

## Introduction

In 2011, the North Carolina General Assembly passed Session Law 2011-374 (HB 609) Section 3.1. G.S. 143-355(l) that mandates improved efficiency of the use of North Carolina's water resources. As part of this mandate, water systems are required to complete and submit a local water supply plan to the N.C. Department of the Environment Natural Resources' Division of Water Resources that includes a plan for the reduction of long-term per capita demand for potable water.<sup>1</sup>

The N.C. Department of Environment and Natural Resources was charged with providing statewide outreach and technical assistance as needed regarding water efficiency, which includes the development of best management practices for community water efficiency and conservation. Although used interchangeably, water efficiency and conservation can have different contextual meanings. Simply put, water efficiency should be thought of as the practice of optimizing the use of available water supply, and water conservation as behavioral practices that result in consumption reduction. The required best management practices include:

- Integrating water efficiency and conservation into local water supply plans.
- Conducting regular water audits to identify revenue and nonrevenue water and water losses.
- Adopting water loss abatement programs.
- Metering and sub-metering of existing residential and multi-unit residential, commercial and industrial complexes.
- Retrofitting residential fixtures (faucets, showerheads, toilets, etc.) and equipment (clothes washers, dishwashers, etc.) to make them more water efficient.
- Landscaping in a manner that conserves water and is regionally appropriate.
- Employing water reuse practices that include harvesting rainwater and using gray water.
- Pricing water to achieve comprehensive conservation and adopting full-cost accounting in line with the recommendation approved by the State Water Infrastructure Commission in November 2010.

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<sup>1</sup> The per capita water demand can be calculated by using a water system's annual residential demand and year-round population (annual demand in gallons per day divided by year-round population).

In addition to developing these, the N.C. Division of Water Resources also included best management practices (BMPs) for:

- Water supply contracts between water systems selling water and those purchasing the water.
- A consumer education program that emphasizes the importance of water efficiency and conservation, including measures residential customers may implement to reduce water consumption. This BMP also serves to help water systems become eligible for state water infrastructure funds from the Drinking Water State Revolving Fund, the Drinking Water Reserve, or any other grant or loan of funds allocated by the General Assembly that require incorporating consumer education as mandated by Section 3.2. G.S. 143-355.4(b).
- A school outreach and education program.

The purpose of this BMP manual is to assist water system managers in determining which BMPs would be most effective in reducing their long-term per capita demand for potable water. Water systems are encouraged to objectively view BMPs in this manual, and make decisions that would most benefit their organization and the customers they serve. Although water systems are not required to implement any specific best management practice, there are several that are considered foundational to effective water efficiency plans. The most important is conducting regular water audits to identify revenue and nonrevenue water and water losses. As part of conducting these water audits, metering of all connections is essential to account for all water used. This data will be used as a baseline for comparison against future water use to determine increased efficiency. In addition, adopting leak detection and water loss abatement programs allows systems to act on the water audit information to reduce water loss and lost revenue.

The manual will outline several BMPs that have been successfully used in other water systems throughout North Carolina and the United States. Each BMP will contain the following components:

**Applicability** – The specific type of water system that could potentially benefit from the BMP is described, as are the general goals for water efficiency that the BMP addresses.

**Description** – This section provides an explanation of the specifics of the conservation measure(s) included in the BMP. The best available technology that is proven and cost effective is recommended. Often a best available technology may not yet be cost effective to be implemented by all water users. Highly efficient water conservation measures that will produce cost-effective results are mentioned.

**Implementation** – The basic steps to accomplish the BMP are described. If the description section includes more than one measure to complete the BMP, the implementation section will suggest necessary steps for achieving the water savings.

**Schedule** – In BMPs with multiple implementation steps, a recommended schedule for implementation is included. In general, planning, data gathering and evaluation steps should be accomplished within 12 months of adoption of a specific BMP.

**Scope** – For simpler BMPs, the scope is complete when the steps described in the implementation section have been achieved. For more complicated BMPs, the scope discusses the level of implementation and constraints necessary to consider the BMP complete.

**Documentation** – To track the progress of a BMP, the water system should collect certain data to document progress in implementing the BMP and evaluating actual water savings. This section identifies the recommended data.

**Determination of Water Savings** – This section specifies information necessary to calculate water savings from implementation of the BMP and may include statistical or mathematical formulas when appropriate.

**Cost-Effectiveness** – Basic costs of implementing the specific BMP are explained. Due to the wide variety in actual costs based upon the size and location of the program, ranges of costs are given where appropriate. In many cases, costs and expenses can be reduced or spread out when multiple BMPs are implemented. This section primarily serves to remind the users of costs to consider when performing a cost effectiveness analysis.

**References** – The BMP concludes with a listing of resources for additional information and contact information that can assist a water system in implementing the BMP.

**Case Study Example** – Each applicable BMP will be followed with an example of how that specific BMP has been successfully implemented by a water system.

As efficiency and conservation practices are implemented, new insights, technological advances and information will become available. In addition, future technologies may improve water savings and reduce costs. Therefore, this manual should be seen as an evolving document that will be routinely updated and modified based on new information or user feedback. The N.C. Division of Water Resources encourages utility managers, efficiency/conservation specialists, planners, policy makers, and others to provide comments and feedback regarding this document, so it can be continually improved to better serve the water systems of North Carolina. For general comments or questions about this BMP Manual, please contact the manager of the Water Supply Planning Branch at 919-707-9024.

By completing the following BMPs, a water system can fulfill several requirements under Section 9 of the Drought Bill. Fulfilling these requirements also will help the water system be eligible for loans under the N.C. Division of Water Resources State Revolving Fund (DWRSRF). For details and further information, see [http://www.ncwater.org/pws/srf/Factsheets/DroughtBill\\_ProcedureMemo.pdf](http://www.ncwater.org/pws/srf/Factsheets/DroughtBill_ProcedureMemo.pdf).