

TOSPIELD WATER CONSERVATION PLAN

Prepared by the Metropolitan Area Planning Council



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*Approved by the Topsfield Board of Water Commissioners
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Section 1

Introduction

1.1 Background

The Town of Topsfield is located in the Ipswich River watershed, which is designated by Massachusetts DEP as a stressed river basin. American Rivers has designated the Ipswich River as one of the twenty most threatened rivers in the United States. Over 330,000 people and thousands of businesses rely on the Ipswich River basin and its associated aquifers for part or all of their water. Seasonal peak water demands have been one of many contributing factors affecting low-flow and no-flow conditions in the upper Ipswich basin that have altered and damaged aquatic and bird habitat, as well as species distributions in the basin. The ecological needs for water conservation have been well documented by several groups in the area..

1.2 Introduction and Rationale for Topsfield Water Conservation Plan

The purpose of the Topsfield Water Conservation Plan is to focus on the needs of Topsfield in the context of its location and water use within the Ipswich River watershed as well as to the overall benefits of water conservation to the town. This document draws upon the Executive Office of Environmental Affairs (EOEA) Water Conservation Standards (May 2006), and the Regional Water Conservation Plan for Ipswich River Watershed (April 2003) as primary source documents for the Plan.

The Topsfield Water Conservation Committee chose to use the EOEA format for the Plan, consistent with Topsfield's desire to align its water conservation actions with existing state policy. Topsfield's water withdrawals from the Ipswich basin are regulated by the standards contained within the Withdrawal Permit issue by MA DEP. In preparing this Plan, the Topsfield Water Conservation Committee established goals that are consistent with those contained within the EOEA document as well as those within the Ipswich River Conservation Plan. They are as follows:

- To integrate water conservation and efficiency measures into all aspects of water supply planning and management;
- To maximize the efficiency of public water supply system operations;
- To reduce indoor and outdoor water use overall by at least 15% overall compared to 1999 water use;
- To reduce peak demand use by at least 20% compared to 1999 use;

- To promote public awareness of the long-term economic and environmental benefits of conserving water.

The EOEAs Water Conservation Standards includes both *standards* and *recommendations*. *Standards* are defined as achievable, implementable and practical measures that should be adopted by water suppliers, water users, and state agencies. *Recommendations* should be considered as goals for the future and adopted wherever possible. The standards and recommendations address key elements of water supply planning, management and water use, including the following ten topics:

- Integrated Planning;
- System Water Audits and Leak Detection;
- Metering;
- Pricing;
- Residential Use;
- Public Sector Use;
- Industrial, Commercial and Institutional Use (ICI);
- Agricultural Use;
- Lawn and Landscape; and
- Public Education and Outreach.

Each of these topics, and the relevant standards and recommendations, are presented in Section 2 of this document, including how Topsfield is meeting them. Similarly, Section 2 also presents relevant conditions outlined in the Town's Withdrawal Permit and how the Town is currently meeting them.

Section 3 of this document summarizes Topsfield's planned enhancements to its existing conservation program. These measures will supplement and strengthen the conservation measures currently implemented by the Town.

Section 2

Current Water Conservation Program

2.1 Overview

Topsfield's current conservation efforts are described in this section, using the May, 2006 EOEAs Water Conservation Standards as a benchmark for evaluating success in meeting overall conservation goals. Table 2-1 summarizes the Town's compliance with each of the applicable standards and recommendations for each of the 10 topics. Standards and recommendations that are not applicable to the Town, such as those requiring state agency actions, are not included in the table or discussed below. The Town's Withdrawal Permit from DEP also creates standards that must be met and are noted in this section as well.

2.2 Integrated Planning

2.2.1 Standards

EOEA stresses the importance of an integrated approach to water use planning- factoring in drinking water withdrawals, wastewater and stormwater- to address and mitigate alterations to the natural water cycle's balance. The Town plans to meet all the standards proposed by EOEAs under this topic, including:

- Developing a drought/emergency management plan;
- Developing a written program to comply with EOEAs conservation standards; and
- Making written policies and recommendations available to municipal personnel and the public.

This Water Conservation Plan constitutes the "written program" referenced above and will be made available to municipal personnel and the public.

An important element of the Town's conservation program that is relevant to integrated planning is its drought management program, which includes strategies to reduce peak daily and seasonal peak demand. As originally adopted in 2000 by the Town, the Topsfield Water Use Restriction Bylaw authorizes the Board of Water Commissioners to declare a State of Water Emergency and limit the use of water by choosing the following methods:

- Odd/Even Day outdoor watering;
- Outdoor watering ban;

- Outdoor watering permitted only during periods of low daily demand;
- The filling of swimming pools is prohibited; and
- The use of automatic lawn sprinklers is prohibited.

DEP’s most recent five-year review of the Town’s Withdrawal Permit introduced water supply and environmental indicator triggers into the town’s drought and emergency program. The Permit requires Topsfield to implement outdoor water use restrictions whenever Ipswich River streamflows fall below the following levels during the peak demand summer season:

Period	Streamflow Trigger (3 consecutive days below threshold)	Flow Volume (USGS Ipswich Gauge Station 01102000)	Required Action
May 1 – September 30	< 0.56 cfsm	<70 cfs	Public Notice for Voluntary Water Restrictions
May 1 – September 30	< 0.42 cfsm	<52.5 cfs	Implementation of Mandatory Water Restrictions

cfsm = cubic feet per second per square mile
Cfs = cubic feet per second

Minimum mandatory restrictions include limiting nonessential outdoor water use to hand held hoses only, with an hourly restriction; no nonessential watering allowed between 9 a.m. to 5 p.m.; irrigation of public parks and recreational fields must be done only by automatic sprinklers with moisture sensors. The restrictions are enforced until streamflow levels exceed the streamflow thresholds noted above for seven consecutive days.

Topsfield also has an automatic sprinkler bylaw that requires all sprinkler systems connected to the municipal water supply to be registered with the Board of Water Commissioners and to have shut off valves located outside the building. All systems must have backflow preventers and rain sensor devices as registered with and approved by the Board of Water Commissioners. See: <http://www.topsfield-ma.gov/documents/ChapterLVIIIWaterSupplyBy-laws.pdf>.

As of 2005, Town Water Department and Planning Board policies dictate that all new developments must be connected to the public water supply and no development-wide sprinkler systems will be permitted. These policies are designed so that water usage can be better monitored and controlled.

2.2.2 Recommendations

EOEA's recommendations pertaining to integrated planning address the need to include water supply, wastewater and stormwater in infrastructure planning. Topsfield supports these recommendations but it must be noted that 100% of wastewater is treated by Title V septic systems and there is no municipal waste water treatment plant.

Topsfield has been proactive in managing stormwater. The Town filed a Stormwater Management Plan with the both the Massachusetts Department of Environmental and the United States Environmental Protection Agency in 2004. The plan was approved and the Town now has a National Pollutant Discharge Elimination System (NPDES) permit to operate its stormwater collection system. The five-year plan outlines the steps the Town will take to reduce water pollution by improving the quality of its stormwater and to reduce the amount generated. The Stormwater Management Plan includes provisions for public education and outreach, infrastructure mapping, regulation review, illicit discharge elimination, and pollution prevention.

The full plan can be found at <http://www.topsfieldpublicworks.org>.

Residents approved a Stormwater Management and Erosion Control Bylaw at the Annual Town Meeting in May 2005 which is one of the major parts of the Town's stormwater management plan. The Stormwater Management Committee has worked with the Metropolitan Area Planning Council to develop regulations that were adopted by the Planning Board to govern the implementation of the bylaw. The bylaw creates permit filing thresholds for land alterations/disturbances and uses the DEP Stormwater Management Standards for both wetland resource and upland resource areas. (The Stormwater and Erosion Control Bylaw and Rules and Regulations is available at www.topsfield-ma.gov.)

Topsfield's Water Department communication with residents and local officials includes an annual report from the Board of Water Commissioners on water consumption and supply, water quality, ongoing or planned capital projects, billing, rates and conservation initiatives. The Town's Water Department web site features a web page devoted to water information and news including current rates, regulations, billing information, real time Ipswich River flow information and conservation links, annual reports, water quality, and withdrawal statistics.

See: <http://www.topsfieldpublicworks.org/water.php>.

In addition, the Water Department began a survey of its water supply system in April, 2006 using the Environmental Protection Agency (EPA) Intermediate Guidelines for Preparing Water Conservation Plans. Designed for communities with between 10,000 and 100,000 people or for smaller communities with stressed supply situations, the

guidelines offer an alternative format in which to develop a water conservation plan. The EPA model offers a different format than EOEAs standards for a community to assess its water supply system and conservation standards. The EPA guidelines correspond to many of the EOEAs standards while creating a quantitative profile of a community's water supply system. The main sections of the EPA guidelines are as follows:

1. Specifying conservation goals
2. Developing a water system profile
3. Preparing a demand forecast and planned facilities (if any)
4. Identifying and evaluating cost/benefit of conservation measures
5. Selecting conservation measures
6. Integrating resources and modifying forecasts
7. Presenting implementation and evaluation strategy

The Topsfield plan in the EOEAs format offers a comprehensive Water Conservation Plan that is in compliance with current Massachusetts state water conservation standards while integrating the information gathered by the Water Department under the EPA guidelines. The EPA guidelines have been particularly valuable in offering a format in which to develop a water system profile and with which to prepare a demand forecast. Topsfield will be able to use the EPA guidelines to identify the cost-effectiveness of the chosen conservation measures over time. In addition, the guidelines offer a toolkit that will allow the Town to measure what impact conservation steps will have: how they may alter average-day and peak demands, as well as overall pre and post conservation use and peak-demand. (See Appendix B for the EPA Intermediate Guidelines and Topsfield's completed sections to date.)

2.3 Water Audits and Leak Detection

2.3.1 Standards

The EOEAs standards relating to water audits and leak detection include:

- Conducting an annual water audit;
- Performing a leak detection survey based on reported water loss and in accordance with AWWA and DEP guidance:
- Repairing all leaks as quickly as possible; and
- Including all costs of water audits and leak repairs in the water supply costs and budgeting.

Water Audits

The Water Department conducts an annual audit of its distribution system as well as yearly leak detection surveys. Topsfield has been required since 2004 under its Withdrawal Permit to limit unaccounted for water to less than 10% of overall water use. The annual audits and leak detection survey has paid off for the Town as unaccounted for water has been reduced to approximately 5 % of total consumption for 2005.

Unaccounted for water use is defined by the Massachusetts Water Resources Commission as the difference between the amount of water pumped or purchased and water that is metered or confidently estimated. Unaccounted for water includes water that can not be accounted for due to meter problems, unauthorized hydrant openings, unavoidable leakage, recoverable leakage, illegal connections, stand pipe overflows and fire protection.

Of the 1,691 water service connections in Topsfield, 136 are commercial or industrial connections. They account for just under 8% of total water consumption. Because of the low amount of industrial and commercial use , the State has directed Topsfield to use resources it may have used to audit commercial and industrial users to target the reduction of seasonal water use and residential gallons per capita use instead.

Leak Detection and Repair

The Withdrawal Permit also requires the Town to conduct an annual leak detection survey. All leaks found must be repaired within 10 days of having a valid Dig-Safe Permit or court warrant to enter private property. Repair reports must be available for inspection by DEP.

Paying for Water Audits and Leak Repairs

The Topsfield Water Department has had enterprise funding since 1988. The cost of the audits and leak repairs is included in the Water Department's annual budget, as required under the Permit.

2.3.2 Recommendations

State plumbing standards are followed by Topsfield. The Water Department has not had to install water pressure reduction valves. Town water regulations prohibit the taking of water from fire hydrants without the approval of the Water Superintendent.

2.4 Metering

2.4.1 Standards

EOEA's standards related to metering include:

- 100 per cent of all sources, building and end-users, including public buildings and schools, should be metered to ensure full registering of water flow;
- The metering program should include on-going inspection and a repair/replacement program;
- All meter systems should be sealed against tampering and inspected periodically.
- Any meter used to record quantity shall be calibrated according to type and specification.

Topsfield meets these standards. It meters 100 per cent of the water distribution system, including public buildings; regularly tests, replaces, and calibrates meters; and budgets annually for meter replacement. All meters are sealed against tampering. Master meters at the well fields and treatment plants are calibrated annually.

2.4.2 Recommendations

Topsfield is complying with EOEA recommendations for metering. Ninety per cent of Topsfield's water use is for residential uses. Because of this, the Water Department employs uniform billing practices for all users, as there are no Industrial, Commercial or Industrial (ICI) users who currently use more than 50,000 GPD. The Water Department uses actual, not estimated data, for billing purposes and is currently moving to a remote meter reading system using radio-read meters.

At present, two thirds of the Town's meters are read and billed bi-annually. Using a grant from the Department of Conservation and Recreation, the Water Department began to install 500 new automated, radio-read water meters in January, 2006 and will complete the installation by May 1. The first 500 new meters will be read and billed for monthly. New radio-read meters will be installed Town-wide by June 30, 2008, a total of 1,691 metered connections at present. The Water Department plans to move to one of the three following options for meter reading and billing procedures once the new meters are installed town-wide:

- Monthly reading and billing;
- Monthly reading and quarterly billing; or
- Quarterly billing and reading.

The new radio-read meters being installed throughout the community will shift reading and billing to at least a quarterly basis.

2.5 Pricing

2.5.1 Standards

The EOEAs standards for pricing indicate that consumers should be charged the full cost of water and that water suppliers should implement full cost pricing. That includes the entire cost of operating the water supply system, including operations, maintenance, capital and indirect costs. The Water Department uses enterprise account funding as recommended and the Water Department meets all of its costs under it. The Town does not use a decreasing block rate structure to charge for water use.

2.5.2 Recommendations

Topsfield meets the recommendations concerning pricing as follows:

- The Town changed from charging a flat rate for water in 2000 and adopted a three-tiered, increasing block rate structure. Water consumption above 48,001 gallons per six months is billed at \$7.75 per thousand gallons for 2005. Water rates are set annually by the Board of Water Commissioners. Peak demand is driven predominantly by residential customers so the Town chose a higher rate for the excess demands. The structure targets the outdoor, non-essential water demands within the system and rewards those who use less water;
- Establishment of an enterprise account in accordance with Massachusetts General Law; and
- Shifting to billing at least quarterly and using billing software that allows customers to compare their water use on a monthly and yearly basis and to see what the average consumption amount is.

2.6 Residential Water Use

2.6.1 Standards

EOEA's standards for residential water use are as follows:

- Install water efficient plumbing fixtures, meeting the standards set forth in the 1992 Federal Energy Policy Act and the Massachusetts Plumbing Code; and
- Meet efficiency goals for residential water use- strive for 65 residential gallons per capita per day.

Topsfield's compliance with both of these standards is described below.

The Water Department plans on offering plumbing retrofit kits to all residential customers for a nominal cost. Indoor kits may include faucet aerators, a low-flow showerhead, and a toilet dam. Outdoor kits could include a multi-position garden hose; hose repair ends, nozzle seals, and a rain gauge. Home water audit kits would also be made available. The kits would be advertised in annual water Consumer Confidence Reports, the Water Department web page, in water bills and in the newspaper.

Residential Per Capita Consumption

Topsfield met the 65 gallon per capita per day standard in both 2005 and 2004. The calculation for 2005 is shown below:

Residential Water Demand, 2005:	121,372,000 gallons
Divide by 365 for daily residential use:	332,526 gallons
Service Population	5,205
Residential Per Capita Demand (daily use / service population)	64 gpcd

2.6.2 Recommendations

Topsfield meets or plans to meet all of the EOEAs residential use recommendations. The Water Department already promotes the use of dual-flush toilets on its web page online and will offer tips there on efficient non-landscaping water use (cars, pools and driveway care) as well. The Water Department's annual Water Consumer Confidence Report makes the link between conserving water and increasing water quality for homeowners and the Department plans to add it to its Conservation web page. The Water Department does not currently audit its largest current users and the Department has chosen to continue targeting aggressively the reduction of non-essential outdoor water use to further lower its residential and peak demand use.

The Water Department does promote efficient landscape water use by encouraging and making available at discount, rain barrels to collect rainwater. Irrigation system controllers are required by the Town and information is available from the Water Department on how to acquire these devices, as well as information on meters, low-flow showerheads and faucet aerators. Conservation information is occasionally mailed out with water bills as well as being online at the Water Department webpage. See <http://www.topsfieldpublicworks.org>.

2.7 Public Sector Water Use

2.7.1 Standards

EOEA's standards for public water use include the following:

- Municipal buildings should conduct indoor and outdoor water use audits; focus on water consuming equipment in buildings; practice good lawn and landscape water use techniques;
- Estimate and meter water used by contractors using fire hydrants for pipe flushing; and
- Strictly apply plumbing codes and incorporate conservation measures in new and renovated buildings.

The Town has implemented these standards to a large degree. Most all public buildings in Topsfield are quite new and have not required audits. Two elementary schools, the Topsfield Library, Department of Public Works building, and the local High School were all built using the 1989 revised State Plumbing Code efficiency standards. The Board of Water Commissioners is planning to work with the Police and Fire Departments to upgrade to efficient fixtures. The Parks and Cemetery Department is working collaboratively with a local landscaping nursery to construct a water-wise demonstration project at Town Hall and to install a rain barrel demonstration project at the Town Library. The Topsfield Conservation Commission constructed a water-wise landscaping and garden demonstration project at Masconomet High School in 2004. The Town is required by its Withdrawal Permit to practice the irrigation of public and recreational fields in accordance with the Water Resource Commission's 2002 Guide to Lawn and Landscape Water Conservation. It employs water-wise landscaping practices on municipal properties by not over-watering lawns, not cutting grass too short, choosing native plants for landscaping, and mulching around shrubs and trees to retain moisture. Town road crews monitor the use of hydrants by contractors. Water Department regulations state that no water may be taken from a hydrant without permission from the Water Superintendent.

2.7.2 Recommendations

EOEA recommendations for conserving public water use are either already implemented by Town Departments or planned for the near future. As mentioned above, the Water Department is coordinating demonstration projects to conserve outdoor water use at both the Library and Town Hall.

2.8 Industrial, Commercial and Institutional Water Use

2.8.1 Standards

A summary of EOEA's draft standards is provided below:

- All users in this category should do a water audit and implement water conservation techniques;
- All users should develop and implement a water saving strategy; and

- In new and renovated buildings, designs should comply with plumbing codes, use Best Available Technology (BAT) for water conservation and allow for the reuse treated wastewater within the facility if possible.

Topsfield has 136 commercial or industrial metered service connections out of a total of 1,691 total connections. Commercial and industrial water uses accounts for 7.9 percent of the Town's annual use. None of the commercial or industrial connections are significant users at present. Because of this low volume and because 90 percent of users are residential, the DEP Withdrawal Permit directs it to focus its efforts on reducing seasonal water use and residential gallons per capita per day use. Although the Town's current capacity for industrial and commercial development is limited by the Town's lack of wastewater treatment facilities and a limited amount of commercial or industrially zoned land, the Town is prepared to fully implement the EOEAs standards if these uses expand in the future.

2.8.2 Recommendations

The EOEAs recommendation for ICI uses include:

- 10 percent reduction of use by significant users;
- ICI water saving retrofits;
- Working with code officials, state programs, manufacturers and legislators to promote water conservation and efficient use;
- Encourage increasing the amount of pervious areas on ICI properties; and
- Encourage implementing efficient lawn and landscaping practices.

Topsfield has begun to implement these recommendations as seen above. The Town has been proactive in adopting conservation measures through recent by-law changes such as the adoption of a comprehensive stormwater and erosion control bylaw (see Section 2.2) and it will consider changes to its subdivision control and site plan review process to address lawn and landscaping practices for its ICI landowners . (See Section 3)

2.9 Agricultural Water Use

Agricultural water use is minimal at this time in Topsfield. There are several small, self-supplied farms that are not significant water users. The Town does allow for agricultural uses in all of its current zoning districts, however, and it is prepared to work with any agricultural operation in the future to develop a water conservation approach that meets the irrigation needs of the farm in an efficient manner, including the EOEAs recommendation to use only micro irrigation systems such as subsurface drip irrigation (SDI) where suitable.

2.10 Lawn and Landscape Water Conservation

2.10.1 Standards

EOEA's standards for lawn and landscape water conservation include:

- Developing and implementing seasonal demand management plan as part of a drought management plan; and
- Adopting and implementing (as appropriate) a water use restriction bylaw which could apply to private wells as appropriate and which allows the community to implement mandatory water restrictions.
- Abide by all water restrictions and other conservation measures adopted by the community.

Topsfield fully meets these standards. Its Withdrawal Permit incorporates a regulatory seasonal demand management plan based on Ipswich River streamflow triggers and river flow volumes. It adopted both a Water Use Restriction Bylaw and an Automatic Lawn Sprinkler Bylaw in 2000. (See Section 2.1) Though the Withdrawal Permit requires the Town to make private irrigation wells subject to the same use restrictions that public users must meet if streamflow triggers or river flow volumes fall below safe thresholds, Topsfield will consider adopting a bylaw that would allow it to regulate the use of private irrigation wells beyond its current capacity to do so. (See Section 3) The Town is abiding by these restrictions and measures and is meeting the 65 gallons per capita residential target in its Withdrawal Permit.

2.10.2 Recommendations

EOEA's recommendations pertaining to lawn and landscape water conservation include:

- Maximize efficient outdoor water use; make outdoor use a small part of overall water use;
- Minimize watering by limiting the number of watering days per week or month and water only if necessary, if at all;
- Maximize efficiency of automatic irrigation systems, reuse and/or infiltrate rainwater; minimize use of potable water to irrigate lawns; don't water lawns or install automatic lawn irrigation systems in water-short communities; enhance soil health; water efficiently and use drought-tolerant landscape species;
- Design and maintain recreational fields and golf courses to minimize water use and use rainfall to irrigate;

- Users of private wells should abide by local water restrictions, especially if the private well is in the zone of contribution of the public water supply;
- Municipalities should raise public awareness of best outdoor water use using an education and outreach program and/or demonstrations of water-wise landscaping on municipal properties;
- Adopt a water conservation bylaw that requires water conservation equipment and audits for automatic irrigation systems; minimizes installation of high water use landscape areas; restricts land clearing and lawn size in new developments and requires 6 inch depth of topsoil on all cleared areas to reduce moisture loss and the need for watering;
- Provide landscape water audits for residential and ICI properties that are large water users;
- Provide rebates for installation of climate-based or moisture sensors for automatic irrigation systems; and
- Control direct water withdrawal from surface water sources.

Topsfield is striving to make nonessential outdoor residential water use a small part of the community's overall water use. Its Water Use Restriction Bylaw and Withdrawal Permit limit outdoor watering to hand-held, hourly use that is not allowed between 9 a.m. to 5 p.m. under certain conditions. The Permit would require the Town to submit an Enhanced Water Conservation Plan if it failed to meet its seasonal or residential performance standards. The Town has worked and is working proactively to adopt many of the measures outlined in the Permit without having failed to meet their performance standards. In line with the Permit's Enhanced Conservation Plan standards, the Town has already adopted a bylaw requiring moisture sensors in all automatic sprinkler systems, has adopted a stormwater and erosion control bylaw that will increase stormwater infiltration, uses water-wise municipal landscaping practices; has enhanced public education concerning water conservation and increased the use of use rain barrels for outside watering use.

The Town is considering adding additional water demand management by adopting a voluntary program to limit outdoor watering to twice weekly from May 1 – September 30, even if not triggered by environmental triggers such as stream flow. (See Section 3)

Water Department regulations currently require that all automatic irrigation systems be registered with the Water Department and that they employ outdoor shutoff valves, have backflow preventers and use moisture sensors to prevent over watering.

If it were deemed necessary the Town has the ability, with radio-read meters, to monitor suspected high users on a day to day basis by using drive-by readings. On-

site audits can be performed by using the Water Department's data logger in conjunction with meter readings to monitor and notify a customer of significant water use as needed.

Topsfield adopted a comprehensive stormwater and erosion control bylaw in 2005 that requires the increased infiltration of stormwater in new projects and redevelopment, regardless of being located in upland or wetland resource areas. The Town also plans to consider adopting a bylaw to increase the use of Open Space Residential Design to preserve land in its natural state and maintain high levels of pervious land in the community.

The Water Department is working with the Parks and Cemetery Department to implement a water-wise demonstration project at the town hall, a rain barrel installation at the town library and offers information on water-wise landscaping practices at the Water Department webpage online.

See <http://www.topsfieldpublicworks.org/conservation.php>.

The Town is planning to revise its subdivision and site-plan review regulations with Low Impact Development guidelines. These guidelines were developed under a Smart Growth Technical Assistance Grant by MAPC. The guidelines outline the acceptable alternatives to existing stormwater management regulations. Additional revisions to be studied would limit the amount of lot clearing allowed for new construction and add standards for soil preparation and depth. The Water Department also plans to add regulations that prohibit water withdrawals from surface water sources without permission from the Town. (See Section 3)

2.11 Education and Outreach

2.11.1 Standards

EOEA's standards for education and outreach include:

- Developing and implementing an education plan for its water consumers; and
- Addressing why it's important for self-supplied users to conserve as well.

Topsfield has been proactive in creating a strong public education plan that incorporates the following elements:

- An annual school program on water conservation presented to Topsfield's Second Grade class;
- Advertising outdoor water restrictions in local newspapers;
- Public speaking on water conservation at Rotary and church groups;

- An updated Water Department web page that features water conservation tips, water regulations, water rates, web links to Ipswich River Watershed Association, residential and outdoor water conservation sites, current conditions for the Ipswich River, restriction notices, rebate and discount programs, Water Commissioners Annual Report;
- Donation to the town library of a complete set of American Water Works Association Landscaping and Lawn Care Practices Guidebooks in 2003;
- Collaboration with the Essex County Cooperative, a local supplier of hardware, to plan the development of a water-wise demonstration project in 2003;
- Participation in three water conservation public awareness demonstration projects at the 2002, 2003 and 2006 Town Expositions;
- Water-wise garden and landscape project at Masconomet High School in 2004;
- Collaborated with the Ipswich River Watershed Association and the Planning Board and Conservation Commission to create and enter a water conservation float in the 2002 Topsfield Fair parade; and
- Joint All- Town Board meeting in 2002 to discuss and set actions for water conservation actions in Topsfield. Boards represented included Selectmen, Planning Board, Conservation Commission, Stormwater Management Committee, Board of Health, Water Commissioners, Water Department and Highway Department. The meeting led to grant applications by the Town that resulted in updated stormwater regulations and this document. The town has formed a working group to address ongoing water conservation needs and to serve as an information link to other Town Boards and Committees.

To facilitate additional public education and outreach on water conservation, the Town will consider the creation of a Water Conservation Coordinator's position. (See Section 3) This person would help plan and hold water use workshops for the public and in schools, provide updated information on water-wise landscaping, lawn-care, retrofit and rebate programs, help educate the public on the link between water conservation and water quality, and educate self-supplied water users on BMPs for private well use and irrigation.

Section 3

Recommended Enhancements for Water Conservation

3.1 Overview

Topsfield's Water Conservation Plan, as presented in this document, provides a baseline for water conservation that will be reviewed over time to consider additional measures to further enhance conservation efforts and successes.

The Water Department will consider the additional water conservation measures, as described below.

3.2 Water Conservation Fund

Topsfield Water Commissioners will consider adopting a water conservation hook up fee (a per gallon cost) for new developments (or existing customers seeking to increase their demand). The funds collected would be used to support specific elements of the Town's Water Conservation Plan. The DEP Withdrawal Permit requires the Water Department to include all costs associated with the water supply program to be covered by rates or fees charged by the Water Department. An alternative to establishing a conservation hook-up fee would be fund the Water Conservation Fund through the rate structure, but the use of the hook-up fee rewards water conservers.

3.3 Demand Management Plan to Reduce Seasonal Irrigation

Topsfield will explore the possibility of requesting its customers to voluntarily limit their outdoor watering to twice weekly, hand-held watering only from May 1 – September 30 even if not triggered by environmental triggers under the DEP Withdrawal Permit. One goal of asking for voluntary limits on outdoor watering is to increase public awareness of water use and increase the acceptance of more stringent controls when it is mandated under the Town's Withdrawal Permit.

3.4 Regulatory Changes

As part of the Water Conservation Plan, the Town will consider the following regulatory changes to increase water conservation and promote efficient use:

- The adoption of a bylaw to regulate the use of private wells for irrigation;
- Updating, as needed, the Town's Water Use Restriction Bylaw with the Massachusetts model water use restriction bylaw;
- The adoption of an Open Space and Residential Design bylaw to encourage the use of land use developments patterns that decrease the amount of impervious areas created and leave more land in a undisturbed, natural state;

- Researching subsurface, drip (SDI) irrigation techniques to see if they are a practical, water saving alternative to installing automated irrigation systems with moisture sensors as is now required. Consider amending the current Water Department regulations if SDI systems are found to be a superior alternative.
- Recommend, as per the EOE 2006 Water Conservation Standards, the use of water conservation Best Available Technologies (BAT) for new buildings and renovations and establish water-wise lawn and landscape requirements for any building undergoing site plan review.

3.5 Use EPA Guidelines to Evaluate and Modify Forecast and Conservation Measures

The EPA Intermediate Guidelines will be used over time to help track the water system profile; prepare revised demand forecasts and planned facilities; identify and evaluate the cost effectiveness and demand impacts of selected conservation measures; develop new conservation measures and implementation strategies.

TOPSFIELD WATER CONSERVATION STANDARDS COMPLIANCE TABLE

TOPIC	EOEA STANDARDS	DOES TOPSFIELD MEET THIS STANDARD?	EOEA RECOMMENDATIONS	DOES TOPSFIELD MEET RECOMMENDATION?
1. INTEGRATED PLANNING (SECTION 2.2)	Water suppliers should develop a drought emergency plan that follows 1992 AWWA guidance.	Topsfield's Water Use Restriction Bylaw and DEP Withdrawal Permit restrict outdoor water and can implement more stringent measures as needed.	Integrated Planning should address water supply, wastewater and stormwater management.	Topsfield supports EOEAs comprehensive planning recommendations: the Town has an approved 2004 Stormwater Management Plan; it adopted a Stormwater and Erosion Control Bylaw in 2005; the town's wastewater is 100 percent Title V systems. Water Conservation Plan incorporates EPA Intermediate Guidelines and EOEAs Standards.
	Water suppliers should develop a written program to comply with Conservation Standards.		Communicate with Other Local Officials: water suppliers should keep local officials regularly informed of water consumption and supply availability.	The Board of Water Commissioners publishes an annual report and at Town Meeting. The Water Department maintains an extensive water information web site.
	Written policies and recommendations should be made available to municipal personnel and the public.		Water banks: Water suppliers prone to capacity problems or experiencing significant growth should consider establishing a water bank ("offset".)	The Town will consider the adoption of a water bank. It is required by DEP to adopt a water bank if exceeds >0.60 mgd on an annual average daily basis.
2. WATER AUDITS AND LEAK DETECTION (SECTION 2.3)	Conduct an annual water audit;	The Water Department is required to conduct an annual audit of its distribution system under DEP Permit.	Pressure reduction: Installation of pressure reducers should be considered in residences and commercial accounts.	The Water Department follows the stated plumbing code but has not found the need to install pressure reducing valves.
	Perform leak detection based on water loss in accord with AWWA and DEP;	Leak detection accompanies annual water audit: UAW was approximately 5 % for 2005;		
	Repair all leaks A.S.A.P.;	DEP Permit requires all leaks found to be repaired w/in 10 days for Dig Safe and for warrants;	Fines for water theft: penalties for unauthorized water withdrawal from hydrants.	Water Department regulations assess penalties for the unauthorized withdrawal of water from hydrants.
	Include all costs of water audits and leak repairs in the water supply program budget.	The Water Department uses enterprise funding and includes all water program costs including audits and leak repairs.		
3. METERING (SECTION 2.4)	100 % of all sources, building and end-users, including schools and public buildings, should be metered.	100 % of the water distribution system is metered.	Grant Program: DEP should re-establish the meter replacement grant program.	Topsfield supports the re-establishment of the meter replacement program.
	Metering program should include on-going inspection and repair/replace program.	The Water Department regularly tests, replaces calibrates and budgets for meter change-outs.	Water meter repair/replacement policy should be enacted by water supplier.	The Water Department is currently installing new meters throughout town.
	Meter reading and billing for domestic accounts should be done quarterly at minimum, monthly if possible and be based on actual readings.	500 new meters are being read monthly and the Water Department will read all meters on at least a quarterly basis by 2008.	Monthly billing for significant users: should be more frequent than domestic accounts.	The Water Department employs universal billing practices as 90% of water use is residential.
	Meters must be calibrated according to type and specification.	The Water Department calibrates all master meters.	Remote reading and monthly billing: consider investing in remote read meters. Minimize use of estimated data.	The town is installing 100% radio read meters by 2008. The Department uses actual data.
4. PRICING(SEE SECTION 2.4) PRICING	Full cost pricing should include all water system operating costs.	The Water Department uses full cost pricing.	Establish conservation-oriented rate structures such as increasing block rates,	Topsfield adopted a three-tiered, increasing block rate structure in 2000.

TOPSFIELD WATER CONSERVATION STANDARDS COMPLIANCE TABLE

TOPIC	EOEA STANDARDS	DOES TOPSFIELD MEET THIS STANDARD?	EOEA RECOMMENDATIONS	DOES TOPSFIELD MEET RECOMMENDATION?
4. PRICING (contd.)			seasonal rates, and/or uniform rates (beyond the fixed customer charge).	
			Bill at least quarterly; report water use in gallons and daily use; indicate rate structure clearly on bill; adopt software to allow customers to compare water use over time and against average use.	The Water Department is moving towards at least quarterly billing for all customers, with monthly now in place for 500 users. Bills include all usage information.
			Establish a Water Department enterprise account.	The Department uses an enterprise account.
5. RESIDENTIAL WATER USE (SECTION 2.6)	Install water efficient fixtures.	Topsfield plans to offer free plumbing retrofit to all customers including faucet aerator, low-flow showerhead and toilet dam. Outdoor retro kits and home water audit kits will also be made available and advertised locally.	Promote water efficient household appliances; offer rebates for water efficient appliances.	The Water Department promotes water efficient household appliances and plans to implement a rebate program for efficient appliances.
			Provide residential water audits.	The town focuses on aggressively reducing non-essential water use but may consider offering residential audits in conjunction with its new radio read meters and data logger.
			Promote efficient non-landscape outdoor water use.	The Department will feature online tips on efficient non-landscape water use for cars, pools, driveways and other uses.
			Promote efficient landscape water use.	The town offers discounted rain barrels, requires irrigation controllers, and backflow devices on all irrigation systems. It makes information available online on how to acquire these devices as well as meter information.
	Meet 65 rgpcd limit; establish comprehensive indoor water program if over 65 rgpcd limit.	Topsfield is within the 65rgpcd efficiency goal.	Minimize/discourage use of garbage disposals.	The Department discourages the use of garbage disposals.
			Educate homeowners about how water conservation benefits water quality.	Conservation information is mailed with water bills, online and in the annual Water Consumer Confidence Report, which is mailed to all customers.
6. PUBLIC SECTOR WATER USE (SECTION 2.7)	Municipal and state buildings should conduct indoor and outdoor water use audits; analyze existing data to spot trends, patterns, and leaks; identify measures with the greatest potential savings; focus on water consuming equipment in buildings; practice good lawn and landscape water use techniques.	All existing municipal buildings except the Fire/Police Departments were built using the 1989 state plumbing code and the Town is planning to update Police and Fire as per DEP permit. The Town is planning water-wise demonstration projects at the town hall and library; the Town is required to practice water wise landscaping practices under its DEP permit.	Retrofit public buildings with water efficient equipment including faucet aerators, low flow showerheads, toilet dams, composting or dual flush toilets and self-closing faucets. Identify these fixtures to users of public facilities or buildings.	All public buildings are fitted or retro-fitted with water saving devices.
	Estimate and meter water used by contractors using fire hydrants.	Water Department regulations require permission from the Water Commissioner before any hydrant is opened for commercial use; town road crews monitor hydrants.	Use public buildings for demonstrations of innovative water conservation techniques.	The Parks and Cemetery Department is coordinating water saving demonstration projects at the town hall and library

TOPSFIELD WATER CONSERVATION STANDARDS COMPLIANCE TABLE

TOPIC	EOEA STANDARDS	DOES TOPSFIELD MEET THIS STANDARD?	EOEA RECOMMENDATIONS	DOES TOPSFIELD MEET RECOMMENDATION?
6. PUBLIC SECTOR WATER USE (contd.)	Strictly apply plumbing codes and incorporate conservation measures in new and renovated buildings.	The Department strictly abides by all state plumbing requirements.		
7. INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL WATER USE (SECTION 2.8)	All ICI users should conduct water audits and implement water conservation techniques; significant users should install separate water meters for processing and sanitary use; all users should develop and implement a water saving strategy; new and renovated buildings should comply with plumbing codes and BAT.	Topsfield has very few ICI users and the DEP has directed the Department to focus its efforts on reducing nonessential residential water use instead.	All ICI users should attain a 10 % water use reduction; all ICI buildings should be retrofitted with water saving devices when possible.	The Department is working with the Masconomet Nursing Home and Topsfield Fairgrounds to retrofit with water saving devices.
			Increase the amount of pervious area and infiltration on ICI properties and implement efficient lawn and landscaping practices.	The Town has adopted comprehensive stormwater and erosion controls and is considering other water efficient changes to its site plan review and subdivision control regulations, which will both impact ICI developments.
8. AGRICULTURAL WATER USE (SECTION 2.9)	Agricultural producers should implement irrigation BMPs.	Agricultural use of public water in Topsfield is insignificant.	All agricultural users should have a documented approach to water conservation and a method to measure water use.	The Town stands ready to adopt and implement water use reduction strategies for agricultural use if it becomes necessary to do so.
9. LAWN AND LANDSCAPE WATER CONSERVATION (SECTION 2.10)	Develop seasonal demand management plans to incorporate into drought management plan.	Topsfield's DEP Permit and Water Use Restriction Bylaw use progressively more restrictive limits on outdoor use based on water supply and environmental triggers.	Owners/ mgrs of lawns and landscapes- water only when necessary; abide by water restrictions and other conservation measures. Adopt water conservation bylaw that requires water conservation equipment and audits for automatic irrigation systems.	Hand- held, off-peak, hourly watering only allowed during low flow periods; automatic irrigation systems must be registered with Town and have moisture sensors, outside shutoffs, and back flow preventers. The Town may consider a voluntary ban to limit water use from May 1 – September 30 backed by increased public education. The Department offers water use reduction tips and information in its <u>billing and online</u> .
			Design and maintain recreational fields and golf courses to minimize water use and use rainfall to irrigate.	All users of public water are bound by the same rules and the Town is required to meet water wise landscaping practices under its DEP permit.
			Users of private wells should abide by local water restrictions, especially if the well is located in the zone of contribution of the public water supply.	The Town will consider adding a bylaw that will regulate the use of private wells.
			Minimize use of high water use landscaping; restrict land clearing and lawn size in new developments and require 6- inch depth of topsoil on all cleared land areas to reduce moisture loss and the need for watering.	The Town is planning to add language to its subdivision review regulations to include lot clearance limits and soil requirements.
			Raise public awareness of best outdoor water use using an education and outreach program, or demonstrations of water-wise landscaping on municipal properties.	The Department is working with the Parks and Cemetery Department to implement a water-wise landscaping demonstration at the town hall, a rain barrel installation at the town library and offers education and outreach material online for water conservation. The Town hope to add a

TOPSFIELD WATER CONSERVATION STANDARDS COMPLIANCE TABLE

TOPIC	EOEA STANDARDS	DOES TOPSFIELD MEET THIS STANDARD?	EOEA RECOMMENDATIONS	DOES TOPSFIELD MEET RECOMMENDATION?
				water conservation coordinator’s position to further education and outreach.
			Provide landscape water audits for residential and ICE properties that are large water users.	The Department may add landscape water audits for residential and ICEI users in the future.
			Control direct water withdrawal from surface water sources.	Water Department regulations will specifically prohibit the withdrawal of water from surface supplies without permission of the Town.
10. EDUCATION AND OUTREACH (SECTION 2.11)	Develop and implement an education plan for its water consumers and address why it’s important for self-supplied consumers to conserve as well.	Topsfield has incorporated the following elements into its public education plan:		

A Service Characteristics		Number		
1	Estimated Service Population	5,205		
2	Estimated Service Area (square miles)	13		
3	Miles of main	50		
4	Number of treatment plants	2		
5	Number of separate water systems	-		
6	Interconnection with other systems	1		
B Annual Water Supply		Annual volume	Number of intakes or source points	Percent metered
7	Groundwater	161.786	2	1%
8	Surface Water	-		
9	Purchases: raw	-		
10	Purchases: treated	-		
11	Total annual water supply	161.786		
C Service Connections		Connections	Water sales	Percent metered
12	Residential, single-family			
13	Residential, multi-family	1,533	121.372	100%
14	Commercial	113	8.631	100%
15	Industrial	23	2.584	100%
16	Public or governmental	11	0.890	100%
17	Wholesale	-	-	
18	Other	11	7.046	100%
19	Total connections	1,691	140.523	
D Water Demand		Annual volume	Percent of total	Per connection
20	Residential sales	121.372	73.3%	0.079
21	Nonresidential sales	12.105	7.3%	0.082
22	Wholesale sales	-		
23	Other sales	7.046	4.3%	0.641
24	Nonaccount water: authorized uses	20.000	12.1%	
25	Nonaccount water: unauthorized uses	5.000	3.0%	
26	Total system demand (total use)	165.523		
E Average & Peak Demand		Volume	Total supply capacity	Percent of total capacity
27	Average-day demand	0.426	1.259	34%
28	Maximum-day demand	1.131	1.619	70%
29	Maximum-hour demand	0.075	0.067	112%
F Pricing		Rate structure	Meter frequency	Billing frequency
30	Residential rate	\$4.50 per 1000 gallons for first 24,000 gallons		
31	Nonresidential rate	\$5.50 per 1000 gallons for 24,001 to 48,000 gallons		
32	Other rate	\$7.75 per 1000 gallons above 48,000 gallons		
G Planning		Prepared plan	Date	Filed with state
33	Capital, facility, or supply plan			
34	Drought or emergency plan			
35	Water conservation plan			

Worksheet 4-3: Current Water Conservation Activities

Conservation Measure	Annual water savings	Date implemented	Continued?
Rain Barrell Program	?		Yes
Water Bans	?		Yes
Public Education			
Town Expo	?		Yes
Website			
Integrated Weather, Streamflow & Withdrawal Informatino	?		Yes
Conservation Information	?		Yes
Water Metering Project	?		Yes
Xeriscape Demo Garden	?		Yes
Float in Topsfield Fair Parade	?		No
Increasing Block Rate Structure	?		Yes
Irrigation Bylaw	?		Yes
Water Emergency Bylaw	?		Yes

Worksheet 4-4: Preliminary Demand Forecast					
Line		Current year	5-year forecast	10-year forecast	20-year forecast
A	Residential Demand				
1	Current annual water residential sales (total gallons)	121.372			
2	Current population served	5,205			
3	Residential sales per capita	0.023			
4	Projected population		5,250	5,600	6,000
5	Projected annual residential water demand		122.42	130.58	139.91
B	Nonresidential Demand				
6	Current annual nonresidential sales (total gallons)	19.151			
7	Current number of employees or jobs	1,000			
8	Water use per employees or jobs	0.019			
9	Projected number of employees or jobs		1,100	1,300	1,500
10	Projected annual nonresidential water demand		21.07	24.90	28.73
C	Nonaccount Water (Water not sold to customers)				
11	Current and forecast amount	25.000	25.000	25.000	25.000
D	Water System Total Demand				
12	Current annual water demand	165.523			
13	Projected total annual water demand		168.487	180.479	193.637
14	Adjustments to forecast				
15	Current and adjusted total annual water demand forecast	165.523	168.487	180.479	193.637
16	Current and projected annual supply capacity	219.000	219.000	195.275	171.550
17	Difference between total use and total supply capacity	53.477	50.513	14.796	(22.087)
E	Average-day and Maximum-day Demand				
18	Average-day demand	0.426	0.462	0.494	0.531
19	Current maximum-day demand	1.131			
20	Maximum-day to average-day demand ratio	2.655			
21	Projected maximum-day demand		1.226	1.313	1.408
22	Adjustment to maximum-day demand forecast				
23	Current maximum-day demand forecast	1.131	1.226	1.313	1.408
24	Daily supply capacity	1.619	1.619	1.619	1.619
25	Ratio of maximum-day demand to daily supply capacity	70%	76%	81%	87%

Worksheet 4-6: Cost of Supply-Side Facilities

Line	Item	Facilities for meeting average-day demand	Facilities for meeting maximum-day demand			Water purchases needed to meet demand	Estimate of simple incremental supply cost (\$/gallon)	
		Source of supply	Water treatment facilities	Treated water storage	Major transmissison lines			
A Supply Capacity in Annual Gallons								
1	Current installed capacity or water purchases	165.52	-	-	-	-		
2	Planned improvements and additions	-	-	-	-	-		
3	Planned retirements	-	-	-	-	-		
4	Future installed capacity or purchases	-	-	-	-	-		
B Cost of Planned Improvements and Additions								
5	Approximate total cost of planned improvements and additions identified in line 2 including financing							
6	Expected life of new facilities in years							
7	Estimated annual capital costs							
8	Estimated annual operating costs							
9	Estimated total costs							
10	Per unit cost of new facilities (line 9 divided by line2)							
11	Simple incremental supply cost							

Worksheet 4-8: Checklist of Conservation Measures

Measure	Already Implemented	Plan to Implement	Optional	Impractical	Comments
Level 1 Measures					
Universal metering					
Source-water metering	X				
Service-connection metering	X				
Meter public-use water	X				
Fixed-interval meter reading	X				
Meter-accuracy analysis		X			
Water Accounting and loss control					
Account for water	X				
Repair known leaks	X				
Analysis if nonaccount water	X				
Water system audit			X		
Leak detection and repair strategy	X				
Automated sensors/telemetry			X		
Costing and Pricing					
Cost-of-service accounting		X			
User charges	X				
Metered rates	X				
Cost analysis	X				
Nonpromotional rates			X		
Advanced pricing methods		X			
Information and Education					
Understandable water bill		X			
Information available	X				
Informative water bill		X			
Water-bill inserts			X		
School program	X				
Public education program			X		
Workshops			X		
Advisory committee				X	
Level 2 Measures					
Water-use audits					
Audits of large volume users			X		
Large landscaped audits			X		
Selective end-use audits			X		
Retrofits					
Retrofit kits available			X		
Distribution of retrofit kits			X		
Targeted programs			X		
Pressure management					
System wide pressure regulation				X	
Selective use of pressure-reducing valves				X	
Landscape efficiency					
Promotion of landscape efficiency			X		
Landscape planning and renovation			X		
Selective irrigation submetering			X		
Irrigation management			X		
Level 3 Measures					
Replacements and promotions					
Rebates and incentives (nonresidential)			X		
Rebates and incentives (residential)			X		
Promotion of new technologies			X		
Reuse and recycling					
Industrial applications				X	
Large volume irrigation applications			X		
Selective residential applications			X		
Water-use regulations					
Water-use standards and regulations			X		
Requirements for new developments			X		
Integrated resource management					
Supply-side technologies				X	
Demand-side technologies				X	

Worksheet 4-7: Preliminary Supply-Capacity Forecast

Year	Additions	Retirements	Total supply capacity for the system (annual or daily)
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			