

Georgia Department of Natural Resources

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MEMORANDUM

To: Regional Planning Council Members

From: Linda MacGregor, Chief
Watershed Protection Branch 

Thru: Assistant Branch Chiefs

Date: September 21, 2010

RE: *EPD Guidance for evaluating management practices to manage water demand*

As you know, management practices to meet future water needs are an important element of regional water planning, and the essential first element of meeting future water needs will be practices that manage water demand. The State Water Plan (SWP) specifically highlights water conservation as a priority water management practice to be implemented to help meet water demand in all areas of the state.¹

More recently, adoption of the 2010 Water Stewardship Act underscored this emphasis.² The Water Stewardship Act is intended to create a culture of water conservation in the State of Georgia. Along with the State Water Plan, the Act includes provisions that you will need to consider as you review and select management practices to meet future water needs.

To assist you in this task, EPD has prepared this guidance on evaluating water demand management practices to determine which are most appropriate for your region. This guidance has three purposes:

- Establish a common starting point for all Water Planning Councils as they review and consider water demand management practices;
- Ensure that management practices reflect current rules and regulations as well as amendments to rules and regulations expected following the State Water Plan and the Water Stewardship Act; and
- Provide flexibility for you to adapt practices to the specifics of your region, including the mix of water users and the condition of your water resources.

The guidance establishes a tiered approach to evaluation of water conservation practices:

Tier 1: Basic water conservation activities and practices that are currently required by statute or will soon to be required in EPD's upcoming amended rules.

¹ SWP, Section 7, Policy 3 (p. 19)

² GA Water Stewardship Act of 2010, Senate Bill 370 - http://www.legis.ga.gov/legis/2009_10/sum/sb370.htm

- Tier 2:* Basic water conservation activities and practices that will be addressed in upcoming amended rules but not required of all permit applicants.
- Tier 3:* Basic water conservation practices (for all water use sectors) that will not be addressed in current or upcoming amended rules.
- Tier 4:* "Beyond basic" water conservation practices to be considered if a gap exists between current or future water supplies and demands for the region.

Georgia's Water Conservation Implementation Plan (WCIP), released in March 2010, is an information resource to inform your Council's discussion of demand management practices.³ Development of the Water Conservation Implementation Plan was led by DNR, with substantial input from water users across the state. It identifies water conservation goals, benchmarks, and best management practices for the state's diverse water users. Please draw on the information in the WCIP as you select demand management practices.

While the WCIP is a valuable resource, it is not an exhaustive collection of all possible water conservation practices. If Council members identify additional water conservation activities that may be appropriate for your region, those practices should also be considered.

EPD's guidance provides detailed tools to support you as you consider water conservation practices. Tools include worksheets that categorize the water conservation goals and practices found in the WCIP, the practices listed in the SWP and the activities discussed in the Water Stewardship Act of 2010. Again, the list of conservation-related activities is not exhaustive. It can and should be supplemented with additional practices as useful for your region.

This guidance will be used in selecting demand management practices appropriate for your region and therefore should be included in your recommended regional water plan. However, the guidance is not intended to prescribe the specific method used to evaluate water conservation practices. That method will be defined by your Council. The process, inputs, outputs and final results will be documented in a Technical Memorandum (TM) as a supplement to the regional water plan.

If you have questions, please contact Alice Miller Keyes at alice_keyes@dnr.state.ga.us or 912-262-3185.

³ A copy of the WCIP and a WCIP Synopsis are available online www.ConserveWaterGeorgia.net/documents/wcip.

EPD Detailed Guidance for Evaluating Practices to Manage Demand

INTRODUCTION

To comply with Policy 3, from Section 7 of the GA Comprehensive State-wide Water Management Plan (SWP), each regional water planning council (Council) needs to include demand management practices in their Regional Water Plan (Plan). **This document will guide the Councils in evaluating demand management practices.**

BACKGROUND

Section 7, Policy 3 of the SWP identifies water conservation as a priority water management practice.¹ To support this policy and management elements in Section 8 – Water Demand Management Practices², the SWP calls on the GA Department of Natural Resources to lead the development of a water conservation implementation plan (WCIP) that identifies water conservation goals, benchmarks, and best management practices for the state’s diverse water users.³ The WCIP was released in March 2010 and should be used to inform the regional Councils considering demand management practices to help meet water needs throughout the state. A copy of the WCIP and a WCIP Synopsis are available online at www.ConserveWaterGeorgia.net/documents/wcip. The WCIP is a valuable resource, but it is not an exhaustive collection of all possible water conservation practices. If the Council members identify additional water conservation activities that may be appropriate for their region, they should also be considered.

Prior to Council Meeting #6 (CM6), EPD distributed information introducing a tiered approach to evaluating water conservation/demand management practices (herein referred to as “CM6 Guidance”). The approach framed the following tiers to be discussed and deliberated by each of the Councils:

Tier ONE (T₁): Basic water conservation activities and practices that are currently required by statute or will soon be required in EPD’s upcoming amended rules.

Tier TWO (T₂): Basic water conservation activities and practices that will be addressed in upcoming amended rules but not required of all permit applicants.

Tier THREE (T₃): Basic water conservation practices (for all water use sectors) that will not be addressed in current or upcoming amended rules.

Tier FOUR (T₄): “Beyond basic” water conservation practices to be considered if a gap exists between current or future water supplies and demands for the region.

Some details on the practices within each tier are provided in the CM6 Guidance.⁴ Detailed examples of practices within each tier are provided in the *Worksheets of Tiered Conservation Practices* that is accompanying this guidance. The *Worksheets of Tiered Conservation Practices* is an Excel file that

¹ SWP, Section 7, Policy 3

² SWP, Section 8, Policy 1 and impl action 2

³ SWP, Section 8, impl action 2a

⁴ For additional copies of the CM6 Guidance, contact Alice Miller Keyes alice_keyes@dnr.state.ga.us

categorizes the water conservation goals and practices found in the WCIP, the practices listed in the SWP and the activities discussed in the Water Stewardship Act of 2010.⁵ (Again, the list of conservation-related activities is not exhaustive and can be supplemented with additional practices.) The *Worksheets of Tiered Conservation Practices* are structured with a separate tab for each tier. The practices are not listed in order of importance, and following each practice is the WCIP page number where each is discussed. The *Worksheets of Tiered Conservation Practices* also provide additional information for practices, such as:

- All water conservation goals found in the WCIP and the page numbers where each is discussed.
- Tier 1 worksheet contains the statute or rule number where the practice is referenced.
- Tier 2 worksheet includes the practices outlined in the SWP, the WCIP goals with which they are aligned, and the SWP section where it is discussed.
- Tiers 3 and 4 worksheets contain practices presented in the WCIP and some additional resources where information can be found that may be helpful in determining the impact implementing the practice may have on the regional water resources.

This process guidance should be used by PCs to assist the Councils in determining which demand management practices are appropriate for their region and therefore included in their Plan. This guidance is not intended to be prescriptive regarding the actual methods used to evaluate water conservation practices, however. The process, inputs, outputs and final results should be documented and presented in a Technical Memorandum (TM) as a supplement to the Plan. (This process and the supporting TM are especially important for those regions experiencing gap between their water demands and available resources - see Appendix D of this guidance on page pg. 14).

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⁵ GA Water Stewardship Act of 2010, Senate Bill 370 - http://www.legis.ga.gov/legis/2009_10/sum/sb370.htm

Process for Evaluating Conservation Practices to include in Regional Water Plans

As specified in the regional planning guidance⁶, management practices include any activity that helps meet the regional vision and goals, adjusts the resource capacity or adjusts the water or wastewater demand to ensure there is sufficient capacity to sustainably meet existing and future needs. This guidance is designed to help the Councils (with the assistance of their professional consulting support) identify appropriate management practices that can help manage demand in their region.

Because the Statewide Water Management Plan identifies water conservation as a priority water quantity management practice,⁷ each Council is expected to include demand management in their Plan. The degree to which regional demand should be managed should be determined by 1) the sustainable capacity of the regional resources, 2) the level of conservation already implemented by water users in the region, and 3) the economic benefits of demand management as compared to other quantity management practices.

By following the general decision support process discussed in this guidance, PCs can help the Councils determine which water conservation goals and practices are to be included in their Plan. This process provides consistency across regions regarding the level of evaluation done when considering water conservation activities appropriate for each water planning region. The process is also general enough to allow the PCs to utilize available information, tools and expertise (through in-house or sub-contract assistance). Appendix A includes a diagram of the general process is provided on page 11 of this guidance.

When initially identifying water conservation practices to be evaluated by the Councils, PCs should use the *Worksheets of Tiered Conservation Practices*. The *Worksheets* include practices listed in the WCIP and are organized by tier. The *Worksheets* also include relevant sections of the Water Conservation Implementation Plan (WCIP March 2010), the Statewide Water Management Plan (SWP) and the Water Stewardship Act of 2010 (WSA). They also provide additional resources where information can be gathered to help with the evaluation and savings calculations.

Tier ONE (T₁) Water Conservation

Tier ONE (T₁) includes basic water conservation activities and practices that are currently required, or general mandates that will be included in upcoming amended rules.

A) These practices need not be extensively evaluated by the Council since they will be required of the appropriate permit applicant and permittees regardless of their planning region.

B) The *Worksheets of Tiered Conservation Practices* include a list of all T₁ conservation practices.

⁶ http://www.georgiawaterplanning.org/pages/technical_guidance/regional_planning_guidance.php

⁷ SWP, Section 7, Policy 3

C) The Councils, with assistance from the PCs should calculate the “natural conservation” savings that result from T1 conservation practices.

1. When calculating savings from T1 practices, PCs should note the method of calculation of the savings (i.e. natural toilet replacement or other). Appendix C includes suggested methods for estimating adjusted future demands to account for savings that will occur due to the conservation practices outlined in the Water Stewardship Act of 2010, including high-efficiency toilets and urinals, commercial cooling towers, and multiunit sub-meters. Calculated savings from the Water Stewardship Act should be documented in the Plan with the caveat that there may be additional savings that are more difficult to adequately predict (such as savings from State Agency efforts).
2. There are additional aspects of the WSA that may result in additional savings, and any methods used to quantify these savings should also be noted.

NOTE: Those T1 practices that were not already included in the forecasts (Section 4) may be incorporated as part of the expected water savings with the management practices (Section 6) of the Plan.

Tier TWO (T2) Water Conservation

Tier TWO (T2) includes practices that will be addressed in upcoming amended water conservation rules for entities applying for non-farm water withdrawal permits and permit modifications.

The SWP also presents several opportunities for the Council to establish conservation expectations for their region. Section 8 – Demand Management Practices describes several water conservation provisions that need to be discussed, and in some cases decided upon by the Council:

- Section 8, Implementation action 2a, establishes a link between the WCIP and the regional Plans by calling for non-farm water withdrawal permits to begin “demonstrating progress toward water conservation goals or water efficiency standards initially identified in the [WCIP] and further refined in the [Plans].”⁸
- Section 8 implementation action 2c describes data and information needs drinking water providers and water withdrawal permittees should report to annually demonstrate progress toward water efficiency.⁹
- Section 8 implementation action 3, the final implementation action listed in this section, emphasizes the importance of regional planning for water conservation activities by stating that the Council may include “enhanced water conservation provisions,” in their Plan.¹⁰

When these three implementation actions are viewed together, the Council needs to discuss, and in some cases decide upon: A) the goals described in the WCIP, B) the water conservation practices outlined in the SWP, and C) the data and information needs to report progress toward water efficiency listed in the SWP.

⁸ SWP, Section 8 impl action 2a. WCIP and Plan are spelled out in the SWP.

⁹ SWP, Section 8, impl action 2c

¹⁰ SWP, Section 8, impl action 3

A) The Council should review the 25 goals presented in the WCIP to identify which goals apply to their region and which goals need further refinement. If no further refinement is needed, the Plan may simply refer those goals in the WCIP.

- 1) The *Workbook of Tiered Conservation Practices* and the WCIP Synopsis include a list of all water conservation goals listed in the WCIP.
- 2) If no refinement to the WCIP goals is needed, the Plan can reference the goals in the WCIP (it is not necessary to restate them in the Plan).
- 3) If the WCIP goals need refinement, the Councils should determine a process to refine the goals for inclusion in the Plan. *An example decision support process is described in the following section related to Tier THREE (T3).*

B) The SWP outlines several basic water conservation practices for municipal and industrial water users.¹¹ The Council should review the practices in the SWP to identify those that may be important enough to incorporate into the Plan. Because most T2 practices are considered basic water conservation practices, many municipal water providers and industries in the region may already be implementing them.

- 1) The *Worksheets of Tiered Conservation Practices* include a list of all T2 conservation practices, including resources where additional information can be found.
- 2) After discussing the practices outlined in the SWP, the Council should decide through use of its Memorandum of Agreement, Operating Procedures and Rules for Meetings whether or not to include each of them in the Plan.
- 3) If Council decides some or all of these practices are important for municipal water providers and industrial water users to implement, they will need to be included in the Plan.

C) The Council needs to also discuss water conservation and efficiency data needs and reporting requirements presented in the SWP.¹² The purpose of reporting information and data on efficiency is for non-farm water permit holders and drinking water providers to document measurable outcomes in terms of reduced or maintained water production or usage. The measurable outcomes, outlined in the SWP include, but are not limited to, per capita water use, per connection water use, and total system.¹³ Although this information is to be reported to the state, it is of critical importance for creating a baseline of current water use for individual facilities and users and for benchmarking individual progress toward water efficiency.

- 1) EPD rules will soon be updated to require non-farm water use permit holders to begin submitting annual reports that include data and information regarding the implementation of water conservation goals or improvements to water use efficiency.
- 2) PCs can assist the Council by facilitating a discussion regarding water conservation and efficiency data needs and reporting. If a set of data are more important to the region, the Plan

¹¹ SWP, Section 8, impl action 2a.iii(1) and (2)

¹² SWP, Section 8, impl action 2c

¹³ SWP, Section 8, impl action 2c

can recommend any additional data collection and/or reporting requirements for non-farm water uses for their region. If no additional data needs are identified, the Council need only acknowledge those listed in the SWP.

NOTE: Because many regional Councils have discussed the importance of per capita information, Appendix B of this guidance includes a standardized methodology for calculating per capita water use.

Tier THREE (T₃) Water Conservation

Tier THREE (T₃) includes water conservation activities that are considered basic but are not addressed in current rules and will not be addressed in upcoming amended rules. If the Council decides these practices are important to the region, they should be incorporated into the Plan.

NOTE: The Council can recommend the Plan include actions to be taken by non-regulated water users, but practices for entities that do not hold water withdrawal permits and will not seek state funding through GEFA will be encouraged through non-regulatory means.

A) The Council should review and discuss potential T₃ practices. The *Worksheets of Tiered Conservation Practices* includes a list of T₃ conservation practices, including resources where additional information can be found. The list is not comprehensive, so the Council should also consider additional practices that may be relevant to the region.

B) PCs can assist the Council by facilitating a decision-making process that will allow for the Council to review and recommend T₃ basic practices for inclusion in the Plan.

- 1) Most practices listed in T₃ are low cost options.
- 2) PCs have access to many different types of conservation evaluation tools that can be used to help Councils choose T₃ practices. (Tools range from standardized calculations for water savings from devices to advanced computer models to estimate impact of water conservation programs.) PCs should utilize available tools to facilitate the Council's review, refinement, and selection of practices for their region.
- 3) Some T₃ practices are quantifiable and will produce measurable results, such as gallons of water saved, yet others are only qualitative. If measurable results are expected, PCs should use available tools to estimate how demand will change when selected water conservation practices are implemented. The evaluation process discussed in the following section on T₄ practices may be applied.
- 4) EXAMPLE: The following is the process being used in the Coosa-North Georgia Water Planning Council:
 - a) Begin by reviewing with the Council's Vision and Goals, and develop evaluation criteria.

- b) From the long list of practices that are NOT required in current or upcoming amended rules, refine the list to those to be considered during a scoring process.
- c) Identify a subcommittee to score and prioritize the refined list of practices using the criteria developed from the Vision and Goals
- d) Basin sub-committees can review the list of scored and prioritized practices, to make recommendations to full Council.
- e) The Council should select recommended practices for inclusion in their Plan

C) The Council should decide through use of its Memorandum of Agreement, Operating Procedures and Rules for Meetings which T3 practices to include in the Plan.

Tier FOUR (T4) Water Conservation

Tier FOUR (T4) practices are considered “beyond basic” water conservation practices that need to be considered if, upon comparison of the resource assessments and water demand forecast, the Council finds they have gaps between sustainable capacity and water demands. If that is the case, either currently or in the future, water conservation practices need to be fully evaluated to determine their utility in closing the water resource gap.

NOTE: Though many Councils have begun to discuss water conservation practices appropriate for their region, the evaluation of practices in T4 should result in quantifiable water savings/demand management. PCs can utilize conservation evaluation tools to help the Councils identify the full suite of conservation practices that can be evaluated to close the gap their region is or is forecasted to experience.

A) Because water conservation is recognized in the SWP as a priority water quantity management practice,¹⁴ water planning regions that are experiencing or expecting a gap between sustainable capacities and water demands, must go through the general process outlined in this section to identify a portfolio of water conservation practices most likely to effectively manage demand and help close the gap. (A portfolio of water conservation practices only is a list of conservation practices to be implemented by a variety of water users in the region at various times to achieve the maximum amount of water savings.)

- 1) The *Worksheets of Tiered Conservation Practices* include a list of T4 conservation practices, including resources where additional information can be found. This list is not comprehensive and PCs and Council members can use additional information from credible national and state-wide sources.
- 2) A primary difference between the practices listed in T3 and those listed in T4 is the cost of implementation. However, if T3 practices may result in measurable results, they can be evaluated through this method.
- 3) All water use groups within the planning region should discuss and identify practice that may help the region manage water demands. (The water use groups specifically addressed in the

¹⁴ SWP, Section 7, Policy 3

WCIP include: public supplied/municipal water users, industrial and commercial water users, agricultural water users, landscape water users, golf courses, state agencies and energy generation water users.)

B) In order to effectively evaluate the potential of demand management to close a current or future resource gap, the Council must quantify the maximum amount of water that can be saved through a water conservation portfolio of a variety of conservation practices for multiple water users in portions of the region contributing to the existence or creation of a gap. The steps outlined below can guide PCs through a process to help the Council identify water conservation management practices to close any water resource gaps:

- 1) Identify the goal – ultimately the gap to be closed (both existing and future conditions) by managing demand.
- 2) Identify a full suite of region-specific, sector-specific practices for the region.
 - a) Convene sub-groups of representative water users from the region to identify appropriate conservation practices that can be implemented to manage demand across the region and those practices that may only apply to portions of the region contributing to the resource gap.
 - b) Compile sub-groups' recommendations into a water conservation portfolio of all possible water conservation practices that can be implemented by the different water use groups in the region.
- 3) Evaluate the water savings achievable from implementation of the region-specific water conservation practices (for all water use sectors compiled in the water conservation portfolio.)
 - a) Many tools are available to assess the water savings and cost of water conservation practices. There are tools available to most sectors of water use. PCs should review their proposed tools with EPD prior to evaluation.

Examples of available tools include, but are not limited to:

 - DSS Model (used in the Metro District)
 - IWR Main
 - Water Conservation Tracking Model (Alliance for Water Efficiency)
 - Water Use and Conservation Profile Tool (EPD)
 - b) A range of timelines of each practice in the portfolio should be considered to demonstrate the effectiveness of the practices in closing the gap over a specific time period.
 - c) The Council needs to include, as a supplement to the Plan, a brief Technical Memorandum describing the decision making process, models used, inputs and outputs, and appropriate references used to meet this objective.
- 4) Using the results of the evaluation performed in step 3, the Council needs to discuss and decide which these water conservation practices will be used to meet their water resource gaps. These discussions need to include the following scenarios.

a) Use the water conservation portfolio (compiled of a suite of water conservation practices to be implemented by multiple water users in the region) to close the resource gap.

b) Use combinations of water quantity management portfolios that include the most effective water conservation practices and other management practices to close the resource gap.

i) At this point PCs should help the Council integrate demand management practices with the other water quantity practices presented in the SWP.

ii) Cost is expected to be used as a comparison in selecting the appropriate portfolios. (In other words, the cost of implementing demand management practices should be compared to the cost of implementing other water quantity management practices.)

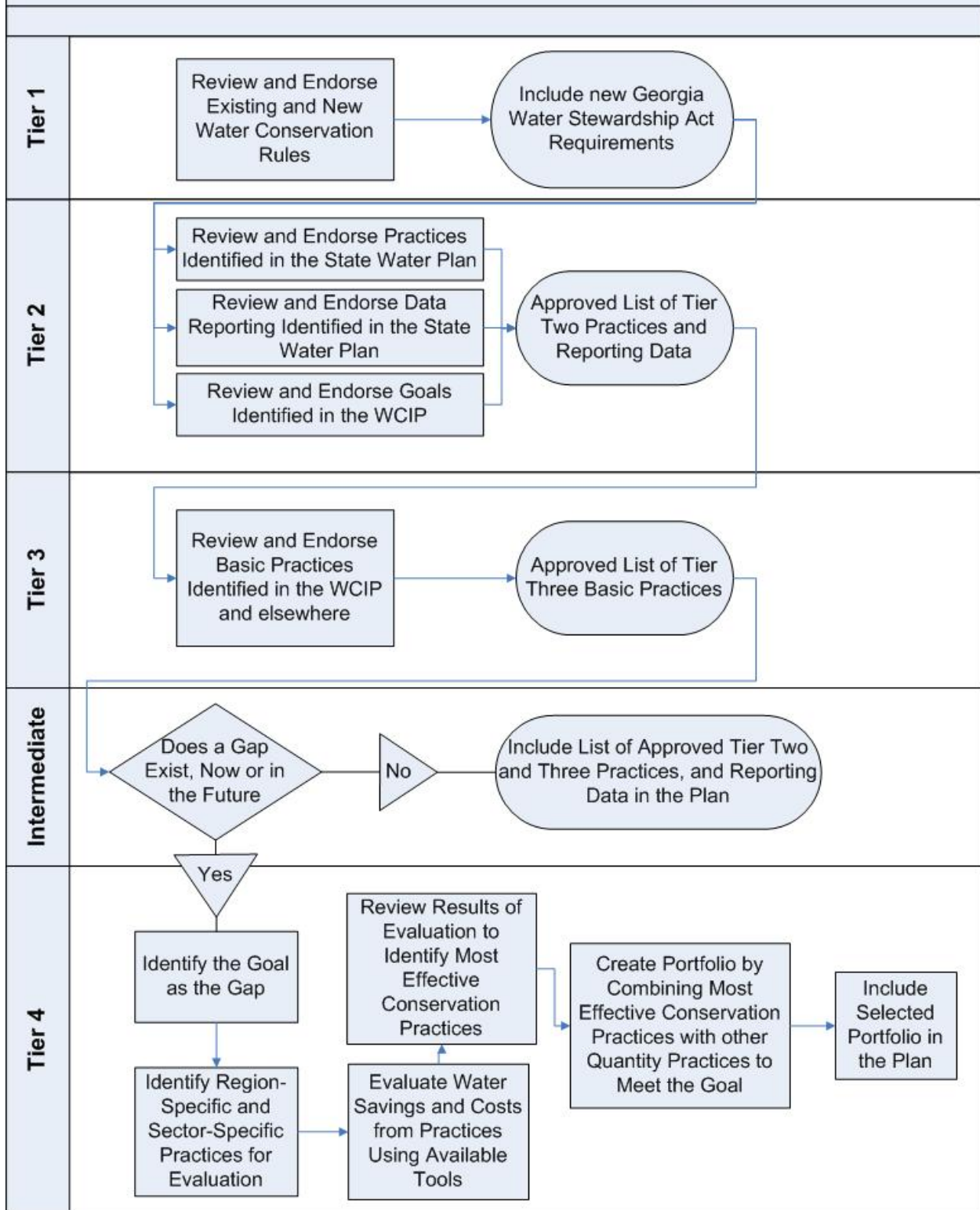
iii) Appropriate timelines of each water quantity management practice in all the portfolios should be identified to demonstrate the effectiveness of the practices in closing the gap over a specific time period.

c) The Council should decide through use of its Memorandum of Agreement, Operating Procedures and Rules for Meetings which T4 practices to include in the Plan.

5) See Appendix A, Water Conservation Guidance Process Flow Diagram for steps to take when evaluating T4 practices.

Appendix A

Water Conservation Guidance Process Flow Diagram



APPENDIX B

Methodology for Calculating Per Capita Water Use

Per capita (person) usage, both total and residential, can be determined in several ways. The first step in this calculation is to determine the population served. Several methods are available to calculate this factor. The population served can be determined using the number of active residential accounts and the average household size from the latest Census results (2000). By multiplying the number of active residential accounts by the household size, a population served can be determined. (If household size is not readily available, the Georgia state average of 2.6 persons per household can be used.) Once the population served is collected, the per capita usage can be calculated - based on amount of water pumped, the amount of water used by all users, or the amount of water used only by accounts classified as residential. This value is usually referred to as gallons per capita per day (g/c/d). Many national leaders in conservation analysis suggest that the most effective measure of a community's efficiency is calculating the residential gallons per capita per day (res g/c/d). The table below shows how to calculate each of these values.

TABLE
Per Capita Water Use Calculation

Type of Per Capita Use	Calculation	Units	Considerations
Overall per capita (based on withdrawal)	(water withdrawal per day) ÷ (total population)	G/c/d Overall based on withdrawal	Includes non-revenue water, and all customers (residential, commercial, industrial, etc.)
Overall per capita (for all users)	(total water sales per day) ÷ (total population)	G/c/d Overall	Includes all customers (residential, commercial, industrial, etc.)
Residential per capita	(residential water sales per day) ÷ (total population)	G/c/d Residential	Includes residential customers only

Note: Depending on availability of customer account classification, not all of these types of per capita usages can always be calculated.
Total population is calculated by multiplying the number of residential accounts by the household size from the latest Census results (2000)

If necessary PCs can assist Councils in selecting “representative” communities in their region. This exercise can characterize the diverse water uses in the region in order to help identify specific conservation measures that can be cost-effective, if implemented properly. Several criteria can be used for selecting “representative communities”, including:

- Size (population served and water withdrawal)
- Water source (surface or ground water)
- Geographic location (and river basin)
- Major water use type (residential, commercial, etc)

APPENDIX C

Adjusting water demand for practices in the Water Stewardship Act

1. High Efficiency Toilets and Urinals – The water savings achieved through the plumbing code changes in the Water Stewardship Act are easily included in the municipal water demand forecasts being used for the planning process. Spreadsheets are available to incorporate the 20% water savings from HETs instead of ULFTs after 2012.
2. Commercial Cooling Towers – Cooling towers account for approximately 20-50% of a large (more than 10,000 square feet) commercial building's water use. Increasing a cooling tower's cycles of concentration from 2 to 6 will reduce the water usage by 40%. Therefore, in new construction the water use of a typical commercial building can be decreased by approximately 8-20%.
3. Multiunit sub meters – Multiunit buildings include both residential and commercial and light industrial buildings. Typically, the installation and billing of individual units actual water use can reduce water usage by approximately 15% in new construction. An assumption needs to be made for quantity of new residential and commercial/light industrial new buildings expected to be constructed in the future.

NOTE: Those T1 practices that were not already included in the forecasts (Section 4) may be incorporated as part of the expected water savings with the management practices (Section 6) of the Plan.

Appendix D

Outline for Technical Memorandum (TM) to supplement the Council's Plan

If the Council finds they have gaps between sustainable capacity and water demands, currently or in the future, water conservation practices need to be fully evaluated to determine their utility in closing the water resource gap. This appendix presents an outline for the technical memorandum (TM) that should summarize the evaluation process, data and methods used and results of the evaluation. The TM should supplement the Plan.

Executive Summary

Section 1 – Process

In this section, describe the process used in evaluating the Tier FOUR practices to meet the water quantity gaps. Also describe which water conservation practices were evaluated and any assumptions made.

Section 2 – Models Used

In this section, describe the model(s) used for evaluation of water savings and cost of the water conservation practices evaluated. Also explain how the model calculates the water savings and costs, and the options available to combine practices or evaluate different levels of implementation.

Section 4 – Inputs/Outputs

In this section, describe the model input criteria for each water conservation practice evaluated, including water savings, cost (to each sector, provider and user), implementation level (or market penetration), savings life, etc. Also describe the sensitivity evaluated in selecting the penetration of water conservation practice implementation, interaction of practices to each other, and how the savings was extrapolated across the entire water planning region, if applicable.

Section 5 - Conclusions

In this section, describe the results of the analysis, including the total water savings achievable through implementation of each water conservation practice, as well as the costs. Include a description of the water conservation practices included in the portfolio selected by the Council (to be included in the Plan), briefly describe the benefits (water savings, costs, etc.) that the portfolio presents to water users in the region, and briefly describe why the Council selected those practices.

Section 6 – References

In this section, list all references used in the preparation of the analysis and Technical Memorandum, such as model documentation, water conservation practice savings and cost information, additional resources etc.

Water Conservation Goals	Goals initially identified in the WCIP
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Foundational Water Conservation Goals	WCIP pgs 26 & 155
Educate and empower Georgia's water users	WCIP pg 26
Create incentives to encourage water use efficiency	WCIP pg 26
Enhance data collection, monitoring, research, and evaluation	WCIP pg 27
Measure water use efficiency	WCIP pg 27
Plan for the future	WCIP pg 28
Integrate water conservation and energy conservation	WCIP pg 28
Secure funding to implement water conservation	WCIP pg 29

Agricultural Irrigation	WCIP pg 37
Goal #1 : Research institutions and state agencies, in cooperation with farmers, should enhance their understanding of water use and levels of efficiency of existing agricultural irrigation.	WCIP pg 41
GOAL #2 : Farmers should improve the efficiency of their irrigation systems.	WCIP pg 42
GOAL #3 : Farmers should consider crop varieties, cropping systems and irrigation systems to maximize the efficient use of water on farms.	WCIP pg 44
GOAL #4 : Farmers should minimize water loss from farm ponds, reservoirs and other rainfall collection systems.	WCIP pg 45

Electric Generation and Use	WCIP pg 55
Goal #1 : Electric utilities should assess the feasibility and benefit of integrating water conservation efforts into utilities' long-term plans for meeting energy demands.	WCIP pg 59
GOAL #2 : Electric utilities should work with their customers to better understand the impact water conservation activities may have on their energy demands and, where practicable, the water savings from energy conservation.	WCIP pg 60

WC Guidance - Worksheets of Tiered Practices

<p>GOAL #3 : Electric utilities should implement practices to improve water efficiency at existing facilities and identify, to the extent practicable, ways to minimize the amount of water necessary to generate electricity.</p>	<p>WCIP pg 61</p>
<p>Golf Courses</p>	
<p>Goal #1: Golf course superintendents or managers should develop and implement a site-specific Best Management Practices (BMPs) plan for turfgrass water conservation.</p>	<p>WCIP pg 69</p>
<p>GOAL #2 : Through a cooperative effort, research institutions and golf-related associations should determine a typical water use range for golf courses in Georgia that accounts for variations in rainfall and other climatic conditions.</p>	<p>WCIP pg 70</p>
<p>GOAL #3 : GCSs, GGCSA and other golf industry groups should help foster a culture of water conservation inside and outside of Georgia's golf industry.</p>	<p>WCIP pg 71</p>

WC Guidance - Worksheets of Tiered Practices

Industrial and Commercial Facilities	WCIP pg 79
GOAL #1 : Industrial and commercial facilities should determine baseline water use, in terms of water use intensity or another efficiency metric.	WCIP pg 83
GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	WCIP pg 84
GOAL #3 : Industrial and commercial facilities should develop a program to educate employees and those contracted by the facility about water use and water conservation efforts.	WCIP pg 86
GOAL #4 : Industrial and commercial facilities should integrate water and energy conservation practices, where practicable.	WCIP pg 86

Landscape Irrigation	WCIP pg 97
GOAL #1 : Landscape and irrigation professionals and water providers should educate their customers on proper and efficient landscape water use practices.	WCIP pg 100
GOAL #2 : Landscape and irrigation professionals and professional associations should establish state-wide standards for design, installation and maintenance of Georgia landscapes, landscape irrigation systems, and other systems dealing with landscape water conservation, such as rainwater catchments systems.	WCIP pg 101
GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.	WCIP pg 103

Domestic and Non-Industrial Public Uses	WCIP pg 115
GOAL #1 : Water providers and local governments should implement a comprehensive water conservation education and outreach program.	WCIP pg 119
GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.	WCIP pg 120
GOAL #3 : Water providers and local governments should implement conservation-oriented rates to encourage citizens to conserve, and to help maintain the water system's financial stability.	WCIP pg 122
GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.	WCIP pg 123

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GOAL #5 : Water providers and local governments should help customers and citizens maximize efficiency of outdoor water uses, such as pools, spas, pressure washing, and non-commercial car washing.	WCIP pg 125
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State Agencies	WCIP pg 143
GOAL #1 : State agencies will reduce water use intensity, relative to a 2007 baseline, by five percent by July 2011, and two percent annually through the year 2020.	WCIP pg 146
GOAL #2 : State agencies should ensure that new or renovated major facility projects are water efficient.	WCIP pg 148
GOAL #3 : State agencies should reduce water loss as much as practical.	WCIP pg 149

Tier ONE (T1) Water Conservation Practices	Addressed in statute and current or upcoming amended rules for non-farm water withdrawal permittees and drinking water providers
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T1 Practice	Associated WCIP Goals	Status	Reference	Adjust demand	Reference for more information
<p><u>Applicants for non-farm water withdrawal permits or permit modifications</u> must demonstrate progress toward water conservation goals or water efficiency standards</p>	Domestic GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.	Upcoming amended rule	SWP, Imp Action 2	No	SWP, Sec. 8 Policy 1; WCIP pg 82 & 118
	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.				
	Electric GOAL #3 : Electric utilities should implement practices to improve water efficiency at existing facilities and identify, to the extent practicable, ways to minimize the amount of water necessary to generate electricity.				
<p><u>Water withdrawal permittees and drinking water providers</u> must submit annual reports on non-farm water use that shall include data and information regarding implementation of water conservation plans and progress toward water conservation goals.</p>	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	Upcoming amended rule	SWP, Imp Action 3	No	SWP, Sec. 8 Policy 1; WCIP pg. 89
	Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.				

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<p><u>Drinking water providers</u> must meet minimum standards and best practices for monitoring and improving the efficiency of public water systems, using a method developed by the International Water Association and implement in a phased approach a water loss detection program. Providers serving over 10,000 individuals shall conduct water loss audits by March 2012, and those serving greater than 3,300 individuals by March 2013.</p>	<p>Domestic GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.</p>	<p>Current statute and upcoming amended rule</p>	<p>WSA, Section 3</p>	<p>Yes, consider current water loss levels and efficiency goals.</p>	<p>WCIP - pg 118 & 121</p>
<p>All multi-tenant buildings (residential, commercial and industrial) constructed after July 1, 2012, to enable sub-metering by each tenant. This new requirement does not apply to renovations or rebuilding. The owners of the buildings shall charge for water and waste-water use by tenants and may charge for common area water and waste-water use</p>	<p>Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.</p>	<p>Current statute and upcoming amended building code or rule</p>	<p>WSA, Section 7</p>	<p>Yes</p>	<p>WCIP - pg 139 & 182</p>
<p>All new construction permitted on or after July 1, 2012, must meet the minimum water flow and performance standards including:</p>	<p>Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.</p>	<p>Current statute and upcoming amended building code or rule</p>	<p>WSA, Section 8; WCIP</p>	<p>Yes</p>	<p>WCIP - pg 140</p>
<p>Water closets or toilets may not exceed 1.28 gallon per flush;</p>					
<p>Urinals (and associated flush valves) must use no more than .5 gallons per flush;</p>					
<p>Lavatory faucets (and aerators) may not exceed 1.5 gallons per minute; and</p>					

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Kitchen faucets (and aerators) may not exceed 2.0 gallons per minute					
Non-farm water withdrawal permittees must submit water conservation plans	GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.	Current statute and current rule	R&Regs 391-3-6 & 391-3-2	No	WCIP pg 118
Water users in Flint River Basin, Coastal Georgia and North GA Metropolitan Water Planning District, must comply with water conservation elements in regional water plans.	Landscape GOAL #2 : Farmers should improve the efficiency of their irrigation systems.	Current statute and current rules	O.C.G.A. 12-5-572, R&Regs 391-3-2, R&Regs 391-3-28	Yes	Flint River Basin Regional Water Plan, Coastal Permitting Plan, and Metro North GA Water Planning District
	Domestic GOAL #3 : Water providers and local governments should implement conservation-				
	Domestic GOAL #1 : Water providers and local governments should implement a comprehensive water conservation education and outreach program.				
	Domestic GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.				
Water use for landscape related purposes is restricted between 10am and 4pm.	Landscape GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.	Current statute	O.C.G.A. 12-5-7	No	WSA, Section 4
Water use for non-landscape outdoor purposes is limited to three days a week (determined by customer address)	Domestic GOAL #5 : Water providers and local governments should help customers and citizens maximize efficiency of outdoor water uses, such as pools, spas, pressure washing, and non-commercial car washing.	Current rules	R&Regs 391-3-30	No	
Public car wash facilities can be certified water efficient if employing water conservation practices	Domestic GOAL #5 : Water providers and local governments should help customers and citizens maximize efficiency of outdoor water uses, such as pools, spas, pressure washing, and non-commercial car washing.	Current statute and current rule	R&Regs 391-3-31	No	

Tier TWO (T2) Water Conservation Practices	Practices outlined in the SWP, to be addressed in rules and regulations as options for non-farm water withdrawal permit applicants seeking permit expansion or modification.
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T2 Practice	Associated WCIP Goals	Status	Reference	Adjust demand	Reference for more information
T2 Practices for Municipal Water Providers (as outlined in SWP)					
Implement conservation-oriented rate structures and distribute informative bills	Domestic GOAL #3 : Water providers and local governments should implement conservation-oriented rates to encourage citizens to conserve, and to help maintain the water system’s financial stability.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(b)	Yes	WCIP pgs 135, 137 & 201; Chesnutt & CUWCC; and TX Water Devel Board (2004) pg. 19
Meter all water uses	Domestic GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(d)	No	WCIP pg 129 and TX Water Devel Board (2004) pg. 75
Adopt a meter calibration, repair and replacement program	Domestic GOAL #2 : Water providers should maximize the efficiency of the systems that treat and deliver water to customers.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(e)	No	WCIP pg 129 and TX Water Devel Board (2004) pg. 75
Adopt a program to collect information on water use by the largest customers	Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(f)	No	WCIP pgs 106 & 139 and TX Water Devel Board (2004) pg. 112
	Landscape GOAL #1 : Landscape and irrigation professionals and water providers should educate their customers on proper and efficient landscape water use practices.				

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Enforce current outdoor water use schedule	Domestic GOAL #5 : Water providers and local governments should help customers and citizens maximize efficiency of outdoor water uses, such as pools, spas, pressure washing, and non-commercial car washing.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(g)	No	WCIP pgs 98 & 103
	Landscape GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.				
Meter water reuse and report reuse on a regular basis	Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(h)	Yes	TX Water Devel Board (2004) pg. 85
	Landscape GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.				
Conduct reuse feasibility studies	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(i)	No	WCIP pg 90
Consider the use of grey water	Landscape GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(j)	No	TX Water Devel Board (2004) pg. 96 and 102

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Consider programs to replace or retrofit inefficient plumbing fixtures	Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(k)	Yes	WCIP pg 123 & 138 and TX Water Devel Board (2004) pgs 28 and 34, Dekalb County Water Fixture Replacement Program (http://dekalbwatershed.com/PDF/plumbingFixturesReplacement.pdf)
Update water conservation plans on a regular basis	Domestic GOAL #4 : Water providers and local governments should help customers maximize the water efficiency of indoor residential and domestic uses.	upcoming amended rules	SWP Sec. 8(2)a.iii.1(l)	No	WCIP pg 141

T2 Practices for industrial water users with water withdrawal permits (as outlines in SWP)					
Conduct facility-specific audits every three years or when processes change	I/C GOAL #1 : Industrial and commercial facilities should determine baseline water use, in terms of water use intensity or another efficiency metric.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(a)	No	WCIP pg 88 and TX Water Devel Board (2004) pgs. 133 and 195
	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.				
Measure all water withdrawals	I/C GOAL #1 : Industrial and commercial facilities should determine baseline water use, in terms of water use intensity or another efficiency metric.				
	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(b)	No	WCIP pg 88
Measure or estimate water reuse and report reuse	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(c)	Yes	WCIP pg 90 and TX Water Devel Board (2004) pg. 154

WC Guidance - Worksheets of Tiered Practices

Adopt maintenance and repair programs for pipelines, intakes and discharge structures	I/C GOAL #1 : Industrial and commercial facilities should determine baseline water use, in terms of water use intensity or another efficiency metric.				
	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(d)	Yes (consider existing efficiency and	WCIP pgs 88 & 93 and TX Water Devel Board (2004) pg. 138
Install rain or moisture sensor shut-off devices for irrigation systems	Landscape GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(e)	Yes	WCIP pg 111
Irrigate landscapes in compliance with outdoor water use schedule	Landscape GOAL #3: Landscape and irrigation professionals, water providers and local governments should help water customers reduce summer peak use.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(f)	No	WCIP pgs 97 & 103 and TX Water Devel Board pg. 184
Conduct reuse feasibility studies	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(g)	No	WCIP pg 90 and TX Water Devel Board pg. 154
Consider the use of grey water	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(h)	Yes	WCIP pg 91
Update water conservation plans on a regular basis	I/C GOAL #2 : Industrial and commercial facilities should establish reduction targets for existing water uses and implement practices to achieve those targets.	upcoming amended rules	SWP Sec. 8(2)a.iii.2(i)	No	WCIP pg 94 and TX Water Devel Board (2004) pg. 190

Tier THREE (T₃) Water Conservation Practices

Basic practices that will not be addressed in rules and regulations

Many of these practices are discussed in the "Handbook on Water Use and Conservation" by Amy Vickers (2001) and are described in the Resource Library for the Alliance for Water Efficiency - www.a4we.org.

T ₃ Practices for Regions with Agricultural Water Use	WCIP	Other Resources
Conduct irrigation audits	WCIP pg 47	http://pubs.caes.uga.edu/caespubs/pubcd/B1253/B1253.htm and TX Water Devel Board (2004) pg. 210
Meter irrigation systems	WCIP pg 46	www.gaswcc.georgia.gov
Irrigate at night-time	WCIP pg 50	TX Water Devel Board (2004) pg. 201
Arrange fields for water efficiency	WCIP pg 49	TX Water Devel Board (2004) pg. 210 and http://www.nespal.org/SIRP/IWC/default.asp
Inspect pipes and plumbing	WCIP pg 49	Thomas, D.L. ed., (1998) and TX Water Devel Board (2004) pg 226
Compile data on cropping and water conservation practices	WCIP pgs 41 & 46	TX Water Devel Board (2004) pg 204
Attend Irrigation workshops	WCIP pg 48	
Eliminate timer-only irrigation controls	WCIP pg 50	http://www.nespal.org/SIRP/IWC/default.asp
Inform cropping and management practices using water demands	WCIP pgs 44 & 52	http://www.nespal.org/SIRP/IWC/default.asp
Minimize or eliminate the use of high-pressure spray guns on fixed and traveler systems	WCIP pgs 38 & 50	Thomas, D.L. ed. (1998) and TX Water Devel Board (2004) pgs 231 and 241

WC Guidance - Worksheets of Tiered Practices

T3 Practices for Regions with Electric Generation	WCIP	Other Resources
Integrate water conservation into educational programs	WCIP pg 64	
Integrate water supply and water conservation impacts into long-term energy plans	WCIP pg 63	

T3 Practices for Regions with Golf Courses	WCIP	Other Resources
Conduct routine site surveys and system audits	WCIP pg	TX Water Devel Board (2004) pg 71
Develop and Implement a Best Management Practices (BMPs) Plan	WCIP pgs 69 & 74	www.commodities.caes.uga.edu/turfgrass/georgiaturf/water/articles/bmps_water_cons_07.pdf
Maintain a water use database	WCIP pg 75	
Maintain water conservation logs	WCIP pg 76	
Educate staff, members, and the community about conservation	WCIP pg 73	
Educate the public about golf course water use and conservation efforts	WCIP pg 74	
Offer training for Course Superintendent	WCIP pg 73	

WC Guidance - Worksheets of Tiered Practices

T3 Practices for Regions with water-using Industries and Commercial businesses	WCIP	Other Resources
Conduct regular water audits	WCIP pg 88	www.p2ad.org and CUWCC
Practice dry methods for cleaning and dust control	WCIP pg 92	
Discontinue discretionary use of water	WCIP pg 93	TX Water Devel Board (2004) pg 138
Offer conservation educational programs	WCIP pg 95	TX Water Devel Board (2004) pg 179
Determine water use efficiency metrics	WCIP pgs 83 & 89	www.ofee.gov/eo/eo13423_main.asp
Conduct cost-benefit analyses of water conservation practices	WCIP pgs 80 & 90	http://www.a4we.org/benit_Cost_Introduction.aspx?terms=direct+install and TX Water Devel Board (2004) pg 195
Calculate water use intensity and establish efficiency targets	WCIP pgs 82 & 84	www.ofee.gov/eo/eo13423_main.asp

T3 Practices for Regions with Heavy Landscape water use	WCIP	Other Resources
Adapt existing educational programs to include outdoor focus	WCIP pgs 100 & 105	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/
Offer continuing education for landscape and irrigation professionals	WCIP pg 102	http://apps.caes.uga.edu/urbanag/GCLP/index.cfm
Distribute information to high-use customers	WCIP pg 106	
Offer homeowners checklists and certification for sustainable landscapes	WCIP pgs 106 & 195	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/
Assess outdoor water use	WCIP pg 108 & 199	
Calculate peaking factor	WCIP pgs 98 & 108	
Distribute information about efficient outdoor water use	WCIP pg 135	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/
Offer guidance documents for outdoor water uses	WCIP pg 140	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/

WC Guidance - Worksheets of Tiered Practices

T ₃ Practices for Regions with Urban and Suburban areas	WCIP	Other Resources
Adopt a comprehensive education and outreach program for community residents.	WCIP pg. 119	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/
Analyze customers water use data	WCIP pg 127	
Categorize water customers by class	WCIP pg 130	
Calculate average utility-specific per capita residential indoor water use	WCIP pg 130	See Regional Planning Water Conservation Guidance Appendix B
Integrate water conservation into existing education curriculum	WCIP pg 134	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/
Target education and outreach programs to high water users	WCIP pg 133	www.ConserveWaterGeorgia.net and http://www.ugaextension.com/
Adopt water waste ordinances	WCIP pg 141	See Athens Clarke County Code Sec, 5-3-120 to 125 on http://www.municode.com/Library/clientCodePage.aspx?clientID=5225 and TX Water Devel Board (2004) pg.25

T ₃ Practices for Regions with State Agency Facilities	WCIP	Other Resources
Conduct regular water audits	WCIP pg 151	Hawaii (2007) and www.ofee.gov/eo/eo13423_main.asp
Meter and measure all water users	WCIP pg 151	Hawaii (2007)
Conduct regular cost-effectiveness or cost-benefit analysis	WCIP pg 151	Hawaii (2007) and www.ofee.gov/eo/eo13423_main.asp
Develop long-term water conservation plans	WCIP pg 152	Hawaii (2007)
Adopt efficiency standards adopted by the GA General Assembly	WCIP pg 153	O.C.G.A. 50-8-18 - www.legis.state.ga.us/legis/2007_08/sum/sb130.htm

Tier FOUR (T₄) Water Conservation Practices

Beyond basic practices that can be used to help fill demand/supply gaps

Many of these practices are discussed in the "Handbook on Water Use and Conservation" by Amy Vickers (2001) and are described in the Resource Library for the Alliance for Water Efficiency - www.a4we.org.

T ₄ Practices for Agricultural areas	WCIP	Additional resources for assessing impact of implementation
Install Variable Rate Irrigation (VRI) controls on center pivots	WCIP pg 49	Thomas, D.L. ed. (1998) and TX Water Devel Board (2004)
Install enhanced center pivot control panels	WCIP pg 49	Thomas, D.L. ed. (1998) and TX Water Devel Board (2004) pg 231
Install end-gun shutoffs with pivots	WCIP pg 49	Thomas, D.L. ed. (1998)
Install low pressure irrigation systems	WCIP pg 50	Thomas, D.L. ed. (1998) and TX Water Devel Board (2004) pg 208
Install soil moisture sensor, evapotranspiration (ET) sensor or crop water use model to timer cycles	WCIP pg 51	
Install real-time weather and soil data and models to aid scheduling decisions	WCIP pg 52	
install real-meters on irrigation systems	WCIP pg 46	
Practice conservation tillage	WCIP pg 52	http://pubs.caes.uga.edu/caespubs/pubcd/C916/C916.htm and TX Water Devel Board (2004) pg 208
Control water loss	WCIP pg 53	TX Water Devel Board (2004) pg 210
Install subsurface drip irrigation on micro-sprinkler systems	WCIP pg 49	Thomas, D.L. ed. (1998) and TX Water Devel Board (2004) pg 234
Install rainfall shut-off devices	WCIP pg 51	

WC Guidance - Worksheets of Tiered Practices

T4 Practices for Regions with Electric Generation	WCIP	Additional resources for assessing impact of implementation
Develop and implement tools that estimate the impact of water conservation on energy demands.	WCIP pg 63	www.valleywater.org and www.pacinst.org/resources/water_to_air_models/index.htm
Offer energy and water conservation technical assistance to customers	WCIP pg 60 & 64	
Offer incentives for water conservation	WCIP pg 65	
Maximize efficiency of flue gas scrubbing	WCIP pgs 61 & 65	http://my.epri.com
Minimize evaporative losses	WCIP pg 65	http://my.epri.com
Adopt alternative water sources, such as reclaimed water for cooling	WCIP pg 66	http://www.a4we.org/Alternative_Water_Sources_Intro.aspx
Pilot projects for new technologies and practices	WCIP pg 66	

WC Guidance - Worksheets of Tiered Practices

T₄ Practices for Regions with Golf Courses	WCIP	Additional resources for assessing impact of implementation
Conduct leak detection and repair process	WCIP pg 76	TX Water Devel Board (2004) pg 71
Pre-condition turfgrass	WCIP pg 76	
Utilize alternative water sources	WCIP pg 77	TX Water Devel Board (2004) pg 61
Improve efficiency inside golf course facilities	WCIP pg 77	

T₄ Practices for Regions with Industries and Commercial water uses	WCIP	Additional resources for assessing impact of implementation
Recycle and reuse water	WCIP pg 90	DNR Guidelines, revised 2002 and TX Water Devel Board (2004) pg 154
Pilot innovative technologies	WCIP pg 92	CUWCC WaterSmart Guidebook; TX Water Devel Board (2004) pgs 145 - 175; http://www.a4we.org/Commercial_Institutional_and_Industrial_Library_Content_Listing.aspx
Increase the efficiency of cooling towers and boilers using performance-based contracting.	WCIP pg 93	http://www.a4we.org/cooling_tower_intro.aspx
Develop water management plans and energy management plans	WCIP pgs 94 & 95	TX Water Devel Board (2004) pg 190

T₄ Practices for Regions with Heavy outdoor water use	WCIP	Additional resources for assessing impact of implementation
Establish standards for landscape and irrigation systems	WCIP pg 109	http://www.epa.gov/watersense/services/cert_programs.html and http://apps.caes.uga.edu/urbanag/GCLP/index.cfm
Establish and require certification of landscape and irrigation professionals	WCIP pg 110	http://www.epa.gov/watersense/services/cert_programs.html and http://apps.caes.uga.edu/urbanag/GCLP/index.cfm
Employ irrigation system certified auditors	WCIP pg 111	http://www.epa.gov/watersense/services/cert_programs.html

WC Guidance - Worksheets of Tiered Practices

Implement innovative technologies	WCIP pg 111	http://www.a4we.org/Evapotranspiration and Net Irrigation Needs Introduction.aspx
Establish water budget-based rates, an aggressive form of conservation-oriented rates	WCIP pgs 112 & 137	http://www.a4we.org/1Column.aspx?id=710&terms=budget-based+rates
Guidelines for pre-construction practices	WCIP pg 112	
Monitor and offer technical assistance to high water users	WCIP pg 112	http://pubs.caes.uga.edu/caespubs/pubcd/B1253/B1253.htm and CUWCC A Guide to Implementing Large Landscape Conservation Programs
Establish a conservation coordinator position for the region	WCIP pg 106	TX Water Devel Board (2004) pg 82

T3 Practices for Regions with older Urbanized areas	WCIP	Additional resources for assessing impact of implementation
Install sub-metering in existing multi-unit buildings and homes	WCIP pg 21	http://www.a4we.org/submetering.aspx?terms=submeter
Offer retrofits and rebate programs to replace older fixtures	WCIP pg 138	http://www.a4we.org/Residential_Library_Content_Listing.aspx
Directly install high efficiency fixtures to replace older fixtures		

T3 Practices for Regions with new or growing Suburban areas	WCIP	Additional resources for assessing impact of implementation
Establish water efficiency building standards		http://www.epa.gov/WaterSense/pubs/ws_homes.html
Establish standards for landscape and irrigation systems	WCIP pg 109	
Adopt ordinances requiring new landscape and irrigation installation be conducted by certified professionals	WCIP pg 109	http://www.epa.gov/watersense/services/cert_programs.html
Require rain sensor shut-off devices in new irrigation systems		http://www.northgeorgiawater.com/html/284.htm

WC Guidance - Worksheets of Tiered Practices

T4 Practices for Regions with Urban and Suburban areas	WCIP	Additional resources for assessing impact of implementation
Conduct regular cost-effectiveness analysis on water conservation practices for service area	WCIP pg 132	http://www.a4we.org/benit_Cost_Introduction.aspx?terms=direct+install and TX Water Devel Board (2004) pg 118
Offer customers informative water bills	WCIP pg 135	
Offer financial or tax incentives for customers to conserve	WCIP pg 139	Hoffman (2009) and TX Water Devel Board (2004) pg 39 & 54
Incorporate water conservation into development plans	WCIP pg 141	
Establish a program to listen to customers	WCIP pg 127	TX Water Devel Board (2004) pg 90

T4 Practices for Regions with State Agency Facilities	WCIP	Additional resources for assessing impact of implementation
Conduct regular leak detection and repair	WCIP pg 154	Hawaii (2007)
Establish water use baseline and water use intensity targets	WCIP pg 146	www.ofee.gov/eo/eo13423_main.asp
Train state agency staff members	WCIP pg 153	
Adopt additional water efficiency standards as suggested in the Green Supplement of the IAPMO plumbing standards		http://www.iapmo.org/Pages/IAPMO_Green.aspx

Additional Resources

Chesnutt, Thomas W. and CUWCC. Designing, Evaluating, and Implementing Conservation Rate Structures - http://www.cuwcc.org/docDetail.aspx?id=720
CUWCC A guide to Implementing a Large Landscape Conservation Program - http://www.cuwcc.org/docDetail.aspx?id=1804
CUWCC A Handbook for Implementing Commercial Industrial and Institutional Conservation Programs - http://www.cuwcc.org/docDetail.aspx?id=1808
CUWCC WaterSmart Guidebook: Water Use Efficiency Plan and Review Guide - http://www.cuwcc.org/resource-center/technical-resources/bmp-tools.aspx
DNR Guidelines, revised 2002. "Guidelines for Water Reclamation and Urban Water Reuse," State of Georgia, Department of Natural Resources, Environmental Protection Division, Watershed Protection Branch. Revised February 20, 2002.
Hawaii (2007) "Water Conservation Manual for State of Hawaii Facilities. Prepared for Dept. of Land and Natural Resources Commission on Water Resources Management by The Limtiaco Consulting Group. Honolulu, HI
Hawkins, G.L. et al. 2007. Water Savings through Conservation Tillage. University of Georgia Extension Circular 916. Http://pubs.caes.uga.edu/caespubs/pubcd/C916/C916.htm
Hoffman, H.W.(Bill) and Associates. December 2009. "Analysis of the Potential for Water Savings Tax Incentives for Selected Commercial Water Using Equipment in Georgia." A Report to the Metropolitan North Georgia Water Planning District.
NESPAL - Irrigation Water Conservation "BMPs Homepage" - http://www.nespal.org/SIRP/IWC/default.asp
Texas Water Development Board Report 362 (November 2004)- Water Conservation Implementation Task Force, Water Conservation Best Management Practices Guide.
Thomas, D.L. ed., 1998 "Irrigation Conservation Practices Appropriate for the Southeastern United States. Project Report 32 by R.O. Evans, K.A. Harrison, J.E. Hook, C.E. Privette, W.I. Segars, W.B. Smith, D.L. Thomas, and A.W. Tyson.
Vickers, Amy. 2001. "Handbook on Water Use and Conservation." WaterPlow Press. 446 pgs.

WATER CONSERVATION OVERVIEW

Georgia's Regional Water Planning Councils

Section 1: Water Conservation as a Management Practice Relevant to all water users in Georgia

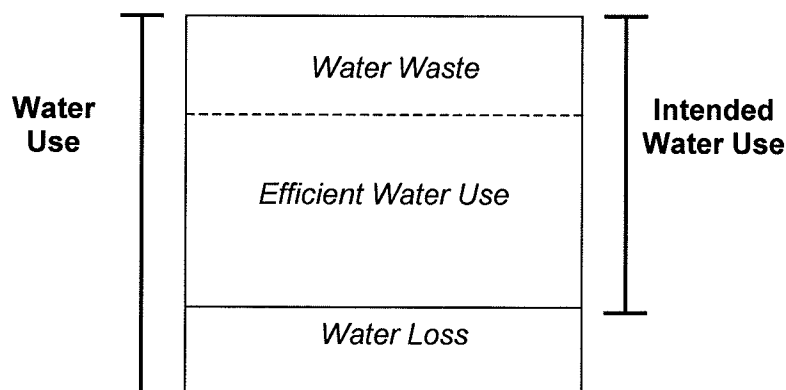
Water conservation is the reduction of water use, water waste and water loss (Statewide Water Management Plan (SWP), Sec 2 – Definition 40). Water conservation, as a demand management practice, is one of several water quantity management practices that can be used to manage the consumptive use of Georgia's regional water resources. The SWP identifies other water quantity management practices as those to manage water supplies and water returns.

The ultimate goal of water conservation is to maximize water use efficiency and maximize the benefit from each gallon used (Georgia's Water Conservation Implementation Plan (WCIP), page 15).

Water use efficiency is considered the minimal amount of water that is technically and economically feasible to achieve an intended water use function (SWP Sec. 2, Definition 47). Water use efficiency can be maximized by implementing efforts to:

- 1) reduce water waste, which is water that meets an intended use, but may not be considered efficient,
- 2) reduce water loss, which is water that does not make it to a point of intended use, usually due to leaks or faulty equipment, and
- 3) reduce total water use, which when necessary, can be accomplished through the use of new or high-efficiency technology or changing water-using behavior.

More information and examples of water use efficiency can be found in the Water Conservation Implementation Plan (WCIP), beginning on page 18.



Section 2: Tiers of Water Conservation Practices Relevant to Regional Water Planning Councils

Because, the GA State-wide Water Management Plan (SWP) identifies water conservation as a priority water management practice (SWP Sec. 7, Policy 3), each regional water planning council is expected to include demand management practices in their water development and conservation plans (WDCPs). While water conservation is not expected to fully meet water needs, it is an effective and efficient practice for all water users (SWP Sec. 8, Policy 1).

In accordance with the GA Water Stewardship Act (WSA) and Section 8 of the SWP, the GA DNR Board shall amend rules for water conservation requirements for water withdrawal permittees (those withdrawing over 100,000 gallons a day) and drinking water permittees. In anticipation of these upcoming amended rules, and in an effort to guide the selection of region-specific water management practices, each Council should consider water conservation activities categorized into four tiers described in general below, and in more detail in the Sections 3 and 4 of this guidance:

Tier ONE: Basic water conservation activities and practices that are currently required or general mandates that will certainly be included in upcoming amended rules.

Tier TWO: Conservation activities and practices that will be addressed in upcoming amended rules, but for which detailed requirements are uncertain.

Tier THREE: Basic water conservation practices for all water users that may not be addressed in current or upcoming amended rules.

Tier FOUR: Additional water conservation practices that can be considered if a gap exists between current or future water supplies and the demands for the region.

Section 3: Tiers ONE and TWO - Water Conservation in Rules Relevant to water withdrawal permittees and permit applicants; drinking water providers; and local governments

Tier ONE: Water Conservation Required through GA Rules and Regulations, SWP and WSA

Tier ONE(a): Existing rules

Since the early 1990's EPD has required water conservation-related activities of most water withdrawal permittees and applicants for non-farm water uses (GA R&Regs Chapters 391-3-6-.07 and 391-3-2-.04(11)). Current rules and regulations, require that all non-farm water withdrawal permit applications for a new or an increase in water withdrawals submit a water conservation plan with their application. In general, plans include information regarding:

- *Non-revenue water*, efforts to reduce unaccounted-for-water through meter installation, replacement and calibration; leak detection; and theft prevention.
- *Water conservation programs*, programs to improve the efficiency of the water system; description of water service billing based on metered use; documentation of plumbing code provisions; description of public education programs; and recycling and inter-connections.
- *Long range planning*, long term water demand projections that reflect any estimated reductions based on the implementation of water conservation measures as outlined in the submitted plan.

For farm water users in the Flint River Basin, after March 2006, any permittee issued a permit for irrigation systems withdrawing from the Floridan aquifer, or any surface water in the basin, must implement conservation practices identified in the Flint River Basin Regional Water Development and Conservation Plan (GA R&Regs Chapter 391-3-28). The conservation practices include:

- a. End-gun shut off switches to prevent irrigation of non-cropped areas by center pivot systems,
- b. Leak prevention and repair plans,
- c. Pump-safety shutdown systems installed on center pivots,
- d. Rain-gauge shut-off switches on travelers, solid set, or drip systems (these devices are not yet available as "off the shelf" items for agricultural irrigation purposes),
- e. Low-flow protection requirements for streams with sensitive aquatic species (including a complete cessation of irrigation when surface flow falls below 25% average annual discharge in Ichawaynochaway and Spring Creek sub-basins or below 7Q10 in streams in the rest of the basin.)

The counties and cities participating in the Metropolitan North GA Water Planning District must comply with plan provisions in order to modify or obtain new water withdrawal permits, discharge permits or loans for water and wastewater projects or stormwater permits (O.C.G.A. §12-5-572). The recently updated 2009 plan includes 12 water conservation requirements.

The WSA (newly enacted 12-5-7) restricts the use of water outdoors for purposes of planting, growing, managing or maintaining ground cover, trees, shrubs, or other plants to the hours of 4:00 PM and 10:00 AM, exemptions apply. (WSA, Section 4).

The schedule for non-irrigation outdoor water uses, such as power washing, car washing is established by the State's Rules for Outdoor Water Use, Chapter 391-3-30. During periods when EPD has declared that drought conditions do not exist, non-irrigation use is allowed by even-numbered addresses on Mondays, Wednesdays, and Saturdays; odd-numbered addresses may water outdoors for non-irrigation purposes on Tuesdays, Thursdays, and Sundays. Non-irrigation water uses are allowed at any time during the day or night. Restrictions increase with the level of drought declared by the state. Chapter 391-3-30 currently addresses outdoor water use for irrigation of landscapes and plants, however, the WSA establishes new water use restrictions for the irrigation of plants.

Water conservation for Georgia's public car wash facilities is addressed in GA R&Reg Chapter 391-31. This rule establishes best management practices and a certification program for permanent car wash facilities. Those facilities that EPD certifies as meeting the best management practices are not considered to be outdoor water uses subject to outdoor water use restrictions.

Tier ONE(b): Upcoming Amended Rules

In addition to existing rules, Tier ONE also includes a variety general water conservation related amendments to be considered by the DNR board in accordance with the SWP and WSA. The upcoming amended rules and codes will authorize the Director to require more information from water withdrawal permit holders, require specific information from drinking water providers, and to some degree, apply to local governments.

- 1) Applicants for non-farm water withdrawal permits or permit modifications must demonstrate progress toward water conservation goals or water efficiency standards (SWP, Section 8, implementation action 2(a)):
 - a) If the applicant does not have an existing service area, they must develop a water conservation plan including a schedule of implementing water conservation practices.
 - b) If the applicant already holds a water withdrawal permit, they must either:
 - i) demonstrate progress toward water efficiency or conservation goals, or
 - ii) demonstrate implementation of water conservation practices.
- 2) Water withdrawal permittees and drinking water providers must submit annual reports on non-farm water use that shall include data and information regarding

implementation of water conservation plans and progress toward water conservation goals. The information shall include measurable outcomes, in terms of reduced or maintained water production or usage, the impact conservation efforts may have on consumptive use of water for this region, or a schedule for implementing water conservation practices or achieving goals (SWP, Section 8, implementation action 2(c)(i-v)).

- 3) Drinking water providers must meet minimum standards and best practices for monitoring and improving the efficiency of public water systems, using a method developed by the International Water Association. Providers serving over 10,000 individuals shall meet the standards by March 2012, and those serving greater than 3,300 individuals shall meet the standards by March 2013 (WSA, Section 3).

Specifically, drinking water providers must:

- Establish an infrastructure leakage index;
- Conduct standardized annual water loss audits and submit them to EPD; and
- Implement a water loss detection program.

- 4) Local building codes must be amended to require (WSA, Sections 7, 8, 9):
 - a) all multi-tenant buildings (residential, commercial and industrial) constructed after July 1, 2012, to enable sub-metering by each tenant. This new requirement does not apply to renovations or rebuilding. The owners of the buildings shall charge for water and waste-water use by tenants and may charge for common area water and waste-water use.
 - b) installation of high efficiency plumbing fixtures in all new construction permitted on or after July 1, 2012. The minimum water flow and performance standards include:
 - Water closets or toilets may not exceed 1.28 gallon per flush;
 - Urinals (and associated flush valves) must use no more than .5 gallons per flush;
 - Lavatory faucets (and aerators) may not exceed 1.5 gallons per minute; and
 - Kitchen faucets (and aerators) may not exceed 2.0 gallons per minute
 - c) installation of high-efficiency cooling towers in all new construction permitted on or after July 1, 2012.

- 5) DNR must amend rules and regulations related to farm water use from surface and ground-water sources to establish three categories of farm use permits. The rules shall establish active, inactive and unused permits, and the rules must describe the process by which the EPD Director will communicate with the farm permit holders. While this process is not expected to result in greater water use efficiency, it is an important step in building our understanding of how water is used on Georgia farms (WSA, Sections 5 and 6).

Tier ONE(c): Georgia Water Stewardship Act

In addition to rules, Tier ONE also includes the requirements of the Georgia Water Stewardship Act, which provides incentives for increasing water stewardship and new conservation requirements. Beginning in July 2012, the legislation requires efficient water fixtures in all new residential and commercial construction statewide, as well as the installation of efficient cooling towers in new industrial construction. Also, for all new residential and commercial multi-unit projects, the bill will require sub-metering so that each unit will receive consumption reports and have incentive to practice conservation measures. The legislation also instructs eight different state agencies to look at local government and water provider grant and loan programs to develop incentive criteria that would encourage retrofit programs on existing construction, such as retrofitting water fixtures or installing drought resistant landscapes. The bill tasks the Georgia Environmental Protection Division with setting standards for water loss and leak detection for all medium and large public water systems. These systems serve 91 percent of Georgia's water customers. Because data on water loss is currently not comparable from system to system, setting the standards will allow the state to assist water providers by identifying where the biggest losses are occurring.

Tier TWO: Activities and practices that will be presented as options for permittees in the upcoming amended rules

Tier TWO includes the water conservation options for applicants for non-farm water withdrawal permits and permit modifications that will be described in upcoming amended rules and regulations.

The SWP calls for the DNR to amend rules and regulations to:

“...authorize the director of EPD to require applicants for water withdrawal permits or permit modifications for non-farm uses to demonstrate progress toward water conservation goals or water efficiency standards initially identified in the water conservation implementation plan and further refined in regional water development and conservation plans.” (SWP, Section 8, impl action 2(a)). *(emphasis added)*

If the Council determines that all or some of the water conservation goals identified in the WCIP or the practices outlined in the SWP are appropriate for the region, the Council can incorporate them in the WDCP (SWP, Section 8, impl action (3)).

1) Twenty-five water conservation goals are identified in the Water Conservation Implementation Plan (WCIP March 2010). The goals are sector-specific and detailed throughout the WCIP, and a summary chart of the goals is provided on page 155 of the WCIP and in the Synopsis. The Council can approve and/or refine these to include in the WDCP.

2) The SWP lists several conservation practices appropriate for municipal water providers to use when demonstrating the implementation of conservation (SWP, Section 8, implementation action 2(a)iii(1)). Some or all of these practices may be included in the WDCP :

1) Conduct regular water system audits and adopt a water loss control program
2) Implement conservation-oriented rate structures
3) Adopt a water loss control program
4) Meter all water uses
5) Adopt a meter calibration, repair and replacement program
6) Adopt a program to collect information on water use by the largest customers
7) Enforce current outdoor water use schedule
8) Meter water reuse and report reuse on a regular basis
9) Conduct reuse feasibility studies
10) Consider the use of grey water
11) Consider programs to replace or retrofit inefficient plumbing fixtures
12) Update water conservation plans on a regular basis

3) The SWP lists several conservation practices appropriate for industrial water users with water withdrawal permits to use when demonstrating the implementation

of conservation (SWP, Section 8, impl action 2(a)iii(2)). Some or all of these practices may be included in the WDCP :

a) Conduct facility-specific audits every three years or when processes change
b) Measure all water withdrawals
c) Measure or estimate water reuse and report reuse
d) Adopt maintenance and repair programs for pipelines, intakes and discharge structures
e) Install rain or moisture sensor shut-off devices for irrigation systems
f) Irrigate landscapes in compliance with outdoor water use schedule
g) Conduct reuse feasibility studies
h) Consider the use of grey water
i) Update water conservation plans on a regular basis

4) Non-farm water withdrawal permittees and drinking water providers shall provide data and information regarding implementation of water conservation plans and progress toward goals, including measurable outcomes, in terms of reduced or maintained water production or usage. Information may also include the impact conservation efforts may have on consumptive use of water for this region or a schedule for implementing water conservation practices or achieving goals (SWP, Section 8, implementation action 2(c)(i-v)).

Section 4: Tiers THREE and FOUR: Water Conservation Options Relevant to All Water Users in the Region

Tier THREE: Basic conservation practices not addressed in existing or upcoming amended rules

Georgia's water planning regions have a diverse mix of water users and the suite of basic water conservation practices should not be limited to only entities subject to DNR rules and regulations. The SWP states that WDCPs may include, "... enhanced water conservation provisions as appropriate for the specific mix of water users in the region and the consumptive use assessments for the region's water sources." (SWP, Section 8, impl action (3)).

The Water Conservation Implementation Plan (WCIP) can be a helpful resource to identify other basic water conservation practices that, to some extent, may already be in practice in the region, but may not be employed on a wide scale. The planning contractors (PCs) will work with the Council to identify a list of Tier THREE practices specific to this region for consideration by the Council. The practices included in Tier THREE will be compiled based on Council discussions regarding existing water use and any known conservation efforts currently employed in the region.

Below are examples of the types of Tier THREE practices that may be appropriate for this region. (The chart also provides WCIP references where more information on the topic can be found):

Water Conservation Practice	WCIP reference	WCIP page #
Municipal Water Providers		
Categorize customers by class such as single family residential, multi-family residential, commercial, institutional, and industrial)	Ch 7, BP 6	Pgs 130
Calculate average utility – specific per capita residential indoor water use (utilizing consistent methods)	Ch 7, BP 7; (App. G)	Pgs 130-131 (Pg 199)
Educate and empower customers to be more efficient with personal use of water	Ch 7, BP 9 & 10	Pgs 133 - 134
Industrial and Commercial Water Users		
Conduct facility-specific water audits	Ch 5, BP 1	Pg 88
Measure and record water use at individual facilities	Ch 5, BP 2	Pgs 88-89
Develop water management plans for IC facilities	Ch 5, BP 11	Pgs 94-95

Agricultural Water Users		
Collect data and information on cropping and water conservation practices on farms	Ch 2, BP 3	Pgs 46-47
Conduct irrigation audits	Ch 2, BP 5	Pgs 47-48
Landscape Water Users		
Landscape and irrigation professionals and water providers can educate customers	Ch 6, BPs 1 & 3	Pgs 105 & 106
Energy Users		
Integrate water conservation into educational material and programs	Ch 3, BP 4	Pg 64
Estimate impacts of water conservation by large customers on overall energy demands	Ch 3, BP 1	Pg 63
Golf Courses		
Develop and implement Best Management Practices Plan	Ch 4, BP 5	Pg 74
Keep water use logs and maintain water use database	Ch 4, BP 6 & 7	Pgs 75 - 76

Tier FOUR: “Closing the Gap” or “Beyond Basic” Conservation Practices

Tier FOUR water conservation practices are those considered to generate greater efficiency than the basic practices identified in Tiers ONE, TWO and THREE. This tier will be especially important for those planning regions experiencing a gap between resource availability and current or forecasted water demands.

Tier FOUR, like Tier THREE is supported by the SWP that states that WDCPs may include, “... enhanced water conservation provisions as appropriate for the specific mix of water users in the region and the consumptive use assessments for the region’s water sources.” (SWP, Section 8, impl action (3)).

If a gap exists between current or forecasted demand and resource availability, PCs and Council members are expected to evaluate the impact additional water conservation practices can have on the region’s demand for water. The region-specific evaluation should inform the Council of a mix of water conservation practices that can most effectively manage the region’s demands and therefore be incorporated into the WDCP.

PCs will work with Councils to identify the need for assessing practices in Tier FOUR. If the need exists, PCs will work through a process, instructed by EPD guidance, that will help the council members determine the most effective and efficient practices to include in the WDCP.