Sustainable Water Management Initiative Pilot Project Phase 2 Summary Report

Completed for

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Section 1 Introduction

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and its agencies developed the Sustainable Water Management Initiative (SWMI) Permitting Framework to help balance ecological and human water needs through the regulation of water withdrawals under the Water Management Act (WMA). The EEA conducted a Pilot Project to test implementation of the SWMI Framework on four public water suppliers (PWSs) that have WMA permits. The water suppliers include Amherst Water Division, Danvers-Middleton Water Divisions, Dedham-Westwood Water District and Shrewsbury Water Department. The results of the Pilot Project are being used to inform EEA and its agencies and guide the development of regulations. This document presents the Phase 2 Summary Report, providing clarification and addressing comments received on the Pilot Project's Phase 2 Draft Report. Where policy issues are discussed, the Summary Report presents the latest thinking of EEA agency staff. However, this information reflects a snapshot in time of the current policy directions based on what was learned during the Pilot Project and informed by the comments and questions received on the Phase 1 and Phase 2 Draft Reports and continued discussion with interested stakeholders. The issues will continue to be discussed during the development of regulations and guidance materials.

The EEA formally issued the Final SWMI Framework on November 28, 2012. The Framework characterizes river basins throughout the Commonwealth and establishes requirements for permitting under the WMA. The Framework will require certain WMA permit holders to evaluate options to minimize existing water withdrawal impacts. Those permit holders requesting an increase to permitted water withdrawals above an established baseline and located within certain subbasins will need to implement mitigation measures to offset those increased volumes, commensurate with the impacts of the withdrawals. The Framework also describes WMA permitting for surface waters with similar minimization and mitigation requirements.

The SWMI Pilot Project consisted of two phases. Phase 1 was conducted between April and June 2012 and focused on the evaluation of minimization and mitigation options to reduce the impacts of groundwater withdrawals on streamflows in accordance with the Draft SWMI Framework. The Pilot Team submitted the draft Phase 1 Report to the Massachusetts Department of Environmental Protection (MassDEP) on June 30, 2012.

Phase 2 was conducted between September and December 2012 and focused on evaluating and developing tools to help PWSs through the SWMI permitting process; testing the permitting process by conducting mock consultations; and evaluating what a site-specific study could include. The Phase 2 Draft Report was provided to EEA, the four PWSs, and the Pilot Stakeholders Committee on December 28, 2012.

Each phase is described in more detail below.

1.1 Summary of Pilot Project Phases

1.1.1 Phase 1 Overview

Phase 1 of the SWMI Pilot Project identified existing and potential minimization and mitigation options to reduce the impacts of water supply withdrawals in the four pilot communities. Minimization options were identified and each was discussed in terms of its feasibility and ability of the PWS to implement the option.

The Pilot Team developed a draft crediting system that could be used to quantify withdrawal mitigation commensurate with the PWSs withdrawal request above baseline. Section 4.0 and Appendix E of the SWMI Pilot Project Phase 1 Report identified the methods for applying these credits. The methods include a direct quantitative approach (Section 4.0), where the volume of water saved or put back into the ground was directly quantified, and an indirect quantitative approach (Appendix E), where a qualitative scoring system was applied to various measures based on the anticipated improvement to the impacted stream. The Pilot Project compiled a menu of existing and potential mitigation measures, with associated credits, for each Pilot PWS. Under a permitting scenario, the PWS could evaluate and choose from the various measures to negotiate mitigation of its withdrawal request above baseline.

The Phase 1 Report included consideration and application of "Location Adjustment Factors" to certain mitigation actions that involved recharge of groundwater. These Location Adjustment Factors provided more credit to mitigation actions that were implemented upstream or within the Zone II of the withdrawal point, as opposed to other locations in the watershed where mitigation measures would not directly replenish the subject groundwater supply. The adjustment factors were applied to the existing and potential credits developed in the Phase 1 Report. The application of Location Adjustment Factors in the SWMI regulations is still under consideration by EEA.

Phase 1 of the Pilot Project involved two meetings with each of the PWSs, one meeting with each of the local watershed groups and one stakeholder meeting to collect and present the findings as the study was performed.

1.1.2 Phase 2 Overview

Phase 2 of the Pilot Project included the development of a "desktop pumping evaluation" methodology to analyze optimization of existing water sources and to analyze alternative sources. Elements included identification of data sources, evaluation of available withdrawal data, and development of a hierarchy for ranking water sources to meet the SWMI Framework goals of minimizing impacts to coldwater fishery resources and more impacted streams.

Phase 2 also included a mock permitting exercise and consultation with EEA agencies for the Shrewsbury Water Department. The outcome of this non-binding, mock permitting exercise included the identification of SWMI-related permit conditions, feasible

minimization and mitigation activities, and a possible implementation schedule for Shrewsbury.

Concurrent to the mock consultations, EEA and the Pilot Team revised the mitigation credit system, including changes to crediting demand management, directly quantifiable measures, and indirect measures. The revised credit system provided a simplified "indirect credit scoring matrix" for mitigation actions that do not have a readily quantifiable effect on offsetting or reducing withdrawals. Alternative Location Adjustment Factors were also developed during the Phase 2 mock permitting exercise. These factors have been furthered refined since the Phase 2 Draft Report was submitted. Section 3 of this Summary Report includes additional information on the Location Adjustment Factors.

EEA and its agencies committed to establish a process within the SWMI Framework that provides the opportunity for a WMA permit holder to provide site-specific evaluations to demonstrate that local conditions may significantly differ from those reflected in the Framework. For Phase 2, the Shrewsbury Water Department and Amherst Department of Public Works Water Division were selected to participate in discussions of site-specific evaluations within their local subbasins. The Phase 2 Draft Report discussed several options and estimated costs for performing site specific evaluations.

In addition, one site-specific evaluation for Danvers-Middleton was conducted during Phase 2 to evaluate how changes in withdrawals of upstream subbasins (e.g., discontinuation of the Town of Reading wells) impact the Biological Category (BC) and/or Groundwater Withdrawal Level (GWL) classifications for the subbasin in which Danvers-Middleton's wells are located. The BC and GWL classifications determine the Permit Review Tier under the SWMI Framework. This exercise showed how site-specific evaluation of such changes in upstream withdrawals can affect a PWS's level of review, with resulting effects on the PWS's permit requirements/conditions.

Finally, during Phase 2, a SWMI evaluation data checklist was developed for use by MassDEP and PWSs to help prepare for a permit application.

Phase 2 of the SWMI Pilot Project involved three Mock Consultation meetings and two Site-Specific Study meetings with Shrewsbury Water Department, three Site-Specific Study meetings with Amherst Water Division, and two meetings with the SWMI Pilot Stakeholder Committee.

1.2 Overview of Data Collected

A large amount of data and information was collected and analyzed throughout the SWMI Pilot Project. Phase 1 included a significant data collection effort to develop an understanding of conditions related to each of the four PWSs and the communities they serve. In general, reports, studies, data, and other information were collected on each Town's drinking water, wastewater, and stormwater systems, as well as its local natural resources and its development bylaws. This information was instrumental in assessing

how the SWMI Framework would apply to each PWS. The data collected for each of the four Pilot PWSs, included (where available):

- Consumer Confidence Reports (CCRs)
- Private Well Regulations
- Wetlands Bylaws
- Wetlands Regulations
- Town Bylaws
- Zoning Bylaws
- Zoning Map
- Rebate Program Info
- Water Rates and Fees
- Water Use Restriction Policies
- Water Rules and Regulations
- Wastewater/Sewer System Rules and Regulations
- Water Management Act Permit
- Water Management Act Registration
- Annual Statistical Reports (ASRs)
- Water Billing Structure
- Emergency Response Plans
- Drought Management Plans
- Watershed Protection Plans
- Information on all Sources (capacities, pump rates, alternate sources)
- Pump tests and Well Construction Information
- Hydrologic Studies/Modeling Results
- Storage Tank information
- Reservoir/Dam information
- Stormwater Management Bylaws/Regulations
- Wastewater treatment facility flows (design & annual average)
- Location and type of wastewater disposal
- NPDES permits/groundwater discharge permits
- Wastewater billing rates/structure
- Infiltration/Inflow Data
- Location of water and sewer service areas
- Comprehensive Wastewater Management Plan, including proposed sewer expansion areas
- Habitat-related studies/reports
- Use/Location of green infrastructure
- Private well locations, construction info
- USGS Fish and Flow Study
- USGS Massachusetts Water Indicators Report
- Water Needs Forecast
- USGS Streamflow data (stream gages data)
- Safe Yield for Basins

- DEP-established "Baseline" volume for each PWS
- Biological Category for each PWS/Town
- Groundwater Flow Level for each PWS/Town
- Habitat-related studies/reports
- Restoration Priorities
- Firm Yield Studies
- Pump tests/Zone II Reports
- Inventory/assessments of road crossings and culvert types
- Precipitation data
- DEP Wellhead Protection Areas (Zone II, IWPA)
- Surface Water Supply Watersheds
- Surface Water Supply Protection Areas (Zone A, B, C)
- Dam locations and ownership
- MassDEP Title 5 Setback Areas
- MassDEP Wetlands
- Topography
- Soils
- Land Use
- Hydrography
- Impervious Areas
- Cold water fisheries resources

This information for each Pilot PWS and their communities was used to develop existing and potential minimization and mitigation options to reduce the impacts of water supply withdrawals for the four pilot PWSs.

Phase 2 data collection was focused on comparing existing data with the USGS model results which were used during the development of the SWMI Framework to create the BC and GWL classifications. Additional data obtained for Phase 2 included:

- ASRs for each Pilot PWS for the years 2000-2004
- ASRs for Reading, North Reading, Wilmington, and Danvers-Middleton Water Districts for the years 2000-2004 and 2007-2011
- Sewer system changes since 2004 in the communities of Wilmington, Reading, Woburn, Burlington, Peabody, Danvers, Middleton, North Reading, Lynnfield, Tewksbury, Andover, North Andover, and Billerica
- Groundwater Discharge Reports covering nine facilities in the Towns of Andover, Middleton, North Reading and Wilmington for the years 2000-2011 (where available)
- Information on the confined aquifer in subbasin 14061 from which Amherst's wells withdraw

1.3 Summary of Phase 2 Draft Report Comments Received

Comments on the Pilot Project's Phase 2 Draft Report were submitted to the MassDEP by the Town of Shrewsbury, Massachusetts Water Works Association (MWWA), City of Worcester Department of Public Works &Parks, Neponset River Watershed Association, and Massachusetts Rivers Alliance. Section 2 of this Summary Report addresses errata and items requiring clarification, as identified in the comments. Section 3 of this Report addresses policy issues raised in the comments. Section 4 addresses comments received on optimization of existing sources and evaluation of alternative sources. Section 5 addresses comments on and requests for additional cost information. Section 6 provides recommendations based on the Pilot Project and comments received.

Note that while many of the comments received are addressed in the following sections of this Summary Report, most were related to policy decisions that will continue to be revised and updated throughout the development of regulations and guidance materials and cannot be fully addressed in this document. The EEA expects to provide a response to comments later this year that addresses comments raised during the Pilot Project and the regulation development process. All comment letters received by MassDEP during Phase 2 are included in Appendix A. Note that the Watershed Groups did submit additional comments that are not in the Appendix, including comments made directly into a pdf version of the Phase 2 Draft Report, and suggested replacement text for Section 3 of the Phase 2 Draft Report.

1.4 Disclaimer

The Pilot Team of Comprehensive Environmental Inc. and Tighe and Bond was contracted by the MassDEP to complete the Pilot Project and to collect and analyze information from a variety of sources in order to develop recommendations related to the implementation of the SWMI Framework. The information in the Pilot Project reports is to be used by EEA and its agencies for consideration in policy decisions.

Section 2 Phase 2 Draft Report Errata and Clarifications

This section of the Summary Report addresses specific errors and requested corrections cited in comments on the Sustainable Water Management Initiative (SWMI) Pilot Project's Phase 2 Draft Report. It also provides general clarifications and explanations to respond to comments expressed by Executive Office of Environmental and Energy Affairs (EEA) staff and in the letters received by the Massachusetts Department of Environmental Protection (MassDEP). These items are addressed in Table 2-1.

Policy-related comments on the Phase 2 Draft Report are addressed in Section 3 of this Summary Report which includes discussions on demand management, wastewater, mitigation, indirect mitigation, stormwater, and site-specific study.

Table 2-1. Errata and Clarifications

Reference to Phase 2 Draft Report	Correction/Clarification
Page 1-1, Page 2-2, and Section 3.1.1: Minimization	Several comments noted that these sections state that the SWMI Framework will require all Water Management Act (WMA) permit holders to evaluate options to minimize existing withdrawal impacts; commenters believed this is not technically accurate because minimization requirements are limited to permit holders in GWL 4 and 5. However, Section 3.1.1 of the Phase 2 Draft Report stated that all permit holders will have some minimization requirements because all will be subject to the WMA Standard Permit Conditions (see subsection 3.1.1.1), which also specify minimization measures. Subsection 3.1.1.2 further explained that additional minimization actions would be required for those permit holders located in a GWL 4 or 5. In future rule-making, the agencies may want to consider one comment which suggested that the term "minimization" only be used when referring to the latter case. This would require refinement of the language in the WMA Standard Permit Conditions.
Page 1-1: Mitigation	The sentence in paragraph 2 implied that all increased withdrawals over baseline must be mitigated; however, mitigation is not required everywhere. It is required for Tier 2 and 3, if in a GWL 4 or 5, or if in a BC 1, 2 or 3, or if a CFR is present.
Page 1-4: "USGS Model"	Here and other places in the Phase 2 Draft Report the term "USGS modeling" was used when referring to the BC and GWL classifications, potentially implying that the USGS reports defined these classifications. However, a SWMI Technical Committee developed the classifications, using the USGS fish and habitat equations. The USGS reports did not define the BC and GWL classifications.
Page 2-1: SWMI "Enforcement"	This page indicated that state agencies "oversee and enforce" SWMI; however, SWMI itself is not a regulation. The SWMI Framework will be incorporated into WMA regulations.

Table 2-1. Errata and Clarifications	
Reference to Phase 2 Draft Report	**Correction/Clarification**
Page 2-2: Safe Yield Description	The Safe Yield description is revised to say, "Safe yield has been calculated for each major basin to determine the maximum annual amount of water that may be withdrawn during drought conditions while maintaining water in streams and rivers for environmental protection."
Page 2-2: Application of SWMI, Guidance	There were several comments that addressed items that should be included in future guidance documents, including a request for a step-by-step process outline that identifies permit applicants' actions, as well as MassDEP's actions. It is anticipated that such a process outline will be included in guidance documents developed concurrently with regulation. EEA will try to release guidance documents and regulations at the same time, or as close together as possible.
Section 3.1: Minimization	There were many comments received regarding minimization and Section 3.1 which sought to clarify the terms "minimization" and "commensurate with impact" (mitigation). Suggested replacement text was provided by commenters, however the Phase 2 Draft Report and its Section 3.1 will not be rewritten. These terms and comments will be addressed by EEA as policy decisions in the draft regulations.
Page 3-3: Mitigation Crediting System	The second sentence of Section 3.1.2 is revised to say, "The Pilot Team provided a mitigation crediting system (revised by EEA, as discussed in Section 3.2), that is based on the requested withdrawal volume above baseline." The SWMI Framework did not include a mitigation crediting system; rather it was developed as part of the Pilot Project.
Page 4-2: Desktop Pumping Evaluation	Number 2 is revised to say, "Generally assess tradeoffs between withdrawals in different subbasins, and not between individual wells within a subbasin. However, if a CFR is present, tradeoffs within a subbasin based on distance to, and impact on, the CFR may also be considered."
Page 4-2: Table 4-1, Desktop Pumping Evaluation Data	There were comments received regarding the methodology outlined in Section 4 and that the list of data on page 4-2 is not a required list. The list suggests the type of data a PWS could use when performing a desktop pumping evaluation. There could be more or less data needed depending on the PWS system. Data needs and the workload requirements will vary for each PWS. Additional discussion on estimated costs for desktop pumping evaluations is included in Section 5 of this Summary Report.
Pages 4-8: Natural Basin Characteristics Used in the USGS Model	A comment pointed out that the last sentence inaccurately describes the natural basin characteristics used in the USGS's fluvial fish relative abundance model. The same error is included in the SWMI Framework on page 13. The natural basin characteristics used were channel slope and percent wetlands in a buffer zone. Drainage area and percent sand and gravel were not part of the USGS model.

Table 2-1. Errata and Clarifications	
Reference to Phase 2 Draft Report	**Correction/Clarification**
Page 4-12: Existing Interconnections	A comment stated that the SWMI Framework Tiers Table does not limit evaluation of interconnections to "existing" interconnections; however, during Phase 2 a clarification was made by EEA staff that for the Pilot optimization and minimization efforts would be evaluated for existing interconnections and sources only. This policy issue will continue to be discussed and has not yet been finalized.
Page 4-12: Firm Yield	The second bullet on the page referred to a surface water suppliers' "safe yield"; however, the WMA term used should be "Firm Yield."
Page 5-3: Feasible Mitigation	The second sentence of the first paragraph is revised to say, "Shrewsbury would need to identify additional feasible mitigation options to receive a permit for the full withdrawal request volume."
Page 5-10: 5% of August Median Flow	The second sentence of the second paragraph is revised to say, "This volume of 1.37 mgd represents 35% and 147% of the unaffected August median flows of the subbasins, respectively." To determine whether a withdrawal request falls above or below 5% of August median flow, the full requested volume above baseline is used.
Page 5-15: Shrewsbury's population growth.	The second sentence under subsection 5.5.3 is revised to say, "While this volume is equal to DCR's current Water Needs Forecast for the Town of Shrewsbury, EEA has said that this projection is no longer appropriate because it is based on older demand and population projections, and Shrewsbury's growth rate was slower than expected and population and water demand did not increase as expected." The original statement that Shrewsbury's population has been declining was incorrect.
Page 6-1: August Median Flow	Section 6.1 Track 1stated that "Within the SWMI Framework, it is assumed that the estimated natural August median flow accurately represents what is needed to maintain the ecological health of the stream." This is revised to say: "Within the SWMI Framework it is not assumed that the August median flow is needed to maintain ecology; however, it is assumed that increases in flow alteration are associated with alterations to ecology. Within SWMI, flow alteration is measured in terms of the percent of August median flow altered by groundwater withdrawals. Natural flows can often be below the August median and at those times, alterations of a given percent of the August median flow may have a far greater impact on actual streamflows."
Page 6-3: SYE/MWI Estimated Flows	Table 6-2, Option A, Number 2 is revised to say, "Compare actual long term flow data to SYE/MWI estimated flows." The SYE/MWI results are not meant to be compared to any individual flow year or even to an average over a few years; rather, they are meant to represent long-term averages, and should only be able to be refuted with long-term data sets.

Table 2-1. Errata and Clarifications	
Reference to Phase 2 Draft Report	**Correction/Clarification**
Page 7-13: Wilmington Withdrawals	The last sentence on page 7-13 should be deleted. Wilmington still uses its Brown's Crossing and Salem Street wells and they are located within the Ipswich River basin.
Page 7-36: Tables 7-23 and 7-24	The middle column headings of both these tables are revised to say, "Shrewsbury Withdrawals" not "DWWD Withdrawals."
Page 9-7: Figure 9-2	The well that is labeled as "Shrewsbury Well" is owned by the City of Worcester and should be labeled "Worcester Well."

Section 3 Policy Decisions Identified

Phase 2 of the Sustainable Water Management Initiative (SWMI) Pilot Project included a mock consultation and permitting exercise for Shrewsbury. This mock process was conducted using the draft policy decisions of the Executive Office of Energy and Environmental Affairs (EEA) and the Massachusetts Department of Environmental Protection (MassDEP) available at the time. While MassDEP and the Pilot Team realized these policies were not final, a basis was needed to complete a meaningful mock permitting exercise and test the application of the SWMI Framework. Comments on the Phase 2 Draft Report, which documented the mock consultation process and mock permit conditions, raised many questions and concerns regarding these draft policy decisions.

There continue to be conflicting opinions regarding many policy decisions, primarily focused around methods to quantify and credit direct and indirect mitigation measures, and these policy decisions will continue to be discussed during the development of regulations. This section identifies several of the outstanding policy decisions that will have to be addressed during that process, clarifies some of the policy assumptions that were used during Phase 2 of the Pilot Project, and provides updates where available on the current policy direction. Again, this information reflects a snapshot in time of the current policy directions based on what was learned during the Pilot Project and informed by the comments and questions received on the Phase 1 and Phase 2 Draft Reports and continued discussion with interested stakeholders.

All policy decisions will continue to be discussed during the regulatory development process and MassDEP will include updated policy decisions in the draft Water Management Act (WMA) regulations, which will be available for public comment, and guidance materials.

3.1 Demand Management

This section discusses some of the policy issues raised concerning demand management.

Demand Management is Not Mitigation

In the SWMI Framework, demand management activities are listed in Table 6: "Offset and Mitigation" on page 28, along with other offset and mitigation actions such as instream flow, stormwater, and habitat improvements. However, during Phase 2 of the Pilot Project, EEA staff presented a draft policy decision to no longer consider demand management activities as mitigation actions. This draft policy decision was based on internal discussion among EEA staff and input from members of the Pilot Stakeholder Committee. There was a growing consensus that demand management should be viewed as "mitigation avoidance" in that successful reduction in demand attributable to such activities would reduce actual withdrawals, thereby reducing the amount of mitigation required. The public water supplier (PWS) will decide for itself whether or not to implement demand management activities over and above those already required in the Standard Permit conditions to reduce its mitigation requirement.

Several comments on the Phase 2 Draft Report reiterated that demand management should not be considered mitigation. Some sections of the Draft Report discussed demand

management in the context of mitigation, so the narrative was not clearly consistent with the above-described policy direction. For example, in Table 2-1 on page 2-4 of the Draft Report, demand management was still listed under mitigation options. Moving forward, the current policy direction is not to credit demand management activities as mitigation, but rather to credit these activities as an adjustment to the requested withdrawal volume above baseline.

Demand Management Estimate and Adjustment

Should a PWS choose to implement demand management activities, it will need to provide a credible estimate of the volume of water expected to be saved. A comment on the Phase 2 Draft Report suggested that MassDEP establish a method that PWSs may use for estimating these volumes. MassDEP is considering developing a worksheet(s) that PWSs could use to develop their credible estimates. This worksheet could be similar to those developed during Phase 1 of the SWMI Pilot Project for estimating water savings for several different demand management activities. PWSs would have to provide the specific information on the activities to be implemented and their estimated volume savings in a Demand Management Plan. Should worksheets be developed to aid in the calculation of credible estimates, these worksheets would likely serve as the Demand Management Plan.

As explained above, under the current policy direction, demand management is no longer considered mitigation; however, it does play a part in calculating the final mitigation requirement. When determining the withdrawal volume to be mitigated, the credible demand management estimate will be an adjustment made to the PWS's withdrawal request above baseline. The remaining volume (minus any other adjustments, such as wastewater returns as discussed below) will be the volume to be mitigated. This final volume will need to be mitigated through direct and/or indirect mitigation actions as discussed in more detail below.

Demand Management Effectiveness

Because a demand management estimate is not a guarantee of lower than projected withdrawals, implemented demand management activities will be evaluated for their effectiveness. MassDEP will check the PWS's water use over time through annual statistical reports (ASRs) to evaluate whether a reduction in demand/withdrawal is achieved. Demand will also be reviewed in detail at each 5-year permit review. Effectiveness is not determined by an evaluation of the Demand Management Plan, as the plan only outlines the activities to be implemented and the estimated savings. Observed savings should be evident in the actual withdrawal volumes reported each year following implementation. To the extent that the PWS's estimates of demand reduction hold true, the PWS may be able to delay, reduce, or totally avoid implementing mitigation actions (see discussion on mitigation below).

The SWMI Phase 2 Draft Report stated that demand management is generally the most cost-effective and environmentally sound strategy for balancing water supply demands and streamflow protection. One comment on the Draft Report offered the opinion that this is not always the case, while another comment agreed with the statement and liked the decision to view demand management as a priority. While these differences of

opinion may continue to exist, the policy decision used during Phase 2 and that currently stands is that demand management is afforded the highest priority during permitting.

This means that MassDEP will encourage PWSs to submit a Demand Management Plan during the permit application or renewal in order to reduce, control existing, and/or limit future system demands as well as to keep mitigation requirements to a minimum. Demand management is encouraged because it may even keep a PWS's demand below baseline for the life of its permit; delay the point at which demand is expected to exceed baseline; and/or reduce the ultimate demand over baseline relative to the 20-year forecast.

3.2 Wastewater

The Phase 2 Draft Report listed the "mitigation activities" in order of MassDEP preference as Demand Management, Direct Mitigation, and Indirect Mitigation. However, as explained in Section 3.1 of this Summary Report, under the current policy direction demand management is no longer considered a mitigation action. EEA is also considering that wastewater returns may no longer be credited as direct mitigation. Instead, future wastewater returns (septic system and permitted groundwater discharges) may serve as another adjustment to the withdrawal request above baseline.

The current policy direction reflects EEA's preferred order of activities when determining a PWS's final volume to be mitigated and how it will be mitigated, as follows:

1) Calculate withdrawal request above baseline (mgd)
2) Apply adjustments:
    a. Credible demand management estimate, if any (mgd)
    b. Future wastewater returned through groundwater (mgd)
3) Remaining volume is to be mitigated through:
    a. Direct mitigation measures (mgd)
    b. Indirect mitigation measures (point system, discussed below)

The withdrawal request above baseline minus adjustments equals the final volume to mitigate. This is a change from the mitigation discussion in the Phase 2 Draft Report where in Section 5.3.5.2, all wastewater returns were credited as direct mitigation.

In addition, under the proposed policy direction, numeric credit would no longer be provided for a Town's existing wastewater return volumes. However, a Town's future return credit would be based upon what it has historically done with its wastewater. For example, if a Town that is served 100% by septic systems wants to request an additional withdrawal of 0.1 mgd, an adjustment of 0.085 mgd (15% consumptive loss) going back through septic systems would be made, and 0.015 mgd would have to be mitigated.

In addition, while a final policy decision has not been made, future wastewater returns may potentially have location adjustment factors applied.

A comment on the Phase 2 Draft Report expressed the opinion that the wastewater adjustment should be made first and then the requirements for demand management and mitigation. Again, EEA's current draft policy decision is that demand management

estimates will be used first to adjust the request above baseline followed by the wastewater adjustment. The reason for this is because wastewater adjustments would be applied to a future withdrawal, which may or may not happen depending on actual growth and the implementation of demand management measures. If demand management serves to keep withdrawals below baseline, the wastewater adjustment would not be needed or applicable. Therefore, the wastewater adjustment should be made after the demand management adjustment. It should be noted that the demand management estimate and adjustment is not a requirement, although it is priority for and highly encouraged by EEA.

Other comments pointed out that the use of location adjustment factors and only crediting wastewater returns within Town is scientifically invalid and would be unfair for PWSs with sources outside of Town. The application of location adjustment factors is a policy decision yet to be finalized. They will continue to be discussed during the development of regulations.

Another comment about future wastewater returns was that there has been very little discussion of water quality concerns and how they should be considered when mitigation credits are sought for wastewater discharges. Any wastewater discharge of the type that would be credited under the SWMI Framework would have to be reviewed and permitted under the jurisdiction of other MassDEP and local regulations. These discharges will already be required to meet some type of water quality criteria/standards. When such discharges are proposed in locations within subbasins where supply wells are located, information regarding water quality should be reviewed during the consultation process. It is not anticipated that the water quality of such discharges would be so poor as to not allow crediting under SWMI. Existing regulations are in place to protect the environment from impacts from wastewater discharges.

3.3 Mitigation

Once the final volume to be mitigated has been calculated according to the procedure explained in Section 3.2 above, the PWS must identify feasible direct and indirect measures that can be implemented to meet the required volume. EEA's order of preference when implementing feasible mitigation measures is to start with direct mitigation options and then proceed to indirect options when no other direct options are available/feasible.

The updated list of mitigation measures available for direct credit, which reflects the current policy direction, includes stormwater improvements during redevelopment, surface water releases, and wastewater collection system infiltration and inflow removal programs.

Location Adjustment Factors and Credit Sharing

Policy decisions still need to be made regarding limitations on credits for mitigation based on location considerations. This includes the issue of limiting credits to only those measures within Town and the issue of applying location adjustment factors based on location relative to the supply watershed and subbasin.

Comments on the Phase 2 Draft Report suggested that only crediting mitigation within Town boundaries would discourage partnerships and cost-sharing. Furthermore, comments suggested that location adjustment factors should not be applied at all because all measures, regardless of location, will benefit streamflow somewhere and they should receive 100% credit.

Several proposed location adjustment factors were discussed during Phase 2 of the Pilot Project and they continue to undergo further consideration in the development of regulations and guidance materials.

A policy question regarding sharing of credit for mitigation activities completed by more than one PWS or municipality was raised by all parties and is clearly an important issue. Some comments suggested that cost of mitigation projects should guide the amount of mitigation credit provided, and further suggested that the funds spent by each municipality in a partnership could then be used for credit allocation when attempting to share credits for a single mitigation action. While this approach could help determine the credit-sharing, costs have never been related to the effectiveness of mitigation. It is not the intent of SWMI to encourage the most expensive mitigation actions, it is to encourage those actions that will provide the largest improvement to streamflow and habitat. In this respect, the cost of actions should not determine the final number of credits received, but could be used to determine the division of credits among partnering municipalities. The division of credits could also be left to agreement between the partnering municipalities.

Credit sharing and the application of location adjustment factors will continue to be discussed during the development of regulations. Provisions for credit sharing and location factors will be included in the draft WMA regulations and available for additional public comment.

Mitigation Plan and Timing of Mitigation Implementation

There were several comments on the Phase 2 Draft Report that requested clarification on the timing of mitigation requirements including identification and implementation of mitigation measures. In the Draft Report, the mitigation approach required PWSs subject to mitigation to develop a Mitigation List during the permit application process, and then prior to pumping volumes that exceed baseline, develop a detailed Mitigation Plan.

The current proposed approach is to eliminate the Mitigation List and require a Mitigation Plan at the time of permit application. Implementation of any measures would be done as needed, prior to exceeding baseline.

The Mitigation Plan will show the calculation of the final volume to be mitigated (= withdrawal request above baseline – demand management estimate, if any – wastewater adjustment), and will identify some combination of direct and indirect mitigation actions to meet that volume, when needed. Direct mitigation actions will be quantifiable on a volumetric basis and indirect mitigation actions will be quantifiable using the point/credit system representing non-volumetric environmental/habitat improvements. The plan will only include measures that the PWS demonstrates are feasible and commensurate with impact.

EEA's current position on implementation timing is that some credit will have to be in place before baseline is exceeded. The DCR water needs forecast provides demand projections in 5 year increments. The PWS may use this information or actual water use as reported in its ASRs to anticipate when its demands will exceed baseline and by how much, and can begin implementation far enough in advance so that mitigation is in place for the appropriate volume, before baseline is exceeded.

Other recommendations offered throughout the SWMI process and in comments on the Phase 2 Draft Report suggest that implementation be based on a 10-year rolling average of actual withdrawals (or some other term rolling average). When the 10-year rolling average of annual withdrawals exceeds baseline, then implementation of mitigation measures should take place. The use of a long term average could account for year to year fluctuations of demand, and address commenters' concerns about situations where a PWS exceeds baseline in one year, but does not exceed it in the following year, or when there is a particularly dry year, followed by a very wet year. However, this method would contradict EEA's draft policy decision that mitigation measures must be in place before withdrawals exceed baseline.

Timing of Outreach and Consultation

Another comment received on timing suggested that outreach and education to permit holders should begin at least 18 to 24 months in advance of permit expiration. The SWMI Framework states that an Outreach Workshop will be held 12 to 15 months prior to basin permit expiration, and that individual town consultation sessions will be scheduled 9 to 12 months prior to expiration for permittees with withdrawals that impact Quality Natural Resource Areas or GWL 4/5. In the Phase 2 Draft Report, the Pilot Team suggested that the 9 to 12 month timeframe for individual consultations should be adequate. The final timelines for such permitting-related events will be included in the draft WMA regulations. The regulations, guidance documents, and anticipated worksheets should provide more clarity and direction to permit-holders regarding their SWMI-related requirements and how to work toward compliance.

Insufficient Mitigation Credits to Offset Withdrawals

The Mock Consultation and Permit Process with Shrewsbury was discussed in Section 5 of the Phase 2 Draft Report. At the conclusion of the process, there were not enough feasible direct and indirect measures identified to mitigate the withdrawal request above baseline. This raised the question, which was reiterated in comments on the Draft Report, about what will happen when a PWS cannot achieve enough mitigation credits. Possible options may include credits for measures performed by the PWS outside of the Town's boundaries, and payment into a mitigation fund that can be used towards mitigation in other locations. EEA will consider this issue during development of the regulations and will clarify for permit holders what will be required of them.

Optimization as Mitigation

A comment on the Draft Report pertained to mitigation in general, stating that the optimization concepts laid out in Section 4.3.1 of the Phase 2 Draft Report should be applied to reduce the required mitigation volume since optimization also reduces impacts on streamflow.

While some comments suggest there is no clear definition of the term "commensurate with impact," during the Pilot Project it has always been assumed to be based on the volume of the withdrawal request above baseline. The optimization concepts in Section 4.3.1 rank sources by their relative impact as follows:

- wells located further away from a coldwater fishery resource (CFR) are assumed to have less impact on the CFR;
- wells withdrawing from a surcharged stream are assumed to have less impact; and
- increased withdrawals from wells located in subbasins with higher August median flows area also assumed to have less impact (when taking into account other withdrawals from the same subbasin and as long as it does not cause backsliding).

Since the optimization analysis is qualitative and does not estimate actual stream volume improvements, more consideration is needed as to how it can be used to adjust mitigation volumes.

EEA is considering using optimization in two ways. First, withdrawals from wells located directly next to surcharged streams may be considered for direct mitigation credit, as long as there is no impact on water quality as discussed in Section 4.2 of this Summary Report. The PWS would have to demonstrate that the increased withdrawals are coming from that well(s)/surcharged stream only. Second, PWSs that develop an optimization plan and manage their withdrawals consistent with the concepts identified in Section 4 of the Draft Report to minimize impacts to streamflow may be eligible for indirect mitigation credit. Section 4.4 of the Draft Report provides a hierarchy for ranking withdrawals which should be used to guide the PWS in developing the optimization plan. In addition, if the PWS also has surface water sources, an evaluation of those sources should also be considered when managing sources to minimize impacts to streamflow. Discussion on this new policy direction will continue during the development of regulations, including the number of indirect credits to be awarded. These credits should be discussed in guidance documents.

3.4 Indirect Mitigation

To the fullest extent practicable, a PWS would implement direct mitigation measures before applying indirect mitigation measures. If the final calculated volume to be mitigated cannot be mitigated with direct credits, the remainder would be mitigated through indirect credits. Indirect mitigation includes actions such as stream habitat improvements, measures to improve water quality, and measures to protect water supplies. Mitigation implementation will be done after consultation with EEA, in which the agencies and PWS will agree on a suite of direct and/or indirect measures and the priority in which they will be implemented.

Indirect Mitigation Credits and Scoring

During Phase 2 of the Pilot Project, EEA developed a simplified "indirect mitigation scoring matrix," adapted from the indirect offset volume calculation methodology included in Appendix E of the Phase 1 Draft Report. The modified matrix establishes the number of points or credits a PWS would need to achieve in order to meet the requirement of "commensurate with impact."

To determine the number of indirect mitigation credits needed, the PWS first determines the total withdrawal request above baseline, and whether or not the total withdrawal request above baseline is greater than 5% of the unaffected August Median Flow and/or causes backsliding. It then adjusts for proposed demand management, if any, and future wastewater credits to determine the mitigation volume. The portion of the mitigation volume to be addressed through direct mitigation measures is deducted to determine the remaining volume that must be mitigated through indirect credits. Refer to Table 3-1 and updated example to determine the credits needed for various withdrawal scenarios.

Table 3-1. Indirect Credit Requirements

Volume of *indirect mitigation** above baseline (mgd)	Credits required if *total withdrawal request above baseline* is less than 5% of unaffected August Median Flow and does not cause backsliding	Credits required if *total withdrawal request above baseline* is greater than 5% of unaffected August Median Flow or causes backsliding (or both)
0 to <0.1	10	20
0.1 to <0.2	20	40
0.2 to <0.3	30	60
0.3 to <0.4	40	80
0.4 to <0.5	50	100
0.5 to <0.6	60	120
0.6 to <0.7	70	140
0.7 to <0.8	80	160
0.8 to <0.9	90	180
0.9 to <1	100	200
1.0 or more	case by case	case by case

*The indirect mitigation volume represents the portion of the final volume to be mitigated that is not "covered" by direct credit mitigation, and therefore requires indirect mitigation. For example:

Baseline =	4.0 mgd
Total withdrawal request =	4.8 mgd
Withdrawal request above baseline =	0.8 mgd (4.8 – 4.0 = 0.8)
Demand management estimate adjustment =	0.25 mgd
Future wastewater adjustment =	0.25 mgd
Direct mitigation =	0.05 mgd
Indirect mitigation =	0.25 mgd (0.8 – 0.25 – 0.25 – 0.05 = 0.25)

Indirect credits needed = 30 or 60 depending on whether the total withdrawal request above baseline is less than or greater than 5% of unaffected August Median Flow or causes backsliding.

The number of credits an applicant can obtain through indirect mitigation measures is based on a credit scoring matrix. The scoring matrix proposed and used during Phase 2 of the Pilot Project has been updated to reflect the current measures considered for indirect credit and is shown in Table 3-2 at the end of this section. The only change at this time is

that sewer infiltration and inflow (I/I) removal programs have been removed from the table as they are now being considered for direct mitigation credit.

Comments on the Draft Report requested clarification on whether the Indirect Credit Requirements were dependent on the total withdrawal request being greater than or less than 5% of "Unaffected August Median Flow" or "Affected August median." The policy decision at the time, and as it stands now is that it is 5% of the *unaffected* August median flow.

There were many comments regarding the number of credits required by indirect measures, amount of credit awarded for specific indirect measures, and relative value among certain measures. All credit requirements and credits awarded have been policy decisions, based on professional judgment, and are still undergoing discussion. Final policy decisions as to what points will be awarded to measures such as a stormwater bylaw, stormwater utility, implementation of MS4 requirements, and other measures, are still being developed. As stated above, EEA is considering crediting I/I as direct mitigation rather than indirect mitigation. In addition, the current draft indirect credit system allows for agency consult to adjust points up or down based on project specific information. These consultations could use the approach and worksheets developed during Phase 1 and included in Appendix E when considering adjusting points for projects that can vary in size, scale, effort, cost, and improvement (considering its location) such as dam removals, culvert replacements, and streambank restorations.

Indirect Mitigation Cap

There was also a comment suggesting establishing a "cap" on the amount of mitigation that can be provided through indirect measures, because it is believed that there is no meaningful way to determine indirect mitigation is "commensurate with impact." Currently there is no cap but the preferred order of mitigation is to implement all direct measures before any indirect measures. This is another policy decision for EEA to discuss during the development of regulations.

Cumulative Impacts

One question raised in a comment on the Phase 2 Draft Report pertained to the issue of cumulative impacts. It asked whether all of the water suppliers in the same nested parent sub-basin can EACH withdraw up to an additional of 5% of the unaffected August median flows of their respective nested sub-basins using indirect mitigation and get the credit requirement at the more favorable ratio in the middle column of Table 3-2? Or is there some limit on the cumulative volume that can be mitigated indirectly in the parent sub-basin? This will be a policy decision to be determined by EEA. However, in order to get the "more favorable ratio" of indirect credits, the withdrawal request above baseline must be less than 5% of the unaffected August Median Flow of the sub-basin(s) from which the PWS withdraws. As is currently written, no additional limits exist based on cumulative effects of nested sub-basins. Again, the hierarchy of actions is intended to "encourage" direct mitigation measures first and then indirect mitigation measures. As explained above, measures selected will be done in consultation with EEA.

3.5 Stormwater

There were several comments on the Phase 2 Draft Report regarding the crediting of stormwater activities. All parties to the pilot study agreed that there are well established methods for calculating stormwater recharge and all such measures should be credited as direct mitigation.

As written in the Phase 2 Draft Report, EEA is still considering direct credits for stormwater recharge with redevelopment projects, based on the actual amount of recharge obtained; however, it is less likely to provide direct credit for implementing a stormwater bylaw with recharge requirements for new development. New development removes natural recharge to groundwater that occurs in undeveloped conditions, and the bylaw would act to help maintain this natural recharge, without necessarily increasing it. The current policy direction is that a stormwater bylaw would be credited as indirect mitigation using the indirect mitigation scoring matrix.

However, the EEA may consider providing direct credit for new development where recharge is greater than natural recharge, in those cases where municipalities are prepared to, and are able to, track the information and data needed. Annual maintenance would also be needed on all projects to ensure that recharge continues to be provided.

Guidance Documents for Stormwater Measures

Several comments also pointed out that guidance documents should be provided with performance criteria or explanations of the conditions that must be met in order to receive stormwater credits. Comments suggested that guidance should include at least the minimum requirements for what a stormwater bylaw must include in order to receive credit. Many communities have adopted bylaws with varying recharge requirements, and there are several sources for sample bylaws; however, the final requirements and the number of credits awarded for passing/having a bylaw are a policy decision for EEA.

Another comment suggested that direct credit for recharge from the disconnection of roof leaders should only be awarded if it is known that all roof runoff prior to disconnection was directly connected to the stormwater system, and after disconnection was directed to an area with sufficient infiltration to ensure recharge. These types of specific requirements will have to be addressed in guidance documents to ensure that permit-holders are aware of the conditions to be met to receive credit.

Supercharging

The Phase 2 Draft Report stated that stormwater recharge credit would be limited to annual recharge under natural conditions (i.e., “supercharging” the aquifer would not be awarded additional credit).

Recharge under natural conditions refers to the volume of recharge that occurs from a parcel before it is developed. Recharge requirements in the Massachusetts Stormwater Handbook are based on maintaining this natural recharge for new development and ‘getting it back’ from redevelopment projects. However, in some cases, where the soils are good, it is possible to recharge a greater volume than would occur naturally from an

undeveloped parcel. This additional recharge above natural recharge is referred to as "supercharging" the aquifer in the SWMI Phase 2 Draft Report.

Several comments were received suggesting that the full volume recharged should be eligible for credit. EEA is reevaluating this and is considering crediting supercharging in redevelopment situations, but the final decision and to what extent it will be credited is a policy decision yet to be made. Consideration must be given to the amount of recharge, if any, from the property as it exists before development/redevelopment in deciding these credits.

In addition, while a final policy decision has not been made, stormwater recharge credits may potentially have location adjustment factors applied.

3.6 Site-Specific Study

Several comments were received regarding the Site-Specific Study Sections of the Phase 2 Draft Report. All of these comments and questions relate to policy decisions that have yet to be made. The site-specific study option within SWMI is still under development. Both the Pilot Project and the comment letters have raised several more important policy questions that EEA will need to address in regulations and guidance documents. A few of these policy questions are listed below:

- If a PWS does a site-specific study and the results indicate more stringent mitigation requirements than the SWMI model, does the PWS have the option to go back into the SWMI model/process?

- Will third parties have the ability to initiate or request a site-specific study, or other means to question the Biological Category (BC) and groundwater Withdrawal Level (GWL) assessments of a subbasin?

- Will guidance documents provide detailed information on what EEA will accept for a site specific study?

- Will there be some protocol developed for changing/updating the BC and GWL maps based on the results of site-specific studies?

- Would the application of STRMDEPL and the use of pump test data be acceptable for a site-specific study when used to assess pumping impacts on surface waters?

Another comment suggested that MassDEP should complete the Track 1 site-specific studies for permit-holders since MassDEP has all of the data necessary to ensure the accuracy of the model inputs. MassDEP may consider performing the data check as part of an overall quality assurance of the model inputs. However, it is the responsibility of the PWS to assess if the model output significantly differs from existing conditions. Should a PWS request assistance in identifying or interpreting system specific constraints (confined aquifer) that may affect a PWS's SWMI compliance, MassDEP will work

jointly with the PWS during the consultation process to pursue the appropriate site-specific study.

One review comment was prompted by the Phase 2 Pilot exercise for the Danvers-Middleton subbasin. Essentially, the comment expressed concern that a PWS's withdrawal request would still be subject to SWMI permitting conditions, when the apparent impact to Biological Condition may be controlled by factors other than withdrawals. For the Danvers-Middleton exercise, the Track 1 site-specific evaluation (Review/Refine Data Inputs to the USGS Model) examined the case where withdrawals outside the subbasin, but upstream in the same major basin, have been significantly reduced. While this pilot evaluation showed that the reduction improved the GWL classification, the change in withdrawals did not improve the BC classification. While the algorithm for determining BC is not published, the Pilot Team has been advised that it is based on withdrawals and on imperviousness. So the conclusion in the Phase 2 Draft Report was that in this particular watershed, imperviousness is the controlling factor for BC.

This prompted the commenter to suggest that if factors other than withdrawals are affecting the biological health of the stream, the state should pursue a study that looks not only at impervious cover, but further into the impacts of water quality and temperature on aquatic biology. Such a study may provide additional input on the impacts of specific water quality parameters on aquatic biology and stream health. This information could be used to address situations where a stream or subbasin is degraded due to impacts from something other than groundwater withdrawals. The implication of this comment is that it may be more effective to address other impacts instead of regulating water withdrawals, based on this site-specific finding.

However, even though other factors may affect BC classification to varying degrees, the scientific study and modeling underlying the development of SWMI shows a strong correlation of BC with withdrawals. Where the SWMI Framework is designed as a water allocation framework to help MassDEP make permit decisions under the WMA that consider human and ecological water needs, MassDEP will expect the PWSs to address their "fair share" of stream impacts by offsetting the impacts of increased withdrawals. Thus, a study into the impacts of water quality and impervious cover may not significantly change the requirements of a permit holder under the WMA (although it may provide useful information for other programs within MassDEP that oversee water quality issues).

Finally, some comments expressed concerns about the costs of site-specific studies. The Phase 2 Draft Report provided a range of estimated costs for various site-specific studies. Actual costs will vary depending on the specifics of each PWS, its subbasins characteristics, and each study proposed.

Table 3-2. Indirect Mitigation Scoring Matrix								
Category	**Mitigation Action**	**Instream Flow Improvement (max 10)**	**Aquatic Habitat[1] Improvement (max 30)**			**Water Supply Protection (max 10)**	**Generic Total Score**	**Permit Specific Adjustments**
			Water Quality[2] Improvement (max 10)	**Habitat Improvement (max 10)**	**Stream Continuity Improvement (max 10)**			
Habitat Improvement	Remove a dam or other flow barrier[3]	5	5	5	10		25	During agency consult total score may be adjusted based on site specific information such as the location or scale of the activity.
Habitat Improvement	Culvert replacement to meet stream crossing standards		5	5	10		20	
Habitat Improvement	Streambank restoration		5	10			15	
Habitat Improvement	Stream channel restoration			10	5		15	
Habitat Improvement	Stream buffer restoration		5	10			15	
Habitat Improvement	Other habitat restoration project			10			10	
Habitat Improvement	Install and maintain a fish ladder[3]				10		10	
Habitat Protection	Acquire property in Zone I or II					10	10	
Stormwater	Stormwater bylaw with recharge requirements	5	5				10	
Stormwater	Stormwater utility meeting environmental requirement[4]	5	5				10	
Stormwater	Implement MS4 requirements[4]		10				10	
Habitat Improvement	Establish/contribute to aquatic habitat restoration fund			5			5	
Habitat Protection	Acquire property for other natural resource protection		5				5	
TBD	Other project proposed by applicant	TBD[5]	TBD[5]	TBD[5]	TBD[5]	TBD[5]	TBD	
							160	

1. Aquatic habitat improvement can include instream water quality improvement, stream corridor habitat improvement, stream continuity improvement and cold water fishery improvement.
2. Water quality improvement can include reduction in cultural-source sediments, reduction in other pollutants, or -for CFR - mitigation of thermal impacts.
3. More credits can be considered if on a coldwater fishery resource.
4. Must result in increased recharge to get credit.
5. No benefit = 0 credits; Indirect benefit/improvement = 5 credits; Direct benefit/improvement = 10 credits

Section 4 - Optimization of Existing Sources and Evaluation of Alternative Sources

The Sustainable Water Management Initiative (SWMI) Permitting Framework requires any Water Management Act (WMA) permit application for a withdrawal in a Groundwater Withdrawal Level (GWL) 4 or 5 subbasin to develop a plan to minimize the impact of the existing withdrawal on streamflow and aquatic habitat to the greatest extent feasible considering cost, improvement expected, and the practicality of implementation. As part of this plan, the public water supplier (PWS) must evaluate optimization of existing resources and the use of alternative sources. Section 4 of the Pilot Project's Phase 2 Draft Report identified analytical tools and suggested data sources for evaluating source optimization including consideration of alternative sources as well as guidance on the prioritization of options.

Source optimization evaluations are intended to identify operational changes to minimize impact on subbasin streamflow. The PWS would use a Desktop Pumping Evaluation to assess whether the impact of the withdrawal on the streamflow in the subbasin can be decreased by modifying well withdrawal operations without significantly altering the PWS's ability to feasibly meet demand.

In addition to the general requirement for source optimization, the SWMI Framework specifies that where a GWL4 or 5 subbasin also contains a Coldwater Fishery Resource (CFR), the evaluation must include a "Desktop Pumping Evaluation" and consultation with agencies to minimize the impact of withdrawals on the CFR.[1] In developing the Pilot Project, the Pilot Team has recognized that the source optimization process essentially consists of a desktop pumping evaluation. Therefore, in subbasins with CFRs, the required "source optimization/desktop pumping evaluation" simply introduces the minimization of impact on CFRs as an additional criterion for the evaluation.

Comments received on the Phase 2 Draft Report, Section 4 Optimization of Existing Sources and Evaluation of Alternative Sources, focused on two categories of concerns:

1. Additional/alternative data sources (specifically the use of stream gage data, where available).

2. Consideration of several constraining factors as part of the Optimization/Evaluation methodology described in the Phase 2 Draft Report. Comments recommended that in determining prioritization for optimization, the following should be considered:

[1]The Massachusetts Division of Fish and Wildlife (MassWildlife) defines a CFR as a stream that meets at least one of the following criteria:

1. Brook, brown or rainbow trout reproduction has been determined.
2. Slimy sculpin, longnose sucker, or lake chub are present.
3. The water is part of the Atlantic salmon restoration effort or is stocked with Atlantic salmon fry or parr.

a. water quality when considering prioritization of streams surcharged by wastewater returns,

b. affected August flows (in addition to unaffected August median flows), and

c. streamlining of regulatory requirements when that is the limiting factor for use of an environmentally favorable water supply source.

This section of the Summary Report addresses these comments.

4.1 Data Collection

One comment recommended that actual stream gage data should be used where available. The Phase 2 Draft Report included four tables of suggested data sources that a PWS could use when performing a desktop pumping evaluation. These tables included Regulatory Data Sources, Well and Aquifer Characteristics Data Sources, Surface Water Supply Characteristics Data Sources, and Operational Data Sources. Stream gage data has been added to the table of Well and Aquifer Characteristics Data Sources included below in Table 4-1. Stream gage data should be considered when assessing well-specific information for documenting impact or lack of impact on adjacent resources. If the period of record is long enough, stream gage data can be compared to estimated unaffected flow to determine the percent alteration.

Table 4-1. Well and Aquifer Characteristics Data Sources

Item	Parameter	Source
1	Well Location	MassGIS/PWS
2	Existing groundwater withdrawals	Annual Statistic Reports (ASRs)
3	Distance from stream	MassGIS/ Survey
4	Distance and location within watershed from waterbodies	MassGIS
5	Authorized withdrawals	WMA Permit/ Registration Statement/ Interbasin Transfer Act (IBTA) Authorization
6	Average monthly withdrawal	ASRs
7	Pump depth/pump capacity	Well logs
8	Well type	Well logs
9	Pumping operation including pump size	Well logs/Pump test report
10	Well yield	Pump test report
11	Specific capacity	Pump test report
12	Static water level	Pump test report
13	Pumping water level	Pump test report
14	Drawdown	Pump test report
15	Cone of depression	Pump test report
16	Zone II Delineation	Pump test report
17	Residual drawdown	Pump test report
18	Well recovery time	Pump test report

Table 4-1. Well and Aquifer Characteristics Data Sources		
Item	**Parameter**	**Source**
19	Watershed area	Zone II Delineation
20	Groundwater levels	USGS sources (waterwatch.usgs.gov/?m=real&r=ma; groundwaterwatch.usgs.gov/StateMaps/MA.html)/ Pump test reports / Monitoring well data
21	Water quality	Water monitoring reports
22	Aquifer characteristics including size, depth, confining layers, transmissivity, storativity	Zone II Delineation Report/ Groundwater Hydraulic Analysis
23	Pumping impacts to adjacent water resources	Pumping Test Reports
24	Rainfall recharge rate	Zone II Delineation Report
25	Stream gage data (where available)	USGS sources (nwis.waterdata.usgs.gov/ma/nwis)

4.2 Optimization/Evaluation Methodology

As discussed in Section 4.1 of the Phase 2 Draft Report, the optimization evaluations are intended to:

1. Include an evaluation of the potential to preferentially pump wells near enough to surcharged streams to take advantage of induced infiltration.
2. Generally assess tradeoffs between withdrawals in different subbasins, and not between individual wells within a subbasin. However, if a CFR is present, tradeoffs within a subbasin based on distance to, and impact on, the CFR may also be considered.

Comments on the Draft Report generally identified three major issues for consideration as EEA develops regulations, permitting procedures, and guidance relative to these optimization/evaluation requirements:

- Accounting for water quality concerns when evaluating optimization of sources where one or more source is near a stream surcharged by wastewater returns;
- Accounting for both *unaffected* and *affected* August median flows when assessing optimization in watersheds impacted by withdrawals other than by the PWS performing the analysis; and
- Potential constraints on optimization due to regulatory limitations.

These considerations are further discussed below.

4.2.1 Water quality issues at streams surcharged by wastewater returns

Comments on the Draft Report expressed concerns about the potential water quality issues related to preferentially pumping wells located close to streams surcharged by

wastewater returns. Water quality is an overriding factor over proximity to a stream surcharged by wastewater returns in prioritizing public water supply sources. The water quality of subbasins surcharged by wastewater returns should be confirmed before they are prioritized as part of the desktop optimization evaluation.

4.2.2. Optimization in the context of unaffected vs. affected August median flows.

The prioritization methodology for assessing available sources to a PWS as presented in Section 4.3 of the Phase 2 Draft Report focused on meeting SWMI objectives of optimization of withdrawals to minimize impacts on CFRs and streamflow. The SWMI Framework generally requires preference for withdrawals that meet one or more of the following criteria:

- Utilize surface water storage
- In a CFR, withdraw from wells with less direct impact on streamflow during low flow periods
- Withdraw from basins with larger natural median August flow such that the percent alteration resulting from the withdrawal is minimized (unless the change in withdrawal would result in an increase in the established GWL)
- Withdraw from wells with less direct impact on streamflow during low flow periods

As written, the SWMI Framework suggests that (unless there is backsliding) it is preferential to withdraw water from subbasins with the largest unaffected flow regardless of other withdrawals because this would result in the lowest impact on percent August flow alteration and therefore the lowest impact on BC/GWL. Furthermore, because of the shape of the fluvial fish abundance/August flow alteration curve, the impact of a given percent flow alteration on fish population is actually less in an already altered stream than in a pristine one.

One of the first steps identified in the optimization process is to compare the unaffected August flows of the target subbasins. As noted above, priority is generally given to withdrawals from basins with larger natural median August flow such that the percent alteration resulting from the withdrawal is minimized. However, this does not take into consideration other impacts to streamflow, such as withdrawals by other communities, private water withdrawals, or dams. Both the unaffected and affected August flow should be considered in optimizing withdrawal sources. The Mass Water Indicators Report, Table 1-2 "Water-use information for Massachusetts stream basins" provides estimates of both the unaffected and affected August streamflow for each subbasin. Additional policy guidance is needed regarding how the affected flows should be considered.

4.2.3. Optimization in the context of constraining regulatory considerations

The Phase 2 Draft Report identified regulatory limitations, such as Authorized Withdrawals under WMA Registrations, WMA Permits, and Interbasin Transfer Act (IBTA) Authorizations, to using or increasing withdrawals from a water supply source. If a source exists that could offer significant optimization benefits except for the existence of regulatory constraints, this should be identified in the source

optimization/desktop pumping evaluation. For the Pilot communities, WMA Authorizations or IBTA Authorizations were generally not the deciding factors in discounting a potential source of optimization. No viable existing sources or alternative sources of water supply identified for Danvers-Middleton were restricted by regulatory constraints. Potential options for alternative sources for Amherst included purchasing water from Sunderland, Hadley and Belchertown through existing interconnections. If the optimization included obtaining water from Belchertown's Connecticut River Basin wells, the IBTA would be a consideration. A potential alternative water supply source for Dedham-Westwood Water District would be to increase their water purchase from Massachusetts Water Resources Authority (MWRA). This would require a new IBTA approval. In Shrewsbury, potential new sources considered included Oak Island and Scandinavian Athletic Club (SAC) wells. These sources would be subject to the IBTA; however, other factors, including costs, adjacent land uses and other political factors, influenced the low ranking of these options. Other alternatives sources considered for Shrewsbury, including purchasing water from the City of Worcester or MWRA, also required IBTA authorizations. Purchasing water from Boylston was discounted as Boylston did not have excess supply based on their WMA authorized capacity.

When regulatory constraints negatively influence the use of a more environmentally desirable water supply source, these constraints should be noted and discussed with MassDEP during the permitting process to identify options for accommodating an increased withdrawal from the targeted source.

Section 5 Costs

Several comments on the Sustainable Water Management Initiative's (SWMI's) Pilot Project Phase 1 and Phase 2 Draft Reports requested additional information regarding the potential costs for compliance with the SWMI Framework requirements. This Section of the Summary Report provides an order of magnitude estimate of these potential costs based on experience with the Phase 2 Shrewsbury Mock Consultation process. Throughout the Pilot Project, EEA staff expressed that Shrewsbury presented a unique case with a withdrawal request above baseline that is significantly higher than is expected for most public water suppliers (PWSs). Therefore, Shrewsbury's SWMI requirements and related costs may also be higher than what is anticipated for most PWSs.

The discussion is separated into costs for planning (desktop pumping/source optimization plan, evaluation of new sources of supply, demand management, minimization and mitigation plans) and implementation. Many of these costs (e.g. identification and evaluation of alternative sources of supply, compliance with standard conditions) will be necessary regardless of the SWMI Framework requirements. In addition, actual costs are expected to vary significantly between systems and permit applications based on factors such as:

- Number of sources
- Number of available and impacted subbasins
- Surface water vs. groundwater withdrawals
- Magnitude of additional supply requested
- Biological Category (BC)/Groundwater Level (GWL) of impacted subbasins
- Existing information regarding alternative sources, withdrawal impacts and demand management, minimization and mitigation alternatives
- Local environmental concerns

5.1 Planning

Table 5-1 presents estimated costs to PWSs for the planning activities required for Water Management Act (WMA) permitting associated with the SWMI Framework. Some of these costs, such as identifying alternative sources of supply, are required for meeting the system needs regardless of the SWMI Framework. The approach to these activities may change as a result of the future SWMI regulations, but their costs would not change significantly. Other activities, such as performing a source optimization study, are not currently required; the costs for these activities are an additional expense necessitated by the SWMI Framework. Each of these activities is discussed individually below.

Table 5-1. Order of Magnitude Cost Estimates – Planning		
Item	**Total Cost**	**SWMI Cost**
Determine Permit Review Tier	$2,500 - $7,500	$2,500 - $7,500
Source Optimization/Desktop Pumping Evaluation	$10,000 - $30,000	$10,000 - $30,000
Evaluate Alternative Sources of Supply	$15,000 - $40,000	None
Demonstrate No Feasible Less Harmful Alternative	Included above	Included above
Develop Demand Management Plan/Mitigation Plan[1]	$10,000 - $25,000	$10,000 - $25,000
Agency Consultation[2]	$10,000 - $25,000	$10,000 - $25,000

1. The costs represent the effort applied in the Shrewsbury Mock Consultation and may be less than what is needed for a consultant to develop the full plan anticipated to be required by the SWMI Framework.
2. The costs are for planning for, attending and follow up for 3 meetings over a 3-month timeframe with assistance from a consultant.

Determine Permit Review Tier – As described in the Pilot Project Phase 1 Report (Section 2.1.2 and Figure 2-1a), the first step in the WMA permitting process will be to determine the applicant's permit review tier. This activity will primarily be performed by the Massachusetts Department of Environmental Protection (MassDEP) with input from the DCR Water Needs Forecast and BC and GWL determinations. MassDEP is developing a tool that will calculate a PWS's permit review tier, however PWSs will spend some time, and potentially retain outside assistance, for review and comment on the initial permit review tier determination.

Source Optimization/Desktop Pumping Evaluations – Traditionally PWSs have optimized the use of sources based on criteria such as water availability, quality and cost of production. The SWMI Framework will require that impact on streamflow and related ecology also be considered in the analysis. PWSs would use a source optimization evaluation to assess whether the impact of a withdrawal on streamflow in the subbasin can be decreased by modifying well withdrawal operations without significantly altering the PWS's ability to feasibly meet demand. In addition, the SWMI Framework specifies that where a GWL4 or 5 subbasin also contains a Coldwater Fishery Resource (CFR), the evaluation must include a "Desktop Pumping Evaluation" to minimize the impact of withdrawals on the CFR.

The SWMI Framework does not provide guidance on how to perform Source Optimization/Desktop Pumping Evaluations. However, as in the SWMI Pilot Project Phase 2 Scope of Work and discussed with state agency staff during Phase 2, the EEA agencies do not intend these evaluations to include groundwater modeling or fieldwork. In addition, the optimization evaluations are intended to assess withdrawals between subbasins, and not between individual wells within a subbasin, unless a CFR is present.

Section 4 of the Phase 2 Draft Report provided an overview of the data collection and analyses to be performed for a source optimization/desktop pumping evaluation. The level of effort required for this study can vary considerably between systems. Because the optimization is intended to be between subbasins, a source optimization study is not applicable to a system that has all of its withdrawals in the same subbasin. Similarly,

source optimization in a system that has a combination of groundwater and surface water withdrawals can be complicated by the need to consider seasonal and firm yield impacts. The ranges of costs presented in Table 5-1 are for relatively simple systems with groundwater withdrawals in multiple subbasins. The costs would be higher for more complicated systems. In addition, PWSs may want to perform more complex studies of groundwater withdrawal/streamflow interactions to justify making significant changes to their system operations.

Evaluate Alternative Sources of Supply – Systems projecting the need for additional water above baseline will also be required to identify and evaluate alternatives for providing the required additional supply. These alternatives evaluations will be required to find new sources of supply regardless of SWMI related requirements. WMA regulations based on the SWMI Framework would, however, require that BC/GWL impacts be included as prioritization criteria. The scope of such an alternative evaluation will vary significantly depending on the number of alternatives available and the level of detail the PWS requires for its decision making. The range of costs provided in Table 5-1 are intended to be for a screening level analysis and are not intended to include land acquisition negotiations, permitting or field work such as test drilling and/or pumping.

Demonstrate No Feasible Less Environmentally Harmful Alternative – Tier 2 permit reviews with additional withdrawals more than 5% of unaffected August median flow and Tier 3 permit reviews, will require the applicant to demonstrate that there is no feasible alternative source that is less environmentally harmful. A source that is less environmentally harmful is defined as a source that is not in a GWL4 or 5 subbasin and where the additional withdrawal would not result in backsliding to a more altered GWL. It is anticipated that this demonstration would be part of an evaluation of alternative sources of supply and would not add significant scope or cost to that evaluation.

Develop Demand Management and Mitigation Plans – PWSs in permit review Tier 2 and Tier 3, with withdrawals located in GWL4 and 5 subbasins, will require development of plans to mitigate the impact of requested withdrawals above baseline commensurate with the impact of those withdrawals. The plans are expected to consist of demand management activities designed to reduce or delay the anticipated increase in withdrawals, an estimate of future wastewater returns and adjustments, and direct and indirect mitigation activities intended to offset increased withdrawals that are not avoided through demand management and wastewater adjustment. Tools and methodology for developing these plans are presented in the Phase 1 and 2 Pilot Project Reports and continue to be developed and refined by the EEA agencies. The level of effort and complexity of the demand management plan and mitigation plan will depend on the quantity of water requested above baseline and the specific activities available to each PWS. The Town of Shrewsbury, for example, assumed a request above baseline of 1.37 mgd for purposes of the Pilot Project. The mock consultation process identified 0.15 mgd in feasible demand management activities, 0.349 mgd of direct mitigation actions and 60 points (equivalent to 0.3 mgd) of indirect mitigation measures. While this was a mock exercise, with no commitment made or required on the part of the Town of Shrewsbury, under the mock permit conditions used, significant additional effort would be required for Shrewsbury to identify additional demand management and mitigation measures to offset the remaining 0.571 mgd Pilot withdrawal request above baseline. The level of effort

presented in Table 5-1 for developing a Demand Management Plan and Mitigation Plan is expected to be generally consistent with the effort applied in the Shrewsbury Mock Consultation and would not likely be adequate for the Town to develop the full plan anticipated to be required by the SWMI Framework. Again, throughout the Pilot Project, EEA staff expressed that Shrewsbury presented a unique case and that most PWSs would not have such a large withdrawal request above baseline and would be expected to be able to identify sufficient mitigation measures.

Agency Consultation – The Phase 2 Draft Report suggested that three consultation sessions between the applicant, agencies and other stakeholders over a three month period would be adequate to address most permit requirements. This effort can vary significantly depending on the complexity of the application, the withdrawal request above baseline, the level of advanced preparation by the PWS and the significance of stakeholder concerns. While agency consultation is already common in WMA permitting, the effort described here is considered incremental and specific to the SWMI process requirements.

5.2 Shrewsbury's Mock Permit Implementation

Conceptual cost estimates for implementation of the SWMI-related minimization, demand management and mitigation activities identified for the Town of Shrewsbury during the mock consultation process are summarized in Table 5-2.

The costs for some of these activities, such as compliance with the WMA Permit Standard Conditions, are already required of the Town, or would be implemented for other reasons. The costs associated with these activities are real, and the benefit of the activities can be credited for SWMI permitting, but the costs are not incremental as a result of SWMI Framework requirements.

Other activities are specific to the SWMI Framework. Costs for those activities are anticipated to be additional expenses and are listed in Table 5-2 in the column labeled "SWMI Cost."

As described in the Phase 2 Draft Report, the demand management and mitigation activities summarized in Table 5-2 would not be adequate to offset the additional withdrawal above baseline required by the Town of Shrewsbury. The SWMI compliance costs for other PWS's will likely vary significantly from those estimated for the Town of Shrewsbury based on the magnitude of withdrawal requiring mitigation and the Town-specific demand management and mitigation measures available. Many communities will not have a dam removal alternative available. Water Authorities and private water companies, for example, may have many fewer stormwater and wastewater recharge alternatives available. Conversely, some communities may have more readily available opportunities for demand management, Zone I/II property acquisition, or stream restoration.

Details of the Town of Shrewsbury's mock consultation minimization and mitigation activities are presented in the Phase 2 Draft Report. A brief discussion of the level of effort and cost of each activity is presented below.

Table 5-2. Order of Magnitude Cost Estimates – Shrewsbury Implementation		
Item	**Total Cost**	**SWMI Cost**
Minimization of Existing Impact		
Compliance with Standard Conditions[1]	Unidentified	None
Minimization of Impact from Additional Withdrawals		
Increased Withdrawals from Existing Wells[2]	$225,000	None
Demand Management		
Outdoor Watering Restrictions (2 days/week)[3]	$175,000	$175,000
Direct Mitigation		
SAC Wastewater Recharge[4]	$10 - $12 million	None
Recharge from Roof Leader Disconnections[5]	None	None
Indirect Mitigation		
Stormwater By-Law[6]	$25,000	None
Stormwater Utility[7]	$100,000 - $200,000	None
MS4 Requirements[8]	$500,000/year	None
I/I Removal Program[9]	$1 million/year	Unknown
Remove Poor Farm Brook Dam[10]	$330,000	$330,000
Other		
Unidentified Measures for Remaining Credits	Unknown	Unknown

1. These conditions are in Shrewsbury's existing WMA permit therefore are not considered incremental costs associated with SWMI.
2. Costs represent increased production costs.
3. Costs represent lost revenue, but do not consider the cost savings achieved by reduced pumping and treatment.
4. Cost to construct facility. Not considered a SWMI cost because although the project feasibility would be aided by SWMI credit, the driver will still be the Town's wastewater needs.
5. Roof leader disconnection and recharge costs are paid directly by the homeowner; therefore no cost was incurred by Shrewsbury. A typical cost of $5,000 per drywell can be used for other communities implementing a roof leader disconnection program.
6. Cost for consultant assistance.
7. Costs include consultant and town staff time to evaluate and set up a stormwater utility.
8. Costs were provided by the Town of Shrewsbury and are based on the draft NPDES MS4 Permit released in 2010. Costs may vary based on the final MS4 permit requirements and the level of stormwater BMPs needed to address water quality concerns in compliance with the permit.
9. Cost provided by the Town of Shrewsbury.
10. Preliminary removal cost.

Compliance with Standard Conditions – The mock consultation process concluded that minimization of Shrewsbury's existing withdrawal impacts would focus on meeting the WMA standard permit conditions of 65 residential gallons per capita per day (RGPCD) and 10% unaccounted for water. These conditions are in Shrewsbury's existing WMA permit and are therefore not considered incremental as a result of potential SWMI requirements. Shrewsbury has achieved compliance with the 65 RGPCD limit but has not been able to reduce unaccounted for water below 10%. The mock consultation process did not consider the additional effort required to meet this standard or demonstration functional equivalency to MassDEP.

Increased Withdrawals from Existing Wells – The Pilot Project included an evaluation of alternatives for increased withdrawals to meet Shrewsbury's projected increase in demand. The process identified increased withdrawals from the Home Farm Wellfield as the alternative for providing the required increased withdrawal that minimizes streamflow impact to the greatest extent feasible. The need to develop additional supply to meet projected demands is independent of the SWMI Framework requirements and therefore

any non-permitting costs associated with restoring capacity of the existing wells is not considered SWMI compliance related. The increased total cost included in Table 5-2 is based on increased withdrawal of 1.37 mgd at Shrewsbury's incremental production cost of approximately $450/MG.

Outdoor Watering Restrictions (2 days/week) – During Phase 2 of the Pilot Project, Shrewsbury analyzed the reduction in demand experienced in Town since implementation of its outdoor watering restrictions. EEA reviewed the information and agreed that 0.15 mgd was a reasonable estimate for volume saved with the reduction of watering from 3 days/week to 2 days/week. The cost associated with this activity in Table 5-2 is the result of lost revenue from a reduction in water sales of 0.15 mgd at Shrewsbury current rate of $3.20/1,000 gallons for usage between 5,001 and 25,000 gallons per quarter. Since sewer bills are based on water usage there would be a subsequent reduction in sewer revenues to the Town (~ $410,000/year at $7.50/1,000 gallons) that is not included in Table 5-2. This reduced revenue would be slightly offset by reduced production (pumping and treatment) costs.

As presented in Section 5.3.5.1 of the Phase 2 Draft Report, an alternative for reducing outdoor watering to one day per week was also discussed during the mock consultation. This alternative was not selected for inclusion in the mock permit but was estimated to be able to reduce demand by an additional 0.1 mgd (0.25 mgd total savings), with associated lost water revenue of approximately $115,000 at the above rates. While there is this potential for lost revenue, the reduction in withdrawal represents volumes that will not accrue mitigation costs.

SAC Wastewater Recharge - The Pilot Project identified the potential for Shrewsbury to achieve 0.3 mgd in direct mitigation credit for implementation of a wastewater recharge facility at the SAC site. Town of Shrewsbury staff has explained that this project does not currently have much political support and would not likely proceed except to address multiple regulatory concerns. The provision of SWMI-related direct mitigation credit may help the project gain needed support.

Recharge from Roof Leader Disconnections – The Phase 2 Draft Report identified approximately 0.001 mgd direct mitigation credit available to the Town for disconnection of existing residential roof leaders from the Town's stormwater system and recharging the collected rainwater into the aquifer. This included disconnection of 49 roof leaders. Roof leader connections to the sanitary sewer system are identified as part of the I/I program. Homeowners pay for the cost to disconnect and recharge their roof leaders, therefore there is no cost to the Town. If a Town chose to implement and pay for a roof leader disconnection program, a cost estimate of $5,000 per drywell/roof can be used for budgeting purposes. The mock consultation process did not identify disconnection of additional rooftops for future mitigation credit.

Stormwater By-Law – The indirect mitigation credit methodology outlined in the Phase 2 Draft Report would provide 10 credits to Shrewsbury for developing and implementing a stormwater bylaw that promoted recharge and treatment of stormwater runoff on a town-wide basis. The $25,000 cost provided in Table 5-2 assumes that Shrewsbury will engage a consultant to help develop and present the bylaw for adoption. These costs may

be less if the Town decides to develop the bylaw in-house. The specific requirements of the bylaw to receive the credit were not established in the Draft Phase 2 Report.

Stormwater Utility – The Town of Shrewsbury is currently in the process of developing a stormwater utility fund. A stormwater utility fund is an account that is dedicated to the operation, maintenance, repair, and management of the municipality's stormwater infrastructure. Revenues to the stormwater utility are kept separate from other municipal funds and uses, and cannot be co-mingled with funds for any other activities. The indirect mitigation credit methodology outlined in the Phase 2 Draft Report would provide Shrewsbury with 10 credits for establishing the fund. The estimated cost to develop and set up a Stormwater Utility, including consulting and staff time, is $100,000 - $200,000. This does not include the development of a stormwater master plan and/or mapping of the stormdrain system.

MS4 Requirements – Shrewsbury, like many other Massachusetts communities, is a regulated municipal separate storm sewer system (MS4) under the National Pollutant Discharge Elimination System (NPDES) Phase II program. As such, Shrewsbury is required to develop a Stormwater Management Program (SWMP) that includes public education and outreach, illicit discharge detection and elimination, regulatory controls and pollution prevention/good housekeeping. A new permit is anticipated to be published within the next year, with more specific requirements for each of these measures and additional requirements for addressing impaired waters. The overall goal is to improve water quality.

The indirect mitigation credit methodology outlined in the Phase 2 Draft Report would provide Shrewsbury with 10 credits for implementation of the NPDES MS4 permit. Shrewsbury was provided an estimate of $350,000 to $500,000 from their consultant to comply with the MS4 draft permit released in 2010. This may change with release of the new draft and final permit anticipated sometime over the next year. It will also vary depending on the level of stormwater treatment needed to address impaired waters.

Also note that this is not a SWMI related cost. Although credit is offered under the SWMI program, Shrewsbury is required to develop and implement a Stormwater Management Program regardless of the SWMI requirements.

Infiltration/Inflow Removal Program - The indirect mitigation credit methodology outlined in the Phase 2 Draft Report would provide 5 credits to Shrewsbury for implementing an infiltration/inflow (I/I) removal program. Subsequent to issuance of the Phase 2 Draft Report, EEA Agencies are considering I/I removal for a direct credit. As described in the Phase 1 report, Shrewsbury has identified the need for a $1 million/year, 13-year I/I removal program and has allocated $500,000 to the program in Fiscal Year 2012. The magnitude of program required to achieve the suggested indirect mitigation credits as presented in the Phase 2 Draft Report is not clear. The direct credit methodology for I/I removal will be further refined by the EEA Agencies.

Remove Poor Farm Brook Dam - The City of Worcester owns a dam on Poor Farm Brook which flows into Lake Quinsigamond in Shrewsbury upstream of the Home Farm and Lambert Wells. As described in the Phase 2 Draft Report, removal of this dam could

provide 25 indirect mitigation credits. A preliminary cost estimate for removal of this dam is approximately $330,000 (Worcester Gazette 7/18/11). Worcester received a $139,500 SWMI grant from MassDEP to perform a feasibility study for this dam removal. The Phase 2 Draft Report assumed that the mitigation credit for this project could be attributed to Shrewsbury. However, this assumption did not take into account, and would be dependent on, the policy decisions to be made by EEA regarding mitigation credits for measures implemented outside of Town and sharing of mitigation credit between municipalities.

Section 6 Recommendations

The Sustainable Water Management Initiative (SWMI) Pilot Project identified many potential implementation issues while testing the application of the SWMI permitting framework in four communities with existing Water Management Act (WMA) permits. This process provided considerable information to support crafting regulations under the next stage of the process, while also identifying where more information or guidance is needed. Based on the data and comments received from the Pilot Project, this section outlines recommendations for the Executive Office of Energy and Environmental Affairs (EEA) and its agencies consideration to help clarify future regulations.

6.1 Demand Management

Worksheets. EEA should develop a worksheet for calculating demand management water savings and associated costs. This would minimize PWS efforts to develop these estimates while providing consistency of estimates among permit holders. The assumptions and worksheets developed by the Pilot Team during Phase 1 can be used for this purpose. The data can be incorporated into one worksheet for ease of use.

Cost-Effectiveness. The EEA should consider allowing PWSs to prioritize between demand management activities and mitigation activities on the basis of cost-effectiveness. That is, if a PWS demonstrates that demand management activities are not cost-effective, or are not as cost-effective as identified feasible mitigation measures, the PWS should be able to opt for the implementation of other activities outlined in its mitigation plan. Where demand management is cost-effective, it should be given priority over mitigation, as discussed in Section 3 of this document.

6.2 Wastewater

Wastewater Adjustment. Guidance should be provided to clarify how EEA will credit adjustments for wastewater returns in Towns that are partly served by septic systems and partly served by sewers. Will the wastewater adjustment be applied based solely on the percent of town served by septic systems, or will Towns be required to track where the wastewater from increased withdrawals ends up (e.g., septic or sewer)? For example, if a Town is 50% septic, 50% sewer, and the PWS has a withdrawal request above baseline of 0.1 mgd, will the Town be credited for 50% of the returns? Or can the Town document a credit for the entire 0.1 mgd because the withdrawal supports growth of development in the portion of town that is served by septic systems, allowing a 100% credit of future returns? Also, is the credit applied to the full withdrawal request above baseline or the adjusted request above baseline after accounting for proposed demand management actions? EEA should provide examples of various scenarios and develop a worksheet that PWSs can use to calculate this adjustment.

Water Quality. EEA should provide guidance on how water quality issues will be evaluated when considering credits for wastewater discharges to subbasins in which drinking water supply wells are located.

6.3 Mitigation

Location Adjustment Factors. The use of location adjustment factors can significantly limit the amount of credits available to a PWS, particularly those where their sources or the subbasins to those sources are located outside of their municipal boundaries. The Pilot Team recommends allowing credit for mitigation outside of municipal boundaries to the extent that they were funded by the applicant.

Infiltration and Inflow (I/I) Removal Program Credits. Guidance should be provided on how direct credits can be achieved for I/I removal programs. Such programs were considered for direct mitigation credit at one point and for indirect mitigation credit at another, but either way the methods for calculating credits for I/I removal should be included in future guidance.

Cumulative Impacts. Guidance should be provided on how cumulative impacts will affect credits. For example, should additional mitigation points/credits be required of upstream PWSs if their additional withdrawals cause a change of Biological Category (BC) or Groundwater Withdrawal Level (GWL) in a downstream subbasin, but not in their own subbasin?

Mitigation Timing. If mitigation measures are implemented prior to increased withdrawals above baseline, flexibility will be needed given the time required to design, permit, fund and implement several of the potential mitigation measures. The Pilot Team recommends an approach such as comparing a multi-year rolling average of withdrawals to allowed withdrawals (adjusted for mitigation) to determine compliance, or allowing a defined number of consecutive years above the allowed withdrawal limit before enforcement is pursued.

Sharing Mitigation Credit. EEA should consider development of guidance on how mitigation credits can be shared or divided between multiple WMA permit holders. Comments on the Phase 2 Draft Report suggested that the cost of the project should be taken into account, and that the percent of those costs paid for by each party should be used to divide the credits. The guidance should provide flexibility for the division of credits to be left to agreement between the partnering municipalities. Trading (or selling) of credits should also be allowed.

Not Enough Mitigation Credit. EEA should consider development of guidance on what will be required of permit holders when there are not enough feasible mitigation options to meet requirements. EEA should consider establishing a state mitigation fund that allows PWSs to pay into when no other feasible mitigation options are available to the PWS. The state can then distribute these funds for mitigation elsewhere. Allowing for credits on measures outside of municipal boundaries should also be considered.

6.4 Indirect Mitigation

EEA should develop guidance on indirect credits for a restoration fund (i.e., is there a method to buy credits from the State?), and for credits for mitigation measures not currently listed in the SWMI offset/mitigation table.

Indirect mitigation measures should have criteria which they need to meet to qualify for credit (e.g. what must be included in a stormwater by-law to receive 10 credits) and/or should be normalized by some criterion (e.g., land acquisition = 10 points/acre, or culvert replacement = 20 points/culvert, dam removal = 25 credits per miles of stream connected).

The indirect credit scheme from Appendix E of the Phase 1 Report accounted for this and should be considered when adjusting points higher or lower than those in the current Indirect Mitigation Scoring Matrix. EEA should consider offering specific guidance on how points would be adjusted; current language in the matrix does not provide predictability for a PWS when it is trying to develop a plan that includes indirect measures.

6.5 Consultation Process

Consultation Process Timeline. PWSs would benefit from a consultation process that starts well in advance of the permit expiration date and that provides adequate time between sessions for them to review and evaluate their SWMI requirements and their minimization and mitigation options. The 9 to 12 month schedule (before permit expiration) outlined in the SWMI framework was adequate but advance notice time for budgeting by municipalities should also be considered.

Consultation Preparation. SWMI concepts are likely to be foreign to some water systems, especially smaller systems. The Pilot Team highly recommends that EEA hold SWMI educational workshops and seminars throughout the state, open to all PWSs, to educate them on their SWMI-related requirements. The initial training sessions should be quite basic, with later sessions bringing in more complex information. The training session materials should also be on the state's website in a modular form so that someone new to the process could get up to speed in just the areas that are unfamiliar.

6.6 Stormwater

EEA should provide guidance on how stormwater will be credited as direct and/or indirect mitigation.

EEA should consider crediting redevelopment projects based on the actual increase in recharge volume compared to existing development conditions. This can be readily calculated by the developer's engineer, with guidance, and can be tracked by the PWS or Town if they are willing.

Regarding new development, if an indirect credit for communities that have adopted a stormwater bylaw is given, EEA should provide guidance on the minimum bylaw requirements that must be met to receive these credits. For example, the Massachusetts Stormwater Handbook specifies stormwater management standards for new and

redevelopment projects within jurisdiction of the Wetlands Regulations and requiring Water Quality Certification. The purpose of these management standards is to maintain natural recharge and remove pollutants from stormwater runoff. EEA could require that bylaws incorporate these standards at a minimum to receive indirect credits, with application of these standards town-wide. EEA may also consider providing an increased credit to communities that adopt more stringent stormwater management standards. For example, if a community requires more recharge they could be eligible for more credit.

Another option EEA can consider is to develop a direct mitigation credit for new development for those communities that require more recharge than outlined in the Stormwater Management Handbook (i.e., more than 'natural' recharge). Estimates of future mitigation could be made based on predicted growth, impervious area and soil types, however, these would require adjustment throughout the permit term based on actual development. This would require the community to track future development and the associated recharge above 'natural' recharge for credits, requiring much more recordkeeping and reporting to track and receive credits.

6.7 Site-Specific Study

Site-Specific Study methods should be further explored in the ongoing process to provide better guidance to communities wishing to use this option. While the Pilot Project has identified some potential site-specific methods, there may be additional approaches that merit consideration. Furthermore, several "unknowns" will need to be resolved for PWSs to feel comfortable exploring the option of site specific studies, including:

- what the actual costs will be for various types of studies, under various withdrawal/impact scenarios;
- what the specific proof of compliance will include; and
- what other more direct methods are available that PWSs can use to determine if Site-Specific Study options will be cost-beneficial.

6.8 Feasibility

EEA should provide guidance on how feasibility will be determined and how costs will be considered in that determination.

6.9 BC/GWL Maps

EEA should provide guidance on how and/or when the BC/GWL maps will be updated.

EEA should provide a user friendly algorithm for determining the fluvial fish density and BC classification, so that PWSs can assess how changes in withdrawals impact the BC classification of the subbasin.

6.10 Minimization

For Tier 1 permit reviews, the Pilot Team recommends that minimization requirements should be limited to optimization of existing sources, including interconnections. For Tier 2 and 3 permit reviews minimization of the impact of withdrawals above baseline should

also include an evaluation of alternative sources. To avoid confusion, demand management activities (e.g. outdoor water restrictions) and mitigation measures (e.g. measures that return water to the subbasin) should not be included as minimization. Furthermore, demand management requirements for Tier 1 permit reviews should be limited to compliance with the standard permit conditions.

Appendix A –

Comments Received

Town of Shrewsbury
Massachusetts Water Works Association
Watershed Groups
City of Worcester

OFFICE OF THE
ENGINEERING DEPARTMENT

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TOWN OF SHREWSBURY

MASSACHUSETTS 01545-5398
February 26, 2013

Duane LeVangie
Department of Environmental Protection
1 Winter Street
Boston, MA 02108-4747

Re: SWMI Pilot Project Phase 2 Report

Dear Duane:

The purpose of this letter is to offer our comments, and observations on the SWMI Pilot Project Phase 2 Report. The Town of Shrewsbury greatly appreciates the opportunity to participate in the SWMI Pilot Program. We found the process to be very informative while helping us to understand the future permitting process. The whole process required a significant investment of time, effort, and funding by the state agencies, the consultant team, and the public water suppliers who participated in the pilot program. We also realize that the development of the regulations will require a similar amount of thought and effort over the next several months. We hope to use our experience in the pilot program to continue to provide input in the development of regulations that we hope will be fair, reasonable, and feasible to implement for the public water suppliers.

Specifically for the Town of Shrewsbury, we have long recognized the need to increase our permitted water withdrawals to provide for the economic development opportunities that are greatly needed to help support the significant population growth that we have seen in the past two decades. In fact, the reason the Town was asked to participate in the pilot program was that we were in discussions with Secretary Bialecki of the Office of Housing and Economic Development relative to the need for increase water supply for economic development. The impetus for the meeting was that we could not meet the water demands of a significant business that wanted to locate in Shrewsbury on a Town-owned piece of industrial land that is zoned for the proposed use. That need for the additional water supply and for economic development still exists. However, as stated Section 5.5.7 of the Phase 2 report, "During the mock permitting exercise EEA and the Town of Shrewsbury were unable to develop a mitigation list commensurate with impact from increased withdrawals utilizing the proposed SWMI methodology." With this in mind, the Town of Shrewsbury hopes that the proposed regulations will be drafted to give additional credit and consideration to the mitigation required to meet the permit request. Many of the credits and allowances were reduced considerably, and in some cases drastically, from the start of the pilot program to the issuance of the Phase 2 report. The Town hopes that the following comments are given serious consideration to develop a permitting process that is feasible and predictable as was intended at the outset of the SWMI process. The Town also asks that the letter from Tata and Howard, our water consultants, be given serious consideration a it further explains the SWMI permitting impacts on the Town of Shrewsbury. A copy of their letter is attached.

The following comments reference the specific page and section of the Phase 2 report.

Page 2-5, Section 2.2:

This section references the location adjustment factor that is applied to certain mitigation projects involving recharge. The Town of Shrewsbury's position on this issue is that there should be no location adjustment factor. We contend that any recharge project will benefit the groundwater flow and stream flow in its basin even if it isn't in the same basin as the wells. For the Town of Shrewsbury, 58% of the Town is in areas that receive 50% or less credit for projects. In fact 37% of the Town is in the watershed that contributes to the Assabet River. This watershed only receives 10% credit for any projects. We know that the Assabet is a stressed basin and that it would greatly benefit from any recharge projects. However, if these projects are only receiving 10% credit, it is very unlikely that this would ever be successful in getting support for the funding when competing with other projects. Given the choice between a project that gets 100% credit or one that gets 10% credit, it would be an irresponsible use of the rate payers money to even consider the 10% project. If the location adjustment factor is eliminated, projects will be developed based on their overall benefit and not on their location.

Page 3-3, Section 3.1.2:

This section uses the phrase, "Commensurate with impacts" for additional withdrawal. It assumes that there is a gallon for gallon correlation between water withdrawals and impacts, which would be a worst case scenario. The cost of the site specific study to prove that this is not the case can be very significant.

Page 3-7, Section 3.2.2.1:

As the Town is approximately 85% sewered and because the subbasin is fairly well developed, there is little to no opportunity for the Town to get additional credit for septic returns.

Table 3-2 indicates the location adjustment factors for the different basins. Again, we believe all projects should receive 100% credit.

Page 3-8, Section 3.2.2.3:

Credit is only allowed up to annual recharge under normal conditions and no credit will be given for "supercharging" the aquifer. The concern with this statement is that there may be a situation, especially in a redevelopment project, where supercharging a site in an area with good soils may help to offset an adjacent area, such as a highway, that may never be recharged.

If the regulations state that there is no credit, some regulators will feel that there hands are tied and won't even consider projects that could be more beneficial with supercharging. This section goes on to say that stormwater recharge will be subject to the location adjustment factor, which again will reduce or eliminate the incentive to provide the recharge.

Page 3-8, Section 3.2.3:

Table 3-3 lists the indirect credit requirements. The number of credits doubles for requests that are over 5% of the August median flow versus requests that are under 5%. What is the basis for doubling the number of credits required?

Page 3-10, Table 3-4:

This table lists the credits available through a point system for various forms of mitigation actions. It should first be noted that the credit attributable to some of the proposed mitigation actions were drastically reduced from the original proposals in the pilot program. This is particularly true for the stormwater bylaw with recharge requirements, the establishment of a stormwater utility, and infiltration/inflow (I/I) removal. Under the proposed point system, these actions are vastly undervalued.

The stormwater bylaw with recharge requirements provides the regulatory tool needed to require recharge for all projects, including redevelopment. It also can require recharge in areas that are outside the MS4 regulated areas. All of these projects will be beneficial to groundwater recharge and may not happen in the absence of a bylaw.

Establishing a stormwater utility provides the funding source that is sorely needed for the implementation to municipal projects and best management practices that will improve both the quality and quantity of stormwater recharge. Without the funding source, projects will be delayed or never implemented as they compete with other requests for funding from other sources.

Finally, I/I removal provides a year round benefit to groundwater flow, especially the removal of infiltration. It is very common to have sewer installed at a depth that is within the groundwater table, especially interceptors and truck lines that are commonly installed in easements that follow a water course. Obviously every gallon of groundwater that is prevented from entering the sewer is a gallon that is available for improved streamflow, especially in the summer.

We would recommend that the stormwater bylaw, stormwater utility, and I/I removal should be the highest valued mitigation actions, not amongst the lowest.

Pages 4-2 to 4-4, Section s 4.2.1, 4.2.2, and 4.2.3:

Tables 4-1, 4-2, 4-3, and 4-4 contain 51 different data sources to be considered in the desk top evaluation of a public water supply system. This points to the complexity of the process and the investment of staff time for both the water supplier and the state agencies as this is considered to be one of the easier tasks to accomplish as it does not require additional modeling or field work.

Page 5-3, Section 5.2:

The report states, "The credits identified by the consultation process were not enough to mitigate Shrewsbury's withdrawal request 'commensurate with impact.' Shrewsbury would need to identify additional mitigation options to receive a permit for the full withdrawal request volume." It should be noted that the list of credits that were assumed to be available included the future wastewater recharge at the SAC site. The Town is extremely interested in this potential project, but we recognize that the estimated construction costs of $10 to $12 million along with extensive permitting and other political considerations may seriously impact the project feasibility and implementation schedule. The second item referenced is the removal of the Poor Farm Brook Dam. This dam is owned by the City of Worcester. Even though both communities would like to see the dam removed, there is no guarantee that it will happen. Funding will be an important consideration. The amount of credit under this SWMI proposal that would be given to each community is also unclear at this time, and needs to be considered before the project funding is sought.

Page 5-9, Section 5.3.5.2:

Table 5-2 lists the location adjustment factors for mitigation credits. As previously stated, all mitigation projects have to receive 100% credit to be viable.

Page 5-10 to 5/11, Sections 5.3.5.3 and 5.3.5.4:

These sections summarize the credits available to Shrewsbury that were developed through the mock consultation and review process. The State's consultants, agencies, staff, Town staff, and the Town's consultants were able to identify 60 indirect credits, leaving 120 credits that Shrewsbury would need to achieve through additional indirect mitigation measures. If indirect measures aren't feasible, the Town needs to re-evaluate its demand management and direct mitigation measures. This further reinforces the fact that many of the indirect measures were greatly undervalued when they were reconsidered from earlier drafts in Phase 2.

It also emphasizes the complexity of the process and the many different aspects of mitigation that must be considered to determine if they are feasible and fundable in order to achieve a viable permit.

Page 5-11, Section 5.4.1:

The report recommends that Shrewsbury submit a minimization plan to D.E.P. during the Water Management Act permit application process under the SWMI process 9 to 12 months in advance of the current permit expiration date. Based on the concerns expressed in the above paragraph, we would agree that this is an absolute minimum. We would anticipate several work sessions with D.E.P. to consider the alternatives. Based on our experiences in the pilot program, we would also recommend that public water suppliers will need to start their own review process at least 6 to 12 months before submitting the mitigation plan to D.E.P. to familiarize themselves with the many aspects of SWMI to be considered prior to submittal. This also allows the public water supplier the time to compile data, analyze mitigation measure, perform cost benefit analysis for various mitigation options, develop a funding plan, and determine the most viable and feasible options to commit to in the mitigation plan.

Page 5-14, Section 5.5.1:

The consultation timeline is described in this section. Within the 9 to 12 months SWMI timeframe proposed, it is suggested that consultation sessions would be held over a three-month period, similar to the timeframe used in the pilot program. We would suggest that three-months would be an absolute minimum and would think about six-months is more realistic under normal circumstances given the additional other duties and responsibilities that we have in addition to water permitting. We were able to meet the three-month timeframe in the pilot program only because it was dictated to us, and other activities had to be set aside. Also, if we were having to commit to the final mitigation plan as a permit requirement, rather than a mock process, we would have spent more time, money, and resources, further analyzing each mitigation measure.

Page 5-15, Section 5.5.2:

We agree that SWMI will place a significant burden on EEA regarding education, guidance, procedures, consultations, reviews, and recommendations needed for every permit and permit renewals. Adequate staffing will be needed in the various agencies to keep the process from bogging down and to meet the suggested timeframe.

Page 5-15, Section 5.5.3:

The statement that Shrewsbury's population has been declining is incorrect. The original DWR projections used for the original permitting had projected the 2010 population to be 22,706. In fact, the actual population in 1990 was 24, 146 and in 2010 was 35, 608. The rate of increase has slowed, but there has been no decline. Please see the letter from Tata & Howard, which goes into further detail on this matter.

Page 5-16, Section 5.5.6:

We agree with the summary outlined in this section for certain mitigation measures and the fact that the development of some will be very complicated and will take years. We also agree that EEA will need to develop guidance to determine when a mitigation measure is considered to be feasible.

Page 5-16, Section 5.5.7:

We agree that based on the pilot program experience, EEA will need to develop guidance regarding how to handle the Town's situation during a real permit process.

Page 5-16, Section 5.5.8:

We totally agree with the recommendation for the need for flexibility in the SWMI process. This was more than substantiated by the pilot program.

Page 5-16, Section 5.5.9:

This section discusses the removal of the Poor Farm Brook Dam which is located in the Town of Shrewsbury but it is owned by the City of Worcester. There is a question as to how the credits would be allocated. Another question that came up during the review related to the location adjustment factor. While a project may be beneficial, a community that is only receiving 10% credit may be far less interested in participating and investing money that could be used for other purposes that would receive more credit.

Pages 6-7 to 6-8, Table 6-3:

The Table presents the Comparison of Site-Specific Approaches. This Table again reinforces the concern with the many different options to be considered with a wide range of costs estimated to be from under $5,000 to as much as $100,000 with no guarantee that enough credit can be obtained to satisfy the requirements.

There is also a significant investment of time and funding to consider which Approach to pursue, if any. These comments also apply to Table 9-1 on Page 9-2.

Page 7-36, Table 7-23 and 7-24:

The middle column heading should be "Shrewsbury Withdrawals" not "DWWD Withdrawals."

Page 9-4, Section 9.3:

This section discusses the issue relative to Poor Farm Brook which is not located within the same subbasin as Shrewsbury's wells. A site-specific study of Poor Farm Brook does not fall under one of the site-specific tracks proposed in Phase 2 and may be an additional requirement. Additional data may need to be collected. If a full site specific study is required, the cost is estimated to be $50,000 to $100,000, which may or may not require additional actions. This again emphasizes the need for flexibility and the complexity of the issues to be considered and the unpredictable outcomes that may be realized after expending substantial funds.

Figure 9-2:

The well that is labeled, "Shrewsbury Well," is owned by the City of Worcester and should be labeled, "Worcester Well."

Page 10-1, Section 10 and 10.1:

We agree with the general recommendations and especially support the statement, "The regulations should balance the need for predictability with flexibility for EEA agencies and public water suppliers to work together to find compliance solutions." We also believe that the learning curve for SWMI will be much greater than with the previous permitting process.

The Town of Shrewsbury would again like to thank EEA for the opportunity to participate in the pilot program. It was a great education and learning experience for us. We also look forward to providing additional comments in the development of the regulations in 2013 and sincerely hope that our input will help to develop a process that is flexible and predictable, and will lead to a permit that has feasible and fundable minimization and mitigation requirements. To achieve this goal it is our sincere belief that the location adjustment factor must be eliminated as it will be a "deal breaker" for many projects. The credit assigned to some of the indirect mitigation measure also needs to be increased based for the reasons previously stated in this letter.

Again, thank you for your consideration and please let us know if you need any additional information or explanations.

Sincerely,

Jack Perreault, P.E.
Town Engineer

Copy to: Bethany Card, Assistant Commissioner, DEP
Shrewsbury Board of Selectmen
Daniel J. Morgado, Town Manager
Robert Tozeski, Superintendent, Water and Sewer
Paul Howard, Tata and Howard
Comprehensive Environmental Inc.
Tighe & Bond
Martin Suuberg, DEP

TATA & HOWARD
Water and Wastewater Consultants

February 21, 2013

Mr. Daniel J. Morgado, Town Manager
Town of Shrewsbury, Town Hall
Richard D. Carney Municipal Office Building
100 Maple Avenue
Shrewsbury, MA 01545

Subject: SWMI Pilot Project Phase II Report
Shrewsbury, Massachusetts
T&H No. 2626

Dear Dan,

Tata & Howard, Inc. has been providing technical assistance to the Town for the Sustainable Water Management Initiative (SWMI) Pilot Project. The Pilot Project has consisted of two phases. The Phase 1 report was completed in August 2012 and the Phase 2 draft report was completed December 28, 2012. The Town submitted a comment letter on the Phase 1 report on September 21, 2012. The Town is preparing a comment letter on the Phase 2 Pilot Project. Comments are due by March 1, 2013.

The SWMI Pilot Project included four communities; Shrewsbury, Amherst, Danvers and the Dedham-Westwood Water District. This letter will summarize the Phase 2 findings for Shrewsbury and address how the proposed SWMI process affects the Town of Shrewsbury in its ability to permit additional water allocation under the Water Management Act (WMA).

Shrewsbury is currently completing a Water Management Act Permit for the increase of the daily withdrawal to meet the estimated future demands prepared by the Massachusetts Department of Conservation and Recreation (DCR). In accordance with the current WMA Registration (21227101) and Permit (9P4-2-12-277.01) Shrewsbury is authorized to withdraw 3.91 million gallons per day (mgd) from the Blackstone Watershed. In order to meet the projected demands with the five percent buffer, the daily withdrawal would need to increase by 1.37 mgd, resulting in a revised withdrawal volume of 5.28 mgd. The pilot process utilized this requested increase during the mock permitting.

During the pilot process, Shrewsbury's requested volume was questioned by The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) staff because the 2010 Census Data was less than the DCR projection. Draft demand projections were originally developed for Shrewsbury by the DCR in a letter dated August 11, 2008. These projections were based on population and employment projections developed by Central Massachusetts Regional Planning Commission (CMRPC). The resulting 2028 service population projection was reported as

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41,000, the employment projection was reported as 15,571, and the projected demand, was 5.05 mgd. Based on historical data, Shrewsbury believed the population projection to be low. Shrewsbury had an independent population projection completed by Community Opportunities Group. DCR utilized these population projections and revised employment projections to revise the demand projections in a letter dated November 20, 2008. The revised service population was reported as 45,200 and the revised employment projection was reported as 17,176. Despite the increase in the service population and the employment projection, the projected 2028 demand decreased to 5.03 mgd. DCR provided no explanation on how the service population and employment projections increased without a corresponding increase in demand.

The original and revised DCR service population is shown in Figure No. 1, along with the Community Opportunities Group service population projections and CMRPC population projections. The figure also shows the Shrewsbury reported population from 1996 to 2006 and the 1990, 2000, and 2010 US Census populations. While we agree that the 2010 US Census data is less than that projected by Community Opportunities Group, the growth rate between 2000 and 2010 and the 2010 population appears to be on track with the population projection originally prepared by CMRPC. It is our belief that the population in Shrewsbury is going to continue to grow at a similar growth rate as it has between 2000 and 2010. The DCR completed the demand projections for Shrewsbury using two different population and employment growth rates, and obtained a similar projected demand, redoing the demand projections again will not result in a significantly different demand projection.

Based on the criteria established in the SWMI framework Shrewsbury's baseline is 3.91 mgd. Therefore the requested volume of 5.28 mgd results in a volume of 1.37 mgd above the baseline.

Under the SWMI framework, biological categories (BC) and groundwater withdrawal level categories (GWL) are determined for all subbasins in the State. Shrewsbury withdraws water from subbasins 23002 and 23008 within the Blackstone River Basin. Both subbasins are rated BC5 and GWL5. Shrewsbury is requesting a permitting volume above the baseline and the volume request will not cause a backsliding of BC or GWL as both are in the lowest category. Additionally, both subbasins contain cold water fisheries (i.e., quality natural resources). The withdrawal request results in a Tier 2 Permit Review. Under the SWMI framework as a Tier2/GWL5 review Shrewsbury is required to:

1. Comply with applicable provisions of Standard Conditions 1-8

2. Minimize the impact of existing withdrawals on streamflow to the greatest extent feasible considering cost, level of improvement achievable and ability to implement

3. Minimize the impact of additional withdrawals on streamflow to the greatest extent feasible

4. Demonstrate that there is no feasible alternative source that is less environmentally harmful

5. Implement mitigation measures that are commensurate with impact of the increased withdrawals.

Shrewsbury currently has to comply with Standard Conditions 1-8 in their WMA Permit; therefore the SWMI framework does not have additional requirements in this provision.

Several alternatives were evaluated to minimize the impact of existing withdrawals. The mock permitting concluded the following:

> "In summary, Shrewsbury has no operational options to pump their existing wells in a seasonal pattern that would shift pumping in the summer from wells in more highly impacted subbasins to those in less impacted subbasins. In addition, Shrewsbury has no feasible access to existing alternative sources or interconnections with less seasonal impacts, and no opportunities for surface water releases.
>
> Minimization of Shrewsbury's existing withdrawal impacts will focus on meeting the WMA standard permitting conditions of 65 residential gallons per capita daily water use and 10% unaccounted-for water, instituting nonessential outdoor water use restrictions seasonally, and implementing best management practices such as frequent leak detection, meter repair/replacement, and public education programs."

Shrewsbury currently complies with the residential gallons per capita daily water use requirements, institutes nonessential outdoor water use restrictions, conducts frequent leak detection, is replacing all residential meters on a scheduled program, and institutes a public education program. Shrewsbury is currently conducting a water audit to identify the sources of unaccounted-for water to comply with the 10% performance standard for unaccounted-for water.

Several alternatives were evaluated to minimize the impact from additional withdrawals required to meet future demands. The mock permitting concluded that "increased withdrawal from the Home Farm Wellfield as the feasible alternative for providing the requested increased withdrawal that minimizes streamflow impact to the greatest extent feasible."

The two surface water options from Worcester and the Massachusetts Water Resources Authority (MWRA) were determined to be from a water source that is less environmentally harmful. However, both options were determined to be infeasible due to a combination of technical, permitting and financial constraints.

The Phase 2 Pilot project developed an alternative mitigation crediting system. Shrewsbury would be required to develop a Mitigation List and Plan that depicts how we will mitigate the withdrawal request above baseline (1.37 mgd) commensurate with impact. The Mitigation List includes the options available and the credits that would be received if implemented. The Mitigation List includes "a combination of demand management actions, direct mitigation actions (credited on a volumetric basis) and indirect mitigation actions (credited using a credit system representing non-volumetric environmental/habitat improvements) that the Town has demonstrated are feasible."

We were able to document through analysis of data that the Town would be eligible for a 0.15 mgd credit for the implementation of the existing outdoor watering restriction. An additional 0.10 mgd would be eligible for credit if an additional one day less of watering were implemented. The mock permitting identified 0.15 mgd credit due to demand management.

Direct mitigation credits available to the Town include existing septic system returns, recharge from the roof leaders, and future wastewater recharge. Location adjustment factors are applied to direct mitigation projects. The adjustment factor is 100% for projects within or upstream of the subbasin or within the Zone II, 50% within the Major Basin and 10% outside the Major Basin. The Town would be credited with 0.048 mgd for existing septic returns. The Town has identified a potential wastewater recharge project at the SAC Site. The preliminary investigations estimate a potential recharge of 0.30 mgd of wastewater. This location is subject to a 100% location factor credit. The cost of the wastewater treatment and disposal system at this site has been estimated to be on the order of $12 million. The credit for past roof leader recharge with location factor applied is 0.001 mgd. Therefore the total direct mitigation credit identified during the mock permitting is 0.349 mgd.

The volume of water that is required to be offset by indirect mitigation is equal to the requested volume minus the credits for demand management and direct mitigation. For Shrewsbury that volume is 0.871 mgd if we assume the SAC project will be implemented or 1.171 mgd without inclusion of the SAC project. During the mock permitting it was assumed the Town would implement the SAC project. The amount of indirect credit needed is based on the volume of water requested over the baseline. For Shrewsbury this volume is 0.871 mgd. The credit requirement is doubled if the withdrawal request is greater than 5% of the August Median Flow or causes backsliding. Shrewsbury's request is 22% of the unaffected August median flow in subbasin 23002 and 94% in subbasin 23008. This translates to an indirect credit requirement of 180.

Several indirect mitigation measures were identified during the study that Shrewsbury could utilize. The measures provide a total of 60 indirect credits and are tabulated below:

Measure	Credit
Implementation of a stormwater bylaw	10
Establishing a stormwater utility	10
Complying with MS4 requirements	10
Implementing Infiltration/Inflow removal activities	5
Removing the Poor Farm Brook Dam	25

This leaves the Town 120 credits short of the 180 credit requirement. The Town would need to identify additional indirect mitigation measures such as culvert replacement, streambank, stream buffer and/or channel restoration, and other habitat restoration. The entire shortfall cannot be met utilizing indirect mitigation as the entire table identified in the study only provides 165

credits. The Town would need to re-evaluate demand management and direct mitigation options. The cost for the removal of the Poor Farm Brook Dam is substantial. If we utilize the assumed conversion of one indirect mitigation credit equals 0.005 mgd, then the twenty five credits for the removal of the dam equates to a credit of 0.125 mgd. It is unclear how the costs and credits would be divided between Shrewsbury and Worcester. Shrewsbury and Worcester jointly submitted a grant application to MassDEP for determining the permitting requirements, preliminary design and estimated costs of the dam removal.

The SWMI framework provides an option to demonstrate that the local conditions may significantly differ from those reflected in the framework. Two tracks were identified. Track 1 provides for a review or refinement of the data inputs to the USGS model and Track 2 provides for determination of the actual streamflow and impacts through an independent streamflow and habitat assessment.

Two options were identified for a Track 1 evaluation. Option 1 - The actual monthly groundwater withdrawal data for 2000-2004 was analyzed and it did not result in a change in BC or GWL for subbasins 23002 or 23008. Option 2 would only apply to subbasin 23002. Option 2 – Lake Quinsigamond may buffer the impacts to streamflow showing that there is not a 1:1 ratio as assumed in the USGS model. Existing hydrogeological data could be reviewed to assess the impacts at the Lake outlet. Additionally, the impacts could be evaluated by modeling. The evaluations may show there is less of an impact to August median flow thereby reducing the mitigation requirements. The estimated cost for this work in the study is $10,000-$20,000.

One Track 2 option is similar to the Track 1 Option 2 evaluation. This evaluation would use actual site-specific data at the downstream USGS Gage 01110000 to determine the effects of pumping the Town's wells on the streamflow. The actual flows would be compared to the flows estimated in the SYE model to determine if the pumping affects the unimpacted flows. Modeling could be used to determine the effects of increased pumping under various flow conditions. The analysis could be used to identify appropriate mitigation. The estimated cost for the evaluation in the study is $5,000. We believe this estimated cost to be low.

Another identified option that does not fall under either a Track 1 or2 evaluation as it would not alter the BC or GWL of the withdrawal subbasin is a Site-specific study on Poor Farm Brook. EEA would require Shrewsbury to determine what role the Home Farm Wells play in reducing streamflow in Poor Farm Brook. If data shows the wells impact the brook a full site-specific study that evaluates specific streamflow and habitat needs for the targeted fish species may be required followed by mitigation depending on the results. If mitigation is required it would be negotiated with MassDEP. The study estimates the cost for this evaluation at $50,000-$100,000.

One of the stated purposes of developing the SWMI framework was to make the permitting process more predictable. Based on our experience in the mock permitting exercise for Shrewsbury we find the framework creates more uncertainty for the Town than the existing permitting process. The study showed that Shrewsbury is not able to identify sufficient credit through demand management, direct mitigation and indirect mitigation to meet the required credits for the volume requested. The Town would need to spend on the order of $12,000,000 to receive 0.30 mgd of credit under the direct mitigation scenario. This represents only 22% of the

volume requested. If the 60 credits of indirect mitigation are approved to provide an offset of 0.30 mgd, the total credit volume identified in the study is 0.799 mgd or 58% of the requested volume. An additional 0.571 mgd would need to be mitigated in order for the Town to receive approval of the requested volume.

The Commissioner of MassDEP has stated on numerous occasions that the SWMI framework was not developed to say no to water yet in Shrewsbury, based on the mock permitting exercise, this will be the case. The framework does not address what happens when a community cannot document sufficient credit feasibly for the volume requested. For Shrewsbury, the SWMI process leaves a lot of unanswered questions. The Town does not have a clear path to follow in order to receive approval of the requested volume of water. Some of the credits identified are extremely expensive and may not be feasible thereby creating even a larger volume of water to mitigate.

Sincerely,

TATA & HOWARD, INC.

Paul B. Howard, P.E.
Senior Vice President

massachusetts water works association

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February 12, 2013

Ms. Bethany Card, Assistant Commissioner
Bureau of Resource Protection
MassDEP
One Winter Street, 5th floor
Boston, MA 02108

RE: Comments on Phase II SWMI Pilot Report
Via Electronic Mail

Dear Beth:

Massachusetts Water Works Association (MWWA) appreciates the opportunity to participate as advisors on the SWMI Pilot Steering Committee. Piloting is an important step in understanding the practicality and feasibility of using the SWMI framework in Water Management Act permitting decisions. As Phase II of the piloting concludes, it appears that Commissioner Kimmell's desire to make Water Management Act permitting more predictable will not come to fruition. In fact, the Framework creates even more uncertainty for communities than the existing permitting process. It is also evident from the multiple meetings held with pilot communities that ecological minimization/mitigation measures are so system specific that MassDEP will require significantly more staffing and resources to administer this program. During a time when MassDEP and the communities they serve are struggling to administer existing programs with increasingly dwindling resources, we question the logic of embarking on such an ambitious program. With the understanding that each pilot community has been tasked to provide specific comments relative to their systems, on behalf of MWWA, I offer the following:

Modeled Assumptions:

1. In section **2.1.1 Basin Characteristics and Categorization** the consultants identified in the Groundwater Withdrawal Levels section that "*The percent alteration assumes each gallon of water withdrawn from the basin by public and private groundwater supplies, but not surface water withdrawals, results in a direct and equal decrease in streamflow.*" Hydrologists who are members of MWWA have repeatedly commented that such an assumption is punitively conservative in that it fails to acknowledge two important factors: timing of withdrawal and proximity to impacted streams. Because of

these variables, the impact of withdrawals on associated streamflows rarely, if ever, have a 1:1 relationship. In fact, in many cases there may be little, if any impact of distant withdrawals on streamflow. When regulating the impact of withdrawal on streamflow, be it through minimization or mitigation, MassDEP must recognize this fact and come up with a fairer way of determining this for each site – if it is truly committed to ensuring such withdrawals will be regulated, "commensurate with impact."

Tools for making this determination include the STMDEPL function that accompanies SYE, as described in the USGS report "Calculation of Sustainable Yields Using the Massachusetts Safe Yield Estimator Tool". That same report includes a graph showing withdrawal impacts on streamflow as a function of distance between the well and the stream. In addition, MassDEP–approved pump tests for new wells often include an assessment of pumping impacts on surface waters. It would make the most sense to look at such information, including the application of STMDEPL at the start of the permitting process and make the impacts that must be mitigated the streamflow impacts and not the withdrawal.

Revised Mitigation Credit Method:

2. Mitigation Obligations and Wastewater Return: The consultants described a process whereby an applicant's mitigation obligations are determined by looking at demand management, direct mitigation and indirect mitigation. There is a fundamental flaw in approaching it this way. When USGS came out with the final Fish and Flow report they had removed wastewater returns and therefore were only looking at flow alteration due to groundwater withdrawal. This ignores the fact that there may be water in the stream from treated wastewater, treated and untreated stormwater runoff and private septic returns. When MassDEP is looking at a permittees' mitigation obligation the very first step should be to fully account for all wastewater returns to provide a more accurate estimate of August streamflow. After that volume is "credited," MassDEP should then use STMDEPL or other means to estimate the withdrawal impact. Only after that analysis is complete should they then consider what additional "credits" need to be obtained through demand management or other direct mitigation and indirect mitigation efforts. We also note that accounting for wastewater returns only within town boundaries is scientifically invalid and creates unfair challenges for those communities with sources located outside of town or whose wells border other towns. MassDEP should issue credit for all upgradient wastewater recharge, regardless of community jurisdiction.

3. Disproportionate Credit Model: In section **3.2 Revised Mitigation Credit Method**, MWWA appreciates that MassDEP attempted to make the mitigation credit methodology a simpler process than was originally conceived in Phase I; however we question the actual values assigned to certain measures. For example, the appropriate "credit" for removing a dam if it improves 10 feet of

stream should not be the same (e.g., 25 points) as the credit for removing or providing passage around a dam that improves 25 miles of stream.

4. Mitigation Planning and Implementation Schedule: During the permit application process a supplier is required to develop a list of potential mitigation opportunities. Prior to receiving permission to increase pumping volumes above the established baseline, a supplier is also required to develop a mitigation plan, a schedule for implementing the plan, and complete mitigation activities. This is not in keeping with what we believe we were told by Commissioner Kimmell in previous planning discussions. It was our understanding that MassDEP would forgo mitigation activities until baseline was exceeded. In essence, if a supplier can operate within their baseline they would not have to spend time and resources developing a mitigation plan.

   While MWWA never agreed with all conditions imposed as a result of the 2004 Water Management Act Permitting Policy, in some ways they make more sense than what is being proposed now. In the 2004 policy a supplier did not have to develop a plan until they exceeded baseline for one year and they didn't have to implement the plan until they exceeded for a second year. Due to the variability of annual system demands, MWWA had previously proposed that if MassDEP intended to incorporate "baseline" into any revised policy, it should be based on a 10-year rolling average to avoid the situation where a supplier could exceed it one year and fall back below it over the following years. MWWA is recommending MassDEP consider this, once again, as the regulations are drafted.

5. Demand Management is Not Always Cost Effective: In section **3.2.1 Demand Management** the consultants make the statement "*Demand management is generally the most cost effective and environmentally sound strategy*…." MWWA refutes such a statement. If a supplier has excess capacity, demand management would not only be unnecessary, but would needlessly and adversely impact revenue. Demand management might be cost effective if it can delay or eliminate the need for large capital expenditures related to new demand (e.g., new sources, increased treatment or pumping capacity). It is not generally cost effective for systems that already have the infrastructure to supply more water and simply want to utilize it. Nor is it necessarily "*the most environmentally sound strategy*" when issues like water quality appear to have a bigger impact on stream habitat.

6. Limiting Mitigation Credit to Geo-political Boundaries: In section **3.2.2 Direct Mitigation** the consultants' note that credits were only offered for direct mitigation within Town boundaries. The suggestion to assign some forms of credit only within the same town "*to avoid double counting*" should be revised as it discourages potentially valuable multijurisdictional partnerships. As MassDEP is aware, the Commonwealth's water resources are blind to political boundaries.

Furthermore, credit limited to Town boundaries also fails to recognize that there are many suppliers with sources outside of their town boundaries and in different major river basins. As a result of this unfortunate geo-political setting, such communities will be required to do ten times the mitigation as a comparable community with in-town and in-basin sources. This is impractical and unfair. *"Locational adjustment"* as noted within the pilot efforts need to consider the options available to a supplier and direct them to take maximum advantage of that which is available. That may mean mitigation in other communities and other major basins, if that is what is most practical. There should be confidence that staff can assign proper credit among (potentially cooperating) applicants for the project. The staff suggestion of HUC-12 as an alternative basis for accounting has merit, but MWWA also believes that there is value to doing projects within the major basin or even another basin if greater environmental benefit can be shown. We do understand that it will be a more complex process to determine who should be assigned this credit, but it needs to be clearly defined before regulations are promulgated. One note of caution when considering crossing town boundaries for mitigation is the legal implications as to a system's ability to authorize expenditures outside of their boundaries.

7. Degree of Difficulty and Credit Costs: Another concept that should be included in mitigation credit development is the "*degree of difficulty*". Some mitigation projects are larger, more difficult and more challenging in scope. The more difficult projects are generally more costly. Thus, mitigation costs can serve as a guide to the degree of difficulty with more difficult projects assigned more credit. For example, a dam removal project might cost $100,000 while another, more challenging dam removal project might cost $1,000,000. The larger project should get more credit based on cost alone. The present scheme does not consider such costs in assigning credit values. Credits based, in part, on costs would also provide a meaningful way to apportion credits in joint projects between two or more communities. If costs are shared equally between two towns then the maximum credit gets shared equally.

8. Supercharging Aquifers: In section **3.2.2.3 Stormwater Recharge** the consultants' state that you cannot get credit for *"supercharging"* the aquifer. This is a term we have not heard before, and do not want to make assumption as to its meaning. However, if the meaning is to prohibit the myriad of proven aquifer recharge alternatives, then this should be revisited. There are new and innovative stormwater techniques that may be able to return more water to the ground than was there before and they should be credited. There are also well established means by which to calculate the volume recharged, making this a reasonable and accurate direct mitigation approach. Furthermore, returning treated stormwater to the stream, especially during periods of low flow, may have fish and ecosystem benefits that should be considered.

9. Direct Measures of Water Quality vs. Impervious Cover: It was stated during the SWMI process that impervious cover was a proxy for other items that might affect aquatic habitat like water quality and temperature. The pilot report seems to discount the potential for direct accounting the impacts of water quality and stormwater flows in favor of continued quantification of impervious cover. The direct measured values for water quality should take precedence over impervious cover when available. USGS had at one point indicated they submitted a scope of work for funding required to "unpack" the impervious cover variables in the model to see what exactly might be impacting biology.

   MWWA thinks that the state should pursue such a study so that results can be available in time to inform the upcoming development of regulations. The Pilot Report reinforces this need, as the analysis in **Section 7.2.5** shows that even significant reductions in water withdrawal have no effect on biological categorization in subbasin 21019. The consultants conclude that it probably has to do with the percent of impervious cover in the basin. This should be explained fully, especially with respect to the specifics of how impervious cover translates into water quality in this subbasin. The consultants should also indicate how, if at all, the actual fluvial fish characteristics of this subbasin differ from what would be expected for this elevation and longitude. Notwithstanding these needed explanations, the larger point is that if the goal of SWMI is to improve aquatic habitat, it does not make sense to further regulate water withdrawals when the biology is degraded for reasons other than flow simply because uncovering the actual cause might be difficult.

Optimization of Existing Sources

10. Staffing and Potential Cost Constraints: It has been suggested that the desktop pumping evaluation, source optimization and alternative source evaluation are intended to be done by water system staff and thus will not have significant associated costs. That premise seems doubtful for all but the larger water systems. Staff and time to commit to data gathering, input and analysis for such an endeavor is in very short supply for most water systems. The SWMI pilot process should identify approximate cost ranges for having this analysis done by a consultant. **Section 4.3.3 Phase 3, Assess operational and financial constraints**, should also consider staffing constraints.

11. Proximity of Withdrawal and Streamflow Impact: Section 4 on optimization describes an approach that incorporates some of MWWA's ideas on impact assessment. For instance, **Section 4.3.1** states, "*The impact of the withdrawal from a well is considered to be directly proportional to the proximity of the well to the water body designated as CFR.*" Wells upgradient of large impoundments are also identified as being preferred locations. Further, on **page 4-6**, it states, "*The optimization analysis should give preference to withdrawals during low flow periods from subbasins with highest August flow accounting for surcharge.* " These are concepts advanced by MWWA throughout SWMI and should inform

the process on how to assess withdrawal impacts. While they appear in Section 4 of the Phase II report they do not appear elsewhere in the Framework or in the pilot project. For determining impacts of a withdrawal, the remainder of SWMI looks at the withdrawal as the impact – again, a simple but inaccurate and unreasonable assumption. The optimization concepts should be applied to withdrawals in order to better determine streamflow impacts which then need mitigation.

12. Inclusion of Actual Streamflow Gaging Data: **Section 4.3.1, Step 1-Data Collection** should also include the use of actual gage data where available.

13. Natural Variables in SWMI Model: **Page 4-8 (last sentence) and 4-9 (first sentence)** inaccurately describe the natural variables used in the SWMI model (Fluvial fish relative abundance model). Drainage area and percent sand and gravel are not part of the Fluvial Fish model. The only natural variables are channel slope and percent wetlands in a buffer zone. It appears this misinformation was copied from the Final Framework, page 13, where it was also inaccurately stated.

Mock Permitting and Consultation Process

14. Maximum Mitigation Credits May Be Insufficient: It was determined through the Mock Permitting process that one of the pilot communities could not achieve enough credits to mitigate commensurate with their proposed withdrawal. While we understand that the pilots were conducted on a very aggressive timeframe and perhaps there was not time to do further analysis within the constraints of the scope of work, we question what will happen if a supplier is unable to achieve full mitigation for their withdrawal? In numerous public forums Commissioner Kimmell has stated that the state is not saying no to water, it just means that a community will have to do more things to get the water. While it is unclear if the community identified above is the exception to the rule or not, this pilot has proven that there will be situations where there may not be enough measures which can be undertaken to get to the full volume that the community is projected to need. This is particularly concerning if the required mitigation has been based on proxy modeling that does not reflect fish and wildlife (or other use) conditions.

15. Mitigation Deficiencies, Timing, and Disputes: In section **5.5 Recommendations for the Consultation Process** the consultants' raise a number of important points which MWWA agrees will require further discussion and deliberation prior to promulgation of regulations, including guidance on what will happen if not enough mitigation credits can be achieved, mitigation timing and determining shared mitigation credit and resolving disputes over demand projections.

    In section **5.5.1 and 5.5.2** the consultants' discuss the preparation and outreach that will be needed before permitting and a proposed timeline; MWWA believes that individual consultations with the communities will have to begin well in

advance of the 12-9 months before permit expiration dates. SWMI is a complex process and if it is determined that systems need to minimize or mitigate impact then water systems might have to hire consultants to help them identify measures and money will need to be budgeted appropriately. It would be advisable for MassDEP to hold a couple of outreach workshops; there should be a general SWMI overview 18-24 months in advance of the basin's permit expiration and then another outreach workshop to go over materials that will need to be provided during permitting.

16. Mitigation and Minimization Costs are Not Sufficiently Characterized: In summarizing the results of mock permitting exercise, associated costs to the community are not described. While the Phase I report offered some sense of costs for mitigation and minimization these costs should be carried into and refined in the Phase II report. One of the primary goals for piloting was to provide information on compliance costs. The absence of such financial information is a disservice to the communities that will ultimately be asked to bear these costs and will seriously jeopardize the apparent transparency of the entire process.

Site-Specific Evaluations:

17. Potential Value of Site Specific Studies: Based on the potential costs associated with mitigation, water suppliers may have no choice but to challenge the model findings as presented within the Framework. From the onset of this process, MWWA was assured that the Framework would allow for this "rebuttable presumption." One of the reasons a supplier might be interested in engaging in site specific study is to dispute the biological categorization or flow categorization that is determined by the model. We have seen several comments submitted by various stakeholders during this process that their knowledge of the biology was better (or worse) than the model predicted. One would assume that if the supplier went through the effort of engaging in site specific study and the results showed that their subbasin was miscategorized that the maps would be changed to reflect actual conditions.

    Todd Richards was asked at a recent Pilot Study meeting about how the concept of rebuttable presumption would be realized and how it would potentially influence the designations as portrayed in the SWMI maps; he informed us that the state did not envision updating these maps. Mr. Richards explained that one of the reasons that the Biological Categories map cannot be updated with site-specific studies is because the flow data used in the regressions was for 2000-2004. If this is indeed the case, modeled fish and flow data are already mis-matched. See **USGS Final Fish and Flow Report Figure 1**. The fish data came from samples collected during 1998-2008. If matching timeframes are essential to the Biological Categorization, then the model effort must match up with flow data and fish data collected from the same years. Furthermore, if you subscribe to reviewer LeRoy Poff's advice to examine long-term "press" impacts, the

selected matched data would emphasize later years (specifically 2004 for the fish), when the fish sampled could be more accurately assumed to have "*seen*" the flows of interest from 2000-2004.

For obvious reasons, we are increasingly concerned that applicants that engage in Pilot Studies and/or permitting challenges may be asked to spend significant money to rebut their mandatory assignment to the modeled Biological Categories (BC), when it is already evident from the SWMI Interactive Map that the model does not accurately predict fluvial fish density. MWWA is equally concerned that applicants cannot, as suggested in the Pilot Report, rebut a BC demonstration based on other techniques, including but not limited to "HABSIM", wetted perimeter, etc., because none of them calculate anything directly comparable to the FFRA endpoint of the SWMI Biological Category modeling methodology. The map data tabulated on the SWMI website indicates that, in practice, it may be impossible to "rebut" the mis-named "biological" categories, since they really are just modeled outputs of the proxy factors of flow alteration and impervious cover.

The contradictions regarding this rebuttal presumption must be reconciled. As agreed upon very early on, it could be a very valuable and important tool if effectively crafted and managed. Ultimately, it will be far more informative and instructive to populate state resource maps with accurate and site specific information, when available. Water suppliers are no strangers to the misunderstandings and misrepresentations that can be drawn from crude and overly simplified graphics, especially when strategically advanced by river advocates with a political agenda. The infamous "stressed basin" map (2001) color coded the state into high, medium, low or unassessed basins; the data behind the map never mattered, it was the visual of the map that people looked at. If history repeats itself, the same will be the case with the SWMI maps.

MWWA requests that MassDEP develop a protocol for changing the biological and flow categories if site specific study proves the model is inaccurate and/or if "mitigation" measures result in a need for revised model outputs. This is particularly important for the "next" applicant in the basin who will otherwise be burdened by the requirements of a no-longer applicable category.

18. <u>Documentation of Fish Species Loss Attributed to Flow Alteration:</u> If the Executive Office of Energy and Environmental Affairs (EEA) believes the model supports predictions of species loss due to flow alteration, as suggested by their representations in the **Final Framework Appendix C** and in the Pilot meetings, EEA is obligated to document those parameters explicitly so that future applicants may address them in site-specific studies. For example, the **Framework, Appendix C, figure 5**, indicates that the model predicts:
    - Loss of 1 species at 15% August median flow alteration
    - Loss of 2 species at 35% August median flow alteration
    - Loss of 3 species at 65% August median flow alteration

EEA should provide in full the actual FFRA data on species loss, including which expected species, if any, have been found missing at which specific sites, and how those data informed the predictions in Appendix C of the Framework.

19. Leveraging Existing Data: The consultants' outline two different opportunities in **Track 1-Review/Refine Data Inputs to the USGS Model** and **Track 2-Determine Actual Streamflow and Impacts through Independent Study**. It appears to MWWA that MassDEP should be able to complete the Track 1 ("sharpen the pencil") for the permittees since MassDEP has all of the data necessary to ensure the accuracy of the model inputs.

20. Clarification of Acceptable Independent Studies: The consultants' identified two potential options for independent study including wetted-perimeter and Instream Flow Incremental Method (IFIM). While scopes for both were included in the report, more detailed guidance should be provided on what MassDEP will accept for site specific study so that there will be greater clarity for a permittee who wants to look at their options. As noted above, there is significant cost for the IFIM. Other alternatives, e.g. for direct measurements, proposed by the permittee should be allowed.

Conclusion:

The Water Management Act speaks at length about the purposeful balancing among competing uses—fish and wildlife, recreation, economic growth, etc.. Unfortunately, these pilots fail to address that central issue by failing to examining how present and "mitigated future" use would (or would not) enhance such balancing in these communities. Furthermore, and even more importantly, the pilots have not helped answer the central question of whether what is being asked of suppliers will have the intended benefits of improving streamflow and aquatic habitat.

We appreciate that the consultants charged to develop the Pilots have identified additional items in their report that MassDEP needs to consider before promulgating regulations. It is abundantly clear that there are still several important policy decisions that need to be made before unveiling such a regulations package, such as: the role of the SWMI modeling as a tool rather than a "rebuttable presumption", tracking of stormwater credits, resolving issues with the locational adjustment factors, mitigation as it relates to surface water withdrawals and guidance on site specific study options.

Perhaps even more importantly, MassDEP and EEA need to quickly identify and communicate how they are going to determine feasibility and cost when making permitting decisions. Permittees are owed a clear explanation of what will be required of them. Any guidance document that will be developed with respect to the regulations should be made available at the same time the regulations are put out for public comment so that water suppliers can clearly understand the impact of not only the regulations but also the guidance. It is our experience that guidance and policy often

have the same effect as regulation and therefore the state should be transparent in what they intend to enforce through guidance, policies and the regulations.

Thank you for the opportunity to comment and if you have any questions on our comments, please do not hesitate to contact me.

Sincerely,

Jennifer A. Pederson
Executive Director

Cc: Ken Kimmell, MassDEP Commissioner
Kathleen Baskin, EEA
Phil Griffiths, EEA
Eileen Commane, DWWD
Amy Lane, Amherst
Guilford Mooring, Amherst
David Lane, Danvers
Bob Tozeski, Shrewsbury
Jack Perrault, Shrewsbury

Comments and Concerns about "Indirect Mitigation"

The concept of "indirect mitigation" seems to have evolved considerably since Phase I. We appreciate that the new scheme is quite a bit easier to understand, but we still have a number of questions and serious concerns:

- **Indirect mitigation concept flawed**. Our most fundamental concern remains unchanged: at this time there is no scientifically defensible way to measure whether a given habitat improvement action is proportionate to a given water withdrawal increase, rendering the entire concept of "indirect mitigation" fundamentally arbitrary and capricious.

- **Clarify "August Median Flow."** The new scheme uses 5% of "August Median Flow" as a key threshold. Does this mean 5% of "Unaffected August Median Flow" or "Affected August median." By definition 5% of unaffected august median is more than 10% of affected median in all GWL5 sub-basins. This is too much to give away from what little water remains in GWL 5's in exchange for very uncertain benefits in return. If the Commonwealth is determined to pursue this approach, it should use 5% of <u>affected</u> august median as the threshold, which would make the indirect mitigation scheme at least somewhat proportionate to the severity of pre-existing impacts.

    - It appears that the intention may be that the 5% test is judged against the total volume of the request over baseline, rather than being judged against the volume of indirect mitigation being requested. If so, a sentence clarifying this should be added to the narrative.

- **Cap "Indirect Mitigation" at 20%.** The new approach provides no practical limit on the volume of required mitigation that can be satisfied using indirect credits for which "commensurate with impact" can not be meaningfully established. <u>A cap of 20% should be placed on the amount of mitigation that can be provided through indirect measures.</u>

- **Cumulative impacts**. One of the points we raised in Phase I was the issue of cumulative impacts and this question still applies. Taking the sub-basin in which the Dedham-Westwood Water District's Neponset wells are located as an example, does the new scheme mean that the Dedham Westwood Water District, the Town of Canton, the Town of Stoughton, the Town of Sharon, the Town of Foxborough, the Town of Medfield, the Town of Dover, the Town of Walpole and any number of golf courses—all of which are in the same nested parent sub-basin—can EACH mitigate an added withdrawal of 5% of the August median flows of their respective nested sub-basins using indirect mitigation and get that credit at the more favorable ratio in the middle column of table 3-3? Or is there some limit of the cumulative volume that can be mitigated indirectly in the parent sub-basin?

- **Size and scale of action proposed should count**. When giving scores to different types of mitigation actions (dam removal, culvert removal) there is a fundamental question of what is the relationship between the size and scale of the actions proposed and the number of points awarded. For example, in the Neponset Watershed there are hundreds of poorly designed culverts; do you only have to repair one of them to earn an additional 200,000 GPD withdrawal? While the new proposal to rely primarily on best professional judgment is better than the previous proposal, it is still extremely subjective, and further guidance is needed to define the "typical" level of effort required to earn the "standard" points.

- **Fish ladder installation not equal to dam removal**. Removing a dam should get a much higher score for stream continuity improvement than installing a fish ladder. The passage efficiency of fish ladders is highly variable and difficult to predict in advance. Even when they do work, they only work for a limited range of species. Dam removals generally allow all species of fish and aquatic life (in addition to fish), to move in the river.

- **Culvert replacement not equal to dam removal**. In a similar vein, culvert replacement should not get a water quality credit of 5 (same as removing a dam). Most problem culverts do not create permanent impoundments (like a dam) with attendant water quality impacts on temperature and DO. Instead, most problem culverts are perched or undersized at times of highflow, thus posing a migration barrier without the water quality impacts of a dam.

- Footnote number 3 of table 3-4 should be revised to say, "More credits can be considered if on a coldwater fishery resource or a stream used by migratory fish."

- The three stormwater actions in Table 3-4 are of particular concern, because they have no relationship to actual changes in recharge or they are double counting or both.

- **Stormwater bylaws, "supercharging."** The adoption of a stormwater bylaw would be extremely beneficial. However, it doesn't need to be credited indirectly, but rather can be measured directly. The necessary calculations are already being performed by wetland and zoning permit applicants on a routine basis, and as currently proposed, there seems to be no barrier to taking credit both for having adopted the bylaw and for tracking the results as direct mitigation. Finally, additional guidance on what constitutes an adequate bylaw as well as a resolution of the "supercharging" issue are needed. At a minimum, this item should receive no more than a total of five points in the indirect rating scheme.

- **Stormwater utilities do not belong here**. The stormwater utility credit is inappropriate. It does not matter to a river how the money to do stormwater work is collected, but rather how it is spent. The existence of a utility in no way dictates that spending will increase or that any particular improvement will be made. Lastly it appears one can get credit indirectly for the way the money is collected and at the same time take direct credit for any helpful action you carry out with the money. At a minimum, this item should receive no more than a total of five points in the indirect rating scheme.

- **MS4 credit still problematic**. The MS4 option, while improved by the addition of footnote 4, is still problematic. The only direct impact of the MS4 program on flow, will be its requirement that communities apply the DEP stormwater policy (including its recharge provisions) to larger sites. Can one take both the MS4 credit and the bylaw credit and direct credit for any actual retrofits which occur because of the bylaw? At a minimum, this item should receive no more than a total of five points in the indirect rating scheme.

- **Inflow & infiltration**. Lastly, we would recommend that indirect credit be given for inflow but that infiltration be reserved for direct credit. The streamflow benefits of an inflow reduction program will be small, and almost completely impossible to measure, thus the only practical way to credit them is indirectly. Infiltration volumes however are very large (larger than intentional water withdrawals in the Neponset River Watershed for example), and although subject to seasonal and annual variation, are relatively easy to directly measure. However, as we mentioned previously, because infiltration is excluded from the GWL calculation, we recommend that it be

credited only for minimization. Note however that any indirect credit for inflow should be subject to footnote 4 in Table 3-4.

Submitted by Ian Cooke, Neponset River Watershed Association & Julia Blatt, Massachusetts Rivers Alliance, 2/20/13 (incorporates input from a large group of environmental NGO's)

DEPARTMENT OF PUBLIC WORKS AND PARKS

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February 11, 2013

Ms. Bethany Card, Assistant Commissioner
Bureau of Resource Protection
MassDEP
One Winter Street, 5th floor
Boston, MA 02108

RE: Comments on Phase II SWMI Pilot Report
Via Electronic Mail

Dear Beth:

The City of Worcester Department of Public Works & Parks concurs with the comments submitted to you on the SWMI Phase 2 Pilot Report by the Massachusetts Water Works Association. In addition, we submit the following for your consideration:

1. The Track 1 Site Specific analysis for Danvers-Middleton (Page 7-6) is very telling. Danvers' actual August ground water withdrawals amount to 1% of the total withdrawals in Subbasin 21019. If Danvers were to eliminate its groundwater withdrawal or increase its withdrawal by a factor of 3 the outcome from these two extremes would be the same- no appreciable change in % flow alteration. Danvers does not withdraw enough groundwater from this subbasin to matter yet it would be held to the same SWMI mandated minimization/mitigation steps. If a suppliers' withdrawals have no bearing on streamflow then why must they be subjected to this new regulatory burden? This analysis could serve as another indicator in determining impacts of a withdrawal and ultimately the degree of mitigation commensurate with those impacts. One idea to consider would be to determine the percent of total subbasin withdrawals by each water system within a subbasin. Systems withdrawing 5% or less of the total subbasin withdrawals would not have to minimize or mitigate its withdrawals but would only have to comply with standard conditions 1-8 regardless of baseline and permit tier.

   The Danvers analysis also points to the futility of the SWMI approach to water management via regulation of withdrawals. The entire subbasin 21019 has witnessed a 50% reduction in water withdrawals over the past decade yet the analysis tells us that there is no change in biological category and only a minimal change in groundwater level (GWL5 to GWL4). There will be few instances statewide where 50% reductions in withdrawals occur in a subbasin. What expectations for streamflow and aquatic habitat improvements can there be when much lower withdrawal reductions are the norm?

2. The site specific evaluations options for Shrewsbury, Section 9, closes on a very disturbing note (page 9-4). It has been made clear that the SWMI approach and SWMI models will dictate WMA permitting. Water suppliers can spend over $100,000 on site specific studies to try to refute general assumptions though the outcomes remain unclear. Yet, for Poor Farm Brook in Shrewsbury apparently EEA has some doubts about SWMI models showing GWL1 and BC5 because evidence shows otherwise. Shrewsbury's wells are not in the Poor Farm Brook subbasin but are downstream. Per SWMI these wells should not be regulated by an upstream subbasin. Yet EEA would require Shrewsbury to do a site specific study to show how its downstream wells impact an upstream basin, clearly contrary to SWMI, but while still applying SWMI mandates to the subbasin where the wells are located. If Shrewsbury wants to contest SWMI through site specific study the Town has to fund the work with no clear outcome assured. If EEA effectively wants to go outside of the SWMI models then the Town has to pay for that too but with a clear outcome that they will have to mitigate another sub-basin in addition to the SWMI dictated mitigation in their "own" subbasin. This seems wholly unfair to Shrewsbury and other towns that might find themselves in similar circumstances. It essentially looks like regulatory "double dipping"-EEA has doubts about the applicability of SWMI models but still holds the town to SWMI compliance in addition to compliance based on non-SWMI observations and assumptions.

3. On page 6-1, 6.1 Track 1, it is stated that "within the SWMI Framework, it is assumed that the estimated natural August median flow accurately represents what is needed to maintain the ecological health of the stream." While this appears to represent the SWMI perspective it is profoundly untrue. If ecological health of streams needed natural August median flow to be maintained then no streams, no matter how pristine and unaltered, could be ecologically healthy because natural August flows are less than natural August median flows 50% of the time. This point has been raised numerous times before but it is a misconception that continues to prevail in the world of SWMI. An analysis of index streams, streams least altered and near natural, reveals that August flows are not only less than August median flows 50% of the time but they can be significantly below August median flows. August flows that are 25% less than August median flows occur nearly 40% of the time in index streams. These natural flow variations exist in healthy streams yet SWMI would have one believe that a withdrawal causing a 4% loss in August median flow is somehow a detrimental impact to the aquatic environment.

Thank you for the opportunity to comment. The SWMI process remains discouraging as I see it continuing down a path that will lead to more costly burdens on public water systems and communities and negatively impact economic growth while producing negligible environmental improvements. I will continue to advocate for wholesale changes in this approach.

Sincerely,

Philip D. Guerin

Philip D. Guerin
Director of Environmental Systems