

|  |  |
|--|--|
| To: Brazos G Regional Water Planning Group     |  |
| From: Kristi Shaw, P.E.<br>David D. Dunn, P.E. | Project: 2006 Brazos G Regional Water Plan |
| CC: Teresa Clark, BRA                          |  |
| Date: September 14, 2004                       | Job No:                                    |

R:\00044113\Conservation\Municipal Conservation\Memo\_mun\_conserv\_David.doc

## RE: Municipal Water Conservation

During the last meeting of the Brazos G Regional Water Planning Group (BGRWPG) on August 12, 2004, a methodology for developing municipal water conservation strategies was presented to the planning group for consideration. The BGRWPG requested HDR to research and evaluate additional municipal water conservation strategies prior to action by the planning group. This memorandum discusses the results of our research and presents a revised recommendation for identifying municipal water conservation strategies in the 2006 Brazos G Regional Water Plan.

### Background

According to regional water planning group rules, any entity with projected needs (shortages) must first consider water conservation as a water management strategy. The current TWDB demand projections through Year 2060 take into consideration water savings to be expected due to implementation of the 1991 State Water- Efficient Plumbing Act, however any projected water savings due to conservation programs over and above the savings associated with the 1991 Plumbing Act need to be listed as a separate water management strategy. The savings projected by the TWDB include a 100 percent (100%) replacement of existing plumbing fixtures to water-efficient fixtures by Year 2045 (assumed 2% per year replacement). It also assumes that 100 percent of new construction includes water-efficient plumbing fixtures. **Consequently, any water management strategy intended to replace inefficient plumbing fixtures installed prior to 1995 would constitute a simple acceleration of the effects of the 1991 Plumbing Act, but provide no additional long-term savings.** Including a retrofit program as a water management strategy without first discounting the TWDB gpcd reductions would double-count water savings, since those savings due to retrofits are already included in the base water demand projections.

Upon comparing TWDB demand projections and projected water supplies through 2060, 89 of 221 municipal water user groups in the Brazos G Region are projected to have water needs (shortages) by Year 2060.

During the August 12<sup>th</sup> presentation, HDR presented three municipal conservation options:

1. The HDR-recommended "advanced conservation" option for which water savings and costs were based on toilet retrofits, installation of low-flow showerheads and aerators, and irrigation audits for high users, but would be applied as general savings and costs to be expected from any advanced conservation program employing a combination of Best Management Practices (BMPs);
2. An undefined program by which a community would achieve a per capita water use of 125 gallons per capita per day (gpcd) (since revised to 140 gpcd), as discussed as a recommendation of the Water Conservation Implementation Task Force<sup>1</sup>; and
3. An undefined program by which a community would achieve an annual average reduction of one percent (1%) as discussed as a recommendation of the Water Conservation Implementation Task Force.

<sup>1</sup> Texas Water Conservation Implementation Task Force, Summary of Water Conservation Implementation Task Force Meeting, May 24, 2004.

The “advanced conservation” option was based on a 2003 report prepared by GDS Associates for the Texas Water Development Board entitled “Quantifying the Effectiveness of Various Water Conservation Techniques in Texas.” Water savings potential and costs were presented by Planning Region, with specific Water User Groups (WUGs) categorized as rural/urban/suburban communities. The three techniques considered for “advanced conservation” in HDR’s original recommendation were selected based on a cost of less than \$500 per acre-foot saved from a list of six water conservation strategies. These were primarily indoor water conservation techniques. The average cost to implement the three selected strategies was estimated at \$325- \$385 per acre-foot of water saved.

Of the 89 water user groups with shortages in Region G, 41 users with shortages have an estimated consumption rate greater than 125 gpcd in Year 2060. Three graphs representing small, medium, and large municipalities with shortages were presented as examples to compare current TWDB gpcd projections through Year 2060 to the various municipal conservation options (advanced conservation, reduction to achieve 125 gpcd, and 1% annual reduction). The effort to meet Task Force recommendations of either 125 gpcd or 1% annual reduction is the most aggressive (resulting in water use reduction exceeding 40% for municipal users with projected 2060 water use of greater than 200 gpcd).

***Additional Evaluation***

Since the August 12, 2004 Region G Planning Group meeting, HDR has researched and compiled additional water conservation strategies identified in the GDS Associates report, the draft report of the Water Conservation Implementation Task Force<sup>2</sup>, and a water utility profile form<sup>3</sup> provided by the TCEQ to assist utilities with developing water conservation plans. A brief summary is presented below.

GDS Associates Report

The expected water savings attributable to “advanced conservation” was about 7 gpcd for each of the 41 users with shortages and per capita usage rates greater than 125 gpcd. If all six water conservation strategies presented in the GDS Associates report were considered (rather than just strategies costing less than \$500 per acre-foot of water saved), the estimated savings would be a blended average of 13.1 gpcd. These savings are specific to Region G and the 41 specific WUGs.

| <u>Water Conservation Strategies</u> | <u>Average Cost (per acft)</u> | <u>Average Water Savings (gpcd)</u> |
|--------------------------------------|--------------------------------|-------------------------------------|
| <b>Toilet Retrofit*</b>              | <b>\$416</b>                   | <b>4.7</b>                          |
| <b>Showerheads and Aerators*</b>     | <b>\$73</b>                    | <b>2.5</b>                          |
| Clothes Washer Rebate                | \$745                          | 3.0                                 |
| <b>Irrigation Audit- High User*</b>  | <b>\$434</b>                   | <b>0.9</b>                          |
| Rainwater Harvesting                 | \$560                          | 0.5                                 |
| Rain Barrels                         | \$1,091                        | 0.5                                 |
| <b>Total (ALL STRATEGIES)**</b>      | <b>\$583</b>                   | <b>13.1</b>                         |

**\* Included in “Advanced Conservation” option presented at August 12 BGRWPG meeting, assuming 50 percent participation**

**\*\*Totals represent “blended” average costs and savings for WUGs just in Region G**

Water Conservation Implementation Task Force Draft Report

The Task Force’s draft report describes 21 recommended BMPs for municipal water conservation in Texas, few of which have water savings and costs quantified in a manner readily converted to savings and costs that can be utilized by regional water planning groups for identifying strategies. Within the latest draft report, water savings were quantified for the following three municipal water conservation BMPs in a manner that could be applied for regional water planning. Costs associated with these BMPs would require a significant effort to translate into a meaningful cost per acre-foot of water saved for specific utilities:

<sup>2</sup> Water Conservation Implementation Task Force, DRAFT Report for Public Comment: “Best Management Practices Guide,” August 2, 2004.

<sup>3</sup> <http://www.tnrcc.state.tx.us/permitting/forms/10218.pdf>

| <u>Water Conservation Strategies</u> | <u>Average Water Savings (gpcd)</u>                  |
|--------------------------------------|--|
| Water Conservation Pricing           | 2% savings for each 10% price increase               |
| Showerhead & Toilet Flapper Retrofit | 9.5  |
| Landscape Irrigation                 | 11.5 (based upon 15% savings – see discussion below) |

Water Conservation Pricing implementation is specific to each utility and may be difficult to quantify regionally, based on limited information available.

Showerhead & Toilet Flapper Retrofit reduction of 9.5 gpcd is estimated statewide, which differs slightly from the savings of 7 gpcd in the GDS Associates study for WUGs specific to Region G.

Landscape irrigation water consumption was calculated to be 76.5 gpcd based on average water use in Region G of 149 gpcd (Year 2000) and residential indoor water use of 72.5 gpcd<sup>4</sup> (without conservation). The draft Task Force report presents estimates of savings related to landscape irrigation BMPs of 15%. Based upon average Region G use, this translates into a savings of  $76.5 * 0.15 = 11.5$  gpcd attributed to a landscape irrigation water conservation program.

Landscape Irrigation conservation is based on “the utility providing customers with customer support, education, incentives, and assistance in improving landscape water-use efficiency” according to the draft Task Force report. The estimated cost of landscape irrigation by the Task Force is \$400 per acft water saved<sup>5</sup>. Successful implementation of this conservation strategy is based on performing one or a combination of the following programs:

- Evapotranspiration-based water-use budgets;
- Water use surveys, metering, and budgeted water use;
- Climate-appropriate landscape design;
- Minimum standards and upgrades, such as installation of separate irrigation meters.

#### TCEQ Water Utility Profile

There are four municipal water conservation techniques included in the TCEQ water utility profile to assist utilities when preparing water conservation plans. The sources and details of the data used for conservation potentials are unavailable. The following TCEQ water conservation estimates are not included in the draft Task Force report.

| <u>Water Conservation Strategies</u> | <u>Minimum Water Savings (gpcd)</u> | <u>Cost (\$ per acft saved)</u> |
|--------------------------------------|-------------------------------------|---------------------------------|
| Reduce unaccounted for losses        | 0                                   | N/A*                            |
| Water efficient plumbing fixtures    | 20.5                                | N/A*                            |
| Seasonal water use reduction         | 2.35                                | N/A*                            |
| Public education programs            | 2.98                                | N/A*                            |
| <b>Total</b>                         | <b>25.8</b>                         |                                 |

\*N/A= Not Available

#### **Summary and Recommendation**

According to TWDB regional water planning rules, any WUG with projected needs (shortages) must first consider water conservation as a water management strategy for the 2006 Regional Water Plan. Two documents, GDS Associates report and Water Conservation Implementation Task Force Draft Report, provide guidance for municipal water conservation, although the costs and savings presented in the Task Force Draft Report have limited applicability. Since the TWDB requires specific BMPs be identified with costs and savings for each entity with projected needs, the list of BMPs to select from is significantly shortened.

The Water Conservation Implementation Task Force Draft Report has adjusted the target level to 140 gpcd (up

<sup>4</sup> Report on Results of Residential End Uses Study, Water Wiser, 1999, as referenced by David Wheelock (Task Force member) in presentation to BGRWPG on April 14, 2004.

<sup>5</sup> David Wheelock (Task Force member), as presented to the BGRWPG on April 14, 2004.

from 125 gpcd). This reduces the number of WUGs exceeding the target from 41 to 30.

HDR suggests using the following municipal conservation BMPs to estimate costs and water savings for the 2006 Brazos G Regional Water Plan for WUGs with shortages and usage greater than 140 gpcd in 2060. For water user groups with shortages and usage less than 140 gpcd in 2060, conservation would be recommended; however, specific conservation BMPs would not be recommended or specifically identified since the Task Force target level of 140 gpcd is met. If all the programs listed below are implemented for a WUG, an estimated total reduction of 21 gpcd can be expected. This total reduction of 21 gpcd includes those reductions already incorporated into the TWDB demand projections. In order to meet both short and long-term needs, it is assumed that the 21 gpcd reduction will occur by Year 2020 for all WUGs with needs, regardless of the timing of shortages.

**Recommended Conservation BMPs for Inclusion as Water Management Strategies for Municipal WUGs with Needs, Beginning in Year 2020**

| <b>Conservation BMP</b>   | <b>Savings</b> | <b>Source</b>  |
|---|----------------|--|
| Advanced Conservation <ul style="list-style-type: none"> <li>• Toilet retrofit</li> <li>• Showerheads and Aerators</li> <li>• Irrigation Audit – High User</li> </ul> | 7 gpcd*        | GDS Associates, savings are for existing connections only      |
| Landscape Irrigation  | 11 gpcd        | Based upon 15% reduction referenced in draft Task Force report |
| Public Education Programs   | 3 gpcd         | TCEQ   |
| <b>Total</b>  | <b>21 gpcd</b> |  |

\*Note: This is an average for the WUGs analyzed, and represents 50% replacement of existing fixtures. In contrast, the TWDB maximum savings for a specific WUG in Region G (Brazos County-other) is about 13 gpcd, representing 100% replacement of existing fixtures for a WUG projected to have declining population and, consequently, minimal new construction.

The above list will be identified in the Plan for costing/savings estimates; however the Plan will include text and/or tables identifying all BMPs that can potentially be substituted for, or combined with, those identified in the 2006 Plan.