

Pomperaug Water Allocation Planning Study (PWAPs)

White Paper

July 2009

Prepared by Pomperaug River Watershed Coalition



Pomperaug Water Allocation Planning Study (PWAPs)

Draft White Paper

The PWAPs Draft White Paper is intended to become a consensus document outlining the actions to be taken by the major stakeholders in the Pomperaug Watershed about the allocation of water resources. It begins with a statement of the current situation in the watershed with regard to water allocation, the short and long-term challenges associated with the current situation and the actions to be taken by the stakeholders to address those problems. ***It will be up to each stakeholder to implement the actions agreed to in this consensus document.*** The final section addresses implementation and monitoring of the agreed-upon actions.

Background on the Pomperaug Watershed

The Pomperaug Watershed is a 90 square mile area that includes major portions of the towns of Bethlehem, Woodbury and Southbury as well as small areas in the towns of Roxbury, Washington, Morris, Watertown and Middlebury. Water from the watershed serves these communities as well as areas in the town of Oxford.

The drinking water is provided to homes and businesses by a mix of public and private water sources. All of the water for the public water companies, community wells and private wells comes from the aquifers in the watershed, which are supplied by the deep infiltration of rainfall and snowmelt. (See Appendix A for a list of public water supplies as well as information on the number of private wells in the watershed.)

Average rainfall to the area is more than ample to meet the needs of the current and projected population. The current average rainfall of 44 inches per year¹ is equivalent to 70 billion gallons of water in the watershed. More than half of the rainfall is estimated to be evaporated or transpired by plants. However, there are many demands on the remaining water.

There is a widespread belief that the Pomperaug watershed has ample water resources and that there is no need to worry about how much water is available or how the water is allocated. Hydrological models developed by the United States Geologic Survey (USGS) show that the average annual precipitation of recent years will provide sufficient water to meet the needs of the population as well as to maintain adequate flow in the rivers through 2050. This model projection includes a complete build-out according to what is currently allowed via zoning ordinances in the towns of Woodbury and Southbury. (There are currently no zoning regulations in Bethlehem, although land parcel size restricts most dense development.) However, like most forecasts, they are only as good as the assumptions behind them.

Although, at face value, there seems to be enough water for all needs, history, recent events and future projections for the region indicate otherwise. As shown in Exhibit 1, averages do not depict what happens in each particular year. In the spring of 2006 and 2007 the watershed experienced heavy rains that were destructive to riparian owners. In 2005 and 2007, the watershed experienced long periods of no rain, including the autumn of 2007 when the Pomperaug river flow rate approached historic lows. The extended period of no rain and low flows eventually led the Governor to declare a drought emergency for the entire State.

¹ Average annual rainfall for 1998 to 2005 for Woodbury per Cornell University

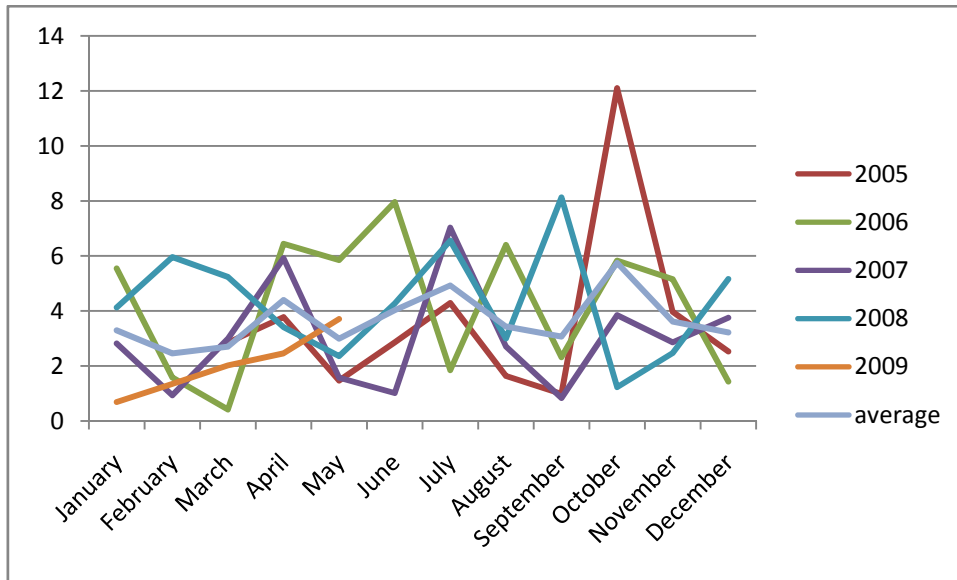


Exhibit 1: Data shows recent variability in monthly rainfall in inches at Weekepeemee rain gauge in Woodbury

One outcome of the drought emergency of 2007 was the realization that the towns were uncertain as to what they should or could do to address the drought². Nationwide, there have been, and continue to be, severe droughts where governmental action was deemed necessary, e.g. water use restrictions that were backed by the police power of the local or state government. The towns in the Pomperaug Watershed do not have such police powers at this time.

Connecticut is proud of its home-rule form of government that relies extensively on the individual towns to control what happens within their borders. Although politically viable in other ways, the water resources each town depends on do not conform to town boundaries. Instead, water resources are defined by the land areas that feed a stream or river, and of aquifers, the subsurface deposits and bedrock which store and convey groundwater.

Watersheds and aquifers form an interconnected system. Precipitation absorbed by the land of a watershed replenishes the aquifer. The aquifer, in turn, discharges groundwater to sustain watershed streams during dry periods. The watershed is an interconnected system of water and minerals that includes the rivers, streams and lakes (surface waters) plus the shallow and deep aquifers (ground water) that is the source of all the water for human consumption in the towns (with the exception of bottled water). The actions taken by an upstream community have implications for the community downstream. The actions taken in the highlands affect the river in the valley. The watershed is not a combination of political jurisdictions; it is a complex interconnected geologic and hydrologic system.

One point that is often overlooked is the relationship between the groundwater and surface water. Many think of these as independent. In fact, they are tightly coupled. The groundwater is the source of the baseflow³ in the river. If groundwater levels are reduced due to a lack of rain, reduced infiltration, excessive pumping or a combination of those, the river will receive less water from the aquifer and the

² Conversation with Richard Crane, First Selectman of Woodbury, December 2007

³ Baseflow is the rate of flow of water in the river when there is no contribution from rainfall. The source of this surface water is the ground water.

baseflow will be reduced. The river's baseflow is a good indicator of the health of the shallow aquifer that supports the towns of the Pomperaug watershed.

People living and working in the Watershed and other stakeholders have to understand and determine how to maintain and allocate the water resources in order to mitigate the impact of drought conditions. This is a need for the State as a whole, but it has become clear that it is best addressed on a watershed by watershed basis. A comprehensive planning model was adopted recently by the State of Connecticut Water Planning Council (see Appendix B).

To help evaluate the effectiveness of current drought response plans and raise the awareness of the stakeholders in the Watershed, a Severe Drought Table-Top exercise was conducted in December 2008 to raise awareness of the stakeholders in the Watershed. The After Action Report describing this effort is in Appendix C. This effort and subsequent discussions identified four specific Water Resource Challenges and twelve associated action items to be undertaken by the various stakeholders.

Four Water Resource Challenges

Water is not always adequate for all demands: As noted, despite the average annual abundance of water, there are great variations over time. Exhibit 1 already showed how precipitation varies significantly month to month and Exhibit 2 below shows how the drought of the 1964 and 1965 severely reduced the flow of water in the rivers compared to the relatively average year of 1960.

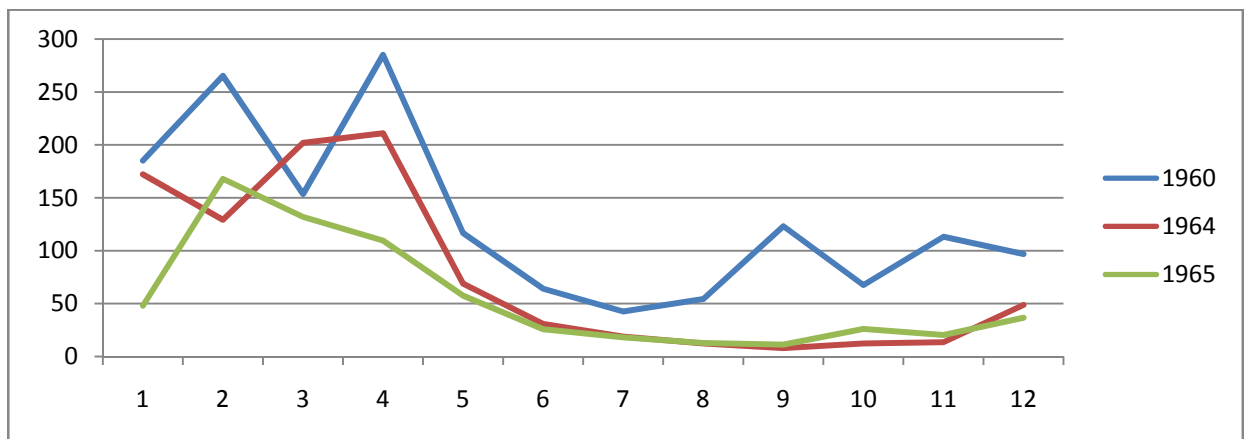


Exhibit 2 – Annual minimum flow recorded in cubic feet per second at Pomperaug Gage for two drought years (1964 and 1965) in comparison to a more normal year (1960). Month 1 is January. Note that the levels shown in July through September in the drought years indicate dry sections in many sections of the river.

The economic effects of that drought were severe. However, they were not as severe as they would be today, because of population growth and increased water utilization by businesses and residents. Additionally, climate change scientists predict that ongoing climate changes will result in longer periods

of drought (as well as more intense flooding)⁴. Thus it is more important than ever to be prepared to mitigate the impact of a drought on the people of the watershed.

Prioritizing water uses: Clean drinking water is not like other commodities; it is necessary for life and there are no alternatives. Approximately 1.2 billion gallons of water are consumed each year by the residents in the Pomperaug Watershed. (This does not include agricultural irrigation.) Not all these uses are of equal economic and social importance. There are distinctions between the uses (human consumption versus lawn watering), the quality of water that is needed (drinking quality versus non-potable water) and the characteristics of the users (older at-risk residents, different business uses, etc.). In-stream uses, including aquatic habitats and waste assimilation, cannot be overlooked.

When allocating a scarce resource, there needs to be some way to make sure it is used and allocated efficiently. The current combination of public water provided at very low cost⁵ with quarterly billing and the use of well water with a low marginal costs of extraction are not conducive to the efficient use or allocation of water. That problem is compounded for Heritage Village Water Company because a large percentage of the use of its water is unmetered (about 60 percent of the company's service connections are unmetered). When customers pay the same amount no matter how much water is used, there is no direct incentive to conserve and the customer has no way of knowing how effective any conservation efforts might be.

Coordinating drought planning and response:

The Connecticut Water Planning Council approved the state's Drought Preparedness and Response Plan in 2003 and continues to coordinate drought planning efforts through the Interagency Drought Workgroup. Droughts are a different kind of emergency. By their very nature, droughts “sneak” up on you; it is not always easy to say when a drought has begun and when government response is necessary. There is always an urge to put off declaring a drought emergency for another day in the hope that it will start raining. In addition, there are many stakeholders who have a role in declaring a drought emergency: the State Government, local water companies and individual towns. To date, there has not been much attention to the coordination between these three levels of action. Nevertheless, given the large increase in demand for Pomperaug Watershed water since the mid-1960s drought of record, coordination is more important now than ever.

Over the course of the last century, citizen expectations about governmental preparedness and response to an emergency have grown. People can argue about whether this is a good or bad thing, but there is no doubt that the pressure on local officials (elected or appointed) to be ready to respond to emergencies is very high. This is demonstrated by the funding of new agencies like the Connecticut Department of Emergency Management and Homeland Security and municipal counterparts. To date, their focus has been on emergencies like hurricanes, terrorism and disease, but it is clear that they must have a comparable role in drought preparation and response.

Need for an Integrated Approach to Watershed Management:

⁴ The IPCC (Intergovernmental Panel on Climate Change) report Climate Change and Water, IPCC Technical Paper VI. The USGS is working on a study to help refine the impact on the Pomperaug Watershed using the existing USGS hydrological model noted above

⁵ Heritage Village Water Company in Southbury has the lowest rates in the State; it recently was able to modify its rates to include higher rates for higher consumption to encourage conservation

An important observation from the participants in the table-top exercise was that the stakeholders needed to work together to effectively address the implications of a severe drought. However, there are few mechanisms in place to facilitate this. One way that has been proposed is for stakeholders in a watershed to develop and support an Integrated Watershed Management Plan:

The goal of integrated watershed management is to plan and work toward an environmentally and economically healthy watershed that benefits all who have a stake in it. It begins with a knowledge of the geology, hydrology and ecology of the watershed and of economic, environmental and social issues linked to the availability of water. From there it is up to the stakeholders to set overall management objectives and to assign actions, including stakeholder responsibility and timing, to achieve those objectives.

The PRWC developed the beginnings of such a management plan in 2005 that characterized what was known about the watershed and what research gaps existed. The document would be a helpful start toward developing an Integrated Watershed Management Plan for the Pomperaug watershed.

Action Steps to Address the Four Challenges

The four challenges identified above are not new, and for some time the State of Connecticut has been trying to resolve these (and other) water-related issues on a state-wide basis. In 2006 the state legislature asked that a focus be placed on particular watersheds to address water allocation issues⁶. The Pomperaug Watershed was one of the watersheds selected. However, given the prevailing view in the Pomperaug Watershed that the water resources are abundant, it was stressed that in order to think about allocation, the stakeholders in the community must first come to recognize the four challenges noted above. That was the rationale behind the Severe Drought Table-Top Exercise.

As described in the After Action Report (see Appendix C), the table-top exercise was undertaken with stakeholders from the Watershed to experience how they might respond to a severe drought and to develop a better sense of the four challenges, as well as to create an impetus for action. It also formed the basis for identifying the corrective actions noted below.

Below is a list of the corrective actions identified to address each major challenge. More details on each challenge and the next action steps are in the tables in the next section of this White Paper

1. Water is not always adequate for all demands
 - a) Develop coordinated local ordinances to restrict the use of water supplied by a water company or via a private well during water supply emergencies
 - b) Implement water conservation programs to minimize demands on water resources and mitigate the impacts of water supply emergencies

⁶ The Institute of Water Resources was charged by the State Legislature to “develop and document a water allocation planning model for a selected basin, which shall include stakeholder involvement and shall identify ways to best manage the water resources to promote ecological protection while providing for the needs and requirements of public health, flood control, industry, public utilities, water supply, public safety, agriculture and other lawful uses of such waters”. (Special Act No.06-9, section1.4)

- c) Develop and adopt land use regulations that minimize runoff so as to maximize the recharge of precipitation to the aquifer to maintain the supply of water and sustain dry season stream flows
2. Prioritizing water uses
- a. Assess benefits and risks to prioritize water uses and lay the foundation for a water allocation plan that will prioritize those uses
 - b. Assess benefits and risks to balance critical water needs with natural resource protection to lay the foundation for a water allocation plan that will balance these needs
3. Coordinating drought planning and response
- a. Integrate drought emergencies into the municipal emergency planning process
 - b. All stakeholders in the water community implement the National Incident Management System⁷
 - c. Establish a process for the periodic review and updating of the Connecticut Drought Preparedness and Response Plan first approved by the Water Planning Council in 2003
 - d. Develop Risk Communication Plans
4. Need for an integrated approach to watershed management
- a. Develop a regionally-oriented drought assessment process and a regional water allocation process plan for deployment during drought conditions
 - b. Water Allocation Process Plan for Pomperaug Watershed: test, review and update
 - c. Establish an Interagency Council of Stakeholders for the Pomperaug Watershed

⁷ The [National Incident Management System \(NIMS\)](#) provides a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment.

Action Plan: Water is not always adequate for all demands

Corrective Action	Description	Next Steps	Responsibility	Timing for Initiating Next Step
Water Use Ordinance	Adopt water use ordinance that recognize the interdependence of all towns deriving water from the watershed. Based on State's model ordinance; revised to fit Pomperaug Watershed	Towns to appoint representative to the multi-town committee	Town of Southbury, Woodbury, Bethlehem, Middlebury, Oxford	November, 2009
		PRWC will coordinate and facilitate initial meeting of this committee	PRWC	December 2009
Water Conservation Program	Commit to adopting a watershed-wide approach to encourage efficient water use through education, building codes, appliance standards, organic turf management, etc	PRWC will develop a document for consideration by the stakeholders	PRWC	March 2010
Land Use Regulations	Adopt land use standards that encourage (or require?) land use techniques for new and existing structures and pavement that maximize recharge to groundwater	PRWC Land Use Committee will develop a document for consideration by each Town	PRWC Land Use Committee	December 2010

Action Plan: Prioritizing Water Uses

Corrective Action	Description	Next Steps	Responsibility	Timing for Initiating Next Step
Risk Assessment of critical water users	Fund a study to evaluate risk, including public input on relative importance of different human water uses; recommendations to be voted upon by Selectmen and incorporated in each town's Plan of Conservation and Development as well as Emergency Response plans. Note: funding could come from external source like State or Foundation.	Develop a study proposal for funding	PRWC and Pomperaug Health District	March 2010
		Agree to back effort to secure funding for study	Towns of Southbury, Woodbury, Bethlehem	June 2010
Balancing critical human requirements with environmental protection	Conduct a workshop of emergency planners, public works, land use offices, fire departments and environmental groups to identify issues, trade-offs and make recommendations to be incorporated in each Town's Plan of Conservation and Development as well as Emergency Management Response Plans	Develop a workshop proposal	The Conservation Partners (PRWC, Southbury Land Trust, Flanders Nature Center and Land Trust and Audubon Center at Bent of the River)	March 2010
		Agree to back effort to secure funding for study	Towns of Southbury, Woodbury, Bethlehem	June 2010

Action Plan: Coordinating drought planning and response

Corrective Action	Description	Next Steps	Responsibility	Timing for Initiating Next Step
Integrate drought response into Emergency Management Plans	Work with State DEMHS to make this part of State's protocol for Emergency Planning. (Already underway with presentations to DEMHS and WPC)	Propose idea to DEMHS coordinating council. Engage local Emergency Management teams to consider revisions to their plans	PRWC and emergency management coordinators of: Southbury, Woodbury Bethlehem COGCNV DEMHS Region V	June 2010
National Incident Management System (NIMS)	Conduct local training in NIMS	PRWC to encourage DEMHS to provide such training locally	Region V of DEMHS	December 2010
Revise / update to CT drought emergency plan	Present findings of PWAPs to various agencies and committees	Work through Office of Policy Management	State agencies (OPM, DPH, DEP, DPUC, DoAgriculture, USGS, DEMHS)	June 2010
Develop Risk Communication Plan	Seek additional funding from DEMHS to develop and incorporate a generic risk communication plan in the local Emergency Response Plans; seek funding/support for future exercise to test plan for drought or other emergency plan	Pursue funding sources to develop	PRWC and emergency management coordinators of: Southbury, Woodbury Bethlehem	December 2009

Action Plan: Need for an Integrated Approach to Watershed Management

Corrective Action	Description	Next Steps	Responsibility	Timing for Initiating Next Step
Development of a regional water allocation process plan for deployment during drought conditions	Charge Pomperaug River Watershed Coalition to develop a water allocation process plan and incorporate into their existing Watershed Management Plan. Such plan to be formally adopted by stakeholders	PRWC to propose this activity along with associated funding / support required.	PRWC and Emergency Coordinators of: Southbury, Woodbury, Bethlehem	December 2010
		Approval by stakeholders – see Interagency Council of Stakeholders below	Interagency Council of stakeholders	March 2011
Water Allocation Process Plan Testing, Review and Updates	Develop a follow-on Table Top simulation to apply tools developed as part of this action plan and test them.	Identify sources of funds to support these activities	PRWC and Emergency Coordinators of: Southbury, Woodbury Bethlehem.	March 2010
Establishment of an Interagency Council of Stakeholders	Identify the mission and goal of such a council and propose a way to implement	Develop mission statement, membership for council	Pomperaug River Watershed Coalition	June 2010
		Revise, revise and adopt by stakeholders	The identified stakeholders	October 2010

Issues in Implementing the White Paper

Funding of Initiatives

There are a number of ambitious initiatives noted in the action steps in the proceeding section. Implementing will take commitment by the stakeholders as well as financial support for the various activities. At this point, funding sources have not been identified. This may be a limitation on the ability of the stakeholders to move forward.

Who will manage all of this?

Many good plans fall short of implementation due to lack of follow-up and oversight. Given the diverse nature of the stakeholders and the various constituencies that they represent, overall management of the plan will be required. Determining who is responsible for the overall oversight/management is a key task that should be before the Interagency Council. The Pomperaug River Watershed Coalition may be in a unique position to undertake this responsibility assuming it can secure adequate resources to do this in a consistent manner.

More issues to be identified

The one day table-top exercise was an excellent first step in identifying the challenges to the watershed. However, more challenges exist including the future plans to create interconnections between water utility companies and the State regulations on minimum streamflow. Any efforts to establish solutions to water allocation should be cognizant of these future challenges and be flexible enough to incorporate them in future efforts.

Conclusion

Management of water resources presents many challenges to major stakeholders within a watershed and to those who depend on the water resources. The Severe Drought Table-Top Exercise provided a useful point of departure to identify the challenges and initial action steps to begin to approach this in a concerted and integrated manner. Now it is up to the stakeholders to commit to the specific action steps.

Appendices

Appendix A: Table of Water Company and Private Well Information

Appendix B: State Planning Process for Water Allocation (flow chart)

Appendix C: Drought Simulation After Action Report

Appendix A

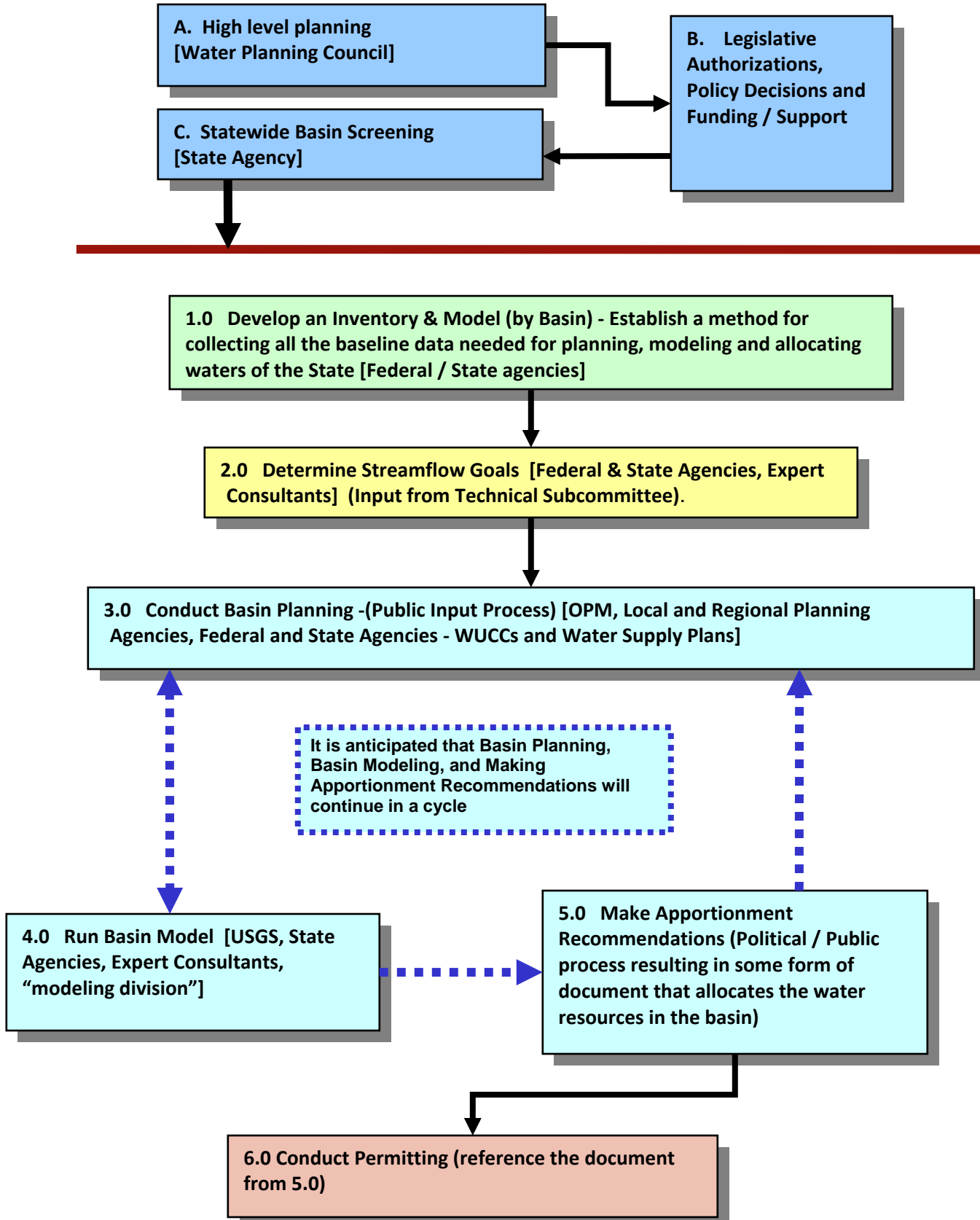
Water Use Data for Pomperaug River Basin

Name	Year of Data	Average Daily Use (million gallons per day)	Total Annual Gallons (million gallons)	Data Source
Large Public Systems				
Heritage Village Water Company	2008	1.1036	402.8	1
Watertown Fire District:	2001	0.7800	284.7	2
United Water Company	2001	<u>0.1700</u>	<u>62.1</u>	2
		2.0536	749.6	
Other Systems				
Heritage Hill	2001	0.0109	4.0	2
North Purchase	2001	0.0055	2.0	2
Oakdale Manor	2001	0.0036	1.3	2
Quassuk Condominiums	2001	0.0098	3.6	2
Roxbury Senior	2001	0.0033	1.2	2
Southbury Training Town and Country Condominiums	2001	0.0218	8.0	2
Woodbury Knoll	2001	0.0235	8.6	2
Woodcreek Village	2001	0.0066	2.4	2
Woodhall School	2001	0.0056	2.1	2
Woodlake Tax District	2001	<u>0.1092</u>	<u>39.9</u>	2
		0.3573	130.4	
Private Wells (ungaged)				
Per USGS estimate		1.0000	365.0	2
Total Consumption of Water		3.411	1,245	

Notes on Private Wells: According to the Pomperaug Health District, 3,882 wells have been approved since 1992 when a computer database was set up. There are paper records for wells beginning in 1975. An estimate is that there are an additional x,xxx. Wells drilled/approved prior to that are not well documented.

Data Sources				
1		Heritage Village Water Company Supply Plan 2009		
2		USGS study: Estimation of the Effects of Land-Use and Ground-Water Withdrawals on Ground-Water Recharge and Streamflow Using the Precipitation Runoff Modeling System (PRMS) Watershed Model and the Modular Ground-Water Flow Model (MODFLOW) for the Pomperaug River, Connecticut (Draft May 2008)		
Comment		Only HVWC has seen an increase in its customer base in recent years as a result of expansion within its service area		

Figure 1
Water Allocation Policy Planning Model



Appendix C: After Action Report (Separate attachment and available on the web site of the Pomperaug River Watershed Coalition.