing in existing resources.

a Review previous studies including exploration, pumping test reports, and Zone II delineations, and published geologic and hydrologic maps, to determine the feasibility of developing additional capacity from the existing Old Marlboro Road and Well No. 4 ground water supply sources.

b Review existing Old Marlboro Road and Well No. 4 well sites to determine if the sites can accommodate increased well yield by improvement in well maintenance practices. Historical well pumping and water level data, including original pumping test report and well maintenance records, will be reviewed to determine if the wells are operating at their highest and most efficient yields or if additional yield can be obtained by performing traditional or alternative well rehabilitation techniques.

c Review the existing Old Marlboro Road and Well No. 4 well sites to determine if the sites can support construction of an additional well that would actually increase capacity from the site during simultaneous operation of the existing and new well(s). Consideration of this alternative needs to review the impacts of the following issues, at a minimum: new well is reviewed according to the DEP New Source Approval Process; new well does not cause too much well interference on existing wells but would result in a material increase in total site capacity; and that the town can control the well site access and Zone I wellhead protection area.

d Review the existing Old Marlboro Road and Well No. 4 well sites to determine if the Town would benefit from construction of a satellite well.

e Review potential new sites that have never been explored as potential groundwater supply sources. USGS geologic map and exploration and pumping test studies prepared for the Town's existing wells will be reviewed to determine if there are aquifers that exist in Town that would meet the Zone I land control requirements of DEP, are located in a potentially productive aquifer, are accessible for construction and connection to the town water system, and appear to be permeable without costly and burdensome permitting requirements. Review of potential well locations will take into account the proximity to environmental receptors sensitive to impacts from well withdrawals, such as wetlands or streams, to assess the potential that a prospective site may be burdened with too many well flow restrictions due to concerns about causing impacts due to drawdown to make an alternative feasible.

f Feasible alternatives will be further evaluated by performing a preliminary cost estimate for developing the new groundwater supply.

g Review existing sources to determine the most feasible option for obtaining additional long-term source capacity. In our review of feasible options, we will consider reactivation of existing source to full service such as expansion and upgrade of existing treatment plants such as the Old Marlboro Road Well Water Treatment Plant to fully utilize the capacity at that well site. The feasibility of options will consider not only available yield for an alternative, but the cost of implementing that alternative.

9 Availability of Federal or State Funding

a Identify potential Federal and State Funding opportunities for the project. This will include MassDEP State Revolving Loan Fund program, USDA Rural Development grant and loan opportunities, and Community Development Block or Action Grants.

10 Evaluate the feasibility of selling excess capacity to Hudson or Sudbury

a Determine if excess capacity exists within the Maynard water system and if there is available quantity for use by Hudson or Sudbury.

b Contact both Hudson and Sudbury to gauge their interest in buying water from Maynard and seek to obtain a firm commitment from both of the Towns.

11 Evaluate the feasibility of a cost sharing proposal in having Hudson or Sudbury share in the cost of plant construction

a Evaluate cost sharing with the Town's of Hudson and Sudbury for the White Pond water treatment facility.

12 Evaluate the feasibility of a connection with Stow

a Evaluate the impact of supplying 11,000 gallon per day to the Town of Stow. The evaluation will consider the additional operation and maintenance costs that would be associated with this additional demand and will also evaluate the legal requirements for the Town to allow service connections to properties along the transmission main route into Stow.

b The evaluation will also consider if a higher demand from Stow is more realistic and the impacts of this higher demand on the Maynard water system, knowing that Stow may be looking to provide water service to the Town Hall, library and elementary schools.

13 Provide estimated time line for design, construction, costs and permitting by DEP and other regulatory agencies

a Prepare a time line for the recommended alternative for permitting, design and construction.

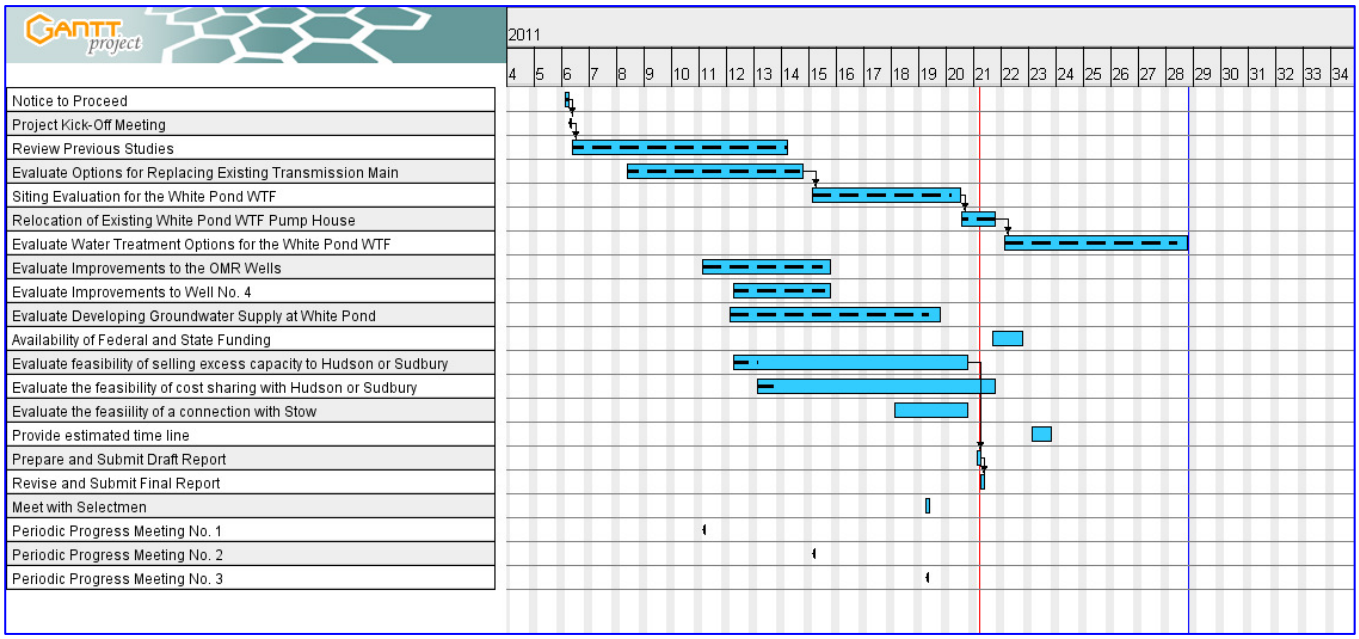
14 Prepare and submit to the DPW a draft Assessment of Water Resources Report, revise report based on Town comments, and meet with Selectmen to discuss final report

a Prepare and submit ten copies of a draft report to the DPW, and attend a meeting to present the results and discuss the opinions and feedback of the DPW.

b The draft report will summarize the results of the water resources assessment and include recommendations on the direction the Town should proceed for future water supply development, including a decision matrix that includes a presentation of advantages and disadvantages for each alternative considered, and the probable cost of implementation for each alternative. The report will also include the results of our evaluation of the feasibility of selling excess capacity and cost sharing with the Towns of Hudson and Sudbury and the results of our evaluation on the feasibility of a Stow connection and the estimated time line for permitting, design and construction of the recommended alternative.

c Incorporate the comments that are received on the draft report and submit ten copies of the final report to the DPW. One PDF of the final report on CD will be included with the submission.

APPENDIX V – Gantt Chart



APPENDIX VI – MAPC Projections

MAPC Methodology

MetroFuture Projections Update 2010 – 2035

Population, Households, and Employment
In support of *Paths to a Sustainable Region 2035*

Technical Methodology

9 March 2010

Prepared by

MAPC Data Services Department
Timothy Reardon
treardon@mapc.org

MAPC Data Services Department has updated the MetroFuture TAZ-level socioeconomic projections to reflect the projected regional totals for population and employment issued by MassDOT in December 2010. These projections also incorporate updated population and employment data and information from MAPC's new Development Database. MAPC also extended the projections by five years to reflect the horizon of *Paths to a Sustainable Region 2035*, the regional transportation plan now under development by the Boston MPO. In February 2011, the MPO officially adopted these projections as the official demographic scenario for the plan.

The 2035 projections supplement, but do not fully replace the 2000 – 2030 MetroFuture projections developed in 2007. The 2030 MetroFuture projections envision more robust growth regionwide than the MassDOT control totals, apply slightly different assumptions about where that growth will go, and provide detail on a wide variety of outcomes beyond what is covered by this update. For purposes of local and regional planning, the two sets of projections are both valid pictures of the future, and may provide more utility in comparison to each other rather than as absolute benchmarks.

Contents of this Methodology:

- **MassDOT Regional Control Totals**
- **Community Comments and Development Database**
- **Project Discounting and Phasing**
- **Base Year and 2010 Projections**
- **Regional Housing Unit Demand**
- **Future Year Household and Population Projections (2020 – 2035)**
- **Regional Employment by Sector**
- **Future Year Employment Projections by Sector (2020 – 2035)**
- **Labor Force Participation Rate (LFPR)**

MassDOT Regional Control Totals

The current round of projections conforms to the regional totals for population and employment growth issued by MassDOT in December 2010. These totals anticipate total population growth of 8.3% from 2010 to 2035 and employment growth of 8.0% over the same time period. The regional control totals were developed by MassDOT through a process that involved estimating state-level population, labor force, and employment in future years and then allocating population and jobs to the state's thirteen Regional Planning Agency districts. The MassDOT projections assume that historical patterns of net domestic outmigration will diminish (though not disappear) in the coming decades; they assume sizeable increases in labor force participation rates for the 65 – 75 year old population; and they assume that the labor force participation rate for the 16- 25 year old population will stabilize (rather than continuing to decline, as projected by BLS.) The state-level projections also assume that unemployment will remain somewhat elevated through 2020 (6.7%), not returning to "natural" unemployment (5.3%) until the 2030 forecast year.

Overall, 40% of the state's population growth and 48% of employment growth is allocated to the MAPC region. This translates to an increase of 267,000 residents and 143,000 jobs over the 25 year forecast period. However, a large portion of the growth is needed just to recover from recent recessions, given regional employment decline of 82,000 over the past 10 years. As a result, 2035 employment exceeds year 2000 by just 56,000 jobs, an increase of less than 1%. It is important to note that nearly 90% of the net increase is anticipated from 2010 – 2020, with much slower growth in employment afterward due to constrained labor supply as the baby boomers retire from the labor force.

Community Comments and Development Database

In July 2010, MAPC solicited information from member municipalities about residential and commercial developments recently completed, under construction, or planned. The request for information was distributed to the chief administrative official, municipal planning staff, planning board chair, and MAPC representative in each municipality. MAPC Subregional Coordinators contacted municipalities to solicit responses.

MAPC Data Services created an on-line web-mapping application for municipalities to submit project data and locate it on a map (www.maps.mapc.org/projections) The website was initially populated with data provided by each municipality in 2007 during development of the MetroFuture projections. Municipal representatives were asked to update this information, provide more detailed location information, indicate projects that had been cancelled, and add new projects not reported in 2007. By the end of the two-month comment period, the site included data (either new or from 2007) about development projects in 77 of the region's 101 municipalities. MAPC then proceeded to augment this municipally-supplied information through additional research on the location of 40R Smart Growth Zoning districts, 43D Expedited Permitting sites, Priority Development Areas identified through the South Coast Rail planning process or the EOHED 6-municipality North Shore study conducted by MAPC, projects currently in the MEPA process, and other large projects.

Including this additional research by MAPC, the Development Database now includes information on 1,700 projects in 83 municipalities, representing 88,000 potential new housing units and 329,000 potential new jobs. Information on each project includes (where available): number of housing units, type of units (single family, townhouse, multifamily), age or affordability restrictions, commercial square footage and allocation to various uses (retail, office, manufacturing, etc), estimated completion date, permitting status, project website, and geocoded location. Projects were assigned to one or more Transportation Analysis Zones

and employment was estimated for the three sectors used in the regional transportation model, based on standard assumptions for employment per square foot for each of the various nonresidential uses.

Project Discounting and Phasing

Because of the uncertainty in the development process and the fact that the aggregate employment growth potential of the projects in the development database far exceeded regional growth totals, it was necessary to discount the potential future development. MAPC applied the following discount rules.

- Specific development projects with all permits secured but not yet under construction were generally discounted by 10-25% to account for potential uncertainty and financing challenges
- Development projects currently in the local permitting process were discounted by 10% – 40% to account for potential local opposition, financing challenges, delays, and changing market conditions.
- Very large, complex, and multi-phase development projects were discounted by 33% - 66% to account for market uncertainty, financing challenges, and project delays that may alter the development plan or push completion beyond the 2035 forecast horizon. If such projects were broken into separate phases, each was discounted separately based on its current status.
- Potential growth resulting from recent rezoning or other planning initiatives was discounted by 50% – 75% to reflect the uncertainty of market demand for the new zoning potential and the likelihood that complete buildout is likely to occur long after the 2035 forecast horizon.
- Projects that appeared to be stalled, permitted but currently for sale, or otherwise clouded by uncertainty were discounted by 50% – 75%
- 40B Comprehensive Permit developments were generally discounted by 50%, no matter where they were in the permitting process, to reflect the impact of appeals, financing challenges, and market uncertainty[1].
- Projects reported as already complete or in construction were not discounted, with the exception that large or multi-phase projects already in construction were discounted up to 10% to account for changes in market conditions or financial challenges.

Within the ranges described above, smaller discounts were applied to projects that were consistent with the MetroFuture land use plan by virtue of their location or other attributes. Smaller discounts were applied to developments in Community Oriented Development Areas (CODAs), a MetroFuture designation for approximately 2,000 TAZs in the modeling region that contain high opportunity areas for development by virtue of existing infrastructure, transportation amenities, and access to destinations. CODAs include city and town centers, areas near transit or other infrastructure, and many major employment centers. Larger discounts were applied to projects less consistent with MetroFuture: conventional single-family subdivision developments, auto-oriented office and industrial parks, multifamily residential development in isolated and auto-dependent locations, and stand-alone retail uses.

Many of the reported projects anticipated to be completed during the period 2020 – 2035 are large multi-phase projects that will likely take many years to complete. MAPC assumed that the (discounted) housing units and employment associated with these projects will come on-line as follows:

- For projects with a reported completion date of 2011 to 2020, 100% of the discounted growth was incorporated into the 2020 forecasts.

[1] This discount is based on a 2007 finding by the MIT Center for Real Estate that, of 369 Comprehensive Permit applications during the period 1990 - 2005 in 95 Eastern Massachusetts municipalities, only 55% had actually received a building permit.

- For projects with a reported completion date of 2020 to 2030, 33% of the discounted growth was included in the 2020 projections, and the balance was included in 2030.
- For projects with a reported completion date of 2030 to 2035, 50% of the discounted growth was included in the 2030 projections, and the balance was included in 2035.

Once discounting and phasing had been completed, projects were summed by TAZ in order to yield anticipated housing units, group quarters, and employment by sector for each TAZ and forecast period.

Base Year and 2010 Projections

The "base year" for the current regional transportation model is 2008/2009. The socioeconomic estimates (population, household, employment by sector, and group quarters) for this base year were developed by the Central Transportation Planning Staff in 2010. These estimates update the year 2000 population, household, and employment estimates that served as the base year for the previous Regional Transportation Plan and associated travel demand model. For population and households, CTPS used the based on the Vintage 2008 U.S. Census Population Estimates to create a municipal total and distributed this across the TAZs in the municipality through some combination of municipal-level growth rates and equal allocation of growth. A similar adjustment was made to the employment figures, based on ES-202 data from the MA Executive Office of Labor and Workforce Development. CTPS also made non-standard adjustments to specific TAZs based on additional information. In some cases, these TAZ-specific adjustments duplicate projects reported in the Development Database; MAPC's methodology for resolving this potential "double counting" is described below.

Because Census 2010 data were not yet available when the projections were being developed, MAPC adapted the base year data from CTPS to create a 2010 estimate that satisfies the MassDOT-issued control totals as well as the data on projects recently completed. The TAZ-level 2010 Group Quarters population is assumed to be the same as the base year unless the Development Database includes pre-2010 group quarters not reflected in the 2008 estimates, in which case 2010 is equal to 2000 plus the applicable Group Quarters from the Development Database. If the base year shows decline in group quarters from 2000 – 2008, community comments on group quarters are added to the 2008 estimate.

At the municipal level, 2010 total population is based on the 2009 Census Bureau Population Estimates and the regional population control total, assuming a constant municipal share of the region's population from 2009 to 2010. Population in households in 2010 for each municipality is calculated by subtracting the 2010 population in group quarters (sum of TAZ-level projections) from the 2010 total municipal population. 2010 municipal household demand is estimated by applying the 2010 MetroFuture municipal average household size to the projected population in households.

Creation of TAZ-level population and household estimates for 2010 began with adding the Development Database count of housing units completed prior to 2010 to the base year estimates. In order to resolve potential double counting between CTPS TAZ-specific adjustments to the base year and development data, MAPC identified TAZs where household growth from 2000 – 2008 exceeded that which would be expected based on equal allocation of households across all TAZs in the municipality. Household growth over and above equal allocation was subtracted from the Development Database count of housing units completed before 2010, and the result was added to the base year household estimate. The product of this addition was summed for the municipality and compared to the 2010 municipal household demand described in the previous paragraph. The resulting ratio was used to scale the household estimates at the

TAZ-level so they sum to the 2010 municipal household demand described above[2]. The MetroFuture 2010 population per household (by TAZ) was applied to the household projection to yield an initial projection of population in households. This initial projection was scaled downward <0.1 %, so that the sum of TAZ population in households is equal to the estimated regional population in households.

The base year (2008/2009) employment developed by CTPS is slightly less than ES-202 based employment for the same period, since it includes CTPS corrections to resolve employment erroneously located at corporate headquarters, and other value-added modifications. This discrepancy is resolved in 2010, when employment is assumed to equal the ES-202-based MassDOT 2010 regional employment estimate. Total municipal-level employment estimates for 2010 were developed by assuming a constant municipal share of regional employment from 2009 (based on ES-202) to the 2010 regional employment (MassDOT control total.) At the TAZ-level, new employment reported for the pre-2010 period was added to the base year estimates (by sector), after accounting for TAZ-specific adjustments made by CTPS using a methodology similar to that used for households. (Employment growth above what would be expected based on municipal percent change was deducted from job growth documented in the development database.) Sector totals were summed by TAZ and then by municipality. These initial totals were compared to the estimated total municipal employment for 2010 and the resulting ratio was used to scale the initial TAZ-level sector estimates so they are consistent with the municipal totals.

Regional Housing Unit Demand

Regional population in households is estimated by subtracting the projected group quarters population for each forecast year (base year plus planned/discounted group quarters) from the MassDOT population control totals for that forecast year. This population in households is divided by MetroFuture's regional average household size projections (persons per household) to yield total housing demand for each forecast year. MetroFuture's household size projections anticipate continued decline in household size from 2.47 persons per household in 2000 to 2.38 in 2010 and 2.29 in 2030; regional household size is then held constant from 2030 - 2035. Declining household size is an important factor in housing demand and population at both the local and regional level. One third of the total demand (approximately 60,000 units) is needed just to accommodate declining household size for the existing population.

Future Year Household and Population Projections (2020 – 2035)

Household forecasts for future years begin with adding the year planned/discounted housing units to the household estimate for the previous forecast year. If the planned/discounted growth exceeds 250 units or if it exceeds MetroFuture projected housing unit growth for the same time period, no additional units are projected for that TAZ. If the planned/discounted growth is less than the MetroFuture projected housing unit growth for the same forecast period, the model calculates a "remainder" for each TAZ and uses this figure as the basis for allocating the balance of housing unit growth:

- For CODA-designated TAZs, the remainder is equal to the MetroFuture housing unit projection minus the planned/discounted growth for that forecast period, or 250 units[3], whichever is less.

[2] CTPS used Vintage 2008 Census Population Estimates in developing the base year estimates, which differ considerably from the Vintage 2009 estimates used for developing the 2010 municipal totals. Also the household size for each municipality in the base year estimates diverges considerably from the trend from 2000 to MetroFuture projected 2010 household size used in these projections. As a result, there are 9 municipalities that appear to lose population from the base year to 2010, and 39 municipalities that appear to be experiencing household declines. These declines are an artifact of the different sources of data for population and household size, not an actual projected loss of population or households.

[3] 125 units for the 2030 – 2035 forecast period

- For non-CODA TAZs, the remainder is equal to the MetroFuture housing unit projection minus the planned/discounted growth, or 100 units[4], whichever is less.
- The remainders from all TAZs are summed and divided into regional housing demand (less planned/discounted units.)
- This ratio is applied to the remainder for each TAZ and the product is added to the planned/discounted units to yield housing unit growth for that forecast period.

Initial population estimates for each TAZ are calculated using the household size for that TAZ & forecast year from the MetroFuture projections; these initial TAZ estimates are then scaled uniformly (<1%)to yield a total population in households that conforms to the regional projections.

This process is repeated for each of the forecast years: 2020, 2030, and 2035. The breakdown of units forecast based on project data versus MetroFuture allocation is as follows.

- 2020: 37,100 units planned/discounted; 28,100 according to MetroFuture allocation
- 2030: 13,800 units planned/discounted; 64,000 according to MetroFuture allocation
- 2035: 4,300 units planned/discounted; 22,800 according to MetroFuture allocation

Group quarters projections are created by adding the estimated population in planned/discounted group quarters to the base year group quarters population. No additional group quarters are projected other than those reported through the Community Comment process.

Regional Employment by Sector

The regional transportation model operated by CTPS classifies employment into three SIC-based sectors: Basic, Retail, and Service. Each sector is assumed to have different trip generation patterns per employee. The MetroFuture projections and the CTPS base year estimates use different methods for allocating employment into the three sectors, so the future year MetroFuture sector shares cannot be used directly. The regional employment by sector for 2010 is based on the base year regional sectoral employment, assuming constant sector shares. Future year sector shares are created by applying the MetroFuture rate of change for that sector's share and forecast period to the estimate for the previous forecast year. The 2030 – 2035 projections use half the rate of change from 2020 – 2030.

Future Year Employment Projections by Sector (2020 – 2035)

TAZ-level employment projections are calculated for each of the three sectors and then summed to yield total employment. As with housing unit growth, the planned/discounted employment is placed first; a "remainder" is calculated based on the MetroFuture projections, existing employment, and CODA status; the remainder is scaled to yield an allocation that, along with the planned/discounted units, equals the regional control total for that sector's employment. Because planned/discounted employment exceeds regional employment growth from 2020 – 2035, different calculations are used for the periods before and after 2020.

From 2010 – 2020, more employment growth is projected than can be attributed to planned/discounted development; as a result, there is some "remainder" to allocate to other TAZs. After placing the planned/discounted projects, the remainder is calculated as follows:

- If there are planned/discounted projects in a TAZ, no remainder is calculated.

[4] 50 units for the 2030 – 2035 forecast period

- In CODA TAZs, the remainder is equal to the MetroFuture projection (if positive job growth) but at a growth rate not more than the regional growth rate for that sector (2.1% for Basic, 8.1% for Retail, 8.5% for Service.
- In Non-CODA TAZs, the remainder is equal to the MetroFuture projection (if positive job growth) but at a growth rate not more than half the regional growth rate for that sector and not more than 50 jobs per sector.
- If MetroFuture projects job losses in Non-CODA TAZs, the remainder is equal to the MetroFuture projection, but not to represent job loss of more than 5%. If job losses are projected in CODA TAZs, the remainder is set to zero.

In 2030 and 2035, the planned/discounted development exceeds the regional projected employment increase (48,000 vs 16,000.) For those forecast years, there is no employment growth in TAZs other than those associated with planned/discounted projects. Planned/discounted job growth must be accommodated by employment losses elsewhere in the region. To accomplish this, the sector employment in each Non-CODA TAZ is reduced by a specified percentage (<1%) so that the sum of the reduction is equal to the amount of "excess" planned/discounted employment that must be accommodated. The employment by sector for 2030 or 2035 is equal to the projection for the previous forecast year plus planned/discounted employment and any remainder adjustments.

Age Projections

Age by municipality is projected for all 164 municipalities in the modeling region based on population totals projected by neighboring regional planning agencies. The baseline MetroFuture projections by age for the modeling region used a cohort survival methodology, with an assumed decrease in net domestic outmigration as a result of improved regional competitiveness. Each municipality has a different age profile (share in each cohort) based on projected shift in share of regional cohort population. The current projections incorporate the MetroFuture age profile for the region through 2030. The 2035 modeling region age profile was estimated by assuming the region retains a constant share of the statewide population for each cohort from 2030 – 2035. Updated cohort population for the modeling region was developed by applying the share in each cohort to the MAPC and RPA population totals for future forecast years.

Initial cohort population for each municipality and decade was calculated applying the projected MetroFuture age profile to the municipal total population for each decade. (The 2030 municipal age profile was used for the initial 2035 estimate.) The initial cohort population was summed across all 164 municipalities and compared to the regional projection. Some cohorts exceeded the regional totals, while others were underrepresented. The "overestimated" cohorts were reduced by the specified percentage in each municipality and the change was redistributed to other cohorts within that municipality, in order to maintain municipal total population while also satisfying the regional cohort population.

Labor Force Participation Rate (LFPR)

The basline MetroFuture LFPR was developed using age-race-sex specific educational attainment rates and corresponding labor force participation rates based on the composition of the projected population and 2000 PUMS data (Public Use Microdata Sample) for the metropolitan region. These projections are further modified based on assumed increase in educational attainment rates among applicable cohorts as a result of specific educational and job training improvements called for by the MetroFuture plan. The MetroFuture LFPR were retained for the current set of projections with two adjustments: the 2035 LFPR was based on the rate of change from 2020 – 2030 for each age category; and the LFPR for the 65+

population was increased by 4 percentage points in 2020 and 8 percentage points in 2030, consistent with the MassDOT assumptions that underlie the state-level labor force projections. LFPR for the 65+ age group is held constant from 2030 – 2035.

APPENDIX VII – Legal Opinion on White Pond Town Counsel Opinion

BLATMAN, BOBROWSKI & MEAD, LLC
Attorneys At Law
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Phone (978) 463 7700
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April 12, 2011

Michael Sullivan
Town Administrator
195 Main Street
Maynard, MA 01754

RE: Chapter 407 of the Acts of 1888

Dear Michael;

Reference is made to the above-captioned matter. In that connection the Whites Pond Citizen Study Group (the "Study Group") has certain questions regarding the Town of Maynard's (the "Town") powers under Chapter 407 of the Acts of 1888, entitled "An Act to Supply the Town of Maynard with Water" (the "Act"). Specifically, the Study Group has requested an opinion as to whether the Town may sell the water it obtains under the Act and whether the state may take the Town's privileges under the Act if the Town does not use the water.

When interpreting a statute, or in this case a special act, the first step is to look to the plain language used. "Where the language of a statute is clear and unambiguous, it is conclusive as to legislative intent." Pyle v. School Committee of South Hadley, 423 Mass. 283, 285-86 (1996); L.W.K. v. E.R.C., 432 Mass. 438, 445-46 (2000) ("Where its terms are unambiguous, a statute must be held to mean what it plainly expresses."). The language of the Act appears to be straightforward, clearly conveying the intent of the Legislature.

The Act expressly gives the Town the ability to "draw and convey directly from White pond, so called, lying partly in the town of Hudson and partly in the town of Stow, so much of the waters thereof, and the waters that flow into and form the same as *it* may require[.]" (emphasis added). Because the Act specifies that the Town may draw the water that it requires from Whites Pond, it is clear that Act intends the water to be used for the Town and not sold to any third party for use in another town. Accordingly, I must advise the Town not to sell water withdrawn under the Act for use in another town.

It is my understanding that the Town is not currently withdrawing water from Whites Pond. Accordingly, the Study Group is concerned that the state could take away the Town's right to the water. There is no provision in the Act giving the state the power to take the water away from the Town if the Town fails to use it. Therefore the state

cannot simply take away the Town's right to the water without passing some form of new legislation. It is always within the Legislature's power to change the laws of the Commonwealth however the Town should feel secure in its right to the Whites Pond water given that it will take an act of the Legislature to loose that right.

Please contact me should you or the Study Group have any further questions regarding the Town's rights with respect to the Whites Pond water.

Sincerely,

Lisa

Lisa L. Mead

From: Michael Sullivan [mailto:MSullivan@TownofMaynard.net]
Sent: Friday, June 10, 2011 14:57
To: Dick Downey
Subject: RE: Legal opinion.

Yes the answer was "change the legislation or ask for new legislation". I know that is not what everyone would like to hear, but if fact to do it the right way it is what must occur. It also does not make difference if you are processing or filtering the water in Maynard or at WP. "Work-around(s)" usually do not work for long, "let's do it right" usually stands the test of time much better.

I think you can approach other towns about their interest with the clear caveat that it may require legislative action, even ask them would they actively support it. The Commonwealth would be likely to consider a request with other communities support more readily. I believe the opinion may not give you the latitude you are seeking, but it gives an honest opinion of the legislation. I get the fact some may be looking for a windfall hear, but a cool breeze is sometimes just as welcoming.

I have to be honest I have seen more historic evidence of Massachusetts General Laws (MGL) being circumvented to accommodate various points of view in Maynard then I ever experienced in my former post. It is just not a good practice and my bosses (BOS) have been consistent about trying to do things by the book, so to speak.

There could be an argument that you sell the well water and use the White Pond Water, but attorneys like to settle arguments not create them …hopefully. Sometimes it is not about how we can as much as should we.

At the end of the day if you want to do it right, petition to change the legislation, admittedly that will difficult, but this should not hinge on that one point.

Mike

From: Dick Downey [mailto:downey@boydcoatings.com]
Sent: Friday, June 10, 2011 1:28 PM
To: Michael Sullivan
Subject: RE: Legal opinion

Hi Mike,
Yes, I already have that. After receiving that I came into your office one evening eating my Erickson's ice cream and asked if we could present the question in a different manner. You crafted an email to her as we were talking. Unfortunately, you didn't copy me on the email, so I can't send you a copy. At the same time I gave you my thumb drive so you could copy a file onto your computer.

In any case, the intent was to reposition the question to her to be "How can we arrange it so that we are able to sell water to one of those towns." With all due respect, there at attorneys who will give you a thousand reasons why one can't do something? I hope she is not one of them. What the committee is looking for is: how does one go about doing it legally and some understanding of the risks. The Managers of the Town (Selectmen, in this case) can then make a proper business decision whether it is worth it to the town.

From the committee's perspective we have a conflict in our charter. We have been expressly asked by the Selectmen to approach the other towns about possibly sharing the cost. We are not in a position to even broach the subject with them based on her last opinion and she does not offer any alternatives.

Sorry to be such a pest but the committee is interested in presenting a well thought out report.

Thanks Mike.

Regards,
Dick Downey

_____

From: Michael Sullivan [mailto:MSullivan@TownofMaynard.net]
Sent: Friday, June 10, 2011 11:31
To: Dick Downey
Subject: RE: Legal opinion
Dick,

She has already given an opinion which you were copied on plain and simple the legislation does not allow you in its present form to sell water to anyone, it is specifies the water is for Maynard use.
Please see third paragraph,
Mike

From: Dick Downey [mailto:downey@boydcoatings.com]
Sent: Friday, June 10, 2011 9:22 AM
To: Michael Sullivan
Subject: Legal opinion

Hi Mike,
A few weeks ago you sent an email to legal counsel re "how would we go about selling water to either Sudbury, Stow or Hudson" and could they contribute to the development cost.
Can you let me know the status of her opinion?
Thanks
Regards,
Dick Downey
WPCSC

APPENDIX XIII – Interview Notes, past Superintendents

Interview Notes with Past Superintendents

To: Dick Downey, Chairman White Pond Study Committee
From: Tom Sheridan and Walt Sokolowski Former DPW. Supt.'s of Maynard
Subject: Maynard Water Supply and Infrastructure
Date: March 14th, 2011

While we were at your meeting of 3-7-2011 you requested that we put together some overall notes of the water supply source and infrastructure as if we were proceeding based on our knowledge of the water system. We have presented an outline of our thoughts as follows. A lot of the items mentioned are currently covered with your engineering study being done by Woodard and Curran.
We will be glad to attend your next meeting on March 21st to discuss our thoughts regarding this little report of our expressed opinions.

Maynard Water System - Review of Supply and Infrastructure

Supply

1.0 - White Pond

1.1 - Capacity: Determine capacity/ safe yield [1950's Engineer Determined it 750,000 gpd] with a lower in take pipe-say 1.0 MGD should be obtainable

1.2- Legal: Determine actual owned area around pond.

1.3 - Well: Determine by testing if a well could be utilized avoiding surface water treatment

1.4- Intramunicipal Agreement – talk with Sudbury, Hudson, Stow and Marlboro once you know your final safe yield and capacity issues about selling excess water.

1.5- Water Line: Determine actual size of new water line- some 13,000 LIN. FT. To Winter Street (needed-16") ? Option to bring line into well # 4 area behind Fowler school?

1.51- Consider option of pipe bursting of existing 10" Asbestos Cement (A.C.) pipe bring new line to Winter St.

1.6 – Consider existing 10" A.C. pipe for effluent discharge to sewer system if not on site.

1.7 – Determine size of pond treatment plant and where onsite. Also other locations in town by Tuttle Hill , by Well #4 behind school or at omr wells

1.8 – Legal – title search to determine easement rights for existing 10" A.C. water pipe through fish and wild life land.

1.9 – Locate old "Army" well – east of White Pond – some 3,000 LIN FT is it of any value anymore.

2.0 – Puffer Pond Wells

2.1- Obtain well data to see if any value to re-development,

2.2 – Does FEMA still have rights to them.

2.3 – Locate existing pipeline from wells to FEMA –determine size and pipe type.

3.0 – Old Marlboro Road/Wells (1,2 & 3)

3.1 – Put together brief history of creation and issues.

3.2 - Color issues – what type of treatment is needed to remove all issues of color and what costs are ?

3.3 – Swamp and surface water does it affect color issues

3.4 – Consider one treatment plant for surface and ground water - plant costs and piping costs, including well behind schools.

3.5 – Look into dissolved air flotation process for treatment.

3.6 – Other potential sites in the 60+/- Acres.

4.0 – Well Behind School (#4)

4.1 – Prepare brief history of creation and issues.

4.2 – What level of treatment is needed to fully utilize well at design capacity.

4.3 – Consider use of test well #14. Currently on Fish and Wildlife property just south west of well #4 – develop as well. Relocate well to town owned land adjacent to it .

4.4 – Consider construction of treatment plant on site for surface and ground water from wells 1, 2, 3 & 4 including pipeline costs.

5.0 – Water Exploration

5.1 – History: Contact Ted Morine of Harvard, MA. He was Geologist for DL Maher, Co. for some 40 years. He knows about 95 % +/- of test well history. Ask him to come to a meeting.

5.2 – Fracture Trace Analysis: Consider Summer Hill, Tuttle Hill, Rod & Gun club area, Country Club area, and well #3 area.

5.3 – Town of Stow: Red Acre Road – Kunelius Property – off Red Acre Road near Acton.

5.4 – Crow Island: Re-examine old W&H Report for Crow Island usage. How does it apply today.

5.5 – Examine prior test well data with new technology for potential.

6.0 – Infrastructure Imp (something)

6.1 – 13,000 +/- L.F 16” Line White Pond to Winter St.

6.2 - ? L.F 16” Line White Pond – well #4 Area.

6.3 - ? L.F replace 12” C.I Pipe Winter St. to tank on Summerhill. The pipe is original some 120 +/- years old. Increase to 16”?

6.4 - ? L.F 12” pipe from Mill St. to Stow town line. This will improve Assabet Heights area.

6.5 - ? L.F to close major dead ends

- Brown St. – wilder to Acton St.
- Great Road across country to Apple Ridge Condominiums

- Maybury Road cross country to Waltham St
- Concord St. Cross golf course to route 27.

Summary Ground Water – Wells

Based on the current withdrawal permits, the town is approved for 1.09 MGD. The current three well sites are approved for some 2.38 MGD for withdrawal.

1.)	OMR (#1, #2 & #3)	= 0.87 MGD
2.)	Great Road – GM (#4)	= 0.38 MGD
3.)	Rockland Ave. (#2, #3 & #5)	= 1.13 MGD
	Total	**= 2.38 MGD**

On face value the current ground water sources have sufficient water to meet the town's daily needs now and in the future.

They do need money spent to provide a better quality and availability based upon past operation issues.

Those costs for ultimate treatment and fool proof operations (if there is such a thing) need to be generated. Those costs are probably considerably less than a White Pond re-do.

However you need to factor in historical rainfall data in area. Compare this to past levels of the well's ground water affect to determine additional backup needs in historical drought years such as additional wells in same general area pumped at lower rates to stabilize water levels.

Surface Water White Pond

Once safe yield is determined (use 1.0 MGD for illustrations) plant cost can be determined along with transmission line to town. A reasonable assumption of plant costs 5.5 million dollars and pipeline 1.3 million dollars, say 6.8 million or 7.0 million dollars. Add in some money for bonding, interest and operation for a worst case of one million dollars per year for 20 years.

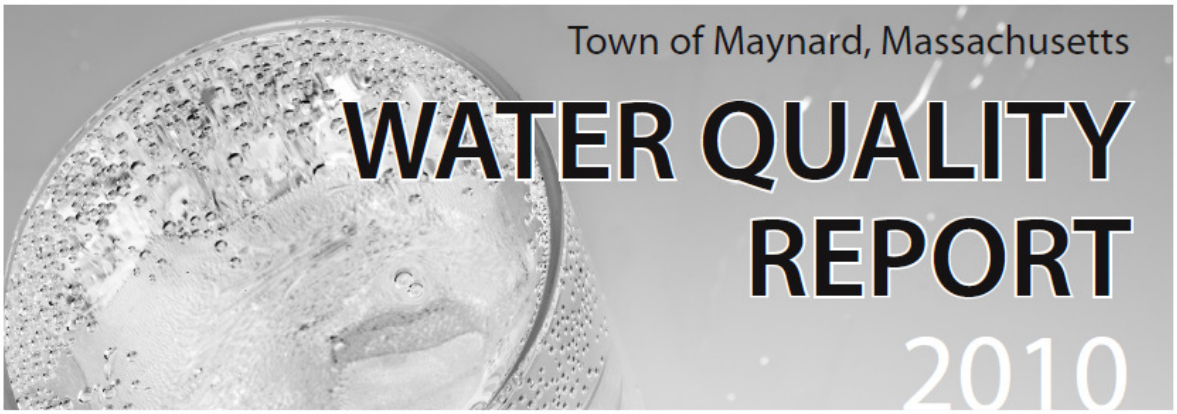
If you sell off some 500,000 G.P.D for some 180 million gallons this would generate some 1.8 million dollars at an out of town rate of some $10.00 per 1,000 gallons ($7.50 per 100 CU FT). This could actually provide a yearly profit to the water system to stabilize rates and infrastructure improvements or other public works related through water surplus funds

This could also provide some 180 million gallons per year of water to the town if needed at no cost.

In our opinion based on current demands, well field capability and estimated costs to improve quality, reliability and some capacity to rest various wells at a time, etc., it makes sense to consider to use ground water as sole source of supply as it has been for the last 10-15 years.

It also makes sense to improve White Pond with contractual agreements with other towns for usage with the town's full protection in case of a catastrophe for full usage.

APPENDIX IX - 2010 Water Quality Report



The Quality of Your Drinking Water

The Maynard Water Department is committed to providing our customers with water that meets or surpasses all state and federal drinking water standards. The Maynard water system is a registered public water supply with ID#2174000. To ensure that we continue to deliver this quality product, the Water Division continues to make investments in water quality monitoring, water source protection, water mains, and the water treatment plants. We are pleased to report the results of our 2010 water testing to inform you about your drinking water. We will be mailing you a report each year with information about annual water quality.

Maynard's Water System

Maynard's Water System Maynard's drinking water comes from seven groundwater sources. Wells #1-4 are constructed in sand and gravel deposits that overlie bedrock. These wells are 40-60 feet and are located in the southern half of Maynard. The remaining three wells, #5 -7, are approximately 400 feet deep into bedrock and are located in the northern half of Maynard. White Pond, a surface water supply located in Hudson and Stow, is no longer in service; however it remains available as an emergency backup supply. The Town has the infrastructure to supply 2.75 million gallons per day (MGD) of high quality treated water from the following facilities:

- **Old Marlboro Road Treatment Facility:** Wells # 1-3: 1.0 MGD
- **Green Meadow Treatment Facility: Well #4:** 0.65 MGD, expandable to 1 MGD
- **Rockland Avenue Treatment Facility:** Wells #5-7: 1.1 MGD

Maynard's Water Treatment

To meet state and federal requirements for public drinking water, our source water receives treatment before it is supplied to our customers. All three water treatment facilities disinfect water and have greensand filters to remove iron and manganese. In addition, Old Marlboro Road and Green Meadow facilities add potassium hydroxide to control corrosion from household plumbing, and the Rockland Avenue facility is equipped with an air stripper to remove radon, a common contaminant in bedrock wells.

Help Protect Our Drinking Water Supply

The MassDEP has completed a Source Water Assessment and Protection (SWAP) Report for our system. The SWAP report assesses the susceptibility of public water supplies to potential contamination by microbiological pathogens and chemicals. A susceptibility ranking of high was assigned to our system using information collected during the assessment by the DEP. A source's susceptibility to contamination does not imply poor water quality. The report states the high vulnerability to contamination is due to the absence of hydrogeologic barriers (i.e. clay) that can prevent contamination migration. The complete SWAP Report is available online at the following website: **http://www.mass.gov/dep/water/drinking/2174000.pdf**

Protecting our water sources is just as important as conserving drinking water. You play an important role in protecting your water resources. To help us protect your water sources:

- Use fertilizers, insecticides, and herbicides sparingly and follow the manufacturers' instructions.
- Never pour harsh chemicals or cleaners down your toilet or sink. Instead, dispose of them and other materials, such as paints and thinners, during household hazardous waste collections programs.
- If you have a septic system, have it pumped out every two years and do not use septic system cleaners.
- Immediately notify the DPW if you notice anyone trespassing or riding motorized vehicles near the wells, or vandalizing any water supply facilities.

Water Quality Summary

Listed below are the 17 contaminants detected in Maynard's drinking water in 2010. Not listed are over 100 other contaminants which we tested, but which we did not detect. The complete list of contaminants that we test for is available at the Department of Public Works office.

Samples Collected from Our Water Supply

Substance (Contaminant)	Date(s) Collected	Highest Level detected	Range Detected	Highest Level Allowed (EPAs MCLs)	Ideal Goals (EPAs MCLGs)	Violation (Y/N)	Possible Source(s) of Contamination
Barium (ppm)	6/10/09	0.044	0.017-0.044	2	2	N	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Beryllium (ppb)	6/10/09	2	0-2	4	4	N	Discharge from electrical, aerospace, and defense industries; erosion of natural deposits
Nitrate (ppm)	5/12/10 6/17/10 6/30/10	0.47	0-0.47	10	10	N	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits

Secondary Contaminants[1]

Substance	Date(s) Collected	Highest Level Detected	Range Detected	Average Detected	SMCL	ORSG	
Iron, ppm	Quarterly in 2010	0.24	0-0.24	0.026	300	N/A	Naturally occurring, corrosion of cast iron pipes.
Manganese, ppm	Quarterly in 2010	0.04	0-0.04	0.012	50	N/A	Erosion of natural deposits.

Volatile Organic Compounds

Substance	Date(s) Collected	Highest Level detected	Range Detected	Highest Level Allowed	Ideal Goals	Violation (Y/N)	Possible Source(s) of Contamination
Benzene, ppb	5/12/10	0.7	0-0.7	5	0	N	Discharge from factories; leaching from gas storage tanks and landfills

Other Organic Contaminants (Unregulated Contaminants[1])

	Date(s) Collected	Result or Range Detected	Average Detected	SMCL	ORSG	Possible Source
Chloroform[1], ppb	Quarterly in 2010	2.4-26.8	11.1	---	---	By-product of drinking water chlorination
Bromodichloromethane[1], ppb	Quarterly in 2010	1.8-6.4	3.8	---	---	By-product of drinking water chlorination
Chloromethane[1], ppb	Quarterly in 2010	0-1.0	0.14	---	---	By-product of drinking water chlorination
Chlorodibromomethane[1], ppb	Quarterly in 2010	0-1.8	1.0	---	---	By-product of drinking water chlorination
Sodium[1, 2]	12/7/10	18	18	----	20	Naturally present in the environment
Sulfate[1, 3]	6/10/09	51	19-51	250	----	Naturally present in the environment

WATER QUALITY TESTING RESULTS

What Does This Data Represent?

The water quality information presented in the following table(s) is from the most recent round of testing done in accordance with the regulations. All data shown was collected during the last calendar year unless otherwise noted in the table(s).

Mass DEP has reduced the monitoring requirements for inorganic contaminants and the lead and copper rule because the source is not at risk of contamination. The last sample collected for these contaminants were taken in 2009 and were found to meet all applicable US EPA and MassDEP standards.

Notes:

[1]Unregulated contaminants are those for which the Environmental Protection Agency (EPA) has not established drinking water standards. The purpose of unregulated contaminant monitoring is to assist EPA in determining their occurrence in drinking water and whter future regulations are warranted.

[2]The Massachusetts Office of Research and Standards has set a guideline concentration of 20 ppm for sodium.

[3]Massachusetts has set a secondary Maximum Contaminant Level of 250 ppm for sulfate. This level was established to protect the aesthetic quality of drinking water and is not health based.

Samples Collected from Your Faucets

Substance (Contaminant)	Date(s) Collected	Highest Running Annual Average	Range Detected	Highest Level Allowed (EPAs MCLs)	Ideal Goals (EPAs MCLGs)	Possible Source(s) of Contamination
Disinfectants and Disinfection By-Products						
Total Trihalonmethanes (TTHMs), ppb	Quarterly in 2010	41	8.3-150.9	80	----	By-product of drinking water chlorination
Haloacetic Acids (HAA5), ppb	Quarterly in 2010	20	9.4-63.1	60	----	By-product of drinking water chlorination
Chlorine, ppm	Monthly in 2010	0.20	0.01-1.25	4 (MRDL)	4	Water additive used to control microbes

Substance (Contaminant)	Date(s) Collected	90th Percentile	Action Level (EPAs MCLs)	Ideal Goals (EPAs MCLGs)	# of site sampled	Possible Source of Contamination
LEAD AND COPPER						
Copper, ppm (0 samples exceeded the action level)		0.1	1.3	1.3	32	Corrosion of household pumping systems
Lead, ppm (1 sample exceeded the action level)		0.008	0.015	0	32	Corrosion of household pumping systems

Important Definitions

Maximum Contaminant Level (MCL) -The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
Maximum Residual Disinfection Level (MRDL) - The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of disinfectants is necessary for control of microbial contaminants (ex. chlorine, chloromines, chlorine dioxide).
Maximum Residual Disinfection Level Goal (MRDLG) - The level of drinking water disinfectant below which there is no known expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
Secondary Maximum Contaminant Level (SMCL) – These standards are developed to protect the aesthetic qualities of drinking water and are not health based.
Massachusetts Office of Research and Standards Guidelines (ORSG) – This the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action.
Action Level (AL) — The concentration of a contaminant, which, if exceeded, triggers a treatment or other requirements that a water system must follow. The action level for lead and copper is the 90th percentile of all samples taken at one time.
90th Percentile – Out of every 10 homes sampled, 9 were at or below this level.

ppm = One part per million or milligrams per liter (mg/L); one part per million is equivalent to $1 in $1,000,000.

ppb = One part per billion or micrograms per liter (ug/L); one part per billion is equivalent to $1 in $1,000,000,000.

ND = Substance not detected in the sample.

Substances Found in Tap Water

Sources of dritnking water (both tap water and bottled water) include rivers, lakes, streams, ponds, brooks, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up contaminants resulting from the presence of animals or human activity. Contaminants that may be present in source water include:

- **Microbial contaminants** - such as viruses and bacteria which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic contaminants** - such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil or gas production, mining, or farming
- **Pesticides & herbicides** - which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
- **Organic chemical contaminants** - including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- **Radioactive contaminants** - which can be naturally recurring or be the results of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Department of Environmental Protection (MassDEP) and the U.S. Environmental Protection Agency (EPA) prescribe regulations, which limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) and the Massachusetts Department of Public Health (DPH) regulations establish

limits for contaminants in bottled water that must provide the same protection for public health. All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some conta minants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at 800-426-4791.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as people with cancer undergoing chemotherapy, those who have undergone organ transplants people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. More information about contaminants and potential health effects along with the EPA/Center for Disease Control guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available by calling the EPA's Safe Drinking Water Hotline at 800-426-4791.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Maynard Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

APPENDIX X - List of Other Reports and Studies

ID # From List	Title	Company	Date
1	Contract Documents for Modifications to Old Marlboro Road Water Treatment Facility	Dufrense-Henry	1-Apr-2000
2	Contract Documents for Furninshing and installing Rockland Avenue Watermain Extension	Dufrense-Henry	1-Jun-2003
3	Supplemental Geohydrological data and groundwater monitoring plan for Willis Hill Subdivision - Sudbury	N/A	9-Jun-1905
4	SUASCO Basin - Preliminary Report MAPC Water Quarterly Report	N/A	30-May-1905
1	Hydrologic Assessment of Old Marlboro Road Wells - Scope of Services	Earth Tech	15-Dec-2006
2	Source Water Assessment program Conceptual Zone II Delineation Old Marlboro Road Wells, Great Road Well	Earth Tech	1-Jan-2000
3	MEPA Environmental Notification Form - Maynard Water Supply Project Rockland Avenue	Dufrense-Henry	1-May-2000
4	Fracture Trace Study to Determine Feasibility for the Development of a Bedrock Water Supply	DL Maher	1-Oct-1998
5	Contract Documents Construction of Gravel Packed Wells off Great Road	SEA Consultants	1-Dec-1977
6	Contract Documents for Modifications to Water Treatment Facility Old Marlboro Road	Dufrense-Henry	1-Apr-2000
7	Contract Documents Water Treatment Facility Old Marlborough Road	Dufrense-Henry	1-May-1997
8	Report on Water Supply Investigation Tuttle Hill Area	Dufrense-Henry	1-Apr-1982
9	Water Forman Reports for 1989	DPW	11-Jun-1905
10	Contract Documents for Cleaning and Redeveloping Well #2	Dufrense-Henry	1-Jun-1990
11a	Applications Submitted Water system Improvements	N/A	5-Jun-1905
11b	Application for Reservoir Repairs		5-Jun-1905
12	Contract Documents for Corrosion Control Facilities Old Marlboro Road Wells 1+2	Dufrense-Henry	17-Jun-1905
13	Application to State for money for Replacement of water mains in four parts of Town, Great Road, Pine Street, Main Street, Tremont	N/A	
14	Hydrologic Study of Old Marlboro Road Wells	Earth Tech	14-Sep-2007
15	Draft Report of Test Well Investigation - Stow and Maynard	Whitman and Howard	1-Oct-1962
16	Progress Report to Test Well Investigation - Maynard	Whitman and Howard	1-Feb-1959
17	Report of Test Well Investigation - Stow, Mass	Whitman and Howard	1-Nov-1962
18	Supplemental Report in Relation to an Additional Water Supply for Maynard - INFO on Whites Pond	Whitman and Howard	16-May-1905
19	Dept. of the Interior - USGS - Water Resources of the Assabet River Basin	USGS	22-May-1905
20	Preliminary Water Resource Investigation - Crow Island	Whitman and Howard	3-Mar-1973
21	Hydralic Diagram Whites Pond Supply Main		1-Dec-1959
22	Letter - White's Pond Water Supply	Haley and Ward	N/A
23	Water Consumption Records - Natick Labs Annex - Gallons Pumped by Maynard Fron Well		18-May-1905
24	Request for Site Exam rockland Ave Well Field	Dufrense-Henry	17-Sep-1999
25	Filtration - White's Pond Pilot Study - Associated pages	Dufrense-Henry	1-Jan-1991
26	Old Marlborough Road Wells - 3 manilla folders		29-Jun-1905
27	Proposed Plan for Pumping Old Marlboro Wells 1, 2, 3	N/A	N/a
28	Water Search	SEA Consultants	25-May-1905
29	Contract for Furnishing/Installing Pumping Equipment Whites Pond	Whitman and Howard	13-May-1905
30	Diposition portion of US ArmyNatick Labs - Right of Entry		2-Feb-1974
31	Old Marlboro Rd Water Treatment Plant, Preformance Eval, Pre-treatment Options, Technology Evaluation, Results	Earth Tech, Dufrense H	2005-2006
32	Water Assets Study - Mass EOEA	EOEA	1-Jun-2004
33	Water Withdrawl Permit #9 P4-2-14-174.01	MASSDEP	10-Aug-2000
34	Supreme Judicial Court 71-3 Quirk v. Maynard		
35	Application for purchase of real property at Public Benefit allowance of water		
36	Old Marlboro Road Pump Station Study	Dufrense-Henry	3-Jun-1986
37	Ft Devens Sudbury Training Annex Cut off on Copy		
38	Concord River Basin - Inventory and Analysis of Current and Projected Water Use		1-Jun-1989
39	Mass Infrastructure Project - Report of Research 1986 Vol II		8-Jun-1905
40	Environmental Activities - Brief History, Sudbury Annex		1-Jul-1990
41	Report on Water Syetem Improvements HUD Project	Whitman and Howard	1-Feb-1967
42	Long Range Capital Planning Study- Draft	Weston & Sampson	1-Feb-1999
43	DEP and Comerical Water Users	Dufrense-Henry	7-Jun-2000
44	File Cabinet Drawer - Water with Document Detailing, Analysis of Water, Usage Statistics to DEP Annual Statistics, Pri		
45	Contact Documents Tremont Street Water main Replacement	Dufrense-Henry	1-Mar-2002
46	Contract Documents for Precast Concrete Roof at Summer Hill Reservoir	Dufrense-Henry	1-Jul-1984
47	Contract Documents for Construction of Water Treatment Plants	Dufrense-Henry	1-Jan-2001
48	Contract Documents for Furnishing and Installing Water mains Rockland Avenue	Dufrense-Henry	1-May-2000
49	Contract Document for Water Main Ext Waltham Street	Dufrense-Henry	1-Oct-1979
50	Contract Document for Water Main Ext Bridge Crossing- Main Street	Dufrense-Henry	1-Oct-1983
51	Old Marlborough Road Pump Station Study	Dufrense-Henry	3-Jun-1986
52	Supplemental Engineering Agreement #1 - Decholorination Facilities Design	Dufrense-Henry	8-Dec-1987
53	Contract Documents - Cleaning/Redeveloping Well #4	Dufrense-Henry	1-Feb-1997
54	Contract Documents - Water Main Extension - Parker Street	Dufrense-Henry	1-Oct-1982
55	Contract Documents - Gravel Packed Well #1A	Dufrense-Henry	1-Nov-1994
56	Contract Documents - Cleaning/Redeveloping Well #2	Dufrense-Henry	1-Jun-1990
57	Contract Documents Cleaning/Redeveloping Well #1	Dufrense-Henry	1-Feb-1993
58	Contract Documents - Rockland Ave Water Mains Contract 2	Dufrense-Henry	Oct. 2000
59	Well Site Application and Correspondance - Misc. Well #4 + Quirk Fields		
60	Letters Re Whites Pond Treatment Facility,Fact Sheet, Supply Alternatives, List of Surface Water Suppliers	Dufrense-Henry	1990-1995
61	DPW to DEQE Water supply Section - Annual Sanitary Survey Report for Maynards Public Water Supplies	DPW	17-Mar-1980
62	DPWAC-Water Supply Documents-Green Folder	Earth Tech	26-Jun-1905
63	Map-65-66, Water Consumption Records - Natick Labs Annex - Sudbury		
64	Whites Pond Supply Report	Haley and Ward	30-Jul-1957
65	Old Maps, Hydraulic Diagram White's Pond Supply Main		12-May-1905
66	Supplementary Report in Relation to an additional water supply for Maynard	Whitman and Howard	Sept. 1963
67	Blue Folder - Disposition- Portion of US Army Natick Lab		2-Jan-1974
68	Manilla Folder Well #3 - Army Land Utilization Report		

APPENDIX XI – MWRA Response

MASSACHUSETTS WATER RESOURCES AUTHORITY
Charlestown Navy Yard
100 First Avenue
Boston, Massachusetts 02129

Telephone: (617) 242-6000
Facsimile: (617) 788-4899

August 2, 2011

Mr. Jim Fulton
Whites Pond Study Committee
Town of Maynard
195 Main Street
Maynard, MA 01754

Subject: MWRA and Potential Service to Maynard

Dear Mr. Fulton:

I am in receipt of your July 27, 2011 letter referencing Maynard's May 13, 2011 letter to MWRA and requesting information related to a municipality joining the MWRA Water System. I provided similar information in a June 2, 2011 letter to Maynard. Accordingly, I have enclosed the letter and attachments previously sent.

As indicated previously, please don't hesitate to contact me at (617) 788 1102 should you have any questions or if MWRA may assist your investigatory process for enhancing water supply.

Sincerely,

Pam Heidell,
Policy and Planning Manager

cc:
Kristen MacDougall

OFFICE OF THE
BOARD OF SELECTMEN
TOWN OF MAYNARD
MUNICIPAL BUILDING
195 MAIN STREET
MAYNARD, MASSACHUSETTS 01754

May 13, 2011

Kristin MacDougall
MWRA
Charlestown Navy Yard
100 First Ave, Building 39
Boston, MA 02129

Ms. MacDougall:

The Town of Maynard is currently engaging investigatory processes to explore options for enhancing its municipal water supply. As such the Town is interested in understanding the requirements involved to connecting the municipality to the MWRA water supply system. Matters of interest would include system connection fees, regulatory requirements and obligations, usage requirements and rates.

Past investigations by the Town of Maynard for a similar connection to the MWRA water supply system produced in an engineering report detailing logistics for transmission main routing. These reports are under review here. Please include any material relevant that may be retained at the MWRA offices.

Please forward applicable material and information relating to such to:

Board of Selectmen
Town of Maynard
195 Main Street
Maynard, MA 01754

Respectfully,

Michael Sullivan

Town Administrator

MASSACHUSETTS WATER RESOURCES AUTHORITY
Charlestown Navy Yard
100 First Avenue, Building 39
Boston, MA 02129

Frederick A. Laskey
Executive Director

Telephone: (617) 242-6000
Fax: (617) 788-4899
TTY: (617) 788-4971

June 2, 2011

Board of Selectmen
Town Of Maynard
Municipal Building
195 Main Street
Maynard, MA 01754

Subject: Exploratory Investigations Regarding Enhancing Municipal Water Supply

Dear Maynard Board of Selectmen:

Thank you for your recent inquiry via Michael Sullivan to Kristin MacDougall regarding requirements to connect to the MWRA Water System; Kristin passed on your letter to me. MWRA has more than ample water to serve new customers and would be happy to work with you to explore ways in which MWRA may help meet your water supply needs.

Our admission process is set forth in OP10, Admission of a New Community (OP#10) to the Water System. I have enclosed both the policy, as well as a summary of the policy that highlights key requirements and regulatory approvals (typically review under the Massachusetts Environmental Policy Act and review under the Interbasin Transfer Act is required). Members of the MWRA water system include both communities fully served by MWRA, as well as communities that are partially served. MWRA has no minimum usage requirements; as page 10 and 11 of the enclosed policy indicates, our current entrance fee is based on a combination of average annual use as well as peak use over a six month period. The entrance fee is approximately 5 dollars a gallon. MWRA's projected rates are also enclosed. Alternative rate projections are included based on varying assumptions regarding system demand; many of our costs are fixed and the higher the demand, the lower the unit cost of water for all.

I have not found any relevant material in our office regarding the prior engineering report detailing water pipeline routing that you reference in your letter.

I hope this information is helpful as a start. Please don't hesitate to call me at (617) 788 1102 if you have any questions or if I may assist you in any way.

Sincerely,

Pam Heidell,
Policy and Planning Manager

OP# 10 REQUIRED SUBMITTAL - Application Checklist - Contents Provided by Applicant
Information re: water use for MWRA's evaluation of impact of new demand on MWRA system, on current MWRA communities, and on watersheds
Documentation that no water supply source has been abandoned without a DEP declaration
Documentation **re:** feasibility f local supply source development - DEP findings
Documentation of community's adoption of a Water Resources Commission (WRC) approved Water management Plan
Detailed description of water conservation and water accountability programs undertaken
Water use survey of users consuming more than 20 million gallons/year
Description of municipal zoning and non-zoning measures designed to protect local sources of supply
Disaggregation of conununiVs total water consumption by customer class
Copies of studies/documentation on safe yield, protection needs and contamination threats
Assessment of Consistency with Local Supply Management Plan (if applicant is state, county, institutional, or federal facility)
Local Water Supply Management Plan or Water Management Plan approved by WRC and assessment of consistency of proposed MWRA connection with Plan (if applicant is community)
Approval of General Court, Governor
MEPA Approval. Documentation that MEPA consulted.
WRC Approval of Interbasin Transfer, if applicable. Documentation that WRC consulted.
Documentation of acceptance of admission, by majority vote of city council if a city or majority vote of Town Council if a town (if applicant is a community).

Massachusetts Water Resources Authority

Projected Prevailing Water Rate - Based on FYI 1
Budget FYI 2-FY20

Based on CY2009 Water Use (current projections)

Fiscal Year	**2011**	**2012**	**2013**	**2014**	2015	**2016**	2017	**2018**	**2019**	**2020**	**2021**
Rate **(per MG)**	$ 2,786.89	$2,859.90	$3,017.31	$ 3,142.94	$3,484.91	$3,981.28	$3,966.44	$4,249.03	$4,748.99	$5,317.60	$5,222.99
System **Water Use (MG)**	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07	64,667.07

Based on CY09 Water Use and an Additional 12 MGD Water Use from new customers.

Fiscal **Year**	**2011**	**2012**	2013	**2014**	**2015**	2016	2017	2018	2019	**2020**	**2021**
Rate (per MG)	$ 2,786.89	$2,679.75	$2,827.25	$ 2,944.97	$3,265.39	$3,730.49	$3,716.59	$3,981.38	$4,449.85	$4,982.64	$4,893.99
System **Water Use (MG)**	64,667.07	69,047.07	69,047.07	69,047.07	69,047.07	69,047.07	69,047.07	69,047.07	69,047.07	69,047.07	69,047.07

FY12-FY20 Based on Preliminary **CY2010** Water Use

Fiscal Year	2011	2012 -	2013	2014	2015	2016	2017	2018	2019	2020	2021
Rate (per **MG)**	$ 2,786.89	$2,775.23	$2,927.99	$ 3,049.90	$3,381.74	$3,863A2	$3,849.02	$4,123.25	$4,608.40	$5,160.18	$5,068.37
System Water Use **(MG)**	64,667.07	66,654.69	66,654.69	66,654.69	66,654.69	66,654.69	66,654.69	66,654.69	66,654.69	66,654.69	66,654.69

[1] CY2010 water use subject to change pending additional review.

FY12-FY20 Based on Preliminary CY2010 Water Use and an additional 12MGD Water Use from new customers 1

Fiscal **Year**	2011	**2012**	**2013**	**2014**	2015	2016	2017	**2018**	2019	**2020**	**2021**

Admission of New Community to MWRA Water System **Policy #: OP.10**	
Effective Date: June 25, 1997	**Last Revised:** 10/11/2006
Contact: Planning Department or Executive Office	**Former Policy #:** OP.10
Reviewed by Chief Operating Officer: Michael J. Hornbrook	**Date:** 4/13/07
Reviewed by Internal Audit: John A. Mahoney	**Date:** 4/17/07
Approved by Executive Director: Frederick A. Laskey	**Date:** 4/17/07

Purpose

This policy explains the criteria and process the MWRA will use to evaluate a request for admission of a new community to the MWRA water system and requests from state, county, institutional and federal facilities for water service to locations in communities not included in section 8 (d) of MWRA's Enabling Act (St.1984, c.372).

Eligibility

This policy applies to communities seeking admission to the MWRA water system, and to state, county, institutional, and federal facilities seeking MWRA water for a location outside MWRA's water service area as set forth in section 8 (d) of MWRA's Enabling Act (St.1984, c.372).

Applicability

Each of the provisions of OP.10, Admission of New Community to Waterworks System, which was in existence just prior to its being amended by the MWRA Board of Director's vote of October 11, 2006 shall continue to apply in full to the entirety of the process by which the Towns of Reading, Wilmington, and by which the entity South Shore Tri-Town Development, created under section 3 of c.301 of the Acts of 1998, may each continue to seek admission to the MWRA Waterworks system and service area.

Continued on next page

In this Policy

This policy contains the following parts:

Policy Name / Part Name	Page #
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Admission of New Community to MWRA Water System (OP.10), Continued

Admission Criteria

In evaluating whether to permit the admission of new communities to the MWRA waterworks system, the MWRA must evaluate the following two groups of criteria:

A. Enabling Act Criteria

- The MWRA must, in accordance with Section 8 (d) of Chapter 372 of the Acts of 1984, find that the following six criteria are met:
  - The safe yield of the watershed system, on the advice of the MDC, is sufficient to meet the new community's demand.
  - No existing or potential water supply source for the community has been abandoned, unless the Department of Environmental Protection (DEP) has declared that the source is unfit for drinking and cannot be economically restored for drinking purposes.
  - A water management plan has been adopted by the community and approved by the Water Resources Commission.
  - Effective demand management measures have been developed by the community, including the establishment of leak detection and other appropriate system rehabilitation programs.
  - A local water supply source feasible for development has not been identified by the community or DEP.
  - A water use survey has been completed which identifies all users within the community that consume in excess of twenty million gallons a year.
- Admission of the applicant community into the MWRA has received approval from the MWRA Advisory Board, the General Court, and the Governor.
- An applicant community has accepted the extension of MWRA's water system to the community by majority vote of the city council if a city or a majority vote of the town meeting if a town.

Continued on next page

OP.10-3

Admission of New Community to MWRA Water System (OP.10), Continued

Admission Criteria continued

- Providing water service to a state, county, institutional or federal facility outside MWRA's water service area has received approval from the MWRA Advisory Board.

B. Other Criteria

- Any expansion of the MWRA water service system shall strive for no negative impact on the interests of the current MWRA water communities, water quality, hydraulic performance of the MWRA water system, the environment, or on the interests of the watershed communities; shall attempt to achieve economic benefit for existing user communities; and shall preserve the rights of the existing member communities. Any evaluation of the impacts of new communities shall clearly evaluate all changes to system reliability.
- The applicant community has met all legal requirements for admission; and
- Upon admission, the applicant community will pay fair compensation for past investment in the MWRA waterworks system by existing user communities.

Application Process

A. Application

An applicant shall submit three copies of a completed application to the MWRA Executive Director for review. A copy shall also be submitted to the MWRA Advisory Board. MWRA staff will review and evaluate the completed application to determine whether the requirements of the Enabling Act and additional requirements can be met, and whether water service can be provided by MWRA without jeopardizing standards and requirements set forth in this policy.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Application Process, continued

B. Requirements

- In a formal application for entrance to the MWRA waterworks system, an applicant community must provide detailed documentation to enable MWRA to make the necessary findings required by MWRA's Enabling Act (Section 8 (d) of St.1984, c.372).

  In addition to providing documentation for the Section 8 (d) findings above, the applicant must provide the following.

- Documentation of approvals from the Secretary of Environmental Affairs in the MEPA process, the Water Resources Commission in the Interbasin Transfer Act process, the MWRA Advisory Board, the DEP on local source feasibility, the General Court, and the Governor. Prior to a formal application to MWRA, MWRA will strive to streamline the approval process, by review of application material concurrently with other approval processes, and by coordination with state agencies to document environmental and hydraulic impacts on MWRA's system.

- A detailed description of the water conservation and water accountability programs undertaken by the community and other entities including: leak detection and repair, commercial and industrial water conservation, residential water conservation efforts, large meter downsizing, meter replacement, municipal facility conservation, unaccounted-for water analysis (present data for UAW levels in last 3 years), true cost pricing and conservation based pricing for water and sewer service.

- Communities shall provide a plan for water conservation. MWRA encourages communities to have a plan that adheres to the Commonwealth's water conservation standards, including guidelines for lawn and landscapes. (Enforcement shall be the responsibility of the Water Resources Commission (WRC), Department of Environmental Protection (DEP) and other Commonwealth agencies.)

- A description (and copy) of municipal zoning and non-zoning measures designed to protect local sources of supply with a comparison showing how they meet DEP's regulations and policies for adequate water supply protection measures.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Application Process, continued

- Copies of any studies conducted on existing and potential local water source safe yield, protection needs, contamination threats, and water demand forecasts. If no studies are available on a potential local source known to the community or DEP, then the applicant should prepare documentation on estimated safe yield, protection needs and contamination threats, even for those sources previously determined to be infeasible to develop.

- A disaggregation of the community's total water consumption by customer class: residential, industrial, commercial, municipal facilities, unaccounted-for, other, and agricultural. A listing of large customers using over one million gallons a year should be provided.

- A Local Water Supply Management Plan if the applicant is a community. For a plan contents, refer to Attachment A. A Water Management Plan approved by the Water Resources Commission will also satisfy MWRA's Local Water Supply Management Plan requirement. A community's application must address how the requested connection is consistent with the stated objectives of the community's Local Water Supply Management Plan.

  All other applicants (*i.e.*, state, county, institutional, and federal facilities) must address how the proposed water connection/water use is consistent with a Local Water Supply Management Plan, if it exists. MWRA also reserves the right to reject applications for those cases in which the community does not have a Local Water Supply Management Plan.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Application Process, continued

C. MWRA Review of Application

Upon receipt of an application for admission to the waterworks system the MWRA will:

- Review the application's documentation on the necessary findings required by the MWRA's Enabling Act, and other criteria listed in the Admission Criteria.
- Review documentation submitted pursuant to the Requirements section of this Policy (Section B.) to help determine if MWRA can make the findings required listed in Admission Criteria.
- Analyze the applicant's demand impact on the MWRA waterworks system and consider the projected long-term demand of the system with the new community and contrast it to the MWRA's operations through average, wet and drought scenarios. The analysis must include the possibility of increased usage of MWRA supplies by partially supplied and non-MWRA communities due to drought conditions. Impacts on service to other community connections under various hydraulic conditions and to reservoir and watershed conditions must also be evaluated.
- Upon the request of the applicant, and subsequent to the completion of application review by MWRA staff and following consultation with the Advisory Board, submit a status report to the Board of Directors to inform it of the request, staffs' review and the status of other pending permits or approvals.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Application Process, continued

D. Concurrent Reviews

Other regulatory approvals or permits may be required before a request for service may be approved. It is the responsibility of the applicant to obtain all such approvals. Copies of all applications or requests for regulatory approval shall be submitted to the MWRA as early as practicable to facilitate MWRA review of the request. MWRA will cooperate with other regulatory agencies to coordinate its review where possible, and will review and comment in other regulatory processes as appropriate. Final action by MWRA cannot be taken until the following regulatory approvals, where required, have been obtained.

- Massachusetts Environmental Policy Act -- Executive Office of Environmental Affairs
- Interbasin Transfer Act - Water Resources Commission
- Local water supply source feasibility - Massachusetts Department of Environmental Protection

E. Legislation

Legislation is required to extend MWRA's water system to a local body not listed in Section 8 (d). Proposed legislation should be submitted to MWRA for review before filing. MWRA may require that certain conditions be included in the proposed legislation.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Waivers

The MWRA may, in its discretion, waive any of the conditions or requirements set forth in this Policy and Procedure, not otherwise mandated by law or regulation, if it finds that the community has demonstrated unusual factors or extraordinary circumstances which would make imposition of the condition or requirement upon that community unfair or inappropriate and finds that the proposed action will not jeopardize the MWRA's ability to supply its water communities.

Connection Costs and Entrance Fees outlined in the following sections shall not be waived.

Entrance Fees

The MWRA will charge an entrance fee to cover the new community's fair share of the costs of the waterworks system in place at the time user joins. The entrance fee must be paid up-front, in one lump sum payment, unless otherwise approved by the Board of Directors. If the new community is unable to provide payment on an up-front basis, it may request an alternative entrance fee payment schedule to be made at an interest rate equivalent to the average cost of MWRA's fixed rate debt at the time of application, plus an additional 25 basis points, over a period as defined by a vote of the MWRA Advisory Board and the MWRA Board of Directors on the community's application.

The entrance fee recovers the new user's proportional share of the waterworks system's asset base, which has already been paid for by the existing users of the system. The net asset value charge will be determined through allocating 25% of the net asset value to peak use and the remaining 75% to average use.

MWRA system average annual use and peak six-month average use will be based upon the prior five calendar years of average of water consumption. The user's projected need for MWRA water will be based upon a detailed analysis of local supplies and shortfalls. Its average annual use and peak six-month average use may be based upon its projected need, but in no case shall the projected need be more than the amount approved under MEPA and the Interbasin Transfer Act. Firm contract limits will be established based upon the usage volumes used in the entrance fee calculation.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Water Supply Agreement

If MWRA approves the request for new service, it will establish appropriate terms and conditions of service in the form of a water supply agreement for an initial term of five years. The agreement will be consistent with MWRA's Continuation of Contract Water Supply regulations (360 CMR 11.00). Before contract renewal, MWRA will reevaluate and assess the status of the community's demand management efforts.

The agreement will set forth as appropriate:

- Firm limits on usage, including average and maximum daily use of MWRA water and a stipulation that any increase beyond the stated amounts would require a contract revision and recalculation of the entrance fee. Any significant increase will also require new approval by the MWRA Advisory Board and MWRA Board of Directors.
- A requirement that the applicant assume all costs of connection and pay an entrance fee.
- A requirement that the applicant continue to use all local non-MWRA sources of water to the maximum feasible extent.
- A requirement that the applicant continue to implement all practicable conservation measures. Communities shall be encouraged to adhere to the Commonwealth's water conservation standards, including guidelines for lawn and landscapes, and follow the MWRA's regulations for Leak Detection (360 C.M.R. 12.00).
- A requirement that the community protect local sources of supply in accordance with DEP's guidelines for water supply protection measures.
- Other conditions as may be appropriate.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Entrance Fees - continued

The formula is as follows:

75% of NAV Allocated to Average Use +25% of NAV Allocated to Peak Six-month system use = Total Entrance Fee

Average Use

$$\frac{\text{New user's projected MWRA "average" use}}{\text{System "average use"}} \times \text{NAV of Total Waterworks System}$$

Peak Use

$$\frac{\text{New user's projected MWRA "peak use" needs}}{\text{System "peak use"}} \times \text{NAV of Total Waterworks System}$$

If the applicant community has purchased MWRA water under an emergency supply agreement and has paid charges, which include asset value contributions, then those contributions will be treated as credits against the total entrance fee. Payments of premium charges under an emergency supply agreement are not credited against the entrance fee.

Connections and Connection Costs

All new community water system connections shall be made directly to the MWRA transmission system wherever practical. The applicant community must pay all the costs of providing the connection. The MWRA will charge the costs to the new user as they are incurred, and as well as expenditures by MWRA for outside services necessary to make the connection. These costs may include, but are not limited to, costs of preliminary and final design, land acquisition, environmental review, pumping and storage facilities, and actual construction including construction services and resident inspection. The new user will pay only the connection cost incurred to serve its own needs. If other existing users will benefit from the new pipelines and facilities, the MWRA will assume an appropriate portion of the connection costs that will be added to the overall capital costs for water.

Continued on next page

Admission of New Community to MWRA Water System (OP.10), Continued

Application of Individual Users

The MWRA Enabling Act allows for arrangements involving the extension of the waterworks system to any local body, institution, agency or facility of the commonwealth or federal government if MWRA finds that the additional demand will not jeopardize the delivery of water to existing users and the MWRA Advisory Board approves arrangements beyond six months in length. All requests from state, county, institutional, and federal facilities outside the water service area will be subject to the policies and procedures outlined above, including the payment of entrance fees and connection costs. Connections and withdrawals by private entities outside the water service area shall remain prohibited. In the event exceptions arise to this prohibition, the applicant will be subject to the policies and procedures outlined above and shall obtain approval from: the receiving community; the transporting community; regulatory bodies, where required; the MWRA Advisory Board; the MWRA Board of Directors; and the Governor and General Court.

Annual Update

MWRA staff shall provide an annual update to the MWRA Board of Directors on the status of any new connections (connections approved within the preceding five years) into the MWRA system. This annual update shall at a minimum include information regarding the proponent entity's compliance with the conditions of approvals as stipulated within the water supply agreement and/or other affiliated contractual arrangements with the MWRA; and the status of payments due to either the MWRA or the proponent entity.

Attachment A

Local Water Supply Management Plan Outline

Water Supply

- Identify existing and potential water supplies in the community, zone II delineations, Interim Wellhead Protection Zones, and/or Zones A and B delineations for surface water sources, and watershed boundaries.
- Describe source water protection program, including compliance with DEP source water protection regulations.
- Identification of all water supply options, including compliance with DEP water protection regulations.
- Identification of all water supply options, including local, regional and conservation options.

Regional Plans

- Describe any existing regional or watershed plans and how these plans relate to the plans of the local community. Refer to reports and plans developed by regional planning agencies, local watershed associations, and other appropriate regional and/or non-governmental agencies.

Future Plans

- Analysis of existing zoning and master plan, including EOEA build-out analyses available from Massachusetts GIS.
- Identification of future water and wastewater needs and various alternatives for meeting these needs.
- Summary and evaluation of water infrastructure plans based on build-out and future needs.
- Overall summary based on above information.

Analysis and Conclusions

- An action plan, with timetables for implementation of the recommendations of the plan, a budget, and identification of people responsible for implementation.

ADMISSION OF A NEW COMMUNITY TO MWRA WATER SYSTEM
POLICY OP#10

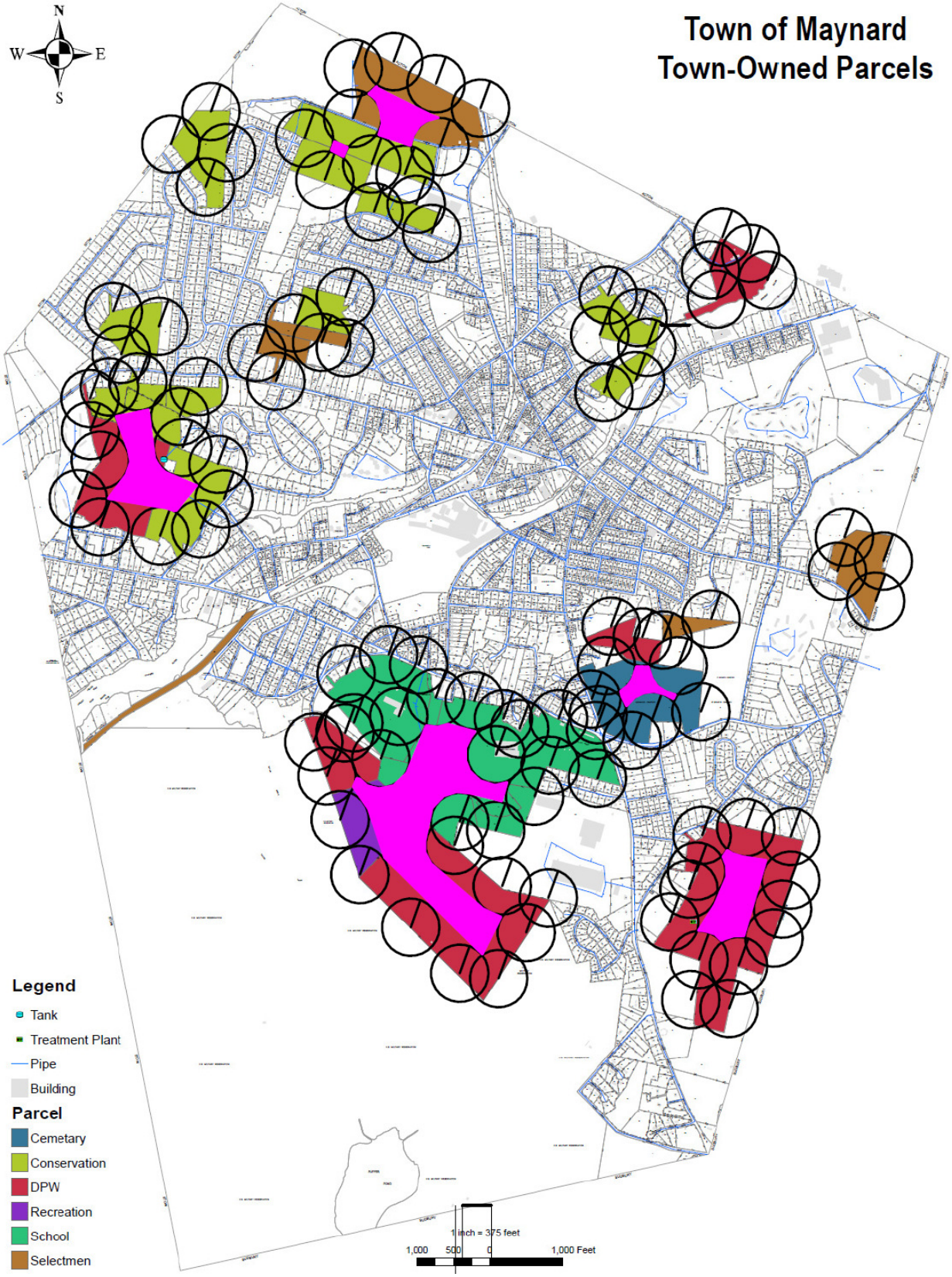
The following table outlines the pre-application/ application process for admission of a new community to the Waterworks System and for state, county, institutional, and federal facilities seeking water from the MWRA. Specifics regarding the process are detailed in OP#10.

PHASE	ACTIONS
[illegible]	Applicant contacts MWRA regarding its request for admission to MWRA. MWRA provides Applicant copies of OP#10. An informational meeting between applicant, MWRA staff, and Advisory Board staff is convened to discuss request and outline key MWRA and regulatory requirements -- Water Resources Commission (WRC) approval under the Interbasin Transfer Act (ITA), and Massachusetts Environmental Policy Act Unit (MEPA) review. Informal meeting or meetings with regulatory agencies - Department of Environmental Protection (DEP), MEPA, and WRC - may also be convened.
[illegible]	Applicant takes actions necessary to satisfy requirements for admission to MWRA, including: • Demand management and water conservation programs • Local source protection • Determination of viability of local sources • Development/Adoption of Water Management Plan Applicant begins applicable regulatory processes, typically MEPA/ITA review. MEPA review for communities requesting admission to MWRA usually follows joint *WRC EIR Scope for Communities Seeking Approval Under the Interbasin Transfer Act to Join the MWRA Water Supply System.* The WRC scope addresses the receiving basin (e.g., community that would receive MWRA water), and Donor Basin (MWRA reservoirs and rivers downstream). MWRA prepares the Donor Basin component of the EIR/ITA application. Community prepares Receiving Basin aspects of MEPA review, and also addresses any localized impacts associated with construction of a pipeline connecting to MWRA. Applicant consults with MWRA re: draft legislation and has legislation introduced (approval of the Legislature and Governor is required for admission to MWRA). MWRA staff provide assistance when requested and wherever possible.

[illegible]	Approvals That Are Required Prior to Application to MWRA Regulatory agencies approve request and/or certify requirements of its agency are met. May impose conditions as deemed appropriate. General Court and Governor approve legislation. Approval of admission to MWRA Water System by majority vote of city council if a city or majority vote of Town Meeting if a town.
[illegible]	Application to MWRA and MWRA Advisory Board Applicant simultaneously submits completed application (application report with appropriate attachments that demonstrate compliance with OP#10, see attached *REQUIRED SUBMITTALS- Application Checklist*) for entrance to the Waterworks system to the: • Executive Director of the MWRA Advisory Board • MWRA Board of Directors through the MWRA Executive Director MWRA staff review documentation to determine if findings required by Enabling Act and other Admission Criteria are met. MWRA staff prepares and negotiate Water Supply Agreement with Community (with appropriate conditions). MWRA staff coordinates with MWRA Advisory Board staff. MWRA Advisory Board votes on request for admission to MWRA (with appropriate conditions). MWRA Board of Directors votes on request for admission to MWRA.

*Some steps may proceed concurrently, but final action by MWRA cannot be taken until all applicable regulatory approvals have been obtained, necessary documentation has been submitted and found adequate, and Advisory Board approval has been obtained.

APPENDIX XII – Analysis of Other Potential Locations



APPENDIX XIII – Financial Analysis of Enterprise Fund

DEPARTMENT #	6100											
	TOWN of MAYNARD											
	ANNUAL BUDGET REQUEST FY-2011											
DEPT: WATER ENTERPRISE FUND												
		FY 2011 LEVEL FUNDED	Maynard Cost per 100 FT³ in $ Actual			White Pond Cost per 100 FT3 in $ Proposed	Old Marlboro Rd Cost per 100 FT3 in $ Proposed	New Well #4 Cost per 100 FT3 in $ Proposed	MWRA Cost per 100 FT³ Proposed (proportional OH)	MWRA Cost per 100 FT³ Proposed	Maynard Cost per 100 FT³ in $ Actual
=========	==========	==========									
Direct Costs Supply											
511020	SALARIES - WATER	117,342.00							See calculations in "Detail Analysis" Tab		
511200	SALARIES - SEASONAL	0.00									
513000	SALARIES - OVERTIME	6,712.50									
521001	ELECTRICITY	181,500.00									
521002	HEAT	26,400.00									
524001	R&M - BUILD & GRNDS	62,100.00									
524002	R&M - VEHICLES	6,300.00									
524003	R&M-EQUIP	35,000.00									
527000	RENT/LEASE EQUIP & VEH	10,000.00									
530016	TRAINING/EDUC	250.00									
591006	WTR TREAT 12/15/97	70,000.00									
591008	WTR FLT BED 2/15/02	15,000.00									
591009	WTR TRMT 2/15/02	6,000.00									
591010	WELL FIELD 2/15/02	24,000.00			% of source						
591017	WTR 2/1/07	110,000.00									
		Total Source cost =	$ 670,604.50	45.5%	100.0%	$ 670,604.50	$ 670,604.50	$ 670,604.50	4.53	4.53	1.47
	Add'l Operations cost					$ 250,000.00	$ 150,000.00	$ 125,000.00			
	Savings										
	Add'l Amortized Capital cost					$1,068,524.51	$ 289,521.52	$ 235,239.89			
	Total cost		$ 670,604.50			$1,989,129.01	$1,110,126.02	$1,030,844.39			
	$ Cost per 100 ft³		$ 1.47			$ 4.35	$ 2.43	$ 2.25	$ 4.53	$ 4.53	
Direct Costs Distribution											
511020	SALARIES - WATER	39,114.00									
511200	SALARIES - SEASONAL	4,727.00									
513000	SALARIES - OVERTIME	16,781.25									
521001	ELECTRICITY										
521002	HEAT										
548000	VEHICLE SUPPLIES	10,000.00									
558000	OTHER SUPPLIES	118,985.00									
591005	WTR 12/15/97	10,000.00									
591007	WTR MAINS 12/15/97	10,000.00									
591012	WTR MAIN 2/1/03	16,200.00									
591013	WTR MAIN II 2/1/03	10,525.00									
591014	MWPAT WTR	167,081.00									
	Police Support	12,027.50			% of source						
	BOH	1,629.38									
		Total Distribution cost =	417,070.13	28.3%	62.2%	$ 417,070.13	$ 417,070.13	$ 417,070.13	2.82	0.91	0.91
Administrative Costs											
511020	SALARIES - WATER	0.00									
511200	SALARIES - SEASONAL	0.00									
513000	SALARIES - OVERTIME	3,356.25									
515000	HOL/EMERG HIRE	36,694.00									
519004	UNIFORM ALLOWANCE	1,700.00									
519005	SICK LEAVE BUYBACK	4,573.00									
521001	ELECTRICITY										
521002	HEAT										
530004	ENGINEER/ARCH	5,000.00									
530115	MWPAT ADMIN FEE	5,388.00									
534000	TELEPHONE										
534003	POSTAGE										
538008	OTH PURCH SERVICE	5,000.00									
542000	OFFICE SUPPLIES	0.00									
591011	WTR EQ 2/15/02	20,000.00									
591016	WTR ENG II 12/15/97	5,000.00									
	Employee Benefits	93,025.00									
	Retirement Benefits	50,302.50									
	Salaries for billing and admin (Hiwy)	65,257.50									
	Hearing, budgets (selectmen)	33,125.63									
	Rate setting (Fin Com	78.13									
	Accounting	16,051.88									
	Collections	28,238.75			% of source						
	Assessor	11,846.88									
		Total Admin (back office) cost =	384,637.50	26.1%	57.4%	$ 384,637.50	$ 384,637.50	$ 384,637.50	2.60	0.84	0.84
	Total Cost	Total Water cost =	1,472,312.13			2,790,836.63	1,911,833.65	1,832,552.02			
	$ Cost per 100 ft³		$ 3.22			6.10	4.18	4.00	9.95	6.28	3.22
	Percent increase		0%			90%	30%	24%	209%	95%	

Assumptions	
1	**Salaries represent 8 people, 6 assigned to source and 2 assigned to distribution**
2	**Seasonal salaries are all assumed to be in distribution**
3	**Overtime**
	3a assume to be 2/8 for source (Vacation fill ins)
	3b 1/8 for Admin, and
	3c 5/8 for distribution (water breaks, blockage, etc)
4	**100% electricity for pumping and allocated to source.**
5	**Put all other department costs into general overhead (i.e. Admin Costs).**
6	**No other revenue such as connection fees are included**
7	**No reserves nor money turned over to free cash are included**
8	**Rates are based on actual pumped volume not billable volume**
	8a Rate calcuations did not state the billable volume so my number do not match W&C
	8b There wate total budget is 1,647.162
	8c My total budget of 1,472,312 excludes other income and reserves
9	**rates between MWRA and Maynard are comparative and**
	9a do not represent what an acutal rate would be.

APPENDIX XIV – Financial Analysis of Projects

Cost information				
	WTF at Whites Pond	WTF in Maynard	Color Treatment at OMR	Well at Green Meadow
Pilot Testing	$ 115,000	$ 115,000	$ 160,000	$ 450,000
Facility Cost	$ 6,900,000	$ 6,900,000	$ 2,650,000	$ 1,900,000
Pipe Cost	$ 3,100,000	$ 4,300,000	$ -	$ -
Total Constuction Cost	$ 10,000,000	$ 11,200,000	$ 2,650,000	$ 1,900,000
Engineer Cost (20%)	$ 2,000,000	$ 2,240,000	$ 530,000	$ 380,000
Permitting (5%)	$ 500,000	$ 560,000	$ 79,500	$ 57,000
Project Cost	$ 12,500,000	$ 14,000,000	$ 3,259,500	$ 2,337,000
Contingency (15%)	$ 1,875,000	$ 2,100,000	$ 488,925	$ 350,550
Total Project Cost	$ 14,375,000	$ 16,100,000	$ 3,748,425	$ 2,687,550
Total Project Cost with Pilot Testing	**$ 14,490,000**	**$ 16,215,000**	**$ 3,908,425**	**$ 3,137,550**
Present Day O&M	$ 250,000	$ 250,000	$ 150,000	$ 125,000
Cost over 20 Years	$ 5,000,000	$ 5,000,000	$ 3,000,000	$ 2,500,000
Total Project Cost with Pilot Testing and 20 year O&M	**$ 19,490,000**	**$ 21,215,000**	**$ 6,908,425**	**$ 5,637,550**
*Previous Cost excludes 2% Interest on SRF Loan.				
Potential Yield (GPD)	1000000	1000000	1000000	1000000
Approved Yield (GPD)	N/A	N/A	875000	380000
Cost Per Gallon Potential (Based on Capacity)	$ 19.49	$ 21.22	$ 6.91	$ 5.64
Cost Per Gallon Approved (Based on Capacity)	N/A	N/A	$ 7.90	$ 14.84
Potential Gallons over 20 Years (Maximum)	7,300,000,000	7,300,000,000	7,300,000,000	7,300,000,000
Approved Gallons over 20 Years (Maximum)	N/A	N/A	6,387,500,000	2,774,000,000
Cost Per Gallon (Total over 20 years)	$ 0.00266986	$ 0.00290616	$ 0.00094636	$ 0.00077227
Cost per 100 Gallons (Total over 20 years)	$ 0.27	$ 0.29	$ 0.09	$ 0.08
Cost per 100 Cubic Feet (Total over 20 years)	$ 2.00	$ 2.17	$ 0.71	$ 0.58
Gallons Per Dollar	374.55	344.10	1056.68	1294.89

APPENDIX XV – Decision Matrix

Decision Matrix

Please enter in the column with your name the importance of each parameter from 1 to 5

Add any new parameter you wish to have considered

Use 1 to 5 Not important = 1 Important = 5

	Paul Boothroyd	Dick Downey	Ellen Duggan	Jim Fulton	Jason Kreil	Gene Redner	Peter Reed	Herb Symes		Average
Operating Costs,	4	4	4	5	3	4	4	2		3.75
Capital Costs,	4	5	4	5	5	4	4	2		4.13
Cost per gallon										-
Effect on water rate	4	5	4	4	5	3	5	2		4.00
Risk To Develop,	3	3	4	5	2	3	3	2		3.13
Risk of cost overrun	3	3	3	4	3	3	3	2		3.00
Quality Of Water,	5	4	5	5	4	5	5	5		4.75
Effect of color	3	1	3	4	5	4	4	5		3.63
Quantity Of Water,										-
Adequate supply	4	3	4	4	3	4	3	5		3.75
Have 10% head room										-
Have 20% headroom										-
Have 30% headroom										-
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4	4	4	4	3	4	4	5		4.00
Risk of contamination	3	3	4	5	4	3	4	4		3.75
Redundancy	4	4	4	5	3	4	3	4		3.88
Diversification	2	2	4	5	5	4	2	4		3.50
										-
										-
										-
										-

Cost info for Matrix

		Jason Value	Math Value
Whites Pond @ Town	16,215,000	2	1.9
Whites Pond @ pond	14,490,000	2	2.2
MWRA	26,000,000	1	0
OMR	3,908,425	4	4.2
Green Meadow	3,137,550	4	4.4

Please find the revised cost table. I have included the cost on a scale of 1-5.

While in the interest of getting this distributed and after looking at the calculus involved in the MWRA connection fee, I included MWRA as 1.

This seems reasonable as the pipe cost allow is almost 17 Million dollars and the cost for buy-in will quickly put the total cost over 25 million exceeding all other prospective alternatives.

Paul Boothroyd

	Weight from Criteria	Do Nothing	Bring on White Pond in Town	Bring on White Pond @ Pond	Join MWRA	Marlboro Road well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look for other sources
Operating Costs,	3.75	5	4	3	1	3	2	2	2	3
Capital Costs,	4.13	5	2	2	1	4	3	3	3	3
Cost Per Gallon	-	5	5	3	3	5	2	2	2	2
Effect On Water Rate	4.00	5	3	3	2	4	3	3	1	4
Risk To Develop,	3.13	5	3	3	2	3	1	1	1	3
Risk Of Cost Overrun	3.00	5	2	3	2	3	2	1	1	2
Quality Of Water,	4.75	2	5	5	2	2	1	1	1	2
Effect Of Color	3.63	2	5	5	2	2	1	1	1	2
Quantity Of Water,	-	2	5	4	2	1	1	1	1	2
Adequate Supply	3.75	1	5	5	4	4	1	1	1	2
Have 10% Head Room	-	4	5	4	4	5	3	3	1	4
Have 20% Headroom	-	3	5	4	3	5	2	2	1	3
Have 30% Headroom	-	1	5	4	2	5	1	1	1	2
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	2	5	4	2	4	2	2	2	2
Risk Of Contamination	3.75	4	4	4	3	5	1	1	1	3
Redundancy	3.88	3	4	3	2	3	2	3	4	3
Diversification	3.50	4	5	3	3	4	1	4	1	2
	-									
	-									
	-									
	-									

Composite score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	phase plan 2
	18.8	15.0	11.3	3.8	11.3	7.5	7.5	7.5	11.3	-
	20.6	8.3	8.3	4.1	16.5	12.4	12.4	12.4	12.4	-
	-	-	-	-	-	-	-	-	-	-
	20.0	12.0	12.0	8.0	16.0	12.0	12.0	4.0	16.0	-
	15.6	9.4	9.4	6.3	9.4	3.1	3.1	3.1	9.4	-
	15.0	6.0	9.0	6.0	9.0	6.0	3.0	3.0	6.0	-
	9.5	23.8	23.8	9.5	9.5	4.8	4.8	4.8	9.5	-
	7.3	18.1	18.1	7.3	7.3	3.6	3.6	3.6	7.3	-
	-	-	-	-	-	-	-	-	-	-
	3.8	18.8	18.8	15.0	15.0	3.8	3.8	3.8	7.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	8.0	20.0	16.0	8.0	16.0	8.0	8.0	8.0	8.0	-
	15.0	15.0	15.0	11.3	18.8	3.8	3.8	3.8	11.3	-
	11.6	15.5	11.6	7.8	11.6	7.8	11.6	15.5	11.6	-
	14.0	17.5	10.5	10.5	14.0	3.5	14.0	3.5	7.0	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,107.3	159.1	179.3	163.6	97.4	154.3	76.1	87.5	72.9	117.1	-
Multiplier 1.3	199.1	224.3	204.8	121.9	193.0	95.3	109.5	91.2	146.6	-

Dick Downey

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources
Operating Costs,	3.75	3	2	2	1	3	3	3	2	2
Capital Costs,	4.13	5	1.9	2.2	0	4.2	4.4	2.5	3	2
Cost Per Gallon	-	5	4	4	2	4	4	2	2	4
Effect On Water Rate	4.00	5	3	3	1	4	4	3	4	3
Risk To Develop,	3.13	5	3	3	2	4	4	4	1	1
Risk Of Cost Overrun	3.00	5	3	3	2	4	4	4	2	1
Quality Of Water,	4.75	3	5	5	5	2	3	3.5	3	3
Effect Of Color	3.63	1	5	5	5	2	1	4	4	3
Quantity Of Water,	-	1	5	5	5	4	3	4	1	3
Adequate Supply	3.75	1	5	5	5	5	4	4	2	2
Have 10% Head Room	-	4	5	5	5	5	5	5	4	5
Have 20% Headroom	-	3	5	5	5	3	4	5	2	3
Have 30% Headroom	-	1	5	5	5	2	3	4	1	2
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	2	5	5	5	3	3	3	1	2
Risk Of Contamination	3.75	3	4	4	5	3	3	3	4	4
Redundancy	3.88	1	4.4	4.4	5	2.2	1.9	2.2	1.1	1.5
Diversification	3.50	3	4	4	4	3	3	3	4	4
	-									
	-									
	-									
	-									

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	11.3	7.5	7.5	3.8	11.3	11.3	11.3	7.5	7.5	-
	20.6	7.8	9.1	-	17.3	18.2	10.3	12.4	8.3	-
	-	-	-	-	-	-	-	-	-	-
	20.0	12.0	12.0	4.0	16.0	16.0	12.0	16.0	12.0	-
	15.6	9.4	9.4	6.3	12.5	12.5	12.5	3.1	3.1	-
	15.0	9.0	9.0	6.0	12.0	12.0	12.0	6.0	3.0	-
	14.3	23.8	23.8	23.8	9.5	14.3	16.6	14.3	14.3	-
	3.6	18.1	18.1	18.1	7.3	3.6	14.5	14.5	10.9	-
	-	-	-	-	-	-	-	-	-	-
	3.8	18.8	18.8	18.8	18.8	15.0	15.0	7.5	7.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	8.0	20.0	20.0	20.0	12.0	12.0	12.0	4.0	8.0	-
	11.3	15.0	15.0	18.8	11.3	11.3	11.3	15.0	15.0	-
	3.9	17.1	17.1	19.4	8.5	7.4	8.5	4.3	5.8	-
	10.5	14.0	14.0	14.0	10.5	10.5	10.5	14.0	14.0	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,301.5	137.8	172.4	173.6	152.8	146.9	143.9	146.5	118.5	109.3	-
Multiplier 1.1	146.7	183.5	184.9	162.6	156.4	153.2	155.9	126.2	116.4	-

Ellen Duggan

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources
Operating Costs,	3.75	4	3	3	1	2	2	3	3	3
Capital Costs,	4.13	5	2	2	1	4	2	3	2	3
Cost Per Gallon	-	5	4	4	2	4	4	3	2	4
Effect On Water Rate	4.00	5	4	3	1	4	4	4	3	4
Risk To Develop,	3.13	5	4	3	4	2	2	3	2	2
Risk Of Cost Overrun	3.00	5	3	3	4	3	3	3	2	1
Quality Of Water,	4.75	3	5	5	4	2	3	3	3	3
Effect Of Color	3.63	1	5	3	4	1	4	4	4	2
Quantity Of Water,	-	2	5	5	4	3	3	4	3	2
Adequate Supply	3.75	1	5	5	4	3	3	4	2	2
Have 10% Head Room	-	4	5	5	5	4	4	4	4	4
Have 20% Headroom	-	3	5	5	5	3	3	3	2	3
Have 30% Headroom	-	1	5	5	5	2	3	3	2	2
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	2	5	5	5	3	3	4	2	3
Risk Of Contamination	3.75	3	1	1	3	3	3	3	4	3
Redundancy	3.88	1	4	4	5	2	2	3	2	3
Diversification	3.50	1	5	5	5	2	2	2	2	3
	-									
	-									
	-									
	-									

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	15.0	11.3	11.3	3.8	7.5	7.5	11.3	11.3	11.3	-
	20.6	8.3	8.3	4.1	16.5	8.3	12.4	8.3	12.4	-
	-	-	-	-	-	-	-	-	-	-
	20.0	16.0	12.0	4.0	16.0	16.0	16.0	12.0	16.0	-
	15.6	12.5	9.4	12.5	6.3	6.3	9.4	6.3	6.3	-
	15.0	9.0	9.0	12.0	9.0	9.0	9.0	6.0	3.0	-
	14.3	23.8	23.8	19.0	9.5	14.3	14.3	14.3	14.3	-
	3.6	18.1	10.9	14.5	3.6	14.5	14.5	14.5	7.3	-
	-	-	-	-	-	-	-	-	-	-
	3.8	18.8	18.8	15.0	11.3	11.3	15.0	7.5	7.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	8.0	20.0	20.0	20.0	12.0	12.0	16.0	8.0	12.0	-
	11.3	3.8	3.8	11.3	11.3	11.3	11.3	15.0	11.3	-
	3.9	15.5	15.5	19.4	7.8	7.8	11.6	7.8	11.6	-
	3.5	17.5	17.5	17.5	7.0	7.0	7.0	7.0	10.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,253.1	134.5	174.4	160.0	153.0	117.6	125.0	147.6	117.8	123.3	-
Multiplier 1.1	148.7	192.8	176.9	169.2	130.1	138.2	163.2	130.2	136.3	-

Jim Fulton

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
Operating Costs,	3.75	5	3	3	5	3	3	3	2	2	
Capital Costs,	4.13	5	1	2	2	3	3	3	3	2	
Cost Per Gallon	-	5	3	3	1	2	2	2	2	2	
Effect On Water Rate	4.00	5	2	2	1	3	3	2	2	2	
Risk To Develop,	3.13	5	4	4	3	1	1	2	1	2	
Risk Of Cost Overrun	3.00	5	3	3	3	3	2	2	1	2	
Quality Of Water,	4.75	1	5	5	4	1	1	2	2	2	
Effect Of Color	3.63	1	5	5	4	1	1	3	2	2	
Quantity Of Water,	-	1	5	5	4	1	1	2	1	2	
Adequate Supply	3.75	1	5	5	5	1	1	2	1	1	
Have 10% Head Room	-	1	5	5	5	1	3	3	1	1	
Have 20% Headroom	-	1	5	5	5	1	2	2	1	1	
Have 30% Headroom	-	1	5	5	5	1	1	1	1	1	
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	1	5	5	5	1	2	2	2	2	
Risk Of Contamination	3.75	3	4	4	3	1	1	4	1	2	
Redundancy	3.88	1	4	4	5	2	2	2	1	1	
Diversification	3.50	1	5	5	5	1	1	1	2	2	
	-										
	-										
	-										
	-										

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	18.8	11.3	11.3	18.8	11.3	11.3	11.3	7.5	7.5	-
	20.6	4.1	8.3	8.3	12.4	12.4	12.4	12.4	8.3	-
	-	-	-	-	-	-	-	-	-	-
	20.0	8.0	8.0	4.0	12.0	12.0	8.0	8.0	8.0	-
	15.6	12.5	12.5	9.4	3.1	3.1	6.3	3.1	6.3	-
	15.0	9.0	9.0	9.0	9.0	6.0	6.0	3.0	6.0	-
	4.8	23.8	23.8	19.0	4.8	4.8	9.5	9.5	9.5	-
	3.6	18.1	18.1	14.5	3.6	3.6	10.9	7.3	7.3	-
	-	-	-	-	-	-	-	-	-	-
	3.8	18.8	18.8	18.8	3.8	3.8	7.5	3.8	3.8	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	4.0	20.0	20.0	20.0	4.0	8.0	8.0	8.0	8.0	-
	11.3	15.0	15.0	11.3	3.8	3.8	15.0	3.8	7.5	-
	3.9	15.5	15.5	19.4	7.8	7.8	7.8	3.9	3.9	-
	3.5	17.5	17.5	17.5	3.5	3.5	3.5	7.0	7.0	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,070.4	124.8	173.5	177.6	169.8	78.9	79.9	106.0	77.1	82.9	-
Multiplier 1.3	161.5	224.6	230.0	219.8	102.1	103.4	137.2	99.8	107.3	-

Jason Kreil

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
Operating Costs,	3.75	5	3	3	1	4	4	4	3	1	
Capital Costs,	4.13	5	2	2	1	3	3	4	1	1	
Cost Per Gallon	-										
Effect On Water Rate	4.00	3	2	2	1	4	4	4	5	4	
Risk To Develop,	3.13	5	3	3	1	3	3	4	1	1	
Risk Of Cost Overrun	3.00	4	2	2	1	2	1	3	1	1	
Quality Of Water,	4.75	1	4	4	4	3	1	4	2	2	
Effect Of Color	3.63	1	5	5	1	5	2	4	3	2	
Quantity Of Water,	-										
Adequate Supply	3.75	2	5	5	5	4	2	4	1	1	
Have 10% Head Room	-										
Have 20% Headroom	-										
Have 30% Headroom	-										
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	1	5	5	1	4	3	4	2	3	
Risk Of Contamination	3.75	4	4	4	4	4	4	4	4	4	
Redundancy	3.88	1	4	4	5	4	3	4	1	1	
Diversification	3.50	1	4	4	4	4	4	4	1	1	
	-										
	-										
	-										
	-										

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	18.8	11.3	11.3	3.8	15.0	15.0	15.0	11.3	3.8	-
	20.6	8.3	8.3	4.1	12.4	12.4	16.5	4.1	4.1	-
	-	-	-	-	-	-	-	-	-	-
	12.0	8.0	8.0	4.0	16.0	16.0	16.0	20.0	16.0	-
	15.6	9.4	9.4	3.1	9.4	9.4	12.5	3.1	3.1	-
	12.0	6.0	6.0	3.0	6.0	3.0	9.0	3.0	3.0	-
	4.8	19.0	19.0	19.0	14.3	4.8	19.0	9.5	9.5	-
	3.6	18.1	18.1	3.6	18.1	7.3	14.5	10.9	7.3	-
	-	-	-	-	-	-	-	-	-	-
	7.5	18.8	18.8	18.8	15.0	7.5	15.0	3.8	3.8	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	4.0	20.0	20.0	4.0	16.0	12.0	16.0	8.0	12.0	-
	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	-
	3.9	15.5	15.5	19.4	15.5	11.6	15.5	3.9	3.9	-
	3.5	14.0	14.0	14.0	14.0	14.0	14.0	3.5	3.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,212.9	121.3	163.3	163.3	111.8	166.6	127.9	178.0	96.0	84.9	-
Multiplier 1.1	138.5	186.5	186.5	127.7	190.4	146.1	203.4	109.7	97.0	-

Gene Redner

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
Operating Costs,	3.75	3	4	3	1	2	3	3	3	2	
Capital Costs,	4.13	5	1	2	1	3	3	2	4	3	
Cost Per Gallon	-	5	4	4	2	3	3	3	3	3	
Effect On Water Rate	4.00	5	3	3	1	4	3	3	3	3	
Risk To Develop,	3.13	5	3	3	5	2	2	3	2	2	
Risk Of Cost Overrun	3.00	5	3	3	3	4	2	3	2	2	
Quality Of Water,	4.75	2	5	5	5	2	3	4	2	3	
Effect Of Color	3.63	1	5	5	5	2	3	3	3	2	
Quantity Of Water,	-	3	5	5	4	4	4	4	3	3	
Adequate Supply	3.75	1	5	5	5	5	4	5	4	2	
Have 10% Head Room	-	4	5	5	5	5	4	5	4	4	
Have 20% Headroom	-	2	5	5	5	3	4	5	4	3	
Have 30% Headroom	-	1	5	5	5	1	4	4	4	2	
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	2	5	5	5	3	3	3	3	3	
Risk Of Contamination	3.75	3	1	1	5	4	4	3	4	3	
Redundancy	3.88	1	5	5	5	2	2	3	2	3	
Diversification	3.50	1	5	5	5	1	1	2	2	3	
	-										
	-										
	-										
	-										

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	11.3	15.0	11.3	3.8	7.5	11.3	11.3	11.3	7.5	-
	20.6	4.1	8.3	4.1	12.4	12.4	8.3	16.5	12.4	-
	-	-	-	-	-	-	-	-	-	-
	20.0	12.0	12.0	4.0	16.0	12.0	12.0	12.0	12.0	-
	15.6	9.4	9.4	15.6	6.3	6.3	9.4	6.3	6.3	-
	15.0	9.0	9.0	9.0	12.0	6.0	9.0	6.0	6.0	-
	9.5	23.8	23.8	23.8	9.5	14.3	19.0	9.5	14.3	-
	3.6	18.1	18.1	18.1	7.3	10.9	10.9	10.9	7.3	-
	-	-	-	-	-	-	-	-	-	-
	3.8	18.8	18.8	18.8	18.8	15.0	18.8	15.0	7.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	8.0	20.0	20.0	20.0	12.0	12.0	12.0	12.0	12.0	-
	11.3	3.8	3.8	18.8	15.0	15.0	11.3	15.0	11.3	-
	3.9	19.4	19.4	19.4	7.8	7.8	11.6	7.8	11.6	-
	3.5	17.5	17.5	17.5	3.5	3.5	7.0	7.0	10.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,282.8	126.0	170.8	171.1	172.8	127.9	126.3	140.4	129.1	118.5	-
Multiplier 1.1	136.1	184.5	184.9	186.6	138.1	136.4	151.6	139.5	128.0	-

Peter Reed

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources
Operating Costs,	3.75	3	2	1	5	4	4	3	4	3
Capital Costs,	4.13	5	1	1	1	4	3	3	2	1
Cost Per Gallon	-	4	2	2	1	4	4	2	3	3
Effect On Water Rate	4.00	3	1	1	1	3	3	2	2	2
Risk To Develop,	3.13	5	2	2	1	4	1	4	2	2
Risk Of Cost Overrun	3.00	5	3	3	3	4	1	4	3	3
Quality Of Water,	4.75	5	4	4	5	4	3	4	3	3
Effect Of Color	3.63	5	5	5	5	4	3	4	3	3
Quantity Of Water,	-	5	5	5	5	5	3	4	3	3
Adequate Supply	3.75	3	5	5	5	5	3	4	3	3
Have 10% Head Room	-	5	3	3	3	3	3	3	3	3
Have 20% Headroom	-	4	4	4	4	4	4	4	3	3
Have 30% Headroom	-	3	5	5	5	5	5	5	3	3
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	4	5	5	5	5	3	5	4	4
Risk Of Contamination	3.75	3	2	2	4	3	3	3	3	3
Redundancy	3.88	3	5	5	5	4	4	5	4	4
Diversification	3.50	1	5	5	5	3	3	5	3	3
	-									
	-									
	-									
	-									

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	11.3	7.5	3.8	18.8	15.0	15.0	11.3	15.0	11.3	-
	20.6	4.1	4.1	4.1	16.5	12.4	12.4	8.3	4.1	-
	-	-	-	-	-	-	-	-	-	-
	12.0	4.0	4.0	4.0	12.0	12.0	8.0	8.0	8.0	-
	15.6	6.3	6.3	3.1	12.5	3.1	12.5	6.3	6.3	-
	15.0	9.0	9.0	9.0	12.0	3.0	12.0	9.0	9.0	-
	23.8	19.0	19.0	23.8	19.0	14.3	19.0	14.3	14.3	-
	18.1	18.1	18.1	18.1	14.5	10.9	14.5	10.9	10.9	-
	-	-	-	-	-	-	-	-	-	-
	11.3	18.8	18.8	18.8	18.8	11.3	15.0	11.3	11.3	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	16.0	20.0	20.0	20.0	20.0	12.0	20.0	16.0	16.0	-
	11.3	7.5	7.5	15.0	11.3	11.3	11.3	11.3	11.3	-
	11.6	19.4	19.4	19.4	15.5	15.5	19.4	15.5	15.5	-
	3.5	17.5	17.5	17.5	10.5	10.5	17.5	10.5	10.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,385.8	170.0	151.1	147.4	171.5	177.5	131.1	172.8	136.1	128.3	-
Multiplier 1.0	170.0	151.1	147.4	171.5	177.5	131.1	172.8	136.1	128.3	-

Herb Symes

	Weight from Criteria	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources
Operating Costs,	3.75	5	2	3	1	3	3	2	1	1
Capital Costs,	4.13	5	2	2	1	3	3	2	1	1
Cost Per Gallon	-	5	3	4	1	2	2	2	1	1
Effect On Water Rate	4.00	5	2	2	1	3	3	2	1	1
Risk To Develop,	3.13	3	3	4	1	2	1	2	1	1
Risk Of Cost Overrun	3.00	5	3	4	1	2	2	2	1	1
Quality Of Water,	4.75	1	5	5	5	2	1	2	1	2
Effect Of Color	3.63	1	5	5	5	2	2	2	2	2
Quantity Of Water,	-	1	5	5	5	3	2	2	1	2
Adequate Supply	3.75	1	5	5	5	2	2	2	1	2
Have 10% Head Room	-	2	5	5	4	2	2	2	1	2
Have 20% Headroom	-	2	5	5	5	2	2	2	1	2
Have 30% Headroom	-	1	5	5	5	2	2	2	1	2
Chance Of Good Quality And Quantity Of Water Proven Over Time.	4.00	1	5	5	5	2	2	2	1	1
Risk Of Contamination	3.75	2	4	4	5	2	2	2	1	1
Redundancy	3.88	1	4	4	4	2	2	2	1	1
Diversification	3.50	2	5	5	5	2	2	2	1	1
	-									
	-									
	-									
	-									

Composit score

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources	
	18.8	7.5	11.3	3.8	11.3	11.3	7.5	3.8	3.8	-
	20.6	8.3	8.3	4.1	12.4	12.4	8.3	4.1	4.1	-
	-	-	-	-	-	-	-	-	-	-
	20.0	8.0	8.0	4.0	12.0	12.0	8.0	4.0	4.0	-
	9.4	9.4	12.5	3.1	6.3	3.1	6.3	3.1	3.1	-
	15.0	9.0	12.0	3.0	6.0	6.0	6.0	3.0	3.0	-
	4.8	23.8	23.8	23.8	9.5	4.8	9.5	4.8	9.5	-
	3.6	18.1	18.1	18.1	7.3	7.3	7.3	7.3	7.3	-
	-	-	-	-	-	-	-	-	-	-
	3.8	18.8	18.8	18.8	7.5	7.5	7.5	3.8	7.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	4.0	20.0	20.0	20.0	8.0	8.0	8.0	4.0	4.0	-
	7.5	15.0	15.0	18.8	7.5	7.5	7.5	3.8	3.8	-
	3.9	15.5	15.5	15.5	7.8	7.8	7.8	3.9	3.9	-
	7.0	17.5	17.5	17.5	7.0	7.0	7.0	3.5	3.5	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
1,013.6	118.3	170.8	180.6	150.4	102.4	94.5	90.5	48.9	57.4	-
Multiplier 1.4	161.7	233.4	246.9	205.6	140.0	129.2	123.7	66.8	78.4	-

FINAL TALLY

	Do Nothing	Bring On White Pond In Town	Bring On White Pond @ Pond	Join Mwra	Expand Marlboro Road Well	New Well 4 Green Meadow	Phased Plan I	Country Club Well	Look For Other Sources
High Score	1,091.6	1,355.4	1,337.3	1,179.3	1,072.0	904.6	1,069.2	796.4	821.6
Normalized	1,262.4	1,580.9	1,562.2	1,364.8	1,227.6	1,032.9	1,217.4	899.6	938.2

APPENDIX XVI – Rate Setting Analysis

COMMITMENT & INTEGRITY
DRIVE RESULTS

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WOODARD &CURRAN

May 24, 2010

Mr. Jerry Flood
Superintendent – Maynard DPW
195 Main Street
Maynard, MA 01754

Re: Water and Sewer Financial Management
Utility Rate Setting

Dear Mr. Flood:

This letter is intended to provide guidance to the Maynard Department of Public Works (DPW) and Board of Selectmen (BOS) with respect to the Water and Sewer Rates which are required to fully fund water and sewer operations within the Town of Maynard. In developing this recommendation, Woodard & Curran (W&C) examined the following items:

1. The revenue requirements for both water and sewer services, inclusive of all budgeted costs associated with operating and maintaining the Town's infrastructure, specifically:
    a. salaries and other direct expenses
    b. the cost of DPW benefits, non-DPW municipal departmental, and other indirect expenses;
    c. the increase in the cost of debt service associated with ongoing sewerage upgrades.
2. Two years of historical consumption data, considering the following effects:
    a. differential consumption patterns between user rate classes; and
    b. abatement documentation/procedures.
3. The rates required to meet the water and sewer system financial needs.

This letter also documents the methodology used in establishing the rate recommendation and summarizes the information provided by the Town used in this assessment. Finally, this letter provides a list of items which the Board of Selectmen may wish to consider changing in future rate settings.

REVENUE REQUIREMENTS

Town Water and Sewer Budgets

In setting water and sewer rates, the primary goal is to match revenue to expenses, allowing for any desired adjustments or non-expense line items which need to be raised through the utility rates. The FY2011 Water Enterprise budget, approved as Article 4 at the 2010 Annual Town Meeting, includes overall water salary and expense data, as well as straight-funded line items for debt for FY2011.

The FY2011 Sewer Enterprise budget, approved as Article 5 at the 2010 Annual Town Meeting, includes the same costs broken down into categories for the wastewater treatment plant and the costs for the Town's sewer system. A simplified breakdown from the two Articles is presented on the Table on the following page.

FY2011 Operating Budgets	Water – Art.4	Wastewater – Art.5
Salary	$ 229,300	$ 445,619
Expenses	$462,235	$ 700,829
Long Term DS – Principal	$ 463,806	$ 619,768
Long Term DS – Interest	$160,748	$ 268,209
Direct Cost Budget - Subtotal	**$1,316,089**	**$ 2,034,425**

Water and Sewer Indirect Costs – DPW

There are significant costs to the municipality associated with the DPW which are not reflected in the direct cost approved budgets (salaries and expenses). Two good examples of these are the cost associated with the billing process (handled by staff funded through the highway department) and the cost of providing employment benefits for staff whose salaries are included in the budget. A detailed breakdown of these costs and the method by which their values were calculated is included in the attached memo titled, "Indirect Costs Allocation Methodology." The value of indirect costs applicable to either water or sewer is proportional based on the overall utility costs. In Maynard, the water accounts for 40.1% of indirect costs and sewer accounts for 59.9% of indirect costs.

	Water	Wastewater
DPW Indirect Costs – Subtotal	**$143,820**	**$ 215,015**

Water and Sewer Indirect Costs – Non-DPW Municipal Depts.

Similar to the DPW indirect costs outlined above, there are significant amounts of time and effort expended by other Town departments in support of providing water and sewer service within the Town. An excellent example of this type of effort is the time spent by the Treasurer/Collector's office in collecting bills. There are numerous similar instances in other departments and these costs should be covered within the rates as they are included in the true cost of water and sewer utilities.

	Water	Wastewater
Municipal Indirect Costs – Subtotal	**$ 82,554**	**$ 123,421**

Enterprise Stabilization Funds

In Articles 6 and 7 of the Town Warrant, a sum of $135,000 was appropriated to each Enterprise Accounts. As costs which are directly attributable to the provision of water and sewer utilities, these costs should be carried within the revenue requirements.

	Water – Art.6	Wastewater – Art.7
Enterprise Stabilization Funds – Appropriated Subtotal	**$135,000**	**$ 135,000**

Capital Outlays

In Article 13 of the Town Warrant, a sum of $212,000 has been appropriated from Water Enterprise Free Cash to pay for a series of line items expenditures and $35,000 has been appropriated to pay for a mandatory I/I Study on the sewer system. Following these expenditures, a total of $65,783 ans $106,277 will remain in the free cash for the water and sewer enterprise accounts, respectively. If the Selectmen wish to replace this money through the rates, these values should be added onto the Revenue Requirement total.

	Water – Art.13	Wastewater – Art.13
Capital Outlay – Appropriated Subtotal	**$212,000**	**$ 35, 000**

Note: The value of these Capital Outlays has not been included in the Revenue Requirement calculation.

Total Revenue Requirements for Water and Sewer

The table below presents the total costs associated with the provision of water and sewer utility service within the Town of Maynard. Consequently, the Town should use the figures in the bottom, highlighted line as the targeted revenue levels for each Enterprise Account for FY2011.

Direct Cost Budget – Appropriated Subtotal	**$1,316,089**	**$ 2,034,425**
DPW Indirect Costs – Subtotal	**$143,820**	**$ 215,015**
Municipal Indirect Costs – Subtotal	**$ 82,554**	**$ 123,421**
Enterprise Stabilization Funds – Appropriated Subtotal	**$135,000**	**$ 135,000**
TOTAL ENTERPRISE FUND REVENUE REQUIREMENT	**$1,677,462**	**$2,507,861**

RATE CALCULATION

Current Practices

The Town of Maynard currently bills water on an increasing rate block structure with an additional mark-up applied to customers located in adjacent municipalities. Sewer is billed on a flat rate structure, also with a mark-up applied to customers located in adjacent municipalities. For the past several years, the water rate structure has been based upon four consumption tiers, billed bi-annually. The table below shows the rates that are currently in effect for water and sewer customers. Tier and non-resident water rate multipliers are shown red in parentheses next to each water rate.

CURRENT RATE STRUCTURE IN MONETARY TERMS AND COMPARATIVE TO TIER 1 RATES

Block #	1	2	3	4
Consumption (cf/biennium)	0-1000	1001-2000	2000-5000	>5000
WATER - in town	$4.90 (1.00)	$6.31 (1.29)	$6.78 (1.38)	$7.73 (1.58)
SEWER - in town	$6.38 (1.00)	$6.38 (1.00)	$6.38 (1.00)	$6.38 (1.00)
WATER - non-resident	$6.85 (1.40)	$8.83 (1.80)	$9.49 (1.94)	$10.89 (2.22)
SEWER - non-resident	$8.88 (1.39)	$8.88 (1.39)	$8.88 (1.39)	$8.88 (1.39)

Based upon a review of the financial performance of the existing rates in past years, it appears that the existing rate structure has been generating significant amounts of free cash over the preceding two fiscal years (since adoption of the current rates in October 2008). The excess revenues are included in the DOR-certified free cash values in each Enterprise Account, most of which will be expended through Article 13 of the FY2011 Town Warrant.

Non-Rate Based Revenue

Non-rate based revenues include things such as fees, fines, and service charges which generate revenue for the W&S enterprise accounts. These fees are assessed by the DPW and (in Maynard) are not included in the water and sewer commitments. Based upon recent year's assessment of fees and fines, the Maynard DPW requested that W&C assume a similar level of non-rate based revenue

generation. For FY2010, these fees and fines totaled approximately $30,300 for the water enterprise account and $65,000 for the sewer enterprise account. A total value of rate-based revenues is shown at the bottom of the following table.

CALCULATION OF REVENUES TO BE RAISED BY WATER AND SEWER RATES

	Water	Sewer
TOTAL ENTERPRISE FUND REVENUE REQUIREMENT	$1,677,462	$2,507,861
less Projected Non Rate Based Revenues	$30,300	$65,000
RATE-BASED REVENUE REQUIREMENT	$1,647,162	$2,442,861

Review of Past Consumption/Water Use Trends

W&C conducted an in-depth review of three years of billing records maintained by the Maynard DPW. The review was completed based upon two separate downloads of the Town's current water and sewer accounting system (Vadar). Consumption records were reviewed for consistency with billing records, errors in meter reading, and the completion of bill/consumption abatement procedures.

Due to the inclusion of a significant level of meter reading errors within the consumption database, W&C completed modifications to the billing records to establish average billing volumes for both water and sewer. The types of errors which were corrected included cases in which a prior billing periods estimated bill resulted in a meter reading in excess of the actual reading taken during the following bill period. These errors introduced large, identifiable errors into the consumption database which, when identified, were removed from the record. The modified consumption levels for the four billing periods for FY2009 and FY2010 are summarized on the table below. It should be noted that although historical billing volumes are often determined using three years of records, the volumes of errors within the FY2008 consumption database precluded its inclusion in this assessment.

Annualized Volumes	Water Consumption (cf)	%	Sewer Consumption (cf)
Tier 1	7,212,590	24.4%	6,834,521
Tier 2	6,063,928	20.5%	5,774,683
Tier 3	8,947,179	30.3%	8,509,923
Tier 4	7,311,255	24.8%	7,241,802
Sum	29,534,951	100%	28,360,927

A full breakdown of the past two years of consumption by billing tier is included in the table below.

METERED CONSUMPTION BY TIER AND BILLING PERIOD FOR FY09 and FY10

Water				Sewer	
First half - FY2009					
Volume (cf)					
Tier 1	3,595,304	23.96%		3,383,209	
Tier 2	3,011,161	20.07%		2,841,419	
Tier 3	4,438,655	29.58%		4,156,789	
Tier 4	3,958,709	26.38%		3,847,570	
	15,003,829			14,228,987	

Second half - FY2009					
Volume (cf)					
Tier 1	3,570,980	24.84%		3,403,402	
Tier 2	3,022,928	21.03%		2,899,068	
Tier 3	4,465,197	31.06%		4,285,185	
Tier 4	3,317,918	23.08%		3,282,514	
	14,377,023			13,870,169	
First half - FY2010					
Volume (cf)					
Tier 1	3,648,151	23.77%		3,438,597	
Tier 2	3,072,099	20.02%		2,915,575	
Tier 3	4,623,951	30.13%		4,398,807	
Tier 4	4,000,908	26.07%		4,036,821	
	15,345,109			14,789,800	
Second half - FY2010					
Volume (cf)					
Tier 1	3,610,744	25.17%		3,443,833	
Tier 2	3,021,668	21.07%		2,893,303	
Tier 3	4,366,554	30.44%		4,179,064	
Tier 4	3,344,975	23.32%		3,316,698	
	14,343,941			13,832,898	

Consumption Adjustment

Due to the multi-tier rate structure currently in place within Maynard, consumption volumes must be adjusted to reflect the higher rates charged to customers in Tiers 2 through 4. This adjustment is critical for rate setting since the high volume users pay a disproportionately higher percentage of the utility operating costs than low volume users, in comparison to their actual usage. Additionally, W&C reviewed the consumption figures for both out-of-town users and Town residents who receive the elderly Tier 1 usage credit. The water and sewer volumes consumed by these two sets of users totaled approximately 0.8% of total consumption, a small enough amount that the revenue impacts of these alternate rate structures should not be taken into account in the rate calculation.

The table below reflects the adjusted consumption volumes broken down by tier. As discussed on the preceding page, the volumes of Tiers 2 through 4 have been increased by the respective water rate "premium" associated with each tier. Since sewer rates have a flat rate structure, no adjustment has occurred to these volumes.

ADJUSTED MAYNARD WATER AND SEWER CONSUMPTION

Adjusted Annualized Volumes	Adjusted Water Consumption	%	Sewer Consumption
Tier 1	7,212,590	18.5%	6,834,521
Tier 2	7,808,854	20.1%	5,774,683
Tier 3	12,379,974	31.8%	8,509,923
Tier 4	11,533,878	29.6%	7,241,802
Sum	**38,935,295**	**100%**	**28,360,927**

It should be noted that the process of switching from bi-annual billing to quarterly billing (from the standpoint of rate setting) will be revenue neutral because Maynard is dividing each of the four tier class volumes by two to account for the more frequent billing periods.

Break-even Base Rate Calculation

Once the adjusted consumption volumes have been calculated (shown in the table above), the determination of the water base rate and sewer rate are straight-forward calculations. The rates are calculated by dividing the water and sewer rate-based revenue requirements by the adjusted consumption values, after projecting the reduced water and sewer usage for the following year. Based upon recent water use records for multiple communities within Massachusetts, the adjusted consumption values shown above have been reduced by 3% to reflect the trend of declining water usage.

The table on the following page shows the rates required for the Maynard water and sewer enterprise accounts to "Break-even" in FY 2011. Rates calculated using today's comparative rate structure are shown on the left. An alternate, less progressive, tier structure is shown on the right. The alternate tier structure is based upon 10% incremental increases in the water rate between tiers.

BREAK-EVEN WATER & SEWER RATES

		Current Tier Structure			
		W	% Change	S	% Change
In-Town	Tier 1	4.36	-11.0%	8.88	39.2%
	Tier 2	5.62	-11.0%	8.88	39.2%
	Tier 3	6.03	-11.0%	8.88	39.2%
	Tier 4	6.88	-11.0%	8.88	39.2%
Out of Town	Tier 1	6.10	-11.0%	12.36	39.2%
	Tier 2	7.86	-11.0%	12.36	39.2%
	Tier 3	8.45	-11.0%	12.36	39.2%
	Tier 4	9.69	-11.0%	12.36	39.2%

Assuming the Town retains its current tier structure, these rate changes constitute an across the board reduction in the water rate of 11.0% and an increase in the sewer rate of 39.2%.

ADDITIONAL CONSIDERATIONS

1. Consider adding a capital improvement reserve line item into the water and sewer budgets.
   Since W&C is proposing switching to a "break-even" rate setting, the Town may wish to consider the inclusion of a capital reserve line items in the water and sewer budgets (or the revenue requirement calculations). This inclusion would help to fund needed equipment replacements/upgrades and would assist in covering any potential revenue shortfalls in future years. In the event that the excess revenues remained unspent at the end of the fiscal year, they would transfer into the enterprise account free cash. The table presented at the top of the following page shows the rate impact of including an additional $100,000 in revenues on the water and sewer rates.

RATE IMPACT OF ADDITIONAL REVENUES

	Water	Sewer
Additional Revenue	$100,000	$100,000
Rate Impact ($/hcf)	0.26	0.36

2. Billing Practices for Resident v. Non-resident Customers

The Town of Maynard currently bills water and sewer usage to non-residents at a 40% premium as compared to Town residents. Based upon a request by the BOS, W&C has completed a review of other communities which sell water and sewer services to non-residents. The table is based upon our search of publically available rate documentation and reflects the findings of this review.

RATE PREMIUMS FOR NON-RESIDENT CUSTOMERS

Community Selling Water & Sewer Services	Premium to non-resident customers (W%/S%)
Andover	8.9% / 8.9%
Leominster	33.9% / 130.0%
Worcester	19.1%/19.1%

*Communities hich sell water to other communities at a wholesale rate have not been included in the table above

Based upon the results of our review, Maynard appears to be within the spectrum of premiums charged by communities to non-resident customers within Massachusetts.

3. Consider an Alternate Comparative Rate Structure

The Town of Maynard may wish to consider altering its current comparative water rate structure to reflect a less "steep" rate curve. The table below presents the break-even rates which could be used if the water rate increased by 10% per Tier.

BREAK-EVEN WATER & SEWER RATES

		Alternate Comparative Tier Structure			
		W	**% Change**	**S**	**% Change**
In-Town	**Tier 1**	4.98	1.6%	8.88	39.2%
	Tier 2	5.47	-13.3%	8.88	39.2%
	Tier 3	5.97	-11.9%	8.88	39.2%
	Tier 4	6.47	-16.3%	8.88	39.2%
Out of Town	**Tier 1**	7.46	9.0%	13.32	50.0%
	Tier 2	8.21	-7.0%	13.32	50.0%
	Tier 3	8.96	-5.6%	13.32	50.0%
	Tier 4	9.70	-10.9%	13.32	50.0%

Use of the alternate tier structure shown above would results in a marginal increase in the Tier 1 water rates but decreases for the other three Tiers. As the sewer bills are dependent upon a flat rate structure, they remain unchanged from the original assessment.

Closing

W&C has been pleased to provide this guidance on Maynard's water and sewer rates. If you have any questions on the recommendations included in this letter, please fell free to contact me either in my office or via e-mail at tfedder@woodardcurran.com.

Sincerely,
WOODARD & CURRAN INC.

Toby Fedder, P.E.
Project Manager

2030630.02

cc: Mike Sullivan; Maynard
Juli Colpoys; Maynard
Dorothy Jay; Maynard
Bob Chapell, W&C
Jessica Richard, W&C

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MEMORANDUM

WOODARD &CURRAN

TO: Mr. Jerry Flood, Superintendent – Maynard DPW
Ms. Juli Colpoys, Finance Director – Town of Maynard

FROM: Toby Fedder, P.E.

DATE: May 24, 2010 cc: R.. Chapell & J. Richard, W&C

RE: Water and Sewer Rate Setting
Indirect Cost Allocation Methodology

This memo is intended to document the methodology used in establishing indirect costs assignable to the Water and Sewer (W&S) Enterprise Funds as part of the rate setting process for Fiscal Year 2011 (FY2011). The indirect costs were identified for non-W&S sources within Department of Public Works (DPW) as well as other Town of Maynard Departments which provide identifiable services to the DPW in support of delivering W&S services to the Town. A breakdown of the W&S indirect costs with a brief description of the reasoning for each indirect costs is provided below:

A. Additional DPW Costs Assignable to W&S Accounts

Portions of the non-W&S DPW budgets have been assigned to W&S accounts based upon the portion of those costs which are related to the provision of W&S services. The percentage of time and budget expended in support of W&S by the various offices is based upon verbal feedback provided by Town staff.

Employee Benefits

With 8 employees, W&S accounts for 9.3% of the Town's 86 current non-school employees. Extending this to the Town's current Employee benefit appropriation of $1,589,281, the W&S personnel receive an estimated $147,840 worth of benefits which are assignable to the W&S accounts.

Retirement Benefits

There are currently 5 W&S retirees, accounting for 9.3% of the 54 former Town employees currently receiving retirement benefits. To reflect this cost, $80,494 has been applied to the W&S accounts (equal to 9.3% of the FY2011 Town Retirement Appropriation of $869,333).

Highway Costs

Salaries for personnel who provide specific W&S management and billing functions are currently carried within the highway budget. In addition, the highway department provides on-the-clock equipment and personnel assistance in the event of main breaks. Based upon the level of effort expended directly in support of the water and sewer departments, the DPW estimates that 20% of the highway budget is spent directly in support of W&S operations. Extended to the FY2011 Highway budget of $522,060, a total of $104,412 has been applied to the W&S indirect costs.

B. Town Departmental Costs Assignable to W&S Accounts

To account for costs of providing support for W&S services, portions of other Maynard Departmental budgets were assigned to W&S accounts based upon the portion of their work which is directly related to W&S services. The method by which the amount of assignments was determined is detailed below. The percentage of time and budget expended in support of W&S by the various offices is based upon verbal feedback provided by Town staff.

Selectmen's Office

The Selectmen's Office (including the Town Administrator) provide identifiable support to W&S services in the form of hearings, water and sewer rate setting meetings, and budgeting. Additionally, the Selectmen provide support to their constituents on W&S issues. To account for the cost of these activities, 20% of the Board of Selectmen's budget (totaling $53,001) has been assigned to the W&S accounts.

Finance Committee

Similar to Selectmen's Office, the Finance Committee supports the hearings, meetings, and rate setting associated with providing water and sewer services to the Town of Maynard. To account for the cost of these activities, 5% of the Finance Committee's budget ($125) has been assigned to the W&S accounts.

Accounting Office

The Accounting Office provides several identifiable services to the water and sewer services, including handling payroll, budgeting assistance, A/P, final reads, and providing financial oversight of the enterprise accounts. It is estimated that this level of support requires 20% of the Accounting Office's resources. To account for this level of support, $25,683, or 20% of the Municipal Finance budget, has been assigned to the W&S accounts.

Assessor's Office

The Assessor's Office provides support to the W&S services through its management of the billing and abatement processes, as well as providing betterment assessment of properties in Town. It is estimated that work in support of W&S service accounts for 8% of the Assessor's Office budget. Consequently, $18,955, or 8% of the Assessor's Office budget, has been assigned to the W&S accounts.

Treasurer/Collector's Office

The Treasurer/Collector's Office provides significant identifiable assistance to the water and sewer utilities in the form of bill collection, payment processing, payroll processing, and bonding assistance. As a result, 35% of the Treasurer/Collector's budget (totaling $45,182) has been assigned to the W&C accounts.

Police Department

The Police Department supports occasional calls to assist with traffic control during main breaks, pipe inspection, and with private property access for Water and Sewer purposes. Support level is identified as 0.5% of the police budget. To account for this support, $19,244 (equivalent to 0.5% of the police budget) has been applied to the W&S accounts.

Board of Health

The Health Department provides support to the W&S services through the testing of storm water/run-off (which could identify sewer leaks) and the handling of water and sewer customer complaints. To account for the cost of providing this support, $2,607 has be assigned to the W&S accounts.

C. Non-W&S Benefits Costs Assignable to W&S Accounts

In the Town of Maynard, the costs of providing benefits to Town employees are not assigned to Departmental budgets, so the costs derived in Section B above do not reflect the true cost to Maynard to provide the support activities discussed. To account for this, the personnel cost allocations detailed in Sections A and B above were adjusted to factor in the cost of benefits

The method used for adjusting these costs was to determine the percentage of the overall town budget which was benefits-related and to correct each of the indirect assigned costs accordingly. In the case of Maynard, providing employee benefits accounts for approximately 25% of the non-school municipal budget, yielding a correction factor of 1.25 on the indirect personnel costs identified above.

APPENDIX XVII – FAQ

Q: How does the cost of Maynard's water compare to other communities?

A: The cost varies depending on the amount used. For the average homeowner the cost in of surrounding towns is:

Acton	@	
Concord	@	
Hudson	@	
Maynard	@	$5.42 per hundred Cubic Feet
Marlboro	@	
Stow	@	No Municipal System
Sudbury	@	

Q: What is Hundred Cubic Feet in Gallons?

A: 1 cubic foot = approximately 7.48 US gallons
100 Cubic Feet = approximately 748

Q: How does the cost of Maynard Water vs. the cost of bottled water

A: The cost of Maynard water is a little less than a penny per gallon ($0.0072)
Shaw's sells its house brand for 95 cents per gallon

Q: If I vote for the upgrade how much will a gallon of water cost?

A: Depending on which option is finally chosen it will be between $0.0089 and $0.014 per gallon ($7.04 to 10.30 per hundred cubic feet)

Q: Will this upgrade eliminate summer water bans?

A: The summer water bans are independent of our actual supply situation. The state has procedures that determine water bans on a more regional level and the level of the Assabet River. For more detail on this decision making see **Error! Reference source not found.**

APPENDIX XVIII - Information from State Re Water Bans

2. Water Bans.
   a. While not part of the scope of our investigation, we feel that there should be an understanding of the purpose of the ban and that their reasons for existence are not directly related to our recommendations and whether they stay or go will not be affected by any recommendation and / or follow through that we make.

   b. Below is a summary explanation by the MassDEP for your edification:

      Q: I just drove through town and saw signs that said Maynard has water restrictions - odd/even days/house numbers.Town hall says its a state drinking water requirement. With all the rain we have been having why are we under a water restriction?

      A: MassDEP's Water Management Act (WMA) Program is responsible for the management of the Commonwealth's water resources which includes balancing competing water withdrawals, uses, and preservation. A condition that requires restricting non-essential outdoor water use is included in Maynard's WMA permit. The condition is based on the residential use from the previous year. WMA permittees are also required to meet a residential use of 65 gallons per person per day. This condition is taken from the Massachusetts Water Resources Commission's (WRC) performance standards for effective water conservation for public water suppliers. The WRC is comprised of state officials and public members and is responsible for developing, coordinating and overseeing the Commonwealth's water policy and planning activities.

      Since Maynard's residential use in 2010 met the performance standard, they are required to restrict nonessential outdoor water use to the hours of 9 pm to 5 am. They can choose to implement this restriction from May through September so that the implementation and public notification process is easier for them, or they can watch the assigned United States Geological Survey (USGS) gage on the Assabet River and wait until the river declines to a flow designation in the permit and then implement the restrictions. Permittees that do not meet the standard are required to limit the number of days of nonessential outdoor water use to one or two days per week depending on where their sources of water are located. Maynard's decision to add an odd/even component to the restriction is their choice. This will help them to continue to meet the 65 gallon standard.

      The hourly restriction is to promote smart water use and to lessen the loss of water evaporated from irrigation systems. Envision the neighbor watering their lawn at noon on hot summer's day. The hourly restriction also benefits water suppliers that are trying to meet peak demand. Water use, much like electricity, has peak days and hours that a supplier may struggle to meet.

Watering in the early morning or at night will ease this concern. MassDEP's decision to include May in the calendar option is to preserve the resource before an issue arises. As we saw last year, spring was plentiful with precipitation and then in the summer three of the Commonwealth's six water resource management regions were issued a drought advisory.

MassDEP has worked closely with water suppliers and environmental groups over the years to find a balance that works for all. I hope I have successfully addressed your question. Please feel free to call or email me again. Here is an excerpt from the permit that describes the exceptions.

As stated in Special Condition 8, in Water Management Act permits, "nonessential outdoor water use" includes uses that are not required:

a. for health or safety reasons;
b. by regulation;
c. for the production of food and fiber;
d. for the maintenance of livestock; or
e. to meet the core functions of a business (for example, irrigation by golf courses as necessary to maintain tees, greens, and limited fairway watering, or irrigation by plant nurseries as necessary to maintain stock).

Examples of **nonessential** outdoor water uses include:

- irrigation of lawns via sprinklers or automatic irrigation systems;
- washing of vehicles other than by means of a commercial car wash, except as necessary for operator safety; and
- washing of exterior building surfaces, parking lots, driveways or sidewalks, except as necessary to apply paint, preservatives, stucco, pavement or cement.

Examples of **acceptable** outdoor water uses include:

- irrigation to establish a new lawn during the months of May and September;
- irrigation of lawns, gardens, flowers, and ornamental plants via hand held hoses only; and
- irrigation of public parks and recreational fields before 9 am and after 5 pm.

Thank you for interest,
Susan Connors
MassDEP-Central Regional Office

APPENDIX XIX - Woodard & Curran Report

Follow this link in the electronic version

http://www.townofmaynard-ma.gov/dpw/water-and-sewer/water-resources-report-2011/

(Insert Engineer's report here for printed version)

APPENDIX XX - Pro-forma Town Meeting Article

Article: XX WATER SYSTEM UPGRADE ENGINEERING STUDY

To See if the Town will vote $332,500 or any other sum of money to fund a phased engineering study to expand & upgrade the existing water system sources according to the recommendations of the report submitted by the WPCSC.

Funding for the study shall be as follows:

- $82,986.69 from Account 6308 0450 580000 Old Marlboro Rd Water Study from Article XX of (Special/Annual) Town meeting of (Date)
- Balance of $249,513 to come from Account xxxx xxxx xxxxxx the Water Enterprise Reserve Fund.

To Do or act thereon:

SPONSORED BY:	Board of Selectmen
APPROPRIATION:	$332,500
FINCOM RECOMMENDATION:	TBD

Comments: This article funds a more detailed analysis of exactly which option of the two recommended by the WPCS Committee is the most cost effective to meet the quality and quantity established as needed. It also funds legal work to provide easements in perpetuity so that Maynard will not lose options currently available to it at any future date due to development, land use change, etc.

APPENDIX XXI – Committee Biographies

Paul Boothroyd	
Resident:	Born and raised in Maynard , Educated in the public school system, married to a Maynard girl and raised three children in the town
Profession:	Self employed the last thirty years, Real Estate
Other Town services:	The Historical Commission, Curator of The Maynard Historical Society, Editor of three books on Maynard
Reason for joining:	To preserve and promote the success and general welfare of the Maynard Community.
Dick Downey (Chairman)	
Resident:	42 years
Profession:	Manufacturing Management
Other Town services:	Finance Committee; Town Assessor; Selectman; Search Committee for Town Administrator; MAGIC representative; Annex Reuse Committee; Board of Directors, Assabet Valley Chamber of Commerce.
Reason for joining:	"Water is an essential element in the quality of life. I believe it is the responsibility of the Town to plan and develop an adequate supply of quality water now and into the future. This requires planning and investment and I want to be sure that our monies are spent on the best, most cost effective alternatives."
Ellen Duggan	
Resident:	Born and raised in Maynard
Profession:	Professional education (45 yrs), Public higher education (32 of 45yrs)
Other Town services:	Search Committee for Town Administrator; Fowler School Improvement Council; Charter Review; Town By-Laws; Historical Commission; Meals on Wheels Program
Reason for joining:	"I joined this committee as I feel strongly that we must plan to meet our needs for good, clean water for the present and the future."
Jim Fulton (Past Member)	
Resident:	44 years
Profession:	Medical Acoustic Design Applications
Other Town services:	Finance committee
Reason for joining:	"I believe it is important for Maynard to review its existing water resources and to explore other sources of water including Whites Pond for the purpose of diversification of supply and increasing source capacity. Clean water is a finite commodity. Future growth for Maynard residents and businesses depends on securing another adequate, dependable and quality source of water."

Jason Kreil	
Resident:	6 years
Profession:	Civil Engineer
Other Town services:	Planning Board
Reason for joining:	"I believe Maynard must make responsible investments in our infrastructure to ensure reliable and efficient public utilities"
Eugene Redner	
Resident:	13 years
Profession:	Electrical/Computer Engineering-retired
Other Town services:	Finance Committee 7 years, part-time school bus driver, Meals on Wheels delivery,
Reason for joining:	"To help the town plan for it's future water needs and to provide citizens with information that is necessary for all of us to make an informed decision."
Peter Reed	
Resident since:	25 years
Profession:	Civil and Environmental Engineer, PE & LEEDS certified
Other Town services:	Library Committee, High School Building Committee
Reason for joining:	"Assure an accurate scientific evaluation of the merits of re-establishing White's Pond as an additional water source."
Herb Symes (Secretary)	
Resident:	Born and raised in Maynard
Profession:	Professional Education (36 yrs), Sports Coach, Real Estate
Other Town services:	Advisor, school system
Reason for joining:	"As a child growing up in Maynard, White's Pond was our sole source of water for the town. I fondly remember that I was able to enjoy good quality water from White's Pond. I believe a town can never possess too much quality water. Water is quickly becoming society's most valuable asset. I firmly believe that it would be in the best interest of the citizens of Maynard to make White's Pond available again, as another water source."