Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

July 2, 2015

Town of Shrewsbury
Attn: Daniel J. Morgado, Town Manager
100 Maple Avenue
Shrewsbury, MA 01545

Town: Shrewsbury
PWS Number: 2271000
Program: Water Management Act (WMA)
WMA Permit #: 9P4-2-12-271.01
Final Modified WMA Permit

Dear Mr. Morgado:

Please find the attached documents:

- Findings of Fact in Support of the Final Modified WMA Permit Decision;
- Final Water Management Act Permit 9P4-2-12-271.01 for the Town of Shrewsbury in the Blackstone River Basin;
- Unaccounted For Water Compliance Plan; and
- Mitigation Plan – Including Appendices A and B.

If you have any questions regarding this permit, please contact Duane LeVangie at (617) 292-5706, or me directly at (508) 767-2827.

Sincerely,

Marielle Stone
Deputy Regional Director
Bureau of Water Resources

ecc: Robert Tozeski, Shrewsbury Water Dept. (rtozeski@th.ci.shrewsbury.ma.us)
T. Philip Leader, Shrewsbury Town Counsel (leader.law@verizon.net
Jeff Howland, Shrewsbury Engineering Dept. (jhowland@shrewsburyma.gov)
Blackstone Headwaters Coalition (peter.coffin@zaptheblackstone.org)
Margaret VanDeusen, Petitioner's representative (mvandeusen@crwa.org)
Deidre Menoyo, Petitioner's representative (dmenoyo@mac.com)
Rivers Alliance (JuliaBlatt@massriversalliance.org)
Phil Guerin, City of Worcester (GuerinP@worcesterma.gov)
Larry Freed (larryfreed1@charter.net)
Massachusetts Audubon Society (hricci@massaudubon.org)
Rhode Island Audubon Society (emarks@asri.org)
OARs (alisonfieldjuma@oars3rivers.org)
MWWA (MWWA@verizon.net)

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July 2, 2015 - Findings of Fact in Support of Decision on Final Modified Permit
Town of Shrewsbury, Water Management Permit # 9P4-2-12-271.01

The Massachusetts Department of Environmental Protection (MassDEP, or the Department) has completed its review of the Town of Shrewsbury's (Shrewsbury's) Water Management Act (WMA) Permit application in the Blackstone River Basin. In preparing the draft permit, the following was taken under consideration: WMA application review, Shrewsbury's February 4, 2013 response to MassDEP's Order to Complete issued on November 6, 2012, Sustainable Water Management Initiative pilot project discussions, written comments received from the Blackstone River Coalition dated April 2, 2013, and meetings with the Town of Shrewsbury and the impacted watershed groups (Blackstone River Coalition, Mass Rivers Alliance, and OARs; the Assabet, Sudbury, and Concord Rivers). Comment letters were received on the draft permit and a summary of the changes incorporated into the permit is provided following the Findings of Fact.

MassDEP issues this Findings of Fact in support of the attached permit, and includes herewith its reasons for approving the permit and for the conditions of approval imposed, as required by M.G.L. c21G, s.11, and the "Massachusetts Water Resources Management Program", 310 CMR 36.00 ("the Regulations").

Town of Shrewsbury's Withdrawal History

Shrewsbury holds a registration statement (2-12-271.01) for an average annual daily withdrawal volume of 2.64 million gallons per day (MGD) from sources in the Blackstone River Basin. Shrewsbury was first issued a Water Management Act permit in November 1990 to increase the total authorized withdrawal volume from the registered sources.

MassDEP issued a new Water Management Act permit to the Town of Shrewsbury dated September 8, 2005 allowing an increase in the permitted withdrawal volume (by applying Shrewsbury's authorized withdrawal volume previously allocated in the Concord River Basin) and to add Home Farm Well #6.2 as an authorized withdrawal location. The WMA Permit issued in September 2005 was appealed by the Town of Shrewsbury. The WMA Permit was subsequently upheld by the Administrative Magistrate and the Recommended Final Decision (RFD) was issued November 23, 2007. The MassDEP Commissioner at the time, Laurie Burt, adopted the RFD in her decision dated March 21, 2008 with the exception of the Administrative Magistrate's findings regarding the requirement to retrofit municipal buildings. Commissioner Burt upheld the permit requirement to complete the retrofit of all municipal buildings within 27

months of the final permit dated May 28, 2008. On March 1, 2010, MassDEP issued a 20-Year Permit Renewal to the Town of Shrewsbury in response to its permit renewal application.

The current permit application by the Town of Shrewsbury included a request for an increase in permitted withdrawal volume of 1.37 MGD for a total authorized withdrawal volume of 5.28 MGD through the end of the 20-year basin cycle in 2033. The following permit includes an additional allocation of up to 0.44 MGD for a total authorized withdrawal volume of 4.35 MGD, until the Department of Conservation and Recreation (DCR) has adequate information to prepare a revised Water Needs Forecast for Shrewsbury and until completion of the Long-Term Safe Yield analysis. The additional authorized withdrawal volume of 0.44 MGD is the remaining volume within the Blackstone River Basin under the Interim Safe Yield. The additional volume being allocated in this permit is contingent upon Shrewsbury demonstrating to the MassDEP's satisfaction that they have evaluated and mitigated the impacts associated with the additional permitted withdrawal volumes.

MassDEP issued Water Management Act permit on January 21, 2014 to the Town of Shrewsbury. Subsequently, the January 21, 2014 WMA permit #9P4-2-12-271.01 was appealed by the Blackstone River Coalition, the Blackstone Headwaters Coalition, the Blackstone River Watershed Association and a 12 Citizens' Group (collectively, the Petitioners) on February 11, 2014. The appeal was docketed with MassDEP's Office of Administrative Appeals and Dispute Resolution (OADR) as Matter of Town of Shrewsbury – WMA Permit, OADR Docket No. 2014-002. This Final Modified Permit and Special Conditions, the attached Unaccounted-for Compliance (UAW) Plan and Mitigation Plan (including Appendices A and B) are a result of a Settlement Agreement reached between the parties to the appeal: MassDEP, the Petitioners and the Town of Shrewsbury. The Final Decision approving and incorporating the Settlement Agreement and Modified Water Management Act Permit (Permit #9P4-2-12-271.01) was signed and issued by Gary Moran, Deputy Commission of MassDEP on June 17, 2015.

Inter Basin Transfer Act (IBTA)

Shrewsbury's water supply wells are located in the Blackstone River Basin and the Town's wastewater is transported to the Westborough wastewater treatment facility in the Concord River Basin. Under the IBTA, an action that increases the capacity to transfer water across municipal and basin boundaries is subject to the IBTA. Prior to 1983, Shrewsbury had grandfathered capacity to transfer 7.8 MGD from the Blackstone River Basin to the Concord River Basin based on Shrewsbury's historical pumping capacity. Shrewsbury's Home Farm Well #6.2 was constructed after 1983; therefore, its use was not grandfathered under the IBTA. The Water Resource Commission (WRC) decision dated September 9, 2004 stated that the total withdrawal volume from the Home Farm Wells site must be restricted to no more than 5.4 MGD to remain consistent with the IBTA.

Understanding that Shrewsbury's current maximum daily pumping volumes at the Home Farm Wells site approach 5.4 MGD, increasing annual system-wide volumes would appear to exacerbate the likelihood that maximum daily volumes from the Home Farm Wells would rise as well. Prior to any exceedence of 5.4 MGD, Shrewsbury should obtain the appropriate IBTA approvals. Contact DCR's Water Resources program staff for guidance regarding the IBTA process should withdrawals necessitate an increase in maximum daily pumping rate above 5.4 MGD at the Home Farm Wells site.

The Water Management Act

Permit Factors

Section 7 of the Act requires that MassDEP issue permits that balance a variety of factors including:

- Reasonable protection of existing water uses, land values, investments and enterprises;
- Reasonable conservation consistent with efficient water use;
- Reasonable protection of public drinking water supplies, water quality, wastewater treatment capacity, waste assimilation capacity, groundwater recharge areas, navigation, hydropower resources, water-based recreation, wetland habitat, fish and wildlife, agriculture, flood plains; and
- Reasonable economic development and job creation.

Safe Yield Permit Factor

Among the minimum permit factors Section 7 requires is a determination by MassDEP that permitted water withdrawals are within the safe yield of the water source from which they are made. Section 2 of the Act defines "safe yield" as: "the maximum dependable withdrawal that can be made continuously from a water source including ground or surface water during a period of years in which the probable driest period or period of greatest water deficiency is likely to occur; provided however, that such dependability is relative and is a function of storage and drought probability".

For the purposes of the Water Management program, MassDEP considers a water source to be any one of Massachusetts' 28 major river basins. A map of the 28 major river basins has been developed by the Department of Conservation and Recreation and can be viewed in their guidance document "A Guide to the Interbasin Transfer Act and Regulations".

On December 14, 2009, MassDEP, with the assistance and concurrence of a group of stakeholders, identified a methodology for determining an Interim Safe Yield while a final Long-Term Safe Yield is developed. The Interim Safe Yield methodology is described in the document "Interim Safe Yield Determinations for Water Management Act Permits" available on MassDEP's website.

This permit is being issued under the Interim Safe Yield methodology. Pursuant to MGL c 21G, section 11 MassDEP cannot issue permits when the combined existing, permitted, and proposed withdrawal volumes exceed the safe yield of the water source. If MassDEP determines that the Long-Term Safe Yield is less than the Interim Safe Yield calculated for this basin, the volumes authorized in all Water Management permits in this basin shall be reviewed and the permitted volumes adjusted downward accordingly. MassDEP is using its best efforts to develop the final Long-Term Safe Yield for the Blackstone River Basin.

Under the Permit Extension Act, which was created by Section 173 of Chapter 240 of the Acts of 2010, and amended by Sections 74 and 75 of Chapter 238 of the Acts of 2012 to promote job growth and long-term economic recovery, expiration dates for WMA permits were extended by four years. Therefore, WMA permits for withdrawals in the Blackstone River Basin expire on February 28, 2033. Permit review in accordance with the Long-Term Safe Yield shall be no later than the next 5-year review of this permit. Note the 5 Year Review schedule for this permit has been altered to account for the additional time added because of the Permit Extension Act. The

reviews scheduled for this permit are in 2017 for Period One, 2023 for Period Two, and 2028 for Period Three (See Special Condition #1).

This permit will also enable MassDEP to incorporate the latest scientific information and to consider recommendations (including but not limited to stream flow criteria) from the currently ongoing Executive Office of Energy and Environmental Affairs' Sustainable Water Management Initiative (SWMI), along with United States Geological Survey (USGS) investigative studies, particularly, *Indicators of Streamflow Alteration, Habitat Fragmentation, Impervious Cover, and Water Quality for Massachusetts Stream Basins* (USGS SIR 2009-5272) which can be viewed at http://pubs.usgs.gov/sir/2009/5272/ ; *Preliminary Assessment of Factors Influencing Riverine Fish Communities in Massachusetts (USGS OFR 2010-1139),* and *Factors Influencing Riverine Fish Assemblages in Massachusetts* (USGS SIR 2011-5193), and other pertinent studies or site-specific analyses that become available. Access to water volumes authorized beyond Period One of this permit is contingent upon all permitted withdrawals in the basin being within the Long-Term Safe Yield, implementation of any required mitigation, and on MassDEP completing a 5-year review modification or a permit amendment incorporating the Long-Term Safe Yield determination.

Using the December 14, 2009 "Approach to Interim Safe Yield (ISY) Determinations for Water Management Act Permits" the ISY for the Blackstone River Basin is 41.76 MGD. The ISY approach is available on the internet at http://www.mass.gov/eea/agencies/massdep/water/watersheds/tools-resources.html:

ISY = EA+0.01((NDB+FY)-EA)

Where,

EA = Existing Allocation
NDB = Net Drought Baseflow[1]
FY= Firm Yield of drinking water supply reservoirs within the watershed

Blackstone River EA = 40.7MGD
Blackstone River NDB = 131.87 MGD
Blackstone River FY = 14.75 MGD

Blackstone River ISY = 41.76 MGD

The water volume remaining for allocation by permitting (RAP) is the difference between the ISY and the withdrawals already allocated by registrations or permits (EA).

RAP = ISY-EA=1.06 MGD

RAP is equal to 1.06 MGD for the existing Blackstone River Basin withdrawals (41.76 MGD-40.7 MGD=1.06 MGD). An additional 0.62 MGD was allocated to the Riverdale Water Co. in a permit dated December 19, 2012; therefore 0.44 MGD is available for allocation until the Long Term Safe Yield is determined.

[1] Net Drought Baseflow was estimated by MassDEP Boston WMA staff by calculating the annual groundwater recharge over the area of the basin during the drought of record.

Findings of Fact for the Performance Standards

MassDEP has determined that there is documented evidence that water withdrawals and an increase in development and impervious area, combined with the out-of-basin export of wastewater, substantially contribute to low flow in the Commonwealth. These low flows impact the ability of rivers and tributaries to adequately serve all of the competing uses described in the Act. To better achieve the balance of competing water uses mandated by the Act, the MassDEP refers to the Water Conservation Standards adopted by the Water Resources Commission. Specific performance standards are applied to new Water Management permits and to existing permits at the time they are amended, during 5-year permit review, or permit renewal.

Consistent with Section 3 of the Act, the performance standards of 65 gallons per day or less for residential per capita water use and 10% or less of unaccounted for water, summer limits on withdrawals, and efforts to offset the impacts of increasing withdrawal volumes are consistent with the Massachusetts Water Conservation Standards approved by the Water Resources Commission in July 2006 and revised June 2012.

MassDEP believes these standards are reasonable based on studies and data developed throughout the country, the 1996 AWWA Leak Detection and Water Accountability Committee report on water accountability (AWWA Journal; July 1996; pp. 108-111), and the fact that the average values in 2012 for Massachusetts were 59 RGPCD, and 13% UAW. While these performance standards represent the minimum standards required for compliance with the Permit, MassDEP believes that through the implementation of all the terms and conditions of Water Management permits, municipalities can meet the performance standards for RGPCD and UAW.

Shrewsbury was required to meet the 65 residential gallons per capita day (RGPCD) and 10% unaccounted-for-water (UAW) performance standards beginning in calendar year 2010. MassDEP will consider any permittee that has been unable to meet the 65 RGPCD or 10% UAW performance standard within 5 years of receiving its permit to be achieving functionally equivalent compliance with the performance standards, if they:

- are complying with the Water Conservation requirements included in the permit,
- have implemented the required limits on nonessential outdoor water use, and
- are making demonstrable efforts to finance, implement and enforce a MassDEP-approved compliance plan.

Because circumstances vary, a permittee may present an analysis of the cost effectiveness of implementing certain conservation measures required by MassDEP and offer alternative measures. The analysis must explicitly consider environmental impacts and must produce environmental benefits. MassDEP will allow permittees to:

- Document economic hardship and present an analysis demonstrating that implementation of specific measures will cause or exacerbate significant economic hardship;
- Present reasons why specific measures are not cost effective because the cost would exceed the costs of alternative methods of achieving the appropriate standard; and
- Propose specific conservation measures that would result in equal or greater system-wide water savings or equal or greater environmental benefits than the conservation measures included in the MassDEP Functional Equivalence Plan(s) (See Appendix A & B).

Findings of Fact for Shrewsbury's Special Permit Conditions

In issuing permits, MassDEP looks primarily at site-specific impacts and other issues specific to the system, such as impacts to nearby streams, wetlands, or other water users, justification of long-term demand projections and the capacity of permitted withdrawal points. The conditions are intended to ensure the efficient use of water and to mitigate the potential impact of withdrawals.

The summary of permit conditions, as part of MassDEP's findings of fact, is not intended to, and should not be construed as, modifying any of the Permit conditions. In the event of any ambiguity between the summary and the actual permit conditions, the Permit language shall be controlling.

The existing permit included a condition that Shrewsbury complete Zone II delineations for all sources. MassDEP records indicate that all of Shrewsbury's sources have approved Zone II delineations. Public Water Systems are required to obtain MassDEP approval of Zone II delineations during the new source approval process and prior to activating any new sources; therefore this condition has been removed as a condition of the permit renewal.

Special Condition 1, Maximum Authorized Annual Average Withdrawal Volume, reflects an additional allocation of up to 0.44 MGD, for a total authorized withdrawal not to exceed 4.35 MGD. The additional withdrawal volume of 0.44 MGD is the remaining allocation for the Blackstone River basin under the Interim Safe Yield (ISY) Determination.

The permit authorizes an additional 0.26 MGD, with the potential to increase that by another 0.18 MGD (4.35 MGD total allocation) should demands increase and Shrewsbury meets the 65 RGPCD and 10% UAW standards, or is determined to be functionally equivalent (See Appendix A& B) if not meeting the standards. As noted earlier these volumes are also contingent upon Shrewsbury implementing the Mitigation Plan developed in consultation with MassDEP that feasibly mitigates impacts of their additional permitted withdrawals.

Massachusetts Department of Conservation and Recreation (DCR), Office of Water Resources prepared a water needs forecast for Shrewsbury dated November 20, 2008. The Water Needs Forecast (WNF) was prepared based on the Water Resources Commission's policy for developing water needs forecasts, which is available at: http://www.mass.gov/eea/docs/eea/wrc/090501-waterneedsforcast-policymethod.pdf. DCR developed Shrewsbury's WNF using 2000 census data and projected growth information obtained from the Town. Shrewsbury's was notified of DCR's final projections on November 20, 2008. Those projections identified a 2018 demand of 4.17 MGD with an additional five percent buffer available if Shrewsbury met the 65 rgpcd and 10% UAW standard. That additional 5% buffer potentially increased the allocation through 2018 to 4.38 MGD. However because the ISY is less than that value, the allocation volume is capped at 4.35 MGD.

DCR has begun using the 2010 census data when preparing WNF for communities requesting an increase in withdrawal volume or for those approaching expiration of the 20-year basin permit. The 2010 census data indicates Shrewsbury will have fewer residents and a slower rate of growth than previously predicted. The 2010 census data reported that Shrewsbury actually had 1,844 less residents in 2010 than predicted in 2008. By 2030, the slower rate of growth predicts a population of 6,242 fewer residents than previously predicted. As a result the revised WNF

prepared by DCR will likely be less than the WNF prepared in 2008. The methodology to prepare a WNF also requires the PWS to report UAW less than 15%. At the time DCR prepared the 2008 WNF, Shrewsbury's Unaccounted for Water (UAW) was 12-19%. Shrewsbury's UAW has been more than 20% since 2007. DCR must have three consecutive years of UAW of 15% or less to prepare a WNF.

Also as noted previously, volumes beyond the Period One allocation (February 28, 2017) are contingent upon the authorized withdrawals being within the Long-Term Safe Yield, and MassDEP completing a 5-Year Review or a permit amendment that incorporates the Long-Term Safe Yield determination into this permit.

Shrewsbury will be required to file and obtain a new Water Management Act Permit to receive authorization to withdraw more than 4.35 MGD. As noted above due to the lower population growth identified in the 2010 census and Shrewsbury's high UAW %, any additional allocations will be based on a revised WNF prepared by DCR.

Special Condition 2, Maximum Authorized Daily Withdrawal from each Withdrawal Point, reflects the maximum daily withdrawal rate by source, according to MassDEP approved Zone II rates.

Special Condition 3, Ground Water Supply Protection, requirements have been met for the Zone II areas within Shrewsbury's municipal boundary for the permitted sources. Additionally, Shrewsbury has submitted copies of letters dated January 28, 2013 to Boylston, West Boylston and Worcester requesting protection of Shrewsbury's Zone II areas that extend into those municipalities. Until each of those municipalities pass Ground Water Supply Protection requirements that satisfy the Regulations and include Shrewsbury's Zone II areas, MassDEP's Best Effort Requirement must be met for new source approvals (including replacement wells); monitoring waiver applications; WMA water withdrawal permit reviews or amendments; Zone II re-delineations; and Sanitary Survey stipulations. Shrewsbury will be required to repeat the "Best Effort" requirement during the next 5-Year Review.

Special Condition 4, Groundwater and Streamflow Monitoring data was collected in the summers of 2009 and 2010 to evaluate the potential impacts from pumping the Home Farm Wells on water levels near Poor Farm Brook. The MassDEP approved a monitoring plan that consisted of collection of monthly water level data from all available monitoring wells from April to November. Data was collected from six monitoring wells and three drive points. Pressure transducers and a data logger were used to record water levels in two monitoring wells during the month of July (a peak summer water use month).

MassDEP's review of the data submitted by Shrewsbury indicates that the pumping of the Home Farm Wells may be reducing baseflow to Poor Farm Brook. Pressure transducers recorded water level fluctuations of up to 0.5 feet in OBS-6 and 1.2 feet in TW-4. Monitoring well OBS-6, is approximately 315 feet west and north of Home Farm Well 6.2 and approximately 200 feet south of Poor Farm Brook. Monitoring well TW-4 is located approximately half-way between OBS-6 and Home Farm 6.2. Fluctuations appeared to correlate to the daily cyclic pumping of the Home Farm Wells. Precipitation was below normal in 2010 and water levels declined 5.4 feet in OBS-6, between April and October.

Shrewsbury's application for an increase in withdrawal volume from the Home Farm well site, necessitates a more comprehensive groundwater level monitoring program. Additional water level monitoring is required to confirm and quantify the impacts to the brook. Within 60 days of the issuance of the final permit, Shrewsbury is required to submit a revised groundwater and surface water monitoring plan for MassDEP's review and approval.

Special Condition 5, Performance Standard for Residential Gallons Per Capita Day Water Use, discussed previously. Shrewsbury reported an RGPCD of 61 in the 2014 Annual Statistical Report. If Shrewsbury's residential water use increases above 65 gallons per person, non-essential outside watering will be reduced to one day per week.

Special Condition 6, Performance Standard for Unaccounted for Water (UAW), discussed previously. The MassDEP adjusted percentage of unaccounted for water for Shrewsbury in 2014 was 22%. Shrewsbury provided an update regarding UAW compliance in a letter dated December 19, 2013. While useful, this update did not satisfy all aspects of the UAW Compliance Plan as outlined in Appendix B. Shrewsbury's UAW according to its 2014 ASR and reviewed by MassDEP, is 22%. Shrewsbury's UAW Compliance Plan resulted from settlement of the appeal docketed as Matter of Town of Shrewsbury – WMA Permit, OADR Docket No. 2014-002 and is attached hereto and incorporated as a requirement of the Modified Permit.

Special Condition 7, Seasonal Limits on Nonessential Outdoor Water Use is based upon Shrewsbury's RGPCD for the preceding year, and will be implemented according to either: 1) calendar triggered restrictions; or 2) streamflow triggered restrictions. The restrictions have been modified from the prior permit based on both technical and policy decisions by the Department. Due to groundwater depletion in the subbasins in which the Town's sources are located, this permit will require that more stringent restrictions than your existing permit be imposed, regardless of compliance with the RGPCD Standard for the preceding year. In addition, the Drought Trigger has been replaced with a new Low-Flow statistic that triggers tighter restrictions during unusually dry weather.

1. **Calendar triggered restrictions:** Restrictions shall be implemented from May 1st through September 30th. Many public water suppliers will find this option easier to implement and enforce than the streamflow triggered approach.

2. **Streamflow triggered restrictions:** Restrictions shall be implemented at those times when streamflow falls below designated flow triggers measured at an assigned, web-based, real-time U.S. Geologic Survey (USGS) stream gage from May 1st through September 30th. At a minimum, restrictions shall commence when streamflow falls below the trigger for three consecutive days. Once implemented, the restrictions shall remain in place until streamflow at the assigned USGS local stream gage meets or exceeds the trigger streamflow for seven consecutive days.

The basis for streamflow triggers is derived from Aquatic Base Flow (ABF) values calculated by the Sustainable Yield Estimator (SYE)[2] for simulated natural flow applied to

[2] Archfield, S.A., Vogel, R.M., Steeves, P.A., Brandt, S.L., Weiskel, P.K., and Garabedian, S.P., 2010, The Massachusetts Sustainable-Yield Estimator: A decision-support tool to assess water availability at ungaged stream locations in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2009–5227, 41 p. plus CD-ROM. See http://pubs.usgs.gov/sir/2009/5227/

the assigned local USGS stream gage. The two-tiered trigger values are based on flow levels that are protective of aquatic habitat for fish spawning during the spring bioperiod, designated with the June ABF; and protective flows for fish rearing and growth during the summer bioperiod, designated with the August ABF trigger. Protective flow levels are derived from index gage flow data which represent the least altered stream flows in Massachusetts, and are further described in the Department of Conservation and Recreation (DCR)[3] and USGS Index Reports[4].

If Shrewsbury selects the streamflow approach, it has been assigned the USGS local stream gage of 01110000 – Quinsigamond River at Grafton, MA. The June ABF estimated using SYE is 0.94 cfsm and the August ABF value is 0.44 cfsm. These cfsm units translate to your local gage streamflow triggers as 24 cubic feet per second (cfs) for May and June, and 11 cfs for July, August and September.

Should the reliability of flow measurement at the Quinsigamond River gage be so impaired as to question its accuracy, Permittee may request MassDEP's review and approval to transfer to another gage to trigger restrictions. MassDEP reserves the right to require use of a different gage.

The Low-flow statistic being applied replaces the Massachusetts Drought Management Task Force Declaration previously used for triggering more stringent restrictions on seasonal limits on nonessential outdoor water use. This value referred to the as "7-day low-flow statistic" is the median value of the annual 7-day low flows for the period of record for the Quinsigamond River gage. That value for the Quinsigamond River gage is 1.9 cfs and will limit non-essential outdoor watering to no more than 1 day per week as outlined in Special Condition #7. This value is expected to be more responsive of actual hydrologic conditions in our rivers and streams than the Drought Management Task Force Declaration.

Special Condition 8, Water Withdrawals that Exceed Baseline Withdrawal Volumes
Baseline withdrawal for Shrewsbury in its previous permit was 3.76 MGD (1372.4 MGY), as previously outlined in the May 28, 2008 permit amendment and March 1, 2010 permit renewal. This was Shrewsbury's average volume withdrawn in compliance with the Act from 2001 to 2003.

As part of the Sustainable Water Management Initiative (SWMI), Baseline withdrawal volumes will be adjusted to the volume of water withdrawn during 2005 plus 5% or the average volume withdrawn from 2003 through 2005 plus 5%, whichever is greater, provided that Baseline cannot exceed the maximum volume authorized for 2005.

Shrewsbury's adjusted Baseline will be 3.91 MGD (1427.15 MGY). Shrewsbury's maximum authorized volume for 2005 was 3.91 MGD. The actual withdrawal volume in 2005 was 3.81 MGD. 3.81 MGD plus 5% would be 4.00 MGD. Because Baseline cannot exceed the maximum

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[3] Massachusetts Department of Conservation and Recreation (DCR), 2008 Index Streamflows for Massachusetts, May 2008, Prepared by Office of Water Resources for the Massachusetts Water Resources Commission, 45 p., plus CD-ROM.

[4] Armstrong, D.S., Parker, G.W., and Richards, T.A., 2008, Characteristics and classification of least altered streamflows in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2007-5291, 113 p., plus CD-ROM.

volume authorized for 2005, Shrewsbury's baseline is limited to 3.91 MGD. Shrewsbury's recent withdrawals, as reported on the ASR, have been 3.66 MGD in 2012, 3.69 MGD in 2011 and 3.64 MGD in 2010.

Shrewsbury's Mitigation Plan (inclusive of Appendices A and B), resulted from settlement of the appeal docketed as Matter of Town of Shrewsbury – WMA Permit, OADR Docket No. 2014-002, and is attached hereto and incorporated as a requirement of the Modified Permit. The Mitigation Plan offsets increased water use over Baseline. The Mitigation Plan provides Shrewsbury with mitigation credit as shown on Table A at the end of the Mitigation Plan. The Mitigation Plan includes evaluation of offsets to be conducted within the sub-basin of the Home Farm Wells withdrawal, such as improvements to the stormwater outfall to Poor Farm Brook located within Shrewsbury's municipal boundaries.

Permittees are required to consult with MassDEP staff and other Executive Office of Energy and Environmental Affairs (EEA) staff deemed appropriate by MassDEP in developing the Mitigation Plan. However, having participated in the SWMI Piloting, Shrewsbury has already consulted with EEA Agency staff to identify potential mitigation options. Activities completed since 2005, such as storm water retrofits, I/I repairs, and bylaw adoption may be considered retroactively for mitigation credits.

The City of Worcester received $139,000 through the SWMI Grant Program (FY 2012) to study the feasibility of removing the Poor Farm Dam. Removal of the dam may provide benefits over the long term to the aquatic health of Poor Farm Brook through habitat and instream flow improvements. Contributing to the removal of the dam may be a creditable mitigation activity for both Worcester and Shrewsbury.

Special Condition 9, Requirement to Report Raw and Finished Water Volumes, ensures that the information necessary to evaluate compliance with the conditions included herein is accurately reported.

Special Condition 10, Water Conservation Requirements, incorporates the Water Conservation Standards for the Commonwealth of Massachusetts reviewed and approved by the Water Resources Commission in July 2006. Shrewsbury completed the retrofit of its municipal buildings with low flow fixtures by February 1, 2015.

Response to Comments on the Draft Permit Dated November 8, 2013:

***Note: The settlement agreement documents attached hereto address some of the comments below. However, these responses to comments are those MassDEP made at the time that the comments were received and therefore do not reflect the settlement.**

Comments on the draft permit were received by:

- The Town of Shrewsbury
- Blackstone River Coalition
- Massachusetts Rivers Alliance and Charles River Watershed Association
- Massachusetts Audubon Society
- Rhode Island Audubon Society
- Lawrence Freed (concerned citizen)
- City of Worcester, Dept of Public Works and Parks

Several of the comment letters stated opposition to the increase in authorized withdrawal volume provided to the Town of Shrewsbury. The Water Management Act permit for Shrewsbury allocates up to an additional withdrawal volume of 0.44 MGD, which is 32% of the 1.37 MGD volume that the Town requested in their permit application. The 0.44 MGD volume is also conditionally allocated at the Department's discretion based upon Shrewsbury meeting the 65 RGPCD and 10% UAW standard or the functional equivalence requirements. Should Shrewsbury fail to meet the performance standards that volume is limited to the 0.26 MGD projected through 2018, which is 19% of what was requested. In addition, access to any volumes above 3.91 MGD is contingent upon Shrewsbury's implementation of the MassDEP Mitigation Plan to offset withdrawals above the existing permitted volume. The Mitigation Plan considered offsets to be conducted within the sub-basin of the Home Farm Wells withdrawal such as improvements to the stormwater outfall to Poor Farm Brook located within Shrewsbury's municipal boundaries. The list of potential mitigation measures provided in Table 5 is not intended to be entirely comprehensive and the mitigation plans for each permit will be reviewed individually.

Shrewsbury has Water Needs Forecasts (WNF) developed by DCR in 2008, using the methodology approved by the Water Resources Commission, which predicted a demand of 5.03 MGD in 2028 assuming the standards of 65 RGPCD and 10% UAW were met. That number could potentially be increased at the Department's discretion by a 5% buffer (0.25 MGD), thus increasing the total allocation to 5.28 MGD. At the time the WNF's were prepared, the Town's UAW was within a range acceptable to DCR for preparing the WNF. However, since that time Shrewsbury UAW has increased significantly and the 2010 census identified a slower rate of growth than was originally expected. For those reasons and the Interim Safe yield cap discussed previously, the Department has not authorized the volume predicted by the existing WNF. Shrewsbury will be required to file a new WMA permit application to request an increase in authorized withdrawal volume above 4.35 MGD. The final permit reflects an additional authorization of 0.26 MGD, with the potential to increase that by another 0.18 MGD (4.35 MGD total allocation) should demands increase and Shrewsbury meets the 65 rgpcd and 10% UAW standards, or is determined to be functionally equivalent (See Appendix A& B) if not meeting the standards.

Shrewsbury's high unaccounted for water is a concern to all parties, including MassDEP and the Town of Shrewsbury. The Town of Shrewsbury is actively pursuing improvements to reduce unaccounted for water . The UAW Compliance Plan developed as a result of the settlement negotiations is attached. The UAW Compliance Plan includes annual leak detection surveys, water audits, and repair, replacement and calibration of meters. Shrewsbury's high UAW may in part reflect unreported water due to faulty, older meters and therefore the water is in use, not lost to the ground. Full cost pricing is required in Special Condition 10 of this permit.

Shrewsbury Water Department provided an update to MassDEP dated December 19, 2013 summarizing work completed in the last 12 months to address UAW. A full leak detection survey was completed in June 2013. Leaks were detected at 36 hydrants, three residential connections and one water main. The water main loss was estimated to be 150,000 to 185,000 gpd. Shrewsbury is continuing to proceed with its residential and commercial meter replacement program and reports that the water rates have been established to fully cover all operational and capital costs.

Several of the comments were directed to the question of the usefulness of additional water level and streamflow monitoring. The preliminary water level monitoring confirmed that the area of influence of the Home Farm Wells extends north towards Poor Farm Brook. However, additional data collection is intended to answer the question of the lateral extent of Poor Farm Brook that is impacted by pumping and possible impacts to Poor Farm Pond. The results of the additional monitoring may provide an understanding of the relationship of summer withdrawals and the duration of low flows, recovery times and the presence of a delayed response to pumping, which could lead to modification or optimization of the pumping schedule of the Home Farm Wells. This condition (Special Condition #4, Groundwater and Streamflow Monitoring) was modified based on the comments received. Item #7 of this condition had "additional monitoring required" inserted clarifying that the Department could require such work.

Public comments were requested at several points within the Water Management Act permit application review process. When the permit application is received, MassDEP posts a notification of receipt of the application in the MEPA Environmental Monitor with a 30-day comment period. The applicant notifies the primary and secondary abutters and posts a notification of the availability of the permit application for review in a local newspaper. Local watershed groups and the Massachusetts Water Works Association are copied on the Order to Complete (request for additional information on the permit application) issued to the applicant. MassDEP customarily provides a 30-day comment period on the draft permit, which is not required by the statute or the regulations.

The Town of Shrewsbury is required to comply with the municipal retrofit requirement of the permit. The Administrative Magistrate's Recommended Final Decision dated November 23, 2007 did not support the retrofit requirement. However, Commissioner Laurie Burt's rejected this recommendation in her Final Decision and outlined her reasons for doing so in the Decision dated March 21, 2008. Shrewsbury reports that 100% of its municipal buildings have been retrofit with water saving devices were completed by February 1, 2015 and confirmed in a letter to MassDEP dated April 9, 2015.

The Town of Shrewsbury's Water Conservation Bylaw restricts non-essential outside watering. The Town's current Water Conservation Bylaw bylaw as amended in May 2015 by Town Meeting vote, specifies two day per week watering by address. The attached permit allows only two day per week watering using the Calendar approach and one day per week for the Streamflow approach.

Comments received also suggested using the less impacted USGS Stillwater Gage near Sterling MA for triggering non-essential outside watering restrictions. The Department decided not to change the gage used as the triggering mechanism because the summer monthly ABF triggers are intended, where available and appropriate, to be local gages that could be affected by upstream pumping impacts. The ABF values are based on SYE-estimated unimpacted flows at the local gages, so that if the local gage downstream of the permittee's withdrawal goes below that, outdoor water use would be curtailed. The 7-day low flow statistics are calculated using actual local gage statistics. Based on our review it appears for the Quinsigamond River Gage at North Grafton that the 11 cfs and 24 cfs triggers will be hit, approximately between 50 and 75 percent of the time June through September (using historic data).

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

FINAL MODIFIED WATER WITHDRAWAL PERMIT
MGL c 21G

This permit is approved pursuant to the Massachusetts Water Management Act for the sole purpose of authorizing the withdrawal of a volume of water as stated below and subject to the following special and general conditions. This permit conveys no right in or to any property beyond the right to withdraw the volume of water for which it is issued.

PERMIT NUMBER: 9P4-2-12-271.01 **RIVER BASIN:** Blackstone

PERMITTEE: Town of Shrewsbury

EFFECTIVE DATE: July 2, 2015

EXPIRATION DATE: February 28, 2033

NUMBER OF WITHDRAWAL POINTS: Groundwater: 7

USE: Public Water Supply

DAYS OF OPERATION: 365

LOCATIONS:

Table 1: Withdrawal Point Identification

Source Name	PWS Source Code ID
Sewell Street Well #4	2271000-02G
Lamberts Sand Pit Well 3.1	2271000-04G (abandoned)
Lamberts Sand Pit Well 3.2	2271000-05G
Lamberts Sand Pit Well 3.3	2271000-011G
Home Farm Well 6.1	2271000-07G
Home Farm Well 6.2	2271000-08G
Home Farm Well 6.3	2271000-09G
Home Farm Well 6.4	2271000-10G

SPECIAL PERMIT CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit authorizes the Town of Shrewsbury to withdraw water from the Blackstone River Basin at the rate described below in Table 2. The volume reflected by this rate is in addition to the 2.64 million gallons per day previously authorized to Shrewsbury under Water Management Act Registration #2-12-271.01 for withdrawal from the Blackstone River Basin. The permitted volume is expressed both as an annual average daily withdrawal rate (million gallons per day or MGD), and as a total annual withdrawal volume (million gallons per year or MGY) for each five-year period of the permit term.

The Department of Environmental Protection (MassDEP) bases these withdrawal volumes on the raw water withdrawn from the authorized withdrawal points, and will use the raw water amount to assess compliance with the registered and permitted withdrawal volumes.

Table 2: Maximum Authorized Annual Withdrawal Volumes

5-Year Periods		Total Raw Water Withdrawal Volumes			
		Permit		Permit + Registration	
		Daily Average (MGD)	Total Annual (MGY)	Daily Average (MGD)	Total Annual (MGY)
Period One*	3/1/2009 to 1/21/2014	1.27	463.6	3.91	1427.2
	1/21/2014 to 2/28/2017	1.53 (1.71**)	558.45 (624.2**)	4.17 (4.35**)	1522.05 (1587.8**)
Period Two*	3/1/2017 to 2/29/2023	***	***	***	***
Period Three*	3/1/2023 to 2/28/2028	***	***	***	***
Period Four*	3/1/2028 to 2/28/2033	***	***	***	***

*This permit is issued under the Interim Safe Yield methodology adopted by MassDEP on December 14, 2009. Under MGL c21G, §11 MassDEP cannot issue permits when the combined existing, permitted and proposed withdrawal volumes exceed the safe yield of the water source. If MassDEP determines that the Long-Term Safe Yield is less than the Interim Safe Yield calculated for this basin, the volumes authorized in all Water Management permits in this basin shall be reviewed and the permitted volumes adjusted accordingly. MassDEP is currently developing the final Long-Term Safe Yield for the Blackstone River Basin. Access to water volumes authorized beyond Period One of this permit is contingent upon all permitted withdrawals in the basin being within the Long-Term Safe Yield, and on MassDEP completing a 5-Year review or a permit amendment incorporating the Long-Term Safe Yield determination. In addition, these volumes are contingent upon their being mitigated to the extent feasible. Shrewsbury will be required to file and obtain a new Water Management Act Permit to receive authorization to withdraw more than 4.35 MGD.

** Permitted volumes may be increased by an additional 5% buffer to accommodate uncertainty in the growth projections used by the Department of Conservation and Recreation in the water needs forecasts, and/or to accommodate the water demand of a community that has not met the 65 RGPCD and 10% UAW performance standards, but has met the functional equivalence requirements included in this permit.

***This permit includes up to an additional allocation of 0.44 MGD. Shrewsbury will need to provide Annual Statistical Reports in sufficient detail to allow the Department of Conservation and Recreation (DCR) to prepare Water Needs Forecasts for Shrewsbury after three consecutive years of 15% or less UAW are reported.

2. Maximum Authorized Daily Withdrawals From Each Withdrawal Point

Withdrawals from individual withdrawal points are not to exceed the approved maximum daily volumes listed below (Table 3) without specific advance written approval from MassDEP. The authorized maximum daily volume is the approved rate of each source. In no event shall the combined withdrawals from the individual withdrawal points exceed the withdrawal volumes authorized above in Special Condition 1.

Table 3: Maximum Daily Withdrawal Rates

Source Name	PWS Source Code ID	Maximum Daily Rate (MGD)
Sewell #4	2271000-02G	1.14
Lamberts Sand Pit Well 3.1	2271000-04G	**
Lamberts Sand Pit Well 3.2	2271000-05G	0.58
Lamberts Sand Pit Well 3.3	2271000-11G	0.75**
Home Farm Well 6.1	2271000-07G	4.32*
Home Farm Well 6.2	2271000-08G	3.02*
Home Farm Well 6.3	2271000-09G	*
Home Farm Well 6.4	2271000-10G	*

* The total pumping volume from all of Shrewsbury's sources is not to exceed a daily maximum of 7.8 MG and the total pumping from Home Farm Wells 6.1, 6.2, 6.3 and 6.4 is not to exceed a daily maximum of 5.4 MG in accordance with the Water Resource Commission Decision concerning Inter-Basin Transfer dated September 9, 2004. Home Farm Well 6.3 and 6.4 were installed as back-up wells for Home Farm 6.1; therefore the combined withdrawal rate for Home Farm Wells 6.1, 6.3 and 6.4 shall not exceed the approved pumping rate for Home Farm Well 6.1 of 4.32 MGD.

** Lamberts Sand Pit Well 3.3 was installed as a replacement well for Lamberts Sand Pit Well 3.1. Lamberts Sand Pit 3.1 will be abandoned in accordance with the abandonment permit dated April 22, 2015.

3. Groundwater Supply Protection

MassDEP records indicate that Shrewsbury's permitted ground water sources meet MassDEP's wellhead protection requirements of the Drinking Water Regulations at 310 CMR 22.21(2), including a floor drain regulation, for the portion of the Zone II areas within its municipal boundaries. The Best Effort Requirement will need to be repeated, at MassDEP's direction, for WMA water withdrawal permit reviews or amendments; new source approvals (including replacement wells); monitoring waiver applications; Zone II re-delineations; and Sanitary Survey stipulations, until Worcester, Boylston and West Boylston adopt the appropriate controls. The Best Effort requirement was last satisfied in January 2013.

4. Groundwater and Streamflow Monitoring

Shrewsbury must develop and conduct, a more thorough groundwater and surface water monitoring plan and include analysis of the data. The purpose of the monitoring is to confirm

and quantify the impacts to Poor Farm Brook from groundwater withdrawals at the Home Farm well site and to determine what portion, or reach, of the stream is impacted. Shrewsbury must submit a monitoring plan for MassDEP's review and approval within sixty (60) days of the issuance date of the final modified permit.

Monitoring of groundwater and surface water in the vicinity of Poor Farm Brook and the Home Farm Wells must, at a minimum, include the following:

1. Collect water level measurements in at least two locations within Poor Farm Brook with a pressure transducer and data logger. Data must be recorded at a minimum of one hour intervals, from May 1 through September 30. One data collection location must be near the mouth of the brook, before it enters Lake Quinsigamond. The second location should be placed upstream, at a location considered outside the area of influence of the pumping wells.

2. Collect water levels from a sufficient number of monitoring wells on the site to develop groundwater contour maps. Prepare hydrographs (water level elevation versus time) for each monitoring well and prepare monthly groundwater contour maps. Measurements must be collected on a weekly basis from May 1 to September 30. Installation of additional monitoring wells may be required to obtain sufficient areal coverage.

3. Install a series of piezometers/staff gages along the length of Poor Farm Brook to help assess the potential that the brook is a "losing" stream and if so, where does it transition from a gaining to a losing stream. Determine the length of the stream reach that is impacted by the pumping of the Home Farm wells.

4. Present water level data from the Home Farm well site in graphic format with precipitation, pumping periods and pumping rate from each of the Home Farm Wells clearly defined.

5. Provide a profile of Poor Farm Brook streambed elevations between the dam and the outlet to Lake Quinsigimond.

6. Provide the data in electronic format.

7. Provide a written summary and analysis of the data collected by an engineer or hydrogeologist.

8. Submit annual reports to MassDEP by December of each year. MassDEP will evaluate the data and determine if additional information is needed, additional monitoring is required, or if monitoring may be terminated.

The results of the additional monitoring may provide an understanding of the relationship of summer withdrawals and the duration of low flows, recovery times and the presence of a delayed response to pumping, which could lead to, including without limitation, modification of the permit or of the pumping schedule of the Home Farm Wells and/or optimization to reduce environmental impacts.

5. Performance Standard for Residential Gallons Per Capita Day Water Use

Permittee's performance standard for residential gallons per capita day (RGPCD) is 65 gallons. Permittee shall be in compliance with the performance standard by December 31, 2010 and each year thereafter. Shrewsbury has been in compliance with this performance standard (<65 RGPCD) as required since 2006. In the event that Shrewsbury's RGPCD increases, non-essential outside watering will be restricted to one day per week (see Condition 7). Shrewsbury's RGPCD may increase as a result of improvements in metering to address the high unaccounted for water as discussed in Condition 6 below.

Permittee shall report its RGPCD and the calculation used to derive that figure as part of its ASR including, without limitation, the source of the data used to establish the service population and the year in which this data was developed. See Appendix A for additional information on the requirements if the performance standard for RGPCD is not met.

6. Performance Standard for Unaccounted for Water

Shrewsbury's performance standard for unaccounted for water (UAW) is 10% of overall water withdrawal. Shrewsbury's WMA Permit has required compliance with the performance standard of 10% UAW since 2010. Shrewsbury reported UAW of 17.5% in 2012, however, MassDEP recalculated UAW to be 27%. Shrewsbury reported a number of large main breaks that were repaired in 2012. However, the volume of water lost through main breaks cannot be considered "Confidently Estimated Municipal Use". The volume of water saved due to leak detection and repair will be reflected in subsequent reporting. Shrewsbury's UAW has shown a steady increase since reporting 21% in 2007. Shrewsbury reported (and MassDEP approved) 22% UAW in its 2014 Annual Statistical Report (ASR) and completion of a leak detection survey of 77% of the Town. Shrewsbury's UAW Compliance Plan has been approved by MassDEP as part of the settlement of the appeal docketed as Town of Shrewsbury – WMA Permit, OADR Docket No. 2014-002 and is attached hereto. The requirements of the UAW Compliance Plan are incorporated herein.

Shrewsbury is required to report its UAW annually in its Annual Statistical Report (ASR) and the ASR shall include the calculation used to derive that figure as part of its ASR including, without limitation, the source of data used, the methodology for calculating UAW and any assumptions used in making the calculation. Any adjustment in the calculation of UAW made as a result of confidently estimated uses shall be fully documented as required in the ASR. See Appendix B for information on requirements if the performance standard for UAW is not met.

7. Seasonal Limits on Nonessential Outdoor Water Use

Permittee shall limit nonessential outdoor water use through mandatory restrictions from May 1st through September 30th as outlined in Table 4 below.

Permittee shall be responsible for tracking streamflows and drought advisories and recording when restrictions are implemented if streamflow triggered restrictions are implemented. See *Accessing Streamflow and Drought Advisory Website Information* in Table 4 for instructions.

Permittee shall document compliance with the summer limits on nonessential outdoor water use annually in its Annual Statistical Report (ASR), and indicate whether it anticipates implementing calendar triggered restrictions or streamflow triggered restrictions during the next year.

Nothing in this permit shall prevent Permittee from implementing water use restrictions that are more restrictive than those set forth in this permit.

Water Use Restrictions

Nonessential outdoor water uses that are subject to mandatory restrictions include:

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

The following uses may be allowed when mandatory restrictions are in place:

- irrigation to establish a new lawn and new plantings during the months of May and September;
- irrigation of public parks and recreational fields by means of automatic sprinklers outside the hours of 9 am to 5 pm; and
- irrigation of lawns, gardens, flowers and ornamental plants by means of a hand-held hose.

Water uses NOT subject to mandatory restrictions are those required:

- for health or safety reasons;
- by regulation;
- for the production of food and fiber;
- for the maintenance of livestock; or
- 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).

To the extent feasible, all summer outdoor water use should take place before 9 am and after 5 pm when evaporation and evapotranspiration rates are lower.

Table 4: Seasonal Limits on Nonessential Outdoor Water Use

For Permittees meeting the 65 RGPCD Standard for the preceding year RGPCD ≤ 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is allowed: a) **two (2) days per week** before 9 am and after 5 pm; **and** b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01110000 - Quinsigamond River at North Grafton, MA falls below **1.9 cfs** for three (3) consecutive days. Once streamflow triggered restrictions are implemented, they shall remain in place until streamflow at the gage meets or exceeds 1.9 cfs for seven (7) consecutive days.
Streamflow Triggered Restrictions	Nonessential outdoor water use is allowed: a) **two (2) days per week** before 9 am and after 5 pm when USGS stream gage 01110000 - Quinsigamond River at North Grafton, MA falls below: • May 1 – June 30: **24 cfs** for three (3) consecutive days • July 1 – September 30: **11 cfs** for three (3) consecutive days b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01110000 - Quinsigamond River at North Grafton, MA falls below **1.9 cfs** for three (3) consecutive days. Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.
For Permittees NOT meeting the 65 RGPCD standard for the preceding year RGPCD > 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is allowed **one (1) day per week** before 9 am and after 5 pm
Streamflow Triggered Restrictions	Nonessential outdoor water use is allowed **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01110000 - Quinsigamond River at North Grafton, MA falls below: • May 1 – June 30: **24 cfs** for three (3) consecutive days • July 1 – September 30: **11 cfs** for three (3) consecutive days Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.

Instructions for Accessing Streamflow and Drought Advisory Website Information

Streamflow information is available at the USGS National Water Information System (NWIS): Web Interface. The USGS NWIS default shows Massachusetts streamflows in real time, i.e., the most recent, usually quarterly hourly, reading made at each USGS stream gage.

Seasonal Limits on Nonessential Outdoor Water Use are implemented when the mean daily streamflow falls below the designated trigger. The mean daily flow is not calculated until after midnight each day when the USGS computes the hourly data into a mean daily streamflow. As a result, permittees must use the mean daily streamflow from the preceding day when tracking streamflows.

Mean daily streamflow gage readings are available at the USGS NWIS Web Interface at http://waterdata.usgs.gov/ma/nwis/current/?type=flow.

- Scroll down to 01110000 – Quinsigamond River at North Grafton, MA.
- Click on the gage number.
- Scroll down to "Provisional Date Subject to Revision – Available data for this site" and click on the drop down menu.
- Click on "Time-series: Daily data" and hit GO.
- Scroll down to the "Available Parameters" box. Within the box, be sure "Discharge (mean)" is checked, then, under "Output Format" click "Table" and hit GO.
- Scroll down to "Daily Mean Discharge, cubic feet per second" table and find the current date on the table.
- Compare the cubic feet per second (cfs) measurement shown on the table to the cfs shown under Streamflow Triggered Restrictions above.

Public Notice of Water Use Restrictions

Permittee shall notify its customers of the restrictions and the consequences of failing to adhere to the restrictions.

- For calendar-triggered restrictions, customers shall be notified by April 15th each year.
- For streamflow-triggered restrictions, when streamflow at the assigned USGS local stream gage falls below a streamflow trigger for three consecutive days, customers shall be notified as soon as possible, but within three days of implementing the restrictions.

Notice to customers shall include the following:

- A detailed description of the restrictions and penalties for violating the restrictions;
- The need to limit water use, especially nonessential outdoor water use, to ensure a sustainable drinking water supply and to protect natural resources and streamflow for aquatic life; and
- Ways individual homeowners can limit water use, especially nonessential outdoor water use.

Notice that restrictions have been put in place shall be filed each year with MassDEP within 14 days of the restriction's effective date. Filing shall be in writing on the form "Notification of Water Use Restrictions" available on MassDEP's website.

Notice to customers and MassDEP need not be provided if Permittee has already implemented water use restrictions that conform to the applicable restrictions and those restrictions are still in force.

8. Water Withdrawals that Exceed Baseline Withdrawal Volumes

Shrewsbury's baseline withdrawal volume (Baseline) is 3.91 MGD or 1,427.2 MGY. This Permit authorizes withdrawals for up to 4.35 MGD upon implementation of the MassDEP approved Mitigation Plan (attached with Appendices A and B) developed to credit measures to mitigate the impacts of withdrawals in excess of Baseline.

Shrewsbury's Mitigation Plan (inclusive of Appendices A and B) is attached hereto and incorporated herein. The Mitigation Plan was developed to reflect a three step process: 1.) Describe demand management measures that can be undertaken to postpone the need for withdrawals over Baseline; 2.) Calculate system-wide local wastewater returns through septic systems and groundwater discharge; and 3.) Describe those activities that can directly return water to the basin impacted by the withdrawals or provide other environmental benefits. Future revisions to the Mitigation Plan that involve new projects not described in the existing Mitigation Plan, shall make a written evaluation of the feasibility of adopting and implementing each of the following measures and any other measures identified by Shrewsbury or through consultation with MassDEP and other agencies of the Executive Office of Energy and Environmental Affairs (EEA).

Future revisions to the Mitigation Plan that involve new projects not described in the existing Mitigation Plan shall follow the mitigation hierarchy set forth in MassDEP's "Water Management Act Permit Guidance" (as amended). At the time that such proposed future revisions to the Mitigation Plan are submitted to MassDEP, Shrewsbury shall also forward a copy of the Plan to the Blackstone River Coalition.

Shrewsbury shall implement approved feasible mitigation measures commensurate with withdrawals in excess of Baseline and in accordance with a schedule to be developed in the Mitigation Plan.

Table 5: Mitigation Plan Components

1. Demand Management Demand management measures, in addition to the requirements of Special Condition 10, are included in mitigation planning as a means to control demand, and possibly lessen the volume of water that requires mitigation, and control the timing of implementation	• Adopt one day/week nonessential seasonal water use restrictions • Adopt a ban on nonessential seasonal water use
	Adopt a water bank • Traditional water and/or sewer bank • Institute "hook-up" fee for all new development with revenues to be dedicated to conservation and mitigation programs
	Increase billing frequency based on actual meter readings
	Install radio-read (remote) water meters
	Adopt a "best available technology" bylaw for irrigation systems
	Provide water saving devices (faucet aerators & low flow showerheads)
	Provide rebates for water efficient appliances
	Industrial, commercial or institutional water conservation programs
	Other measures to reduce demand and conserve water

Table 5: Mitigation Plan Components (continued)	
2. Calculate Local Wastewater Recharge Returns	Provide documentation in the Mitigation Plan of the portion of withdrawals over Baseline that will be returned to groundwater within the Blackstone River Basin via septic or permitted groundwater discharge
3. Mitigation Planning	
Wastewater improvements	Quantifiable I/I removal program
	Additional wastewater recharge through septic or treated groundwater discharge
Stormwater Management and Recharge	Adopt a stormwater utility or dedicated stormwater fees used to build and maintain stormwater infiltration facilities
	Adopt and implement MS4 requirements for municipality not subject to MS4 • Municipality subject to MS4 requirements can be considered for mitigation credits for successfully implemented MS4 measures
	Remove or retrofit and infiltrate targeted areas of impervious cover
Development Guidelines and Bylaws	Adopt a bylaw to extend water use restrictions to private wells
	Adopt Low Impact Development, Conservation Development and Smart Growth bylaws or regulations in addition to those implemented through the November 2001 Best Development Practices Guidebook
	Adopt land clearing/development bylaws (loan, native vegetation, site clearing limitations, lawn size limitations) in addition to those implemented through the November 2001 Best Development Practices Guidebook
Instream Flow Improvements - applicable to surface waters	Measures to be determined as applicable
Habitat Improvement	Install and maintain a fish ladder
	Remove a dam or other flow barrier
	Acquire/protect water supply or high quality natural resource lands
	Replace/resize identified culverts to improve habitat connectivity
	Restore stream buffers
	Establish and/or contribute to a mitigation fund for aquatic habitat restoration

9. Requirement to Report Raw and Finished Water Volumes

Shrewsbury shall report annually on its Annual Statistical Report the raw water volumes and finished water volumes for the entire water system and the raw water volumes for individual water withdrawal points.

10. Water Conservation Requirements

At a minimum, Shrewsbury shall implement the following conservation measures forthwith and shall be in compliance with these measures on or before February 28, 2017. Compliance with the water conservation requirements shall be reported to MassDEP upon request or by February 28, 2017, unless otherwise noted below.

Table 6: Minimum Water Conservation Requirements

System Water Audits and Leak Detection

1. At a minimum, conduct a full leak detection survey every three years. The first full leak detection survey shall be completed no later than 3 yrs from the date of last documented leak detection survey.
2. Perform a leak detection survey of those sections of the distribution system that have not been surveyed within the last year whenever the percentage of unaccounted for water increases by 5% or more (for example an increase from 3% to 8%) over the percentage reported on the ASR for the prior calendar year. Within 60 days of completing the leak detection survey, Permittee shall submit to MassDEP a report detailing the leak detection survey, any leaks uncovered as a result of the survey or otherwise, dates of repair and the estimated water savings as a result of the repairs.
3. Conduct field surveys for leaks and repair programs in accordance with the *AWWA Manual 36.*
4. Permittee shall have repair reports available for inspection by MassDEP. Permittee shall establish a schedule for repairing leaks that is at least as stringent as the following:
   - Leaks of 15 gallons per minute or more shall be repaired as soon as possible but not later than one month after leak detection.*
   - Leaks of less than 15 gallons per minute, but greater than 5 gallons per minute, shall be repaired as soon as possible but not later than two months after leak detection.*
   - Leaks of 5 gallons per minute or less shall be repaired as soon as possible but not later than six months after leak detection, except that hydrant leaks of one gallon or less per minute shall be repaired as soon as possible.*
   - Leaks shall be repaired in accordance with the priority schedule including leaks up to the property line, curb stop or service meter, as applicable.
   - Have water use regulations in place that require property owners to expeditiously repair leaks on their property.

   The following exceptions can be considered:
   - Repair of leakage detected during winter months can be delayed until weather conditions become favorable for conducting repairs;* and
   - Leaks in freeway, arterial or collector roadways may be coordinated with other scheduled projects being performed on the roadway.**

   *Reference: MWRA regulations 360 CMR 12.09
   **Mass Highway or local regulations may regulate the timing of tearing up pavement on roads to repair leaks.

Metering

1. Calibrate all source and finished water meters at least annually and report date of calibration on the ASR.
2. Ensure that the system is 100% metered, including all water use at municipal facilities (schools, school athletic fields, etc.).

Metering (continued)

3. All water distribution system users shall have properly sized service lines and meters that meet AWWA calibration and accuracy performance standards.
   AWWA References:
   AWWA Manual M22 – Sizing Water Service Lines and Meters
   AWWA Manual M6 – Water Meters, or as amended
4. Permittee shall have an ongoing program to inspect individual service meters to ensure that all service meters accurately measure the volume of water used by your customers. The metering program shall include regular meter maintenance, including testing, calibration, repair, replacement and checks for tampering to identify and correct illegal connections.
5. Ensure placement of sufficient funds in the annual water budget to calibrate, repair, or replace meters as necessary.

Pricing

1. Implement a water revenue structure that includes the full cost of operating the water supply system in compliance with state and federal requirements by 3 years from permit issuance. Evaluate revenues every three to five years and adjust rates as needed. Full cost pricing factors all costs - operations, maintenance, capital, and indirect costs (environmental impacts, watershed protection) - into the revenue structure.
   AWWA References for Additional Information on Pricing:
   AWWA Manual 1- Principals of Water Rates, Fees and Charges
   AWWA Manual 29- Fundamentals of Water Utility Financing
2. Permittee reports using an increasing block rate structure and shall continue to do so.

Residential and Public Sector Conservation

1. Permittee shall meet the standards set forth in the Federal Energy Policy Act, 1992 and the Massachusetts Plumbing Code.
2. Meter or estimate water used by contractors using fire hydrants for pipe flushing and construction.
3. Municipal buildings
   - Shrewsbury has confirmed in writing to MassDEP that it has completed retrofitting its municipally owned public buildings with water saving devices (faucet aerators, low flow shower heads and low flow toilets) as of February 1, 2015.

Industrial and Commercial Water Conservation

1. Permittee shall review the use records for its industrial, commercial and institutional water users and develop an inventory of the largest water users. Permittee shall develop and implement an outreach program designed to inform and (where appropriate) work with its largest industrial, commercial and institutional water users on ways to reduce their water use. Such outreach plans can include, but are not limited to: information on water audits, meter sizing, water reuse, low-flow plumbing fixtures, mandatory outdoor water use restrictions, suggestions for contacting trade

Industrial and Commercial Water Conservation (continued)

associations for process specific information on water use reductions, and information on contacting the Executive Office of Environmental Affairs Office of Technical Assistance for Toxics Use Reduction (OTA) which offers a range of assistance and information to help facilities improve water use efficiency and reduce wastewater discharge. OTA can be contacted at (617) 626-1060 or at www.mass.gov/envir/ota.

2. Upon request by MassDEP, Permittee shall report on industrial, commercial and institutional water conservation including the results of its review of water use records for industrial, commercial and institutional water users, the inventory of the largest water users, copies of any outreach materials distributed to industrial, commercial and institutional water users, and to the extent practical, a summary of water use reductions or savings that have resulted. Upon receipt of this report, MassDEP will take whatever action it deems appropriate to promote the interests of the Water Management Act, including without limitation requiring Permittee to take additional actions to reduce industrial, commercial and institutional water use.

Lawn and Landscape

1. Shrewsbury adopted a water use restriction bylaw in May 2014 consistent with the requirements of this permit.

Public Education and Outreach

1. Develop and implement a Water Conservation Education Plan. Permittee's Water Conservation Education Plan shall be designed to educate Permittee's water customers of ways to conserve water. Without limitation, Permittee's plan may include the following actions:
    - Annual work sheets, included in water bills or under separate cover, to enable customers to track water use and conservation efforts and estimate the dollar savings;
    - Public space advertising/media stories on successes (and failures);
    - Conservation information centers perhaps run jointly with electric or gas company;
    - Speakers for community organizations;
    - Partner with garden clubs, or other private and non-profit organizations, to promote efficient water use;
    - Provide information on water-wise landscaping, gardening, efficient irrigation and lawn care practice;
    - Public service announcements; radio/T.V./audio-visual presentations;
    - Joint advertising with hardware stores to promote conservation devices;
    - Water conservation workshops for the general public
    - Use of civic and professional organization resources;
    - Special events such as Conservation Fairs;
    - Develop materials that are targeted to schools with media that appeals to children, including materials on water resource projects and field trips; and
    - Make multilingual materials available as needed.

References and additional information available through the USEPA Water Sense Program at http://www.epa.gov/watersense.

2. Upon request of MassDEP, Permittee shall report on its public education and outreach effort, including a summary of activities developed for specific target audiences, any events or activities sponsored to promote water conservation and copies of written materials.

GENERAL PERMIT CONDITIONS (applicable to all permittees)

No withdrawal in excess of 100,000 gallons per day over the registered volume (if any) shall be made following the expiration of this permit, unless before that date MassDEP has received a renewal permit application pursuant to 310 CMR 36.00.

1. **Duty to Comply** The permittee shall comply at all times with the terms and conditions of this permit, the Act and all applicable State and Federal statutes and regulations.

2. **Operation and Maintenance** The permittee shall at all times properly operate and maintain all facilities and equipment installed or used to withdraw water so as not to impair the purposes and interests of the Act.

3. **Entry and Inspections** The permittee or the permittee's agent shall allow personnel or authorized agents or employees of MassDEP to enter and examine any property for the purpose of determining compliance with this permit, the Act or the regulations published pursuant thereto, upon presentation of proper identification and an oral statement of purpose.

4. **Water Emergency** Withdrawal volumes authorized by this permit are subject to restriction in any water emergency declared by MassDEP pursuant to MGL c 21G ss 15-17, MGL c 150 ss 111, or any other enabling authority.

5. **Transfer of Permits** This permit shall not be transferred in whole or in part unless and until MassDEP approves such transfer in writing, pursuant to a transfer application on forms provided by MassDEP requesting such approval and received by MassDEP at least thirty (30) days before the effective date of the proposed transfer. No transfer application shall be deemed filed unless it is accompanied by the applicable transfer fee established by 310 CMR 36.37.

6. **Duty to Report** The permittee shall complete and submit annually, on a form provided by MassDEP, all of the information required by said form including, without limitation, a certified statement of the withdrawal. Such report shall be received by MassDEP by the date specified on the form each year. Such report must be mailed or hand delivered to:

   Department of Environmental Protection
   Water Management Program
   One Winter Street, 5th Floor
   Boston, MA 02108

7. **Duty to Maintain Records** The permittee shall maintain withdrawal records and other information in sufficient detail to demonstrate compliance with this permit.

8. **Metering** The withdrawal point(s) included within this permit are metered and shall be calibrated annually. Meters shall be maintained and replaced as necessary to ensure the accuracy of the withdrawal records.

APPEAL RIGHTS AND TIME LIMITS

The January 21, 2014 Water Management Act permit issued by MassDEP was appealed and docketed with OADR as In the Matter of the Town of Shrewsbury – WMA Permit, OADR Docket No. 2014-002. That appeal has been settled by all of the parties, resulting in issuance of this Modified Permit. Consequently, no further appeal may be filed, not only because the appeal period has passed but because the sole appeal filed has been settled and that settlement has been accepted by the Commissioner of DEP, who is the final agency decision-maker for administrative appeals. The Final Decision approving and incorporating the Settlement Agreement and Modified Water Management Act Permit (Permit #9P4-2-12-271.01) was signed and issued by MassDEP on June 17, 2015.

Issuance Date: July 2, 2015

By: Marielle Stone

Marielle Stone
Deputy Regional Director – CERO
Bureau of Water Resources
8 New Bond Street
Worcester, MA 01606

Appendix A – Residential Gallons Per Capita Day (RGPCD)

I. Compliance Plan Requirement

If the permittee fails to achieve and document compliance with the RGPCD performance standard in its Annual Statistical Report (ASR), then the permittee must file with that ASR a Residential Gallons Per Capita Day Compliance Plan (RGPCD Plan) which shall:

a. meet the requirement set forth below in Section II;
b. include measures to be implemented to meet the performance standard); and
c. include the schedule for implementing such measures.

The filing of an RGPCD Plan shall not constitute a return to compliance, nor shall it affect MassDEP's authority to take action in response to the permittee's failure to meet the performance standard.

If an RGPCD Plan is required, the permittee must:

a. submit information and supporting documentation sufficient to demonstrate compliance with its RGPCD Plan annually at the time it files its ASR; and
b. continue to implement the RGPCD Plan until it complies with the performance standard and such compliance is documented in the permittee's ASR for the calendar year in which the standard is met.

II. Contents of an RGPCD Plan

A permittee that does not meet the 65 RGPCD performance standard within 2 years, has the choice to file an RGPCD Plan containing measures that the permittee believes will be sufficient to bring the system into compliance with the performance standard (Individual RGPCD Plan) or may adopt the MassDEP RGPCD Functional Equivalence Plan that includes mandated Best Management Practices (BMPs).

A permittee that has been unable to meet the 65 RGPCD performance standard within 5 years must implement the MassDEP RGPCD Functional Equivalence Plan to be considered functionally equivalent with the performance standard.

At a minimum, all RGPCD Compliance Plans must include a detailed:

a. description of the actions taken during the prior calendar year to meet the performance standard;
b. analysis of the cause of the failure to meet the performance standard;
c. description and schedule of the actions that will be taken to meet the performance standard; and
d. analysis of how the actions described in c. will address the specific circumstances that resulted in the failure to meet the performance standard.

RGPCD Plans may be amended to revise the actions that will be taken to meet the performance standard.

Individual RGPCD Plan

Individual RGPCD Plan will document a plan to adopt and implement measures tailored to the specific needs of the water supply system that the permittee believes will be sufficient to bring the system into compliance with the performance standard within three years.

At a minimum, all Individual RGPCD Plans for failure to meet the RGPCD performance standard must include implementation of at least one of the following residential conservation programs:

a. a program that provides water saving devices such as faucet aerators and low flow shower heads at cost;
b. a program that provides rebates or other incentives for the purchase of low water use appliances (washing machines, dishwashers, and toilets); or
c. the adoption and enforcement of an ordinance, bylaw or regulation to require the installation of moisture sensors or similar climate related control technology on all automatic irrigation systems.

If the permittee is already implementing one or more of these programs, it must include in its Individual RGPCD Plan the continued implementation of such program(s), as well as implementation of at least one additional program. All programs must include a public information component designed to inform customers of the program and to encourage participation in the program.

Without limitation, the Individual RGPCD Plan for failure to meet the RGPCD performance standard may include any of the actions set forth in the MassDEP RGPCD Functional Equivalence Plan below.

MassDEP RGPCD Functional Equivalence Plan

In order to be considered functionally equivalent with the RGPCD performance standard, the permittee must adopt and implement the MassDEP RGPCD Functional Equivalence Plan that requires all the following residential conservation programs:

a. a program that provides water saving devices such as faucet aerators and low flow shower heads at cost;
b. a program that provides rebates or other incentives for the purchase of low water use appliances (washing machines, dishwashers, and toilets);
c. the adoption and enforcement of an ordinance, bylaw or regulation to require the installation of soil moisture sensors or similar climate related control technology on all automatic irrigation systems;
d. the use of an increasing block water rate or a seasonal water rate structure as a tool to encourage water conservation;
e. the adoption and enforcement of an ordinance, bylaw or regulation to require that all new construction include water saving devices and low water use appliances; and
f. the implementation of monthly or quarterly billing.

Hardship

A permittee may present an analysis of the cost effectiveness of implementing certain conservation measures included in the MassDEP RGPCD Functional Equivalence Plan and offer alternative measures. Any analysis must explicitly consider environmental impacts and must produce equal or greater environmental benefits. Suppliers will be able to present:

a. Reasons why specific measures are not cost effective because the cost would exceed the costs of alternative methods of achieving the appropriate standard;
b. Alternative specific conservation measures that would result in equal or greater system-wide water savings or equal or greater environmental benefits than the conservation measures included in the MassDEP RGPCD Functional Equivalence Plan; and
c. When applicable, an analysis demonstrating that implementation of specific measures will cause or exacerbate significant economic hardship.

Appendix B – Unaccounted for Water (UAW)

UAW is defined as the residual resulting from the total amount of water supplied to a distribution system as measured by master meters, minus the sum of all amounts of water measured by consumption meters in the distribution systems, and minus confidently estimated and documented amounts used for certain necessary purposes.

UAW shall include, without limitation: unavoidable leakage, recoverable leakage, meter inaccuracies (unless they fall under the category of source meter calibration which allows for adjustment per results of source meter calibration); errors in estimation of stopped meters, unauthorized hydrant openings, illegal connections, stand pipe overflows, data processing errors; and undocumented fire fighting uses. The need for water main flushing and the use of water in construction or meter calibration shall be metered or estimated as appropriate to assist in determining actual demand. Volumes flushed to waste shall be reported on permittee's ASR.

Uses that can be confidently estimated and documented in writing include: storage tank overflow and drainage; water main flushing and flow testing; fire fighting; bleeding or blow-offs; sewer and storm water system flushing; and cleaning and street cleaning. Any adjustments made as a result of the properly documented source meter calibration shall be provided as required by the ASR. Any adjustment in the calculation of UAW made as a result of confidently estimated uses shall be fully documented as required in the ASR.

I. Compliance Plan Requirement

If the permittee fails to document compliance with the UAW performance standard in its Annual Statistical Report (ASR), then the permittee must file with that ASR an Unaccounted for Water Compliance Plan (UAW Plan) which shall:

a. meet the requirements set forth below in Section II;
b. include measures to be implemented to meet the performance standard; and
c. include the schedule for implementing such measures.

The filing of a UAW Plan shall not constitute a return to compliance, nor shall it affect MassDEP's authority to take action in response to the permittee's failure to meet the performance standard.

If a UAW Plan is required, the permittee must:

a. submit information and supporting documentation sufficient to demonstrate compliance with its UAW Plan annually at the time it files its ASR; and
b. continue to implement the UAW Plan until it complies with the performance standard and such compliance is documented in the permittee's ASR for the calendar year in which the standard is met.

II. Contents of a UAW Compliance Plan

A permittee that does not meet the 10% UAW performance standard within 2 years, has the choice to file a UAW Plan containing measures that the permittee believes will be sufficient to bring the system into compliance with the performance standard (Individual UAW Plan) or may adopt the MassDEP UAW Functional Equivalence Plan that includes mandated Best Management Practices (BMPs).

A permittee that has been unable to meet the 10% UAW performance standard within 5 years must implement the MassDEP UAW Functional Equivalence Plan to be considered functionally equivalent with the performance standard.

At a minimum, all UAW plans must include a detailed:

a. description of the actions taken during the prior calendar year to meet the applicable performance standard;
b. analysis of the cause of the failure to meet the performance standard;
c. description and schedule of the actions that will be taken to meet the performance standard; and
d. analysis of how the actions described in c. will address the specific circumstances that resulted in the failure to meet the performance standard.

UAW plans may be amended to revise the actions that will be taken to meet the performance standard.

Individual UAW Compliance Plan

Individual UAW Plan will document a plan to adopt and implement measures tailored to the specific needs of the water supply system that the permittee believes will be sufficient to bring the system into compliance with the performance standard within three years. Individual UAW compliance plans may include any of the actions set forth in the MassDEP UAW Functional Equivalence Plan compliance plan below.

MassDEP UAW Functional Equivalence Plan

In order to be considered functionally equivalent with the UAW performance standard, the permittee must adopt and implement the MassDEP UAW Functional Equivalence Plan that, at a minimum, requires all the following measures:

a. within one year of filing the MassDEP UAW Functional Equivalence Plan, complete a water audit and leak detection survey of the entire system and submit completed audit and survey to MassDEP;
   within one year of completing the audit and leak detection survey, conduct sufficient repairs to reduce by 75% (by water volume) all leaks detected in the survey;
   within one year of completing such repairs, conduct additional repairs of leaks detected in the survey as may be necessary to reduce permittee's UAW to 10% or the minimum level possible;
b. if UAW remains above 10%, repeat the steps outlined in paragraph a.;
c. implementation of a program that ensures the inspection and evaluation of all water meters and, as appropriate, the repair, replacement and calibration of water meters in accordance with the following schedule:
   Large Meters (2" or greater) - within one year of filing the MassDEP UAW Functional Equivalence Plan
   Medium Meters (1" or greater and less than 2") - within two years of filing the MassDEP UAW Functional Equivalence Plan
   Small Meters (less than 1") - within three years of filing the MassDEP UAW Functional Equivalence Plan;
d. implementation of monthly or quarterly billing within three years of fling the MassDEP UAW Functional Equivalence Plan; and
e. within one year of filing the MassDEP UAW Functional Equivalence Plan, implementation of a water pricing structure that achieves sufficient revenues to pay the full cost of operating the system including, without limitation, the costs of repairs under paragraph a.,

the costs of meter repairs, replacements and calibrations under paragraph c., the costs of employees and equipment, and ongoing maintenance and capital costs.

Hardship

A permittee may present an analysis of the cost effectiveness of implementing certain conservation measures included in the MassDEP UAW Functional Equivalence Plan and offer alternative measures. Any analysis must explicitly consider environmental impacts and must produce equal or greater environmental benefits. Suppliers will be able to present:

a. Reasons why specific measures are not cost effective because the cost would exceed the costs of alternative methods of achieving the appropriate standard;
b. Alternative specific conservation measures that would result in equal or greater system-wide water savings or equal or greater environmental benefits than the conservation measures included in the MassDEP UAW Functional Equivalence Plan; and
c. When applicable, an analysis demonstrating that implementation of specific measures will cause or exacerbate significant economic hardship.