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Water Conservation Plan

Prepared for:

North Texas Municipal Water District

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FORWARD

This Water Conservation Plan was prepared by Freese and Nichols for the North Texas Municipal Water District (NTMWD), pursuant to Texas Commission on Environmental Quality rules. Some material is based on the existing water conservation plans listed in Appendix A.

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This water conservation plan is based on the Texas Administrative Code in effect on June 25, 2013 and considers water conservation best management practices from Texas Water Development Board Report 362, *Water Conservation Best Management Practices Guide*. The Texas Commission on Environmental Quality (TCEQ), Texas Water Development Board (TWDB) and Water Conservation Advisory Council (WCAC) are currently reviewing additional regulations in compliance with the mandates of Senate Bill 181 enacted in 2011 by the 82nd Texas Legislature. In addition to these rules, the WCAC is reviewing additional Best Management Practices (BMPs) for Wholesale Suppliers. The draft regulations and BMPs have also been considered in the preparation of this plan. The following items that are not currently in the regulations are presented in the draft regulations or under consideration by the WCAC:

- Reporting requirement for TWDB and TCEQ.
- A standardized methodology for calculating per capita use.
- Calculating per capita use by sector (i.e. total, residential (single and multi-family), industrial, institutional and commercial).
- Additional BMPs for Wholesale Suppliers (Contract Requirements, Technical Assistance and Outreach, Collective Purchasing and Direct Distribution, Cost Sharing Programs).

None of the currently proposed adjustments will cause this plan to be obsolete. The most current annual report form should be obtained from TCEQ¹ when preparing the annual report (Appendix F) to submit to the TCEQ. A copy of the annual report should be sent to the Texas Water Development Board as well as to the TCEQ.

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1. INTRODUCTION AND OBJECTIVES

The North Texas Municipal Water District (“NTMWD” or the “District”) is a regional wholesale supplier of water for 13 Member Cities and 60 other water suppliers in Collin, Dallas, Denton, Fannin, Hopkins, Hunt, Grayson, Kaufman, Rains, Rockwall and Van Zandt Counties. NTMWD currently provides water for over 1.6 million people throughout North Central Texas. The District has developed this updated Water Conservation Plan as a replacement for previous District water conservation plans dated August 2004, April 2006 and March 2008.

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development of North Central Texas have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely already developed. Additional supplies to meet future demands will be expensive and difficult to secure. Severe drought conditions in recent years have highlighted the importance of efficient use of our existing supplies to make them last as long as possible. Extending current supplies will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (“TCEQ”) has developed guidelines and requirements governing the development of water conservation and drought contingency plans for wholesale water suppliers². The TCEQ guidelines and requirements for wholesale suppliers are included in Appendix B. NTMWD has developed this water conservation plan in accordance with TCEQ guidelines and requirements.

NTMWD also recognizes that in order to achieve its goals of maximizing water conservation and efficiency, it is necessary to develop and implement a water conservation plan that goes beyond basic compliance with TCEQ guidelines and requirements. This plan reflects NTMWD’s commitment to enhanced water conservation and efficiency strategies – particularly those best management practices established by the Water Conservation Implementation Task Force,³ which were incorporated, where practicable, in the development of these water conservation measures. The Water Conservation Implementation Task Force developed the Texas Water Development Board Report 362 *Water Conservation Best Management Practices Guide* in partial fulfillment of the Texas Legislature’s charge to the TCEQ and Texas Water Development Board (“TWDB”) to develop recommendations for optimum levels of water use efficiency and conservation in the State.

NTMWD has, where practicable, implemented those best management practices that are appropriate for a wholesale water supplier of its type, reflecting the intent of the best management practices to provide flexibility to wholesalers in implementing those practices that are appropriate for their individual circumstances.

As a wholesale supplier of water to customers, NTMWD does not have any direct control over the end user of water, nor does it have the authority to create ordinances or enforce the measures laid out in this plan for end users. In order to work within the confines of its role as a wholesaler, NTMWD has developed Model Water Conservation Plans to be adopted by Member Cities and Customers, who then have the ability to enforce those measures through ordinances or regulations on end users (See Appendix C).

NTMWD has also made significant financial and other investments to promote water conservation and efficiency, including public education and awareness programs and other initiatives targeted toward reducing water use. Specifically, the District maintains active participation in the Water Conservation Advisory Council, the Alliance for Water Efficiency (on behalf of itself and its Member Cities), EPA Water Sense, the Texas Water Smart Coalition, and the Water Efficiency Network of North Texas, and it developed and financed the *Water IQ* Program, a highly successful public awareness campaign that is now being used statewide to promote water conservation.

NTMWD understands that achieving the highest practicable levels of water conservation and efficiency requires that it look beyond the TCEQ requirement to update its plan every five years. To that end, the District will continually reassess ways in which to improve upon its water conservation and efficiency, and is committed to updating this plan whenever new opportunities to improve upon water conservation and efficiency necessitate edits and revisions hereto.

The objectives of this Water Conservation Plan are as follows:

- To reduce water consumption from the levels that would prevail without conservation efforts.
- To reduce the loss and waste of water.
- To improve efficiency in the use of water.
- Encourage efficient outdoor water use.
- To document the level of recycling and reuse in the water supply.

- To extend the life of current water supplies by reducing the rate of growth in demand.

2. DEFINITIONS

1. ATHLETIC FIELD means a public sports competition field, the essential feature of which is turf grass, used primarily for organized sports practice, competition or exhibition events for schools, professional sports, or sanctioned league play.
2. COOL SEASON GRASSES are varieties of turf grass that grow best in cool climates primarily in northern and central regions of the U.S. Cool season grasses include perennial and annual rye grass, Kentucky blue grass and fescues.
3. CUSTOMERS include those entities to whom NTMWD provides water on a customer basis that are not members of NTMWD.
4. EVAPOTRANSPIRATION abbreviated as ET represents the amount of water lost from plant material to evaporation and transpiration. The amount of ET can be estimated based on the temperature, wind, and relative humidity.
5. ET/SMART CONTROLLERS are irrigation controllers that adjust their schedule and run times based on weather (ET) data. These controllers are designed to replace the amount of water lost to evapotranspiration.
6. EXECUTIVE DIRECTOR means the Executive Director of the North Texas Municipal Water District and includes a person the Director has designated to administer or perform any task, duty, function, role, or action related to this plan or on behalf of the Executive Director.
7. INSTITUTIONAL USE means the use of water by an establishment dedicated to public service, such as a school, university, church, hospital, nursing home, prison or government facility. All facilities dedicated to public service are considered institutional regardless of ownership.
8. MEMBER CITIES include the cities of Allen, Farmersville, Forney, Frisco, Garland, McKinney, Mesquite, Plano, Princeton, Richardson, Rockwall, Royce City, and Wylie, Texas.
9. MULTI-FAMILY PROPERTY means a property containing five or more dwelling units.
10. MUNICIPAL USE means the use of potable water provided by a public water supplier as well as the use of treated wastewater effluent for residential, commercial, industrial, agricultural, institutional, and wholesale uses.

11. RECLAIMED WATER means reclaimed municipal wastewater that has been treated to a quality that meets or exceeds the minimum standards of the 30 Texas Administrative Code, Chapter 210 and is used for lawn irrigation, industry, or other non-potable purposes.
12. REGULATED IRRIGATION PROPERTY means any property that uses 1 million gallons of water or more for irrigation purposes in a single calendar year or is greater than 1 acre in size.
13. RESIDENTIAL GALLONS PER CAPITA PER DAY (Residential GPCD) the total gallons sold for residential use by a public water supplier divided by the residential population served and then divided by the number of days in the year.
14. TOTAL GALLONS PER CAPITA PER DAY (Total GPCD) The total amount of water diverted and/or pumped for potable use divided by the total permanent population divided by the days of the year. Diversion volumes of reuse as defined in TAC 288.1 shall be credited against total diversion volumes for the purposes of calculating GPCD for targets and goals.
15. WATER CONSERVATION PLAN means this water conservation plan approved and adopted by the NTMWD Board of Directors on February 27, 2014.

3. REGULATORY BASIS FOR WATER CONSERVATION PLAN

3.1 TCEQ Rules Governing Conservation Plans

The TCEQ rules governing development of water conservation plans for wholesale water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.5 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a water conservation plan is defined as “a strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).”² The elements in the TCEQ water conservation rules addressed in this Water Conservation Plan are listed below. In addition to being a wholesale provider under TCEQ rules, NTMWD also acts as a retail water provider, and thus the TCEQ water conservation rules for retail water providers are addressed in Section 9 of this Plan.

Minimum Conservation Plan Requirements for Wholesale Water Suppliers

NTMWD is a wholesale water supplier to Member Cities and Customers in North Central Texas (NTMWD’s Customers include cities, water supply corporations, and utility districts). The minimum requirements in the Texas Administrative Code for water conservation plans for wholesale water suppliers are covered in this Plan as follows:

- 288.5(1)(A) – Description of Service Area – Section 4 and Appendix D
- 288.5(1)(B) – Specification of Goals – Section 5
- 288.5(1)(C) – Specific, Quantified Goals – Section 5
- 288.5(1)(D) – Measure and Account for Water Diverted – Section 6.1.1
- 288.5(1)(E) – Monitoring and Record Management System – Section 6.1.2
- 288.5(1)(F) – Program of Metering and Leak Detection and Repair – Section 6.1.3
- 288.5(1)(G) – Requirement for Water Conservation Plans by Wholesale Customers – Section 6.2
- 288.5(1)(H) – Reservoir System Operation Plan – Section 6.3

- 288.5(1)(I) – Means of Implementation and Enforcement – Section 6.4
- 288.5(1)(J) – Documentation of Coordination with Regional Water Planning Group – Section 6.5
- 288.5(3) – Review and Update of Plan – Section 8

Texas Administrative Code 288.7(a) imposes additional requirements for Water Conservation Plans submitted with a water right application for new or additional state water, and those requirements are addressed in Appendix H.

Additional Conservation Strategies

The Texas Administrative Code lists additional water conservation strategies that can be adopted by a wholesale supplier but are not required. Additional strategies adopted by NTMWD include the following:

- 288.5(2)(C) – Program for Reuse and/or Recycling – Section 7.1
- 288.5(2)(D) – Other Measures
 - Section 7.2 (public education),
 - Section 7.5 (model water conservation plans),
 - Sections 7.5.1 and 7.5.2 (landscape water management measures),
 - Section 7.10 (zero discharge from water treatment plants); and
 - Section 7.11 (in-house conservation measures).

3.2 Guidance and Methodology for Reporting on Water Conservation and Water Use

In addition to TCEQ rules regarding water conservation, this plan also incorporates elements of the Guidance and Methodology for Reporting on Water Conservation and Water Use developed by TWDB and TCEQ, in consultation with the Water Conservation Advisory Council (the “Guidance”). The Guidance was developed in response to a charge by the 82nd Texas Legislature to develop water use and calculation methodology and guidance for preparation of water use reports and water conservation plans in accordance with TCEQ rules. While the Guidance is targeted toward retail water providers, the Guidance provides helpful resources for wholesalers such as NTMWD to determine water use and water loss for purposes of its water conservation

plan. NTMWD has considered elements of the Guidance in preparation of this Plan. NTMWD has also incorporated features of the Guidance into the Model Water Conservation and Model Water Resource and Emergency Management Plans that it develops for use by its Member Cities and Customers. Copies of the Model Water Conservation Plans and Model Water Resource and Emergency Management Plans are included herewith as Appendix C.

4. DESCRIPTION OF THE NTMWD SERVICE AREA

NTMWD provides treated potable water to 13 Member Cities and 60 other Customers (some direct and some indirect) in North Central Texas. Figure 4-1 shows a schematic diagram of NTMWD's system and its Member Cities and Customers. Figure 4-2¹ shows the NTMWD service area, which covers over 2,200 square miles in Collin, Dallas, Denton, Fannin, Grayson, Hopkins, Hunt, Kaufman, Rains, Rockwall and Van Zandt Counties.

NTMWD obtains its raw water supplies from Lavon Lake, Lake Texoma, Jim Chapman Lake, Lake Tawakoni, the Upper Sabine Basin, Lake Bonham and reuse of treated wastewater effluent from its Wilson Creek Regional Wastewater Treatment Plant, and the East Fork Raw Water Supply Project. In 2009, NTMWD ceased raw water pumping from Lake Texoma due to the presence of Zebra Mussels, reducing available water supplies by 28 percent. NTMWD is in the process of constructing a pipeline that will allow the District to resume pumping from Lake Texoma in 2014. The long-term supply available to NTMWD as of 2013 is 617,499 acre-feet per year. The reliable supply from existing sources is somewhat less than the permitted supply, and NTMWD is seeking additional supplies to meet its projected demands. NTMWD operates four water treatment plants in Wylie, Texas, near Lavon Lake, with a total treatment capacity of 770 MGD. NTMWD also operates the 30 MGD Tawakoni water treatment plant northeast of Terrell and the 6 MGD Bonham water treatment plant. Plate 1 in the envelope at the back of this Plan shows NTMWD's current water treatment and distribution system. In addition to the facilities shown on Plate 1, NTMWD owns and operates a 6 MGD water treatment plant in Bonham, Texas.

Appendix D to this Water Conservation Plan is a water utility profile for NTMWD, based on the format recommended by the TCEQ. Table 4-1 summarizes key facts from the Water Utility Profile.

¹ The NTMWD service area shown in Figure 4.2 includes the entire service area of all of the entities to which NTMWD provides water. Actual NTMWD facilities do not extend into Hopkins, Hunt, and Rains Counties. Some of NTMWD's customers have other sources of water supply in addition to NTMWD.



Figure 4-1 North Texas Municipal Water District System Schematic

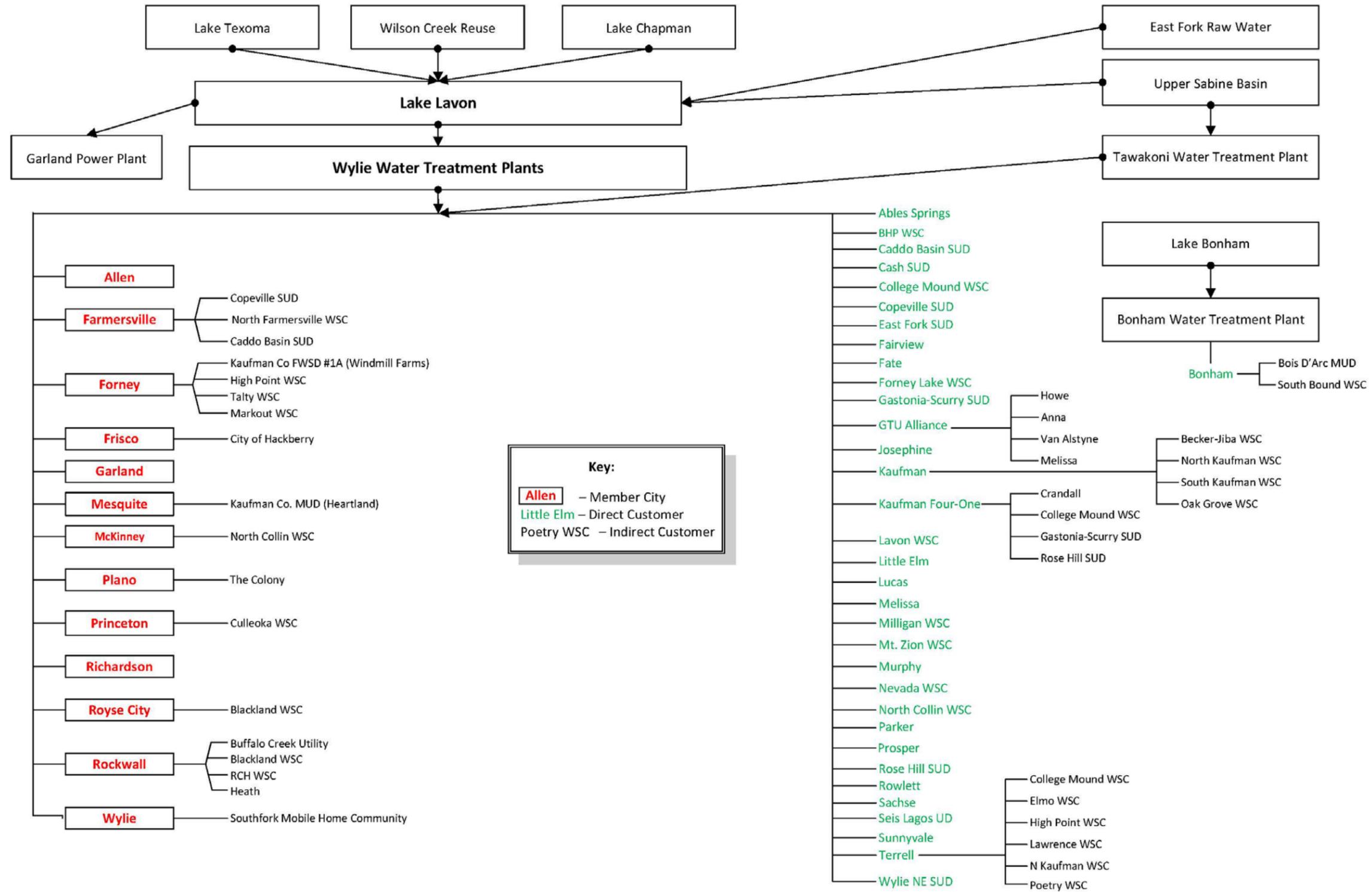


Figure 4-2 North Texas Municipal Water District Current Service Area Map

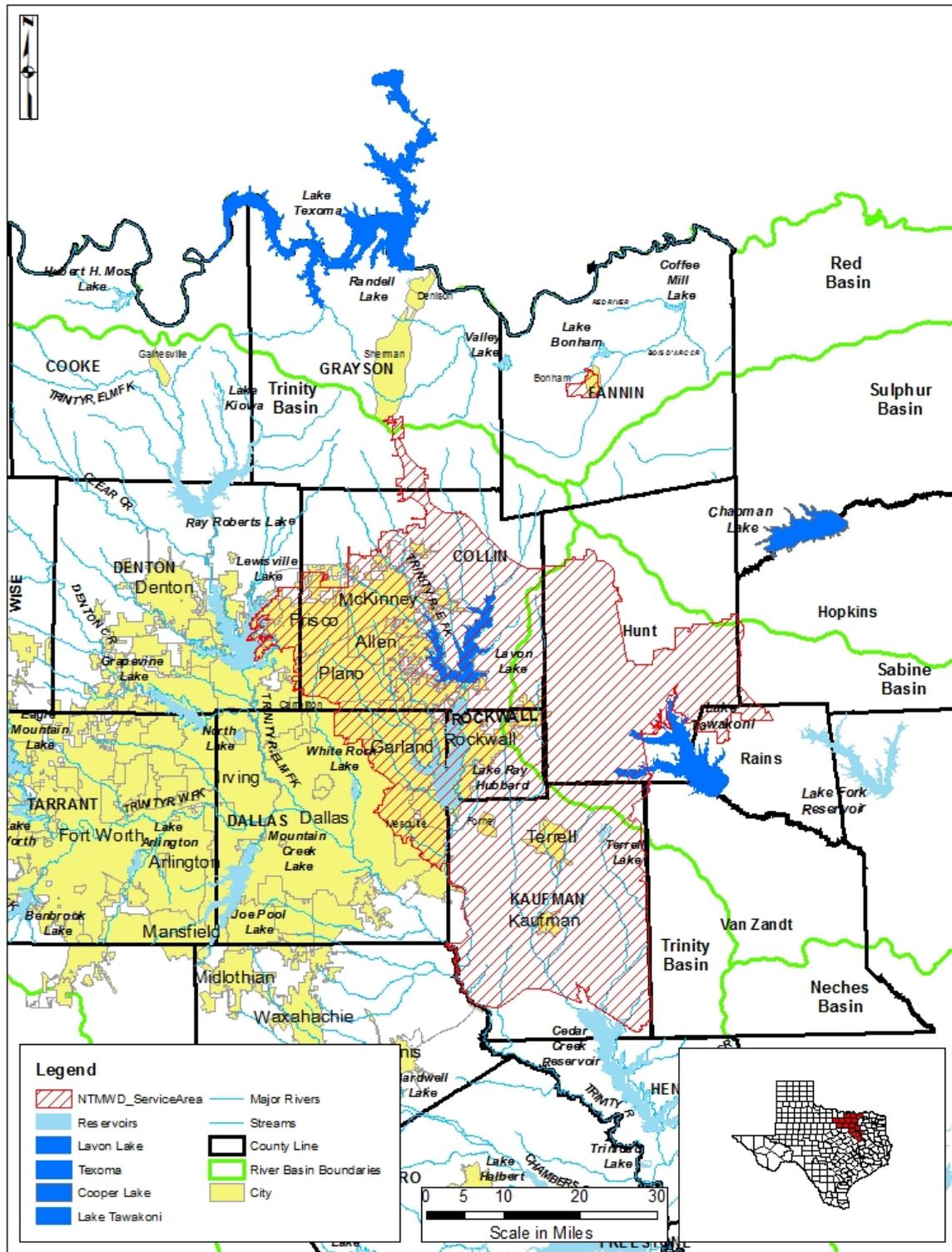


Table 4-1 Summary of Water Utility Profile for North Texas Municipal Water District

Water Service Area = 2,200 square miles

Miles Raw and Potable Water Transmission Distribution Pipeline = 518 miles

Population:

Current Population Served = 1.6 million in 2013 (estimated)

Projected 2070 Population = 3.8 million (current & projected Member Cities & Customers)

Connections:

Current Retail Connections = 41 in 2012

Information on Water Sales for the Last Five Years:

Year	Total Municipal Raw Water Diverted (Million Gallons)	Estimated Population*	Raw Water Total GPCD with Credit for Indirect Reuse (GPCD)	Ratio of Peak Day to Average Day
2008	96,441	1,413,059	165	2.04
2009	88,536	1,455,451	134	1.94
2010	101,478	1,464,391	156	1.97
2011	108,813	1,501,001	161	2.03
2012	100,933	1,596,304	140	2.01

* The estimated population served in 2012 is from the Appendix D submitted by NTMWD Customers.

Water Supply Sources (as of 2012) = Lavon Lake, Lake Texoma, Jim Chapman Lake, Lake Tawakoni, Lake Bonham, Reuse from Wilson Creek Regional Wastewater Treatment Plant, East Fork Raw Water Supply, and Upper Sabine Raw Water Supply.

Treatment and Distribution System:

Treatment Plant Capacity = 770 MGD in September 2012

Ground storage = 74 million gallons (35 MG at Plants, 39 MG remote)

Current Wastewater Flow = 42,683 million gallons in 2012

5. SPECIFICATION OF WATER CONSERVATION GOALS

As a wholesale water supplier, NTMWD does not control the water use of its Member Cities and Customers and does not have a direct relationship with the retail customers who are the ultimate consumers of the water. The Total GPCD for NTMWD’s system can be affected by changes in per capita use by its Member Cities and Customers, and can also be affected by how much water NTMWD is asked to supply to high per capita use customers or low per capita use customers. These factors are not controlled by NTMWD. In order to gain a more accurate understanding of water use within its service area and assist Member Cities and Customers in conservation efforts, NTMWD, where practicable, works with its Member Cities and Customers to utilize the Guidance and Methodology for Reporting on Water Conservation and Water Use for sector-based water use reporting. NTMWD also affords its Member Cities access to the Alliance for Water Efficiency’s Tracking Tools at the District’s expense, which enable the Member Cities to more adequately track water use by sector.

Figure 5-1 North Texas Municipal Water District Total GPCD Analysis

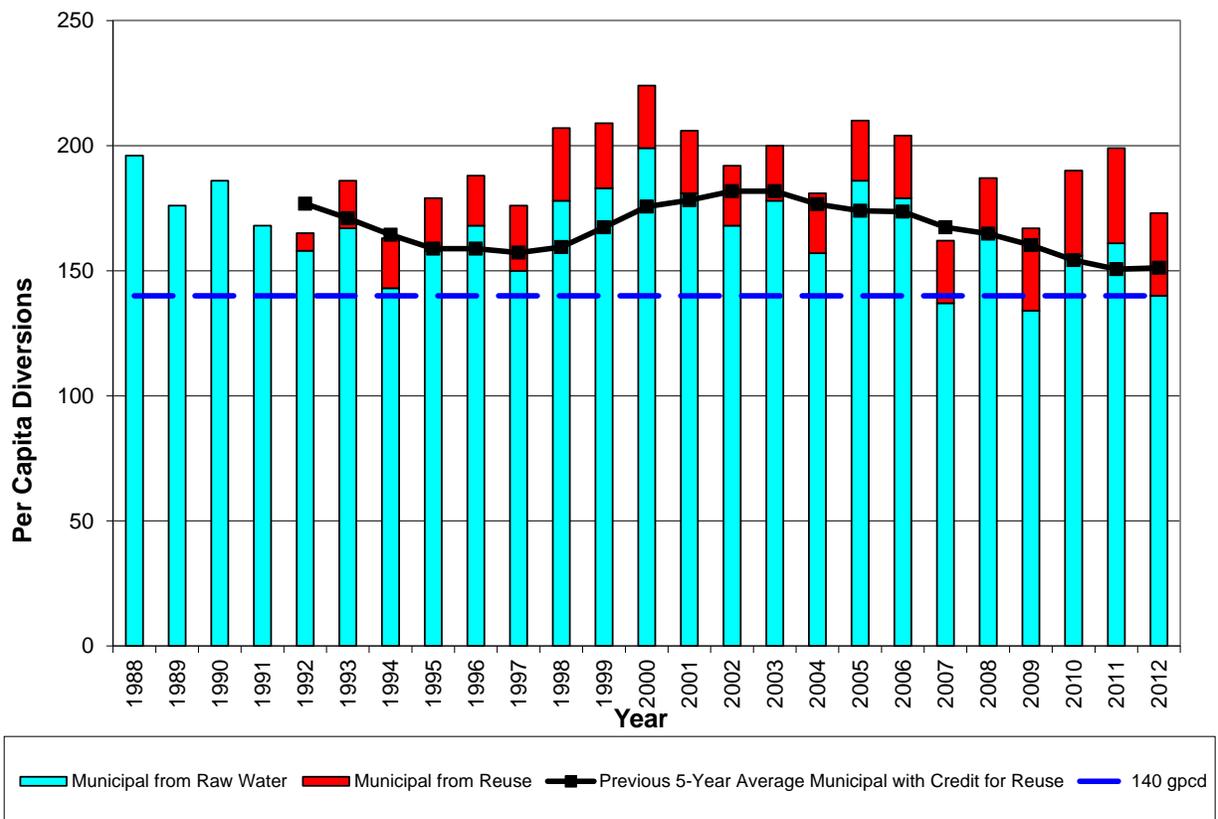


Figure 5-1 shows the historical total GPCD, with credit for indirect reuse, for the NTMWD from 1998-2012. The figure shows the amount of per capita from municipal use, industrial use and from municipal reuse. As is the case with most suppliers, there is great variability in per capita use due to weather and other factors. A 5 year average total GPCD with credit for indirect reuse is plotted to show long-term trends. Since the early 2000s, NTMWD has experienced a steady decline in their 5 year average, including dry years in 2006 and 2011. Currently, the 5-year average for total GPCD, with credit for indirect reuse, is approximately 150 GPCD, which is near the State goal for water use outlined in the Water Conservation Implementation Task Force Report 362, as well as the Region C 2011 Water Plan.²

NTMWD has control over the operation of its water supply, treatment, and delivery system and takes direct action to maximize the efficiency of that system. In areas under its direct control, NTMWD adopts the following goals for water conservation and efficiency:

- Keep the level of unaccounted water in the system below 5 percent in 2013 and subsequent years, as discussed in Section 6.1.
- Maintain universal metering of customers, meter calibration, and meter replacement and repair, as discussed in Section 6.1.
- Maintain a program of leak detection and repair, as discussed on Section 6.1.
- Continue to utilize wastewater reuse as a major source of water supply, as discussed in Section 7.1. Seek TCEQ authorization for additional reuse to increase the efficiency of the NTMWD water supply system.
- Raise public awareness of water conservation and encourage responsible public behavior by a public education program, as discussed in Section 7.2.
- Continue to recycle wash water from NTMWD water treatment plants, as discussed in Section 7.10.
- Continue to implement other in-house water conservation efforts, as discussed in Section 7.11.

As a wholesale provider, NTMWD will continue to assist its Member Cities and Customers in the development of water conservation programs. NTMWD has developed a Model Water Conservation

² Note that both Water Conservation Implementation Task Force Report 362 and the 2011 Region C Water Plan identify a goal of 140 GPCD incorporating a credit for both direct and indirect reuse. NTMWD has mirrored that approach in its calculation of Total GPCD with a credit for indirect reuse.

Plan for NTMWD Member Cities and Customers³ and a Model Water Resource and Emergency Management Plan that its Member Cities and Customers can use to develop their own water conservation and drought contingency plans. As part of the Model Water Conservation Plan, NTMWD requires Member Cities and Customers to provide annual water conservation reports. NTMWD reviews these reports and compiles the information as part of its own annual conservation report, which is used to manage NTMWD's water conservation program. Annual water conservation reports also provide for the reporting of annual sector-based water use information, where practicable.

Table 5-1 shows the projected Total GPCD, with credit for indirect reuse, for NTMWD. NTMWD has outlined its 5- and 10-year Total GPCD goals according to a credit for indirect reuse, as the GPCD goals recommended by the Region C Water Planning Group and approved by the TWDB incorporate a credit for indirect reuse. The projected per capita use approved by the TWDB includes the estimated effect of low-flow plumbing fixtures but does not include the effect of new water conservation measures that may be adopted by NTMWD Member Cities and Customers. Table 5-1 also shows NTMWD's targets for reduction in Total GPCD, with credit for indirect reuse, as a result of implementing this Water Conservation Plan and the plans to be developed by its Member Cities and Customers. The data shown on the table reflect the following:

- The five year moving average of the current Total GPCD, with credit for indirect reuse, is used based on the Water Conservation Implementation Task Force recommendation².
- The target for the five-year (2017) Total GPCD with credit for indirect reuse for all NTMWD Member Cities and Customers is 145 gallons per capita per day, based on a five-year moving average, as shown in Table 5-1 (5-year goal). This represents a reduction of 6 gallons per capita per day.
- The target for the ten-year (2022) Total GPCD with credit for indirect reuse for all NTMWD Member Cities and Customers is 140 gallons per capita per day based on a five year moving average, as shown in Table 5-1 (10-year goal). This represents a reduction of 11 gallons per capita per day.

The per capita use in recent years includes reductions due to drought measures that have been implemented in the past five years. In addition to these drought measures, NTMWD has continued to increase the percentage of its supply that comes from reuse, as shown in Table 5-1. The goal is for a 5-

year average and some years (dry years) will be higher. A series of dry years might lead to an average exceeding the goal.

Table 5-1 Five-Year and Ten-Year Total GPCD Goals*

Description	Current Average (GPCD)	5-Year Goal (2017) (GPCD)	10-Year Goal (2022) (GPCD)
Current 5-Year Average Per Capita Total Use	183		
Current 5-Year Average Per Capita Municipal Use from Reuse	32		
Current 5-Year Average Per Capita Municipal Use with Credit for Reuse	151		
Expected Reduction Due to Low-Flow Plumbing Fixtures		1	3
Projected Reduction Due to Elements in this Plan		5	8
Water Conservation Goals (Based on 5-Year Average with credit for reuse)		145	140

* Includes credit for indirect reuse.

6. BASIC WATER CONSERVATION STRATEGIES

6.1 Metering, Water Use Records, Control of Unaccounted Water, and Leak Detection and Repair

One of the key elements in water conservation is careful tracking of water use and control of losses. Accurate metering of water deliveries, detection and repair of leaks in the raw water delivery and potable water distribution systems and regular monitoring of unaccounted water are important elements of NTMWD's program to control losses. To that end, in 2012 the NTMWD Board of Directors authorized an expenditure of \$4.8 million in flow metering improvements, including new meters for several of its water treatment plants. These metering upgrades allow for more accurate metering and ultimately, more careful monitoring of water use and water loss control.

6.1.1 Practices to Measure and Account for the Amount of Water Diverted

NTMWD meters its raw water diversions by meters with accuracy of $\pm 2\%$. These meters are calibrated on an annual basis by NTMWD and are repaired and/or replaced as needed.

6.1.2 Monitoring and Record Management Program for Determining Deliveries, Sales, and Losses

As a wholesale water supplier, NTMWD has instituted a program of careful monitoring and record management to assure that its Member Cities and Customers are charged appropriately for their water use. The program includes the following elements:

- Deliveries to all Member Cities and Customers are metered by meters with accuracy of $\pm 2\%$, which are read monthly by NTMWD personnel. These readings are used to bill Member Cities and wholesale Customers.
- The meters used to measure deliveries to the Member Cities and wholesale Customers are calibrated quarterly and tested, as necessary.
- Potable drinking water leaving NTMWD's water treatment plants is metered by meters with accuracy of $\pm 2\%$.
- Plant potable water discharge meters are calibrated at least quarterly and more frequently if necessary.
- All meter readings are sent to Member Cities and Customers so that they can compare the readings against the operation of their systems.

- NTMWD monitors unaccounted water in its delivery system. (For NTMWD, unaccounted water is defined as raw water diverted from Lavon Lake less metered sales to Member Cities and Customers and line flushing use.) Historical records show that NTMWD's unaccounted water has been as high as 8.4 percent and as low as 0.9 percent of raw water diversions and averaged 2.9 percent over that period. This low level of unaccounted water is evidence of NTMWD's diligence in metering all uses and controlling losses in its system.
- Some NTMWD Member Cities and Customers have leak detection crews that are utilized and available for other Member Cities and Customers.

One of the goals of NTMWD's water conservation program is to maintain unaccounted water below 5 percent in every year.

6.1.3 Leak Detection and Repair

NTMWD's metering program for raw and potable water is described in Sections 6.1.1 and 6.1.2. As evidenced by the low level of unaccounted water described in Section 6.1.2, NTMWD has an effective program to control, detect, and repair leaks:

- All NTMWD water transmission pipelines are reinforced concrete cylinder pipe or steel cylinder pipe with an internal protective liner and an external protective coating. Because of the multiple layers of material, these pipelines have very long service lives and are not subject to frequent development of leaks.
- Most joints in NTMWD water transmission pipelines are designed with bell and spigot joint construction including a rubber gasket. Some joints are welded.
- All NTMWD water transmission pipelines are constructed in legally defined and identified rights-of-way, properly registered with authorities in each county.
- NTMWD personnel routinely inspect NTMWD facilities and water transmission pipelines for leaks or mechanical problems. Repairs are undertaken as soon as practicable in order to minimize waste.
- NTMWD operates a program for right-of-way identification for construction projects adjacent to NTMWD facilities and water transmission pipelines in order to minimize leaks caused by pipeline damage during construction.
- NTMWD's metering program allows comparison of measured flows in the system and metered deliveries to Member Cities and Customers, which can be used to identify leaks.

- NTMWD's regular monitoring of unaccounted water (on a monthly basis) provides a further check for problems in the distribution system.
- NTMWD personnel perform regular inspections of its system to detect unauthorized connections.

6.2 Requirement for Water Conservation Plans by Wholesale Customers

NTMWD has developed language for all contracts for the wholesale sale of water by NTMWD entered into, renewed, or extended after the adoption of this Plan that will require the wholesale customer and any wholesale customers of that wholesale customer to develop and implement a water conservation plan meeting the requirements of Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code.

Further, all wholesale contracts with Customers entered into, renewed, or extended after the adoption of this plan will include the following language:

Customer agrees to adopt, implement, and enforce any and all ordinances and policies related to water conservation and drought management as required by the Texas Water Code, rules of the TCEQ and/or as may be adopted by the Board of Directors of NTMWD. NTMWD's obligations pursuant to this Contract shall be subject to the Customer preparing and implementing any water conservation plans and drought contingency plans adopted by NTMWD and required or approved by the TCEQ, the Board, or any federal, state, or local regulatory authority with power to require or approve water conservation and drought contingency plans. Upon execution of this Contract, Customer shall submit its water conservation plan or water conservation measures, and drought contingency plan, to NTMWD for review and approval, and Customer agrees to amend its water conservation plan or other water conservation measures, and drought contingency plan as requested by NTMWD in order to comply with the requirements of NTMWD's water conservation plan and drought contingency plan, program and/or rules. Customer shall also submit any changes or amendments to its water conservation plan or water conservation measures, and drought contingency plan, to NTMWD for review and approval.

6.3 Reservoir System Operation Plan

NTMWD currently has a long-term water supply of 617,499 acre-feet per year from the following permitted and contractual sources:

Lavon Lake water right	118,670 acre-feet per year
Lake Texoma†	197,000 acre-feet per year
Jim Chapman Lake	57,214 acre-feet per year
Lake Bonham	5,340 acre-feet per year
Reuse - Wilson Creek Reg. WWTP*	71,882 acre-feet per year
East Fork Raw Water Supply*	157,393 acre-feet per year
Upper Sabine Basin	10,000 acre-feet per year
TOTAL	617,499 acre-feet per year

* Availability from Wilson Creek WWTP and East Fork Raw Water Supply Project is limited to actual discharges and is currently less than amount authorized.

† Availability from Lake Texoma is limited due to issues with zebra mussels and salt levels.

In addition, NTMWD has entered into short-term interim contracts for 67,260 acre-feet per year from the City of Dallas (expiring in 2016), and for 40,000 acre-feet per year from the Sabine River Authority (decreasing incrementally over time and expiring in 2025).

The current reliable water supply (based on current return flows and supplies available in a drought of record) is about 295,000 acre-feet per year. Upon completion of the pipeline to deliver Lake Texoma water directly to the Wylie Water Treatment Plants is completed (scheduled for April 2014), the reliable water supply will increase to 379,000 acre-feet per year.

Water from Jim Chapman Lake is pumped by pipeline to the Lavon Lake watershed, where it flows into Lavon Lake. A pipeline from Lake Texoma is being constructed that will bring water from the lake directly to NTMWD's Water Treatment Plant in Wylie. Treated wastewater effluent from the Wilson Creek Regional Wastewater Treatment Plant is returned to the Lavon Lake watershed. Water from East Fork Raw Water Supply Project is pumped to Lavon Lake. Water from Lake Tawakoni (Upper Sabine Basin) is pumped to the Lake Tawakoni Water Treatment Plant and also delivered as raw water to Lavon Lake. Water from Lake Bonham is pumped to the NTMWD Bonham Water Treatment Plant. NTMWD has developed a reservoir system operation plan for its various sources of supply in order to maximize the efficiency of operation within existing water rights. The NTMWD reservoir system operation plan includes pumping from alternative sources before Lavon Lake reaches extremely low elevations to avoid water supply problems that would be caused by low water surface elevations. The plan minimizes pumping into the Lavon Lake during flood conditions. The plan also avoids unnecessary pumping from

alternative sources to minimize energy use and avoid causing low elevations in other sources. Overall, the operation of the reservoir system is intended to optimize the use of the District's sources (within the constraints of existing water rights) while minimizing energy use cost for pumping, maintaining water quality and minimizing potential impacts on recreational users of the reservoirs and fish and wildlife.

6.4 Water Conservation Implementation and Enforcement

The Executive Director of NTMWD is authorized to implement and enforce the Water Conservation Plan. Appendix F includes the TCEQ-required water conservation implementation report. NTMWD will submit this report to the TCEQ by the required date of May 1 of every year. This report lists the various water conservation strategies that have been implemented, including the date the strategy was implemented. The report also lists the five-year and ten-year per capita water use goals from the previous water conservation plan, and the amount of water saved. This report will be used to review the effectiveness of NTMWD's water conservation program, and results will be reported to the NTMWD Water Committee of the NTMWD Board and the Board of Directors.

As a wholesale provider of water, NTMWD has no direct enforcement authority over those conservation practices ultimately implemented and enforced by its Member Cities and Customers. However, as discussed herein, NTMWD makes best efforts to ensure implementation and enforcement of its water conservation plan via outreach, technical assistance, and the contractual requirements discussed in Section 6.2. Further, NTMWD's annual water conservation report provides a means by which NTMWD can measure its success and quantify water savings via conservation initiatives, thereby optimizing implementation of the plan over time.

6.5 Coordination with Regional Water Planning Groups

NTMWD's service area is located within two regional water planning areas, Region C and the North East Texas Region (Region D). Appendix G includes copies of those letters sent to the Chairs of the Region C and North East Texas Region water planning groups with a copy of this Water Conservation Plan.

As part of its coordination with the appropriate regional water planning groups to ensure consistency with the state and regional water plans, NTMWD has undertaken an evaluation of the feasibility of alternatives to proposed future water right applications by NTMWD pursuant to Title 30, Chapter 288, Section 288.7 of the Texas Administrative Code. This evaluation assessed waste prevention, recycling and reuse, water transfer and marketing, regionalization, and other water supplies identified in the

Region C and the North East Texas (Region D) Water Plans as possible alternatives to future appropriations. A synopsis of this assessment is included herewith as Appendix H.

7. ENHANCED WATER CONSERVATION STRATEGIES

NTMWD has implemented a number of enhanced water conservation measures which allow the District to serve as a regional leader and resource for water conservation efforts throughout its service area. These enhanced water conservation measures are outlined below.

7.1 Reuse and Recycling of Wastewater

NTMWD's Wilson Creek Regional Wastewater Treatment Plant discharges treated effluent into Wilson Creek upstream from Lavon Lake. NTMWD reused 41,327 acre-feet of treated wastewater from the Wilson Creek WWTP for municipal purposes in 2012. In addition, NTMWD has developed the East Fork Raw Water Supply Project, which diverted 43,735 acre-feet in 2012. These two projects represent the largest municipal water supply based on reuse in the State of Texas. When fully developed, the two projects will provide up to 44 percent of the NTMWD's currently permitted water supplies.

The 18 wastewater treatment plants that NTMWD owns and/or operates use treated effluent for all necessary wastewater plant washdowns and for wastewater plant site irrigation. NTMWD also makes treated wastewater from its plants available for direct reuse for landscape irrigation use. In 2012, approximately 378 million gallons of NTMWD's treated wastewater were used for off-site irrigation.

NTMWD has been recognized, both at the state and national level, for its reuse program:

- ACEC Engineering Excellence Award – 2012; in recognition of the East Fork Raw Water Supply Project.
- TCEQ Texas Environmental Excellence Awards – 2011; in recognition of the East Fork Raw Water Supply Project
- WEAT Sidney L. Allison Award – 2010; in recognition of the East Fork Raw Water Supply Project.
- Water Reuse Association Large Project of the Year -2008; in recognitions of the East Fork Raw Water Supply Project.
- North Central Texas Council of Governments CLIDE Award – 2013; in recognition of the East Fork Water Supply Project

7.2 Public Education Program

As a regional wholesale water supplier, NTMWD has few opportunities to directly interact with end users of water throughout its service area. However, NTMWD's public education program is intended to

educate water suppliers and end users in conservation efforts, and to assist and supplement the public education efforts of its Member Cities and Customers to reach end users and effect water savings. NTMWD's public education efforts include the following elements:

- Beginning in 2006 and continuing through 2013, NTMWD has invested \$11.2 million in the development and implementation of the “Water IQ: Know Your Water” campaign, including newspaper ads, radio spots, billboards, a web site, and other forms of communication all intended to educate the public regarding water use and water conservation . NTMWD has budgeted an additional \$1.1 million for the “Water IQ: Know Your Water” campaign for 2014. During the 2012 campaign, over a quarter of a million people were reached by the program through media relations, outreach and interactive media. The total audience reached through the campaign in 2012 was over 72 million impressions.
- NTMWD has prepared and presented programs to area cities, civic organizations and other groups concerning the need for water conservation and strategies that can be implemented on an individual and corporate level. Presentations have been made to Rotary Clubs, Lions Clubs, Chambers of Commerce, Leadership Training Classes, Boy Scouts, Girl Scouts, mayors, city councils, city staff, etc.
- NTMWD provided funding for the conversion of the Texas Smartscape CD-ROM into an interactive web site. Texas Smartscape is an educational tool designed to assist citizens with the design and development of landscaping using Texas native and drought tolerant plants. NTMWD promotes the use of the Texas Smartscape web site (www.txsmartscape.com).
- NTMWD provides conservation brochures and information to interested civic groups and schools. Information includes brochures on water-saving measures and xeriscape landscaping.
- NTMWD participates in special events to distribute water conservation information to the public.
- NTMWD participates in the Water Educators Network of North Texas to enhance regional programs and develop water efficiency brochures, videos, “Sprinkler Smarts” irrigation outreach, in addition to numerous other activities for regional cooperation and water awareness.

- NTMWD has partnered with Texas A&M AgriLife Extension Service to provide proven, scientific based best management practices to the region through public events, seminars, and brochures.
- NTMWD has partnered with Dallas Water Utilities and Tarrant Regional Water District to host an annual Water Conservation Symposium, a half day event where leading water conservation experts present best management practices.
- NTMWD is an EPA Water Sense Partner and participates in the EPA Water Sense sponsored “Fix a Leak Week.” NTMWD encourages all Member Cities and Customers to become EPA Water Sense Partners.
- NTMWD operates the East Fork Raw Water Supply project in cooperation with the John Bunker Sands Wetland Center, funding the operation and maintenance cost of the Center, as well as the personnel cost. As part of its mission, the Center provides education to the public, area school districts, wildlife and conservation organizations, and research institutions in the areas of water supply, water conservation and reuse.
- NTMWD acts as a supporting participant and member of the Texas Water Smart education campaign, and participates at Texas Water Smart meetings, conferences, media events designed to increase public awareness and education on water conservation.
- NTMWD has been recognized at the state and national level for its water conservation program with the following awards:
 - ADDY Award – 2012; in recognition of the 2011 Water IQ media campaign.
 - Water Conservation Advisory Council Large Supplier Water Conservation and Stewardship Award – 2011; in recognition of outstanding and innovative commitment to conservation of Texas’ water resources.
 - Texas AWWA Watermark Award – 2011; in recognition of the 2010 Water IQ media campaign.
 - TCEQ Texas Excellence Environmental Awards – 2011; in recognition of the NTMWD water conservation program.

7.3 Interactive Weather Stations / Water My Yard Program

NTMWD has developed the Water My Yard program to install weather stations throughout its service area to provide consumers with a weekly e-mail and information through the Water My Yard website in determining an adequate amount of supplemental water that is needed to maintain healthy grass in specific locations. This service represents the largest network of weather stations providing ET-based irrigation recommendations in the State of Texas, and provides the public advanced information regarding outdoor irrigation needs, thereby reducing water use. Through a series of selections on the type of irrigation system a consumer has, a weekly email is provided that will determine how long (in minutes) that an irrigation system needs to run based on the past seven days of weather. This recommendation provides the actual amount of supplemental water that is required for a healthy lawn based on research of the Texas A&M Agrilife Extension Service and proven technologies. This innovative program has been available to those within the NTMWD service area since May 2013.

7.4 Technical Assistance and Outreach

Beginning in 2003, NTMWD has held a series of water conservation workshops for staff of its Member Cities and Customers. These workshops have covered a number of conservation-related topics, including TCEQ requirements for water conservation and drought contingency plans, advanced water conservation strategies, current NTMWD water conservation efforts, water conservation programs of the cities, current drought status, progress on future water supplies, and related topics. These workshops also provide training and education regarding water use accounting, irrigation evaluations, industrial, commercial, and institutional (ICI) audits, and other procedures.

NTMWD encourages its Member Cities and Customers to develop and implement rebate and bulk purchasing programs, where such programs may benefit the Member Cities and Customers in achieving overall water savings. Further, NTMWD provides technical assistance to those Member Cities and Customers who wish to implement rebate and bulk purchasing programs.

In addition, NTMWD staff participates in the following technical assistance and outreach for Member Cities and Customers:

- Dedicated conservation coordinator on NTMWD staff to field conservation-related queries from Member Cities and Customers and coordinate with media regarding conservation issues.

- Provision of training for Member Cities and Customers regarding Industrial, Commercial, and Institutional retail customer audits.
- Provision of online portal on NTMWD website for Member Cities and Customers to communicate and share information on water conservation programs.
- Presenting at meetings and conferences to various commercial, institutional, and industry stakeholder groups: landscapers, irrigators, tree and nursery growers, pool and spa industries, school district facility managers, and hospitality industry groups.
- Holding monthly meeting with Member Cities and Customers for water supply updates, Water IQ campaign strategies, and legislative activities related to water and water conservation.
- Provision of web-based water conservation tips on the NTMWD website, Water IQ website, and Water My Yard website, in addition to links to other water related agencies for additional resources.
- Purchasing American Water Works Association Research Foundation publications for use by Member Cities and Customers to further enhance resources for water efficiency, water rate structures, etc.
- Member/partner of EPA Water Sense
- Member/partner of the Alliance for Water Efficiency (NTMWD membership, as well as membership paid for by NTMWD for Member Cities)
- Member/partner for the Texas Water Foundation
- Member of American Water Works Association and American Water Works Association Research Foundation
- Member of WENT (Water Efficiency Network of North Texas)

7.5 NTMWD Model Water Conservation Plan for NTMWD Member Cities and Customers

In order to assist its Member Cities and Customers in the development of their own water conservation plans, NTMWD has developed a Model Water Conservation Plan for NTMWD Member Cities and Customers⁴. The Model Water Conservation Plan addresses the TCEQ requirements for water conservation plans for municipal use by public water suppliers¹ and includes advanced water conservation strategies beyond TCEQ requirements that mirror the NTMWD plan. NTMWD continues to

assist Member Cities and Customers in the development of their water conservation plans using the Model Conservation Plan as a guide.

7.5.1 Compulsory Landscape and Water Management Measures

The following landscape water management measures are included in the NTMWD Model Water Conservation Plan to be utilized by Member Cities and Customers. These measures represent minimum measures to be implemented and enforced in order to irrigate the landscape appropriately, and are to remain in effect on a permanent basis unless water resource management stages are declared.

1. Landscape Water Management Measures

- Limit landscape watering with sprinklers or irrigation systems at each service address to no more than two days per week (April 1 – October 31), with education that less than twice per week is usually adequate. Additional watering of landscape may be provided by hand-held hose with shutoff nozzle, use of dedicated irrigation drip zones, and/or soaker hose provided no runoff occurs.
- Limit landscape watering with sprinklers or irrigation systems at each service address to no more than one day per week beginning November 1 and ending March 31 of each year, with education that less than once per week is usually adequate.
- Prohibit lawn irrigation watering from 10 AM to 6 PM (April 1 – October 31).
- Prohibit the use of irrigation systems that water impervious surfaces. (Wind driven water drift will be taken into consideration.)
- Prohibit outdoor watering during precipitation or freeze events.
- Prohibition of use of poorly maintained sprinkler systems that waste water.
- Prohibit excess water runoff or other obvious waste.
- Require rain and freeze sensors and/or ET or Smart controllers on all new irrigation systems. Rain and freeze sensors and/or ET or Smart controllers must be maintained to function properly.
- Prohibit overseeding, sodding, sprigging, broadcasting or plugging with cool season grasses or watering cool season grasses, except for golf courses and athletic fields.

- Require that irrigation systems be inspected at the same time as initial backflow preventer inspection.
- Requirement that all new irrigation systems be in compliance with state design and installation regulations (TAC Title 30, Part 1, Chapter 344).
- Require the owner of a regulated irrigation property to obtain an evaluation of any permanently installed irrigation system on an periodic basis. The irrigation evaluation shall be conducted by a licensed irrigator in the state of Texas and be submitted to your local water provider (i.e., city, water supply corporation).

2. Additional Water Management Measures

- Prohibit the use of potable water to fill or refill residential, amenity, and any other natural or manmade ponds. A pond is considered to be a still body of water with a surface area of 500 square feet or more.
- Non-commercial car washing can be done only when using a water hose with a shut-off nozzle.
- Hotels and motels shall offer a linen reuse water conservation option to customers.
- Restaurants, bars, and other commercial food or beverage establishments may not provide drinking water to customers unless a specific request is made by the customer for drinking water.

7.5.2 Additional Water Conservation Measures in the NTMWD Model Water Conservation Plan

NTMWD also urges its Member Cities and Customers to consider including the following additional water conservation measures from the NTMWD Model Water Conservation Plan in their plans:

1. Landscape Water Management Regulations

- Requirement that all existing irrigation systems be retrofitted with rain and freeze sensors and/or ET or Smart controllers capable of multiple programming. Rain and freeze sensors and/or ET or Smart controllers must be maintained to function properly.
- Requirement that all new athletic fields be irrigated by a separate irrigation system from surrounding areas.
- Implementation of other measures to encourage off-peak water use.

2. Landscape Ordinance

- Landscape ordinances are developed by cities to guide developers in landscaping requirements for the city. A model landscape ordinance is provided in as part of the model plan and is intended as a guideline for adopting a landscape ordinance to promote water efficient landscape design.
- Native, drought tolerant or adaptive plants should be encouraged.
- Drip irrigation systems should be promoted.
- ET/Smart controllers that only allow sprinkler systems to irrigate when necessary should be promoted.

3. Water Audits

- Water audits are useful in finding ways in which water can be used more efficiently at a specific location. NTMWD recommends that Member Cities and Customers offer water audits to customers.

Member Cities and Customers are required to develop regulations, ordinances, policies, or procedures for enforcement of water conservation guidelines.

4. Rebates

- In addition to the conservation measures described above, the NTMWD also recommends the following water conservation incentive programs for consideration by Member Cities and Customers:
 - Low-flow toilet replacement and rebate programs,
 - Rebates for rain/freeze sensors and/or ET or Smart controllers,
 - Low-flow showerhead and sink aerators replacement programs or rebates,
 - Water efficient clothes washer rebates,
 - Pressure reducing valve installation programs or rebates,
 - Rain barrel rebates,
 - Pool Covers,
 - On-demand hot water heater rebates, and/or
 - Other water conservation incentive programs.

7.6 Annual Reports

One element of NTMWD's Model Water Conservation Plan for NTMWD Member Cities and Customers is a requirement that Member Cities and customers complete annual conservation reports by March 31 of the following year and submit them to NTMWD. A copy of the annual report is included herewith as Appendix E. NTMWD compiles these reports and uses them to help generate its own annual water conservation report

. NTMWD's annual water conservation report is used to review the effectiveness of its water conservation program and results will be reported to the NTMWD Water Committee of the NTMWD Board and the Board of Directors.. As part of the development of Appendix E, Member Cities and Customers will complete the Alliance for Water Efficiency (AWE) tracking tool by March 31 each year for the previous year and submit those results to NTWMD. The completion of this annual water conservation report allows NTMWD to track the effectiveness of its water conservation programs over time and reassess those programs that are not providing water savings, ensuring maximum water use efficiency and greater levels of conservation.

7.7 Water Conservation Symposium

NTMWD has partnered with Dallas Water Utilities and Tarrant Regional Water District to host the annual North Texas Regional Water Conservation Symposium. The Symposium is a half-day event bringing together leading water conservation experts from around the country to present water conservation best management practices to a wide audience of water utility staff. NTMWD's (and others') sponsorship allows the Symposium to be offered for free to all attendees. In 2013, the 7th annual North Texas Regional Water Conservation Symposium was attended by over 130 professionals.

7.8 Industrial Pretreatment

As part of its wastewater system, NTMWD has developed industrial pretreatment programs for the cities of Allen, Forney, Frisco, McKinney, Mesquite, Murphy, Plano, Richardson, Rockwall, Terrell, and Wylie. The pretreatment programs developed by NTMWD are adopted and implemented by the cities, which are also responsible for enforcement of the programs. By reducing allowable volumes of specific pollutants and encouraging pretreatment of industrial wastes, this joint effort by NTMWD and the cities has improved water quality in the region's streams and reservoirs. NTMWD industrial pretreatment personnel are also available to assist cities on request in the review or design of systems to allow

industrial recycling and reuse of wastewater. Such systems have reduced water use by some industries, while also reducing wastewater volumes and saving money for the industries.

7.9 Watershed Protection

The NTMWD monitors and samples about fifteen sites monthly on Lavon Lake to evaluate the water quality of the reservoir. Additionally, the hydraulic inputs into Lake Lavon are monitored to evaluate the nutrient and pollutant loading. Studies are performed to evaluate and model hydraulics, nutrient loading and pollutant loading of the reservoir.

The District monitors and performs monthly sampling of the tributaries that will be contributing water to the future Bois d'arc Creek Reservoir. The information is used to evaluate nutrient loading and pollutant loading of the future reservoir.

The NTMWD regularly monitors and samples the East Fork of the Trinity River to evaluate the impact of the constructed wetland on the river. The monitoring includes habitat assessments and biological assessments.

The District also monitors and samples the receiving streams of each of the NTMWD-operated wastewater treatment plants. That information is used to evaluate hydraulics, nutrient, and pollutant loading of the stream.

7.10 Zero Discharge from Water Treatment Plants

Since 1975, NTMWD's water treatment plants have operated under zero discharge permits. Wash water from filter washing and sludge from the water treatment process are pumped to lagoons for solar drying. After settling of solids, suitable water is decanted from the lagoons and recycled to the head of the water treatment plant for treatment. This approach saves water and contributes to NTMWD's excellent control of unaccounted water in treatment and distribution.

7.11 In-House Water Conservation Efforts

NTMWD has implemented an in-house water conservation program, including the following elements:

- Wherever possible, landscapes will use native or adapted drought tolerant plants, trees, and shrubs.

- Irrigation at NTMWD facilities will occur between 11 p.m. and 5 a.m. in the peak consumption summer months (April 1 and ending October 31) in order to lower evaporation losses.
- Irrigation will be limited to the amount needed to promote survival and health of plants and lawns.
- Irrigation will be avoided on Saturday and Sunday if possible, since these are periods of high water use by the public.
- Irrigation will be done with treated wastewater effluent wherever feasible and reasonable.

8. ADOPTION OF WATER CONSERVATION PLAN; PERIODIC REVIEW AND UPDATE OF PLAN

Appendix I contains a copy of the minutes of the NTMWD Board of Directors meeting at which this water conservation plan was adopted.

TCEQ requires that water conservation plans be reviewed and, if necessary, updated every five years to coincide with the regional water planning process. This Water Conservation Plan will be updated as required by TCEQ, and in addition, will be continually reassessed for opportunities to improve water efficiency and conservation based on new or updated information.

9. CONSERVATION PLAN REQUIREMENTS FOR A PUBLIC WATER SUPPLIER

9.1 Introduction

In addition to serving as a wholesale water supplier, NTMWD is also a public water supplier of potable water, providing direct retail service to 41 customers who do not have access to retail service from other sources. The TCEQ has established rules for the development of water conservation plans for public water suppliers that provide retail service. The rules for water conservation plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.2 of the Texas Administrative Code. These rules are included in Appendix B.

An additional requirement for public water suppliers is that they report 5 and 10 year goals for residential per capita water use. Table 9-1 shows the residential per capita goals for the 41 direct retail service customers.

Table 9-1 Five-Year and Ten-Year Residential GPCD Goals

Description	Assumed Average (GPCD)	5-Year Goal (2017) (GPCD)	10-Year Goal (2022) (GPCD)
Assumed Current 5-Year Average Per Capita Residential Use	100		
Expected Reduction Due to Low-Flow Plumbing Fixtures		1	3
Projected Reduction Due to Elements in this Plan		2	4
Water Conservation Goals (Based on 5-Year Average)		97	93

NTMWD’s Water Conservation Plan, specifically Sections 1-8 of the Plan, address the majority of requirements in the TCEQ rules pertaining to water conservation plans for public water suppliers. This section summarizes the TCEQ requirements for public water suppliers, indicates where they are met in the Plan, and covers any additional information needed to meet public water supplier requirements.

9.2 State Requirements for Water Conservation Plans for Public Water Suppliers

Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.2 of the Texas Administrative Code contains the requirements for water conservation plans for public water suppliers. This rule is included in Appendix B.

Minimum Requirements

TCEQ's minimum requirements for water conservation plans for public water suppliers are addressed below:

- 288.2(a)(1)(A) – Utility Profile – Included in Appendix D.
- 288.2(a)(1)(B) – Specification of Conservation Goals – Addressed in Section 5 and Section 9.
- 288.2(a)(1)(C) – Specific, Quantifiable Goals – Addressed in Section 5 and Section 9.
- 288.2(a)(1)(D) – Metering of Diversions – Addressed in Section 6.1.1.
- 288.2(a)(1)(E) – Universal Metering – Addressed in Section 6.1. Deliveries to all of NTMWD's retail customers (like those to all of its wholesale customers) are metered. NTMWD tracks use for its retail customers to ensure that the meters remain in good working order.
- NTMWD has implemented a meter replacement program, in accordance with AWWA standards. At a minimum, all customer meters will be replaced every 15 years.
- 288.2(a)(1)(F) – Measures to Determine and Control Unaccounted Water – Addressed in Section 6.1.
- 288.2(a)(1)(G) – Program of Continuing Public Education and Information – Addressed in Section 7.2. NTMWD also will also communicate directly with its retail customers by including brochures and other material on water conservation in monthly invoicing.
- 288.2(a)(1)(H) – Non-Promotional Rate Structure – The NTMWD has a three-tiered rate structure for its residential customers as follows:
 - Monthly minimum charge of \$15.00 with up to 2,000 gallons
 - Base rate of \$3.50 per 1,000 gallons for water use of 2,000 to 10,000 gallons
 - 2nd tier rate of \$5.38 per 1,000 gallons from 10,000 to 20,000 gallons
 - 3rd tier rate of \$6.72 per 1,000 gallons for water use above 20,000 gallons
- 288.2(a)(1)(I) – Reservoir System Operation Plan – Addressed in Section 6.3.

- 288.2(a)(1)(J) – Means of Implementation and Enforcement – Addressed in Section 6.4.
- 288.2(a)(1)(K) – Documentation of Coordination with Regional Water Planning Groups – Addressed in Section 6.5.
- 288.2(c) – Review and Update of Plan – Section 8.

Additional Requirements for Users Serving a Current Population of 5,000 or More

TCEQ has additional requirements for water conservation plans for public water suppliers serving more than 5,000 people. Including its wholesale customers, NTMWD serves more than 5,000 people. Those additional TCEQ requirements are addressed below:

- 288.2(a)(2)(A) – Program of Leak Detection, Repair, and Water Loss Accounting – Addressed in Section 6.1.3.
- 288.2(a)(2)(B) – Record Management System – NTMWD’s retail customers include 34 residential accounts, 3 commercial accounts, and 4 public accounts. NTMWD has no retail industrial customers. The vast majority of NTMWD’s sales are to wholesale suppliers. NTMWD makes records available for residential use by retail customers, commercial use by retail customers, public use by retail customers, and wholesale sales.
- 222.8(a)(2)(C) – Requirement for Conservation Plans for Wholesale Customers – Addressed in Section 6.2.

Additional Conservation Strategies

TCEQ also lists additional water conservation strategies which may be implemented by a public water supplier but are not required. This water conservation plan includes several of those strategies:

- NTMWD’s program for reuse and recycling of wastewater is described in Section 7.1.
- Sections 7.3, 7.4, and 7.5 describe additional measures NTMWD has adopted to encourage water conservation by its Member Cities and Customers.
- Section 8.4 describes NTMWD’s plans to monitor the effectiveness of the water conservation program.
- Section 7.2 describes NTMWD’s public education program.
- Section 7.10 describes NTMWD’s program to maintain zero discharge from its water treatment plants.
- Section 7.11 describes NTMWD’s in-house water conservation efforts.

APPENDIX A
LIST OF REFERENCES

APPENDIX A

LIST OF REFERENCES

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11. Freese and Nichols Inc, Alan Plummer Associates, Inc., CP & Y Inc., Cooksey Communications. "2011 Region C Water Plan"

APPENDIX B

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

RULES ON MUNICIPAL WATER CONSERVATION AND DROUGHT

CONTINGENCY PLANS FOR WHOLESALE WATER SUPPLIERS

APPENDIX B

TEXAS COMMISSION OF ENVIRONMENTAL QUALITY RULES ON MUNICIPAL WATER CONSERVATION AND DROUGHT CONTINGENCY PLANS FOR WHOLESALE WATER SUPPLIERS

<u>TITLE 30</u>	ENVIRONMENTAL QUALITY
<u>PART 1</u>	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
<u>CHAPTER 288</u>	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
<u>SUBCHAPTER A</u>	WATER CONSERVATION PLANS
<u>RULE §288.1</u>	Definitions

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

(1) Agricultural or Agriculture--Any of the following activities:

(A) cultivating the soil to produce crops for human food, animal feed, or planting seed or for the production of fibers;

(B) the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or non-soil media by a nursery grower;

(C) raising, feeding, or keeping animals for breeding purposes or for the production of food or fiber, leather, pelts, or other tangible products having a commercial value;

(D) raising or keeping equine animals;

(E) wildlife management; and

(F) planting cover crops, including cover crops cultivated for transplantation, or leaving land idle for the purpose of participating in any governmental program or normal crop or livestock rotation procedure.

- (2) Agricultural use--Any use or activity involving agriculture, including irrigation.
- (3) Best management practices--Voluntary efficiency measures that save a quantifiable amount of water, either directly or indirectly, and that can be implemented within a specific time frame.
- (4) Conservation--Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.
- (5) Commercial use--The use of water by a place of business, such as a hotel, restaurant, or office building. This does not include multi-family residences or agricultural, industrial, or institutional users.
- (6) Drought contingency plan--A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).
- (7) Industrial use--The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, and the development of power by means other than hydroelectric, but does not include agricultural use.
- (8) Institutional use--The use of water by an establishment dedicated to public service, such as a school, university, church, hospital, nursing home, prison or government facility. All facilities dedicated to public service are considered institutional regardless of ownership.
- (9) Irrigation--The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water from a public water supplier.
- (10) Irrigation water use efficiency--The percentage of that amount of irrigation water which is beneficially used by agriculture crops or other vegetation relative to the amount of water diverted from the source(s) of supply. Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for vegetative maintenance and growth, salinity management, and leaching requirements associated with irrigation.
- (11) Mining use--The use of water for mining processes including hydraulic use, drilling, washing sand and gravel, and oil field re-pressuring.

(12) Municipal use--The use of potable water provided by a public water supplier as well as the use of sewage effluent for residential, commercial, industrial, agricultural, institutional, and wholesale uses.

(13) Nursery grower--A person engaged in the practice of floriculture, viticulture, silviculture, and horticulture, including the cultivation of plants in containers or nonsoil media, who grows more than 50% of the products that the person either sells or leases, regardless of the variety sold, leased, or grown. For the purpose of this definition, grow means the actual cultivation or propagation of the product beyond the mere holding or maintaining of the item prior to sale or lease, and typically includes activities associated with the production or multiplying of stock such as the development of new plants from cuttings, grafts, plugs, or seedlings.

(14) Pollution--The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

(15) Public water supplier--An individual or entity that supplies water to the public for human consumption.

(16) Residential use--The use of water that is billed to single and multi-family residences, which applies to indoor and outdoor uses.

(17) Residential gallons per capita per day--The total gallons sold for residential use by a public water supplier divided by the residential population served and then divided by the number of days in the year.

(18) Regional water planning group--A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

(19) Retail public water supplier--An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

(20) Reuse--The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-

owned water.

(21) Total use--The volume of raw or potable water provided by a public water supplier to billed customer sectors or nonrevenue uses and the volume lost during conveyance, treatment, or transmission of that water.

(22) Total gallons per capita per day (GPCD)--The total amount of water diverted and/or pumped for potable use divided by the total permanent population divided by the days of the year. Diversion volumes of reuse as defined in this chapter shall be credited against total diversion volumes for the purposes of calculating GPCD for targets and goals.

(23) Water conservation plan--A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

(24) Wholesale public water supplier--An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

(25) Wholesale use--Water sold from one entity or public water supplier to other retail water purveyors for resale to individual customers.

Source Note: The provisions of this §288.1 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective August 15, 2002, 27 TexReg 7146; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective January 10, 2008, 33 TexReg 193; amended to be effective December 6, 2012, 37 TexReg 9515

<u>TITLE 30</u>	ENVIRONMENTAL QUALITY
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<u>SUBCHAPTER A</u>	WATER CONSERVATION PLANS
RULE §288.2	Water Conservation Plans for Municipal Uses by Public Water Suppliers

(a) A water conservation plan for municipal water use by public water suppliers must provide information in response to the following. If the plan does not provide information for each requirement, the public water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for municipal uses by public water suppliers must include the following elements:

(A) a utility profile in accordance with the Texas Water Use Methodology, including, but not limited to, information regarding population and customer data, water use data (including total gallons per capita per day (GPCD) and residential GPCD), water supply system data, and wastewater system data;

(B) a record management system which allows for the classification of water sales and uses into the most detailed level of water use data currently available to it, including, if possible, the sectors listed in clauses (i) - (vi) of this subparagraph. Any new billing system purchased by a public water supplier must be capable of reporting detailed water use data as described in clauses (i) - (vi) of this subparagraph:

- (i) residential;
 - (I) single family;
 - (II) multi-family;
- (ii) commercial;
- (iii) institutional;

- (iv) industrial;
- (v) agricultural; and,
- (vi) wholesale.

(C) specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use in total GPCD and residential GPCD. The goals established by a public water supplier under this subparagraph are not enforceable;

(D) metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply;

(E) a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement;

(F) measures to determine and control water loss (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.);

(G) a program of continuing public education and information regarding water conservation;

(H) a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water;

(I) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies; and

(J) a means of implementation and enforcement which shall be evidenced by:

(i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and

(ii) a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(K) documentation of coordination with the regional water planning groups for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional content requirements. Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected

population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements:

(A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system;

(B) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

(3) Additional conservation strategies. Any combination of the following strategies shall be selected by the water supplier, in addition to the minimum requirements in paragraphs (1) and (2) of this subsection, if they are necessary to achieve the stated water conservation goals of the plan. The commission may require that any of the following strategies be implemented by the water supplier if the commission determines that the strategy is necessary to achieve the goals of the water conservation plan:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) adoption of ordinances, plumbing codes, and/or rules requiring water-conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition;

(C) a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures;

(D) reuse and/or recycling of wastewater and/or graywater;

(E) a program for pressure control and/or reduction in the distribution system and/or for customer connections;

(F) a program and/or ordinance(s) for landscape water management;

(G) a method for monitoring the effectiveness and efficiency of the water conservation plan;

and

(H) any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) A water conservation plan prepared in accordance with 31 TAC §363.15 (relating to Required Water Conservation Plan) of the Texas Water Development Board and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and the Texas Water Development Board.

(c) A public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Source Note: The provisions of this §288.2 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective December 6, 2012, 37 TexReg 9515

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<u>SUBCHAPTER A</u>	WATER CONSERVATION PLANS
RULE §288.5	Water Conservation Plans for Wholesale Water Suppliers

A water conservation plan for a wholesale water supplier must provide information in response to each of the following paragraphs. If the plan does not provide information for each requirement, the wholesale water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for wholesale water suppliers must include the following elements:

(A) a description of the wholesaler's service area, including population and customer data, water use data, water supply system data, and wastewater data;

(B) specific, quantified five-year and ten-year targets for water savings including, where appropriate, target goals for municipal use in gallons per capita per day for the wholesaler's service area, maximum acceptable water loss, and the basis for the development of these goals. The goals established by wholesale water suppliers under this subparagraph are not enforceable;

(C) a description as to which practice(s) and/or device(s) will be utilized to measure and account for the amount of water diverted from the source(s) of supply;

(D) a monitoring and record management program for determining water deliveries, sales, and losses;

(E) a program of metering and leak detection and repair for the wholesaler's water storage, delivery, and distribution system;

(F) a requirement in every water supply contract entered into or renewed after official adoption of the

water conservation plan, and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements of this chapter. If the customer intends to resell the water, then the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter;

(G) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin. The reservoir systems operations plans shall include optimization of water supplies as one of the significant goals of the plan;

(H) a means for implementation and enforcement, which shall be evidenced by a copy of the ordinance, rule, resolution, or tariff, indicating official adoption of the water conservation plan by the water supplier; and a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(I) documentation of coordination with the regional water planning groups for the service area of the wholesale water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional conservation strategies. Any combination of the following strategies shall be selected by the water wholesaler, in addition to the minimum requirements of paragraph (1) of this section, if they are necessary in order to achieve the stated water conservation goals of the plan. The commission may require by commission order that any of the following strategies be implemented by the water supplier if the commission determines that the strategies are necessary in order for the conservation plan to be achieved:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) a program to assist agricultural customers in the development of conservation pollution prevention and abatement plans;

(C) a program for reuse and/or recycling of wastewater and/or graywater; and

(D) any other water conservation practice, method, or technique which the wholesaler shows to be

appropriate for achieving the stated goal or goals of the water conservation plan.

(3) Review and update requirements. The wholesale water supplier shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. A wholesale water supplier shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Source Note: The provisions of this §288.5 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective December 6, 2012, 37 TexReg 9515

APPENDIX C
MODEL WATER CONSERVATION PLAN AND MODEL DROUGHT
CONTINGENCY PLAN

MODEL WATER CONSERVATION PLAN FOR NORTH TEXAS MUNICIPAL WATER DISTRICT MEMBER CITIES AND CUSTOMERS

APRIL 2014

Prepared by:

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FORWARD

This Model Water Conservation plan was prepared by Freese and Nichols for the North Texas Municipal Water District (NTMWD). It is intended to be used as a guide by NTMWD Member Cities and Customers as they develop their own water conservation plans. The model plan was prepared pursuant to Texas Commission on Environmental Quality rules. Some material is based on the existing water conservation plans listed in Appendix A.

Questions regarding this Model Water Conservation plan should be addressed to the following:

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This Water Conservation plan is based on the Texas Administrative Code in effect on June 25, 2013, and considers water conservation best management practices from Texas Water Development Board Report 362, *Water Conservation Best Management Practices Guide*. The Texas Commission on Environmental Quality (TCEQ), Texas Water Development Board (TWDB) and Water Conservation Advisory Council (WCAC) are currently reviewing additional regulations in compliance with the mandates of Senate Bill 181 enacted in 2011 by the 82nd Texas Legislature. In addition to these rules, the WCAC is reviewing additional Best Management Practices (BMPs) for Wholesale Suppliers. The draft regulations and BMPs have also been considered in the preparation of this plan. The following items that are not currently in the regulations are presented in the draft regulations or under consideration by the WCAC:

- Reporting requirement for TWDB and TCEQ.
- A standardized methodology for calculating per capita use.
- Calculating per capita use by sector (i.e. total, residential, industrial and commercial).
- Additional BMPs for Wholesale Suppliers (Contract Requirements, Technical Assistance and Outreach, Collective Purchasing and Direct Distribution, Cost Sharing Programs).

None of the currently proposed adjustments will cause this plan to be obsolete. The most current annual report form should be obtained from TCEQ¹ when preparing the annual report (Appendix J) to submit to the TCEQ. A copy of the annual report should be sent to the Texas Water Development Board as well as to the TCEQ.



WATER CONSERVATION PLAN
INSERT ENTITY NAME

APRIL 2014

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1. INTRODUCTION AND OBJECTIVES

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development of North Central Texas have led to growing demands for water supplies. At the same time, local and less expensive sources of water supply are largely already developed. Additional supplies to meet future demands will be expensive and difficult to secure. Severe drought conditions in recent years have highlighted the importance of efficient use of our existing supplies to make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of water conservation and drought contingency plans for wholesale water suppliers². The TCEQ guidelines and requirements for wholesale suppliers are included in Appendix B. The North Texas Municipal Water District (NTMWD) has developed this model water conservation plan pursuant to TCEQ guidelines and requirements. The best management practices established by the Water Conservation Implementation Task Force³ were also considered in the development of the water conservation measures.

This model water conservation plan includes measures that are intended to result in ongoing, long-term water savings. This plan replaces the previous plans dated August 2004, April 2006 and March 2008⁴.

The objectives of this water conservation plan are as follows:

- To reduce water consumption from the levels that would prevail without conservation efforts.
- To reduce the loss and waste of water.
- To improve efficiency in the use of water.
- Encourage efficient outdoor water use.
- To document the level of recycling and reuse in the water supply.

- To extend the life of current water supplies by reducing the rate of growth in demand.

The water conservation plan presented in this document is a model water conservation plan intended for adoption by the NTMWD Member Cities and Customers. In order to adopt this plan, each Member City and Customer will need to do the following:

- Complete the water utility profile (provided in Appendix C).
- Complete the annual water conservation implementation report (in Appendix J).
- Set five-year and ten-year goals for per capita water use.
- Adopt ordinance(s) or regulation(s) approving the model plan.

The water utility profile, goals, and ordinance(s) or regulations should be provided to NTMWD in draft form for review and comments. Final adopted versions should also be provided to NTMWD, as well as TCEQ. This model plan includes all of the elements required by TCEQ. Some elements of this model plan go beyond TCEQ requirements. Any water supplier wishing to adjust elements of the plan should coordinate with NTMWD.

¹ Superscripted numbers match references listed in Appendix A.

2. DEFINITIONS

1. **ATHLETIC FIELD** means a public sports competition field, the essential feature of which is turf grass, used primarily for organized sports practice, competition or exhibition events for schools, professional sports, or sanctioned league play.
2. **COOL SEASON GRASSES** are varieties of turf grass that grow best in cool climates primarily in northern and central regions of the U.S. Cool season grasses include perennial and annual rye grass, Kentucky blue grass and fescues.
3. **CUSTOMERS** include those entities to whom NTMWD provides water on a customer basis that are not members of NTMWD.
4. **EVAPOTRANSPIRATION** abbreviated as ET represents the amount of water lost from plant material to evaporation and transpiration. The amount of ET can be estimated based on the temperature, wind, and relative humidity.
5. **ET/SMART CONTROLLERS** are irrigation controllers that adjust their schedule and run times based on weather (ET) data. These controllers are designed to replace the amount of water lost to evapotranspiration.
6. **EXECUTIVE DIRECTOR** means the Executive Director of the North Texas Municipal Water District and includes a person the Director has designated to administer or perform any task, duty, function, role, or action related to this plan or on behalf of the Executive Director.
7. **INSTITUTIONAL USE** means the use of water by an establishment dedicated to public service, such as a school, university, church, hospital, nursing home, prison or government facility. All facilities dedicated to public service are considered institutional regardless of ownership.
8. **MEMBER CITIES** include the cities of Allen, Farmersville, Forney, Frisco, Garland, McKinney, Mesquite, Plano, Princeton, Richardson, Rockwall, Royce City, and Wylie, Texas.
9. **MULTI-FAMILY PROPERTY** means a property containing five or more dwelling units.

10. MUNICIPAL USE means the use of potable water provided by a public water supplier as well as the use of treated wastewater effluent for residential, commercial, industrial, agricultural, institutional, and wholesale uses.
11. RECLAIMED WATER means reclaimed municipal wastewater that has been treated to a quality that meets or exceeds the minimum standards of the 30 Texas Administrative Code, Chapter 210 and is used for lawn irrigation, industry, or other non-potable purposes.
12. REGULATED IRRIGATION PROPERTY means any property that uses 1 million gallons of water or more for irrigation purposes in a single calendar year or is greater than 1 acre in size.
13. RESIDENTIAL GALLONS PER CAPITA PER DAY (Residential GPCD) the total gallons sold for residential use by a public water supplier divided by the residential population served and then divided by the number of days in the year.
14. TOTAL GALLONS PER CAPITA PER DAY (Total GPCD) The total amount of water diverted and/or pumped for potable use divided by the total permanent population divided by the days of the year. Diversion volumes of reuse as defined in TAC 288.1 shall be credited against total diversion volumes for the purposes of calculating GPCD for targets and goals.
15. WATER CONSERVATION PLAN means this water conservation plan approved and adopted by the NTMWD Board of Directors on February 27, 2014.

3. REGULATORY BASIS FOR WATER CONSERVATION PLAN

3.1 TCEQ Rules Governing Conservation Plans

The TCEQ rules governing development of water conservation plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a water conservation plan is defined as “A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water².” The elements in the TCEQ water conservation rules covered in this conservation plan are listed below.

Minimum Conservation Plan Requirements

The minimum requirements in the Texas Administrative Code for Water Conservation Plans for Public Water Suppliers are covered in this report as follows:

- 288.2(a)(1)(A) – Utility Profile – Section 4 and Appendix C
- 288.2(a)(1)(B) – Specification of Goals – Section 5
- 288.2(a)(1)(C) – Specific, Quantified Goals – Section 5
- 288.2(a)(1)(D) – Accurate Metering – Section 6.1.1
- 288.2(a)(1)(E) – Universal Metering – Section 6.1.2
- 288.2(a)(1)(F) – Determination and Control of Water Loss – Section 6.1.3
- 288.2(a)(1)(G) – Public Education and Information Program – Section 6.2
- 288.2(a)(1)(H) – Non-Promotional Water Rate Structure – Section 7.1
- 288.2(a)(1)(I) – Reservoir System Operation Plan – Section 6.3
- 288.2(a)(1)(J) – Means of Implementation and Enforcement – Section 8
- 288.2(a)(1)(K) – Coordination with Regional Water Planning Group – Section 6.4 and Appendix F
- 288.2(c) – Review and Update of Plan – Section 9

Conservation Additional Requirements (Population over 5,000)

- The Texas Administrative Code includes additional requirements for water conservation plans for drinking water supplies serving a population over 5,000
- 288.2(a)(2)(A) – Leak Detection, Repair, and Water Loss Accounting – Sections 6.1.4
- 288.2(a)(2)(B) – Record Management System – Section 6.1.5
- 288.2(a)(2)(C) – Requirement for Water Conservation Plans by Wholesale Customers – Section 6.6

Additional Conservation Strategies

The TCEQ requires that a water conservation implementation report be completed and submitted on an annual basis. The template for this report is included in Appendix J.

In addition to the TCEQ required water conservation strategies, the NTMWD also requires the following strategy to be included in the Member City and Customer plans:

- 288.2(a)(3)(F) – Considerations for Landscape Water Management Regulations – Section 7.5 and Appendix E

TCEQ rules also include optional, but not required, conservation may be adopted by suppliers. The NTMWD recommends that the following strategies be included in the Member City and Customer water conservation plans:

- 288.2(a)(3)(A) – Conservation Oriented Water Rates – Section 7.1
- 288.2(a)(3)(B) – Ordinances, Plumbing Codes or Rules on Water-Conserving Fixtures – Section 7.2
- 288.2(a)(3)(C) – Replacement or Retrofit of Water-Conserving Plumbing Fixtures – Section 7.6
- 288.2(a)(3)(D) – Reuse and Recycling of Wastewater – Section 7.3
- 288.2(a)(3)(F) – Considerations for Landscape Water Management Regulations – Section 7.4, 7.5 and Appendix E
- 288.2(a)(3)(G) – Monitoring Method – Section 7.7
- 288.2(a)(3)(H) – Additional Conservation Ordinance Provisions – Section 7.6

3.2 Guidance and Methodology for Reporting on Water Conservation and Water Use

In addition to TCEQ rules regarding water conservation, this plan also incorporates elements of the Guidance and Methodology for Reporting on Water Conservation and Water Use developed by TWDB and TCEQ, in consultation with the Water Conservation Advisory Council (the “Guidance”). The Guidance was developed in response to a charge by the 82nd Texas Legislature to develop water use and calculation methodology and guidance for preparation of water use reports and water conservation plans in accordance with TCEQ rules.

4. WATER UTILITY PROFILE

Appendix C to this model water conservation plan is a template water utility profile based on the format recommended by the TCEQ. In adopting this model water conservation plan, each Member City and Customer will provide a draft water utility profile to NTMWD for review and comment. A final water utility profile will be provided to NTMWD.

5. SPECIFICATION OF WATER CONSERVATION GOALS

TCEQ rules require the adoption of specific water conservation goals for a water conservation plan. As part of plan adoption, each Member City and Customer must develop 5-year and 10-year goals for per capita municipal use. These goals should be submitted to NTMWD in draft form for review. The goals for this water conservation plan include the following:

- Maintain the total and residential per capita water use below the specified amount in gallons per capita per day in a dry year, as shown in the completed Table 5-1.
- Maintain the water loss percentage in the system below 12 percent annually in 2013 and subsequent years, as discussed in Section 6.1.3. (The 12 percent goal for water loss is recommended but is not required. Systems with long distances between customers may adopt a higher percent water loss goal.)
- Implement and maintain a program of universal metering and meter replacement and repair, as discussed in Section 6.1.2.
- Increase efficient water usage through a water conservation ordinance, order or resolution as discussed in Section 7.5 and Appendix E. (This ordinance is required by the NTMWD.)
- Decrease waste in lawn irrigation by implementation and enforcement of landscape water management regulations, as discussed in Section 7.6. (These landscape water management regulations are recommended but are not required.)
- Raise public awareness of water conservation and encourage responsible public behavior by a public education and information program, as discussed in Section 6.2.
- Develop a system specific strategy to conserve water during peak demands, thereby reducing the peak use.

Table 5-1 Five-Year and Ten-Year Per Capita Water Use Goals (gpcd)

Description	Current Average (gpcd)	5-Year Goal (gpcd)	10-Year Goal (gpcd)
Current 5-Year Average Total Per Capita Use with Credit for Reuse			
Current 5-Year Average Residential Per Capita Use			
Water Loss (GPCD) ¹			
Water Loss (Percentage) ²			
Expected Reduction due to Low-Flow Plumbing Fixtures			
Projected Reduction Due to Elements in this Plan			
Water Conservation Goals (with credit for reuse)			

1. Water Loss GPCD = (Total Water Loss ÷ Permanent Population) ÷ 365

2. Water Loss Percentage = (Total Water Loss ÷ Total Gallons in System) x 100; or (Water Loss GPCD ÷ Total GPCD) x 100

6. BASIC WATER CONSERVATION STRATEGIES

6.1 Metering, Water Use Records, Control of Water Loss, and Leak Detection and Repair

One of the key elements of water conservation is tracking water use and controlling losses through illegal diversions and leaks. It is important to carefully meter water use, detect and repair leaks in the distribution system and provide regular monitoring of real losses.

6.1.1 Accurate Metering of Treated Water Deliveries from NTMWD

Water deliveries from NTMWD are metered by NTMWD using meters with accuracy of $\pm 2\%$. These meters are calibrated on an annual basis by NTMWD to maintain the required accuracy.

6.1.2 Metering of Customer and Public Uses and Meter Testing, Repair, and Replacement

The provision of water to all customers, including public and governmental users, should be metered. In many cases, Member Cities and Customers already meter retail and wholesale water users. For those Member Cities and Customers who do not currently meter all internal water uses, as well as all subsequent users, these entities should implement a program to meter all water uses within the next three years.

Most Member Cities and Customers test and replace their customer meters on a regular basis. All customer meters should be replaced on a minimum of a 15-year cycle. Those who do not currently have a meter testing and replacement program should implement such a program over the next three years.

6.1.3 Determination and Control of Water Loss

Total water loss is the difference between water delivered to Member Cities and Customers from NTMWD (and other supplies, if applicable) and metered water sales to customers plus authorized for use but not sold. (Authorized for use but not sold would include use for fire fighting, releases for flushing of lines, uses associated with new construction, etc.) Total water loss includes three categories:

- Apparent Losses – including inaccuracies in customer meters. (Customer meters tend to run more slowly as they age and under-report actual use.) Losses due to

illegal connections and theft. (Included in Appendix H.) Accounts which are being used but have not yet been added to the billing system.

- Real Losses – includes physical losses from the system or mains, reported breaks and leaks, storage overflow.
- Unidentified Water Losses – (System Input - Total Authorized - Apparent Losses - Real Losses)

Measures to control water loss should be part of the routine operations of Member Cities and Customers. Maintenance crews and personnel should look for and report evidence of leaks in the water distribution system. A leak detection and repair program is described in Section 6.1.4 below. Meter readers should watch for and report signs of illegal connections, so they can be quickly addressed.

Total water loss should be calculated in accordance with the provisions of Appendix J. With the measures described in this plan, Member Cities and Customers should maintain water loss percentage below 12 percent in 2013 and subsequent years. If total water loss exceeds this goal, the Member City or Customer should implement a more intensive audit to determine the source(s) of and reduce the water loss. The annual conservation report described below is the primary tool that should be used to monitor water loss.

6.1.4 Leak Detection and Repair

As described above, city crews and personnel should look for and report evidence of leaks in the water distribution system. Areas of the water distribution system in which numerous leaks and line breaks occur should be targeted for replacement as funds are available.

6.1.5 Record Management System

As required by TAC Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2(a)(2)(B), a record management system should allow for the separation of water sales and uses into residential, commercial, public/institutional, and industrial categories. This information should be included in an annual water conservation report, as described in Section 7.7 below. Those entities whose record management systems do not currently comply with this requirement should move to implement such a system within the next five years.

6.2 Continuing Public Education and Information Campaign

The continuing public education and information campaign on water conservation includes the following elements:

- Utilize the “Water IQ: Know Your Water” and other public education materials produced by the NTMWD.
- Insert water conservation information with water bills. Inserts will include material developed by Member Cities’ and Customers’ staff and material obtained from the TWDB, the TCEQ, and other sources.
- Encourage local media coverage of water conservation issues and the importance of water conservation.
- Notify local organizations, schools, and civic groups that Member City or Customer staff and staff of the NTMWD are available to make presentations on the importance of water conservation and ways to save water.
- Promote the *Texas Smartscape* web site (www.txsmartscape.com) and provide water conservation brochures and other water conservation materials available to the public at City Hall and other public places.
- Make information on water conservation available on its website (if applicable) and include links to the “Water IQ: Know Your Water” website, *Texas Smartscape* website and to information on water conservation on the TWDB and TCEQ web sites and other resources.
- NTMWD is an EPA Water Sense Partner and participates in the EPA Water Sense sponsored “Fix a Leak Week.” NTMWD encourages all member cities and customers to become EPA Water Sense Partners.
- Utilize the Water My Yard website and encourage customers to sign-up to receive weekly watering advice.

6.3 NTMWD System Operation Plan

Member Cities and Customers of NTMWD purchase treated water from NTMWD and do not have surface water supplies for which to implement a system operation plan. NTMWD operates multiple sources of water supply as a system. The operation of the reservoir system is intended

to optimize the use of the District's sources (within the constraints of existing water rights) while minimizing energy use cost for pumping, maintaining water quality, minimizing potential impacts on recreational users of the reservoirs and fish and wildlife.

6.4 Coordination with Regional Water Planning Group and NTMWD

Appendix F includes a letter sent to the Chair of the Region C and Region D water planning group with this model water conservation plan. Each Member City and Customer will send a copy of their draft ordinance(s) or regulation(s) implementing the plan and their water utility profile to NTMWD for review and comment. The adopted ordinance(s) or regulation(s) and the adopted water utility profile will be sent to the Chair of the appropriate Water Planning Group and to NTMWD.

6.5 Requirement for Water Conservation Plans by Wholesale Customers

Every contract for the wholesale sale of water by Member Cities and/or Customers that is entered into, renewed, or extended after the adoption of this water conservation plan will include a requirement that the wholesale customer and any wholesale customers of that wholesale customer develop and implement a water conservation plan meeting the requirements of Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code. The requirement will also extend to each successive wholesale customer in the resale of the water.

7. ENHANCED WATER CONSERVATION STRATEGIES

7.1 Water Rate Structure

Member Cities and Customers should adopt, if they have not already done so, an increasing block rate water structure that is intended to encourage water conservation and discourage excessive use and waste of water upon completion of their next rate study or within five years. An example water rate structure is as follows:

Residential Rates

1. Monthly minimum charge. This can (but does not have to) include up to 2,000 gallons water use with no additional charge.
2. Base charge per 1,000 gallons up to the approximate average residential use.
3. 2nd tier (from the average to 2 times the approximate average) at 1.25 to 2.0 times the base charge.
4. 3rd tier (above 2 times the approximate average) at 1.25 to 2.0 times the 2nd tier.
5. Additional tiers with further increases if desired.
6. The residential rate can also include a lower tier for basic household use up to 4,000 gallons per month or a determined basic use.

Commercial/Industrial Rates

Commercial/industrial rates should include at least 2 tiers, with rates for the 2nd tier at 1.25 to 2.0 times the first tier. Higher water rates for commercial irrigation use are encouraged, but not required.

7.2 Ordinances, Plumbing Codes, or Rules on Water-Conserving Fixtures

The state has required water-conserving fixtures in new construction and renovations since 1992. The state standards call for flows of no more than 2.5 gallons per minute (gpm) for faucets, 2.5 gpm for showerheads, and 1.6 gallons per flush for toilets. Similar standards are now required nationally under federal law. These state and federal standards assure that all new construction and renovations will use water-conserving fixtures. Rebate programs to encourage replacement of older fixtures with water conservation programs are discussed in Section 7.6.

7.3 Reuse and Recycling of Wastewater

Most Member Cities and Customers do not own and operate their own wastewater treatment plants. Their wastewater is treated by NTMWD. NTMWD currently has the largest wastewater reuse program in the state. NTMWD has water rights allowing reuse of up to 71,882 acre-feet per year of this treated wastewater through Lavon Lake for municipal purposes. In addition, NTMWD has also developed the East Fork Raw Water Supply Project which can divert up to 157,393 acre-feet per year based on treated wastewater discharges by the NTMWD. When fully developed, these two reuse projects will provide up to 44 percent of the NTMWD's currently permitted water supplies. NTMWD also provides treated effluent from its wastewater treatment plants available for direct reuse for landscape irrigation and industrial use.

Those Member Cities and Customers who own and operate their own wastewater treatment plants should move toward reusing treated effluent for irrigation purposes at their plant site over the next three years. These entities should also seek other alternatives for reuse of recycled wastewater effluent.

7.4 Interactive Weather Stations / Water My Yard Program

NTMWD has developed the Water My Yard program to install weather stations throughout its service area to provide consumers with a weekly e-mail and information through the Water My Yard website in determining an adequate amount of supplemental water that is needed to maintain healthy grass in specific locations. This service represents the largest network of weather stations providing ET-based irrigation recommendations in the State of Texas, and provides the public advanced information regarding outdoor irrigation needs, thereby reducing

water use. Through a series of selections on the type of irrigation system a consumer has, a weekly email is provided that will determine how long (in minutes) that an irrigation system needs to run based on the past seven days of weather. This recommendation provides the actual amount of supplemental water that is required for a healthy lawn based on research of the Texas A&M Agrilife Extension Service and proven technologies. This innovative program has been available to those within the NTMWD service area since May 2013.

7.5 Compulsory Landscape and Water Management Measures

The following landscape water management measures are required by the NTMWD for this plan. These measures represent minimum measures to be implemented and enforced in order to irrigate the landscape appropriately, and are to remain in effect on a permanent basis unless water resource management stages are declared.

1. Landscape Water Management Measures

- Limit landscape watering with sprinklers or irrigation systems at each service address to no more than two days per week (April 1 – October 31), with education that less than twice per week is usually adequate. Additional watering of landscape may be provided by hand-held hose with shutoff nozzle, use of dedicated irrigation drip zones, and/or soaker hose provided no runoff occurs.
- Limit landscape watering with sprinklers or irrigation systems at each service address to no more than one day per week beginning November 1 and ending March 31 of each year, with education that less than once per week is usually adequate.
- Prohibit lawn irrigation watering from 10 AM to 6 PM (April 1 – October 31).
- Prohibit the use of irrigation systems that water impervious surfaces. (Wind driven water drift will be taken into consideration.)
- Prohibit outdoor watering during precipitation or freeze events.
- Prohibition of use of poorly maintained sprinkler systems that waste water.
- Prohibit excess water runoff or other obvious waste.

- Require rain and freeze sensors and/or ET or Smart controllers on all new irrigation systems. Rain and freeze sensors and/or ET or Smart controllers must be maintained to function properly.
- Prohibit overseeding, sodding, sprigging, broadcasting or plugging with cool season grasses or watering cool season grasses, except for golf courses and athletic fields.
- Require that irrigation systems be inspected at the same time as initial backflow preventer inspection.
- Requirement that all new irrigation systems be in compliance with state design and installation regulations (TAC Title 30, Part 1, Chapter 344).
- Require the owner of a regulated irrigation property to obtain an evaluation of any permanently installed irrigation system on a periodic basis. The irrigation evaluation shall be conducted by an licensed irrigator in the state of Texas and be submitted to your local water provider (i.e., city, water supply corporation).

2. Additional Water Management Measures

- Prohibit the use of potable water to fill or refill residential, amenity, and any other natural or manmade ponds. A pond is considered to be a still body of water with a surface area of 500 square feet or more.
- Non –commercial car washing can be done only when using a water hose with a shut-off nozzle.
- Hotels and motels shall offer a linen reuse water conservation option to customers.
- Restaurants, bars, and other commercial food or beverage establishments may not provide drinking water to customers unless a specific request is made by the customer for drinking water.

Member Cities and Customers are responsible for developing regulations, ordinances, policies, or procedures for enforcement of water conservation guidelines.

Appendix E is a summary of considerations for landscape water management regulations adopted as part of the development of this water conservation plan. These regulations are intended to minimize waste in landscape irrigation. Appendix E includes the required landscape water measures in this section.

7.6 Additional Water Conservation Measures (Not Required)

NTMWD also urges its Member Cities and Customers to consider including the following additional water conservation measures from the NTMWD Model Water Conservation Plan in their plans: Member Cities and Customers are responsible for developing regulations, ordinances, policies, or procedures for enforcement of water conservation guidelines.

1. Landscape Water Management Regulations

- Requirement that all existing irrigation systems be retrofitted with rain and freeze sensors and/or ET or Smart controllers capable of multiple programming. Rain and freeze sensors and/or ET or Smart controllers must be maintained to function properly.
- Requirement that all new athletic fields be irrigated by a separate irrigation system from surrounding areas.
- Implementation of other measures to encourage off-peak water use.

2. Landscape Ordinance

- Landscape ordinances are developed by cities to guide developers in landscaping requirements for the city. A sample landscape ordinance is provided in Appendix I and is intended as a guideline for adopting a landscape ordinance to promote water efficient landscape design.
- Native, drought tolerant or adaptive plants should be encouraged.
- Drip irrigation systems should be promoted.
- ET/Smart controllers that only allow sprinkler systems to irrigate when necessary should be promoted.

3. Water Audits

- Water audits are useful in finding ways in which water can be used more efficiently at a specific location. NTMWD recommends that Member Cities and Customers offer water audits to customers.

4. Rebates

- In addition to the conservation measures described above, the NTMWD also recommends the following water conservation incentive programs for consideration by Member Cities and Customers:
 - Low-flow toilet replacement and rebate programs,
 - Rebates for rain/freeze sensors and/or ET or Smart controllers,
 - Low-flow showerhead and sink aerators replacement programs or rebates,
 - Water efficient clothes washer rebates,
 - Pressure reducing valve installation programs or rebates,
 - Rain barrel rebates,
 - Pool covers,
 - On-demand hot water heater rebates, and/or
 - Other water conservation incentive programs.

7.7 Monitoring of Effectiveness and Efficiency - Annual Water Conservation Report

Appendix D is a form that should be used in the development of an annual water conservation report by Member Cities and Customers. This form should be completed by March 31 of the following year and used to monitor the effectiveness and efficiency of the water conservation program and to plan conservation-related activities for the next year. The form records the water use by category, per capita municipal use, and total water loss for the current year and compares them to historical values. As part of the development of Appendix D, Member Cities and Customers will complete the tracking tool by March 31 of the following year and submit them to NTMWD. The annual water conservation report should be sent to NTMWD, which will monitor NTMWD Member Cities' and Customers' water conservation trends.

7.8 Water Conservation Implementation Report

Appendix J includes the TCEQ-required water conservation implementation report. The report is due to the TCEQ by May 1 of every year. This report lists the various water conservation strategies that have been implemented, including the date the strategy was implemented. The report also calls for the five-year and ten-year per capita water use goals from the previous

water conservation plan. The reporting entity must answer whether or not these goals have been met and if not, why not. The amount of water saved is also requested.

8. IMPLEMENTATION AND ENFORCEMENT OF THE WATER CONSERVATION PLAN

Appendix G contains a draft ordinance, order, or resolution which may be tailored to meet Member or Customer City needs and be adopted by the City Council or governing board regarding the model water conservation plan. The ordinance, order, or resolution designates responsible officials to implement and enforce the water conservation plan. Appendix E, the considerations for landscape water management regulations, also includes information about enforcement. Appendix H includes a copy of an ordinance, order, or resolution that may be adopted related to illegal connections and water theft.

9. REVIEW AND UPDATE OF WATER CONSERVATION PLAN

TCEQ requires that the water conservation plans be updated prior to May 1, 2014. The plans are required to be updated every five years thereafter. The plan will be updated as required and as appropriate based on new or updated information.

**MODEL WATER RESOURCE AND EMERGENCY
MANAGEMENT PLAN
NORTH TEXAS MUNICIPAL WATER DISTRICT
MEMBER CITIES AND CUSTOMERS**

APRIL 2014

Prepared by:

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FORWARD

This Model Water Resource and Emergency Management Plan (which is an update to the previous Drought Contingency and Water Emergency Response Plan) was prepared by Freese and Nichols for the North Texas Municipal Water District (NTMWD). It is intended to be used by NTMWD Member Cities and Customers as a guide as they develop their own Water Resource and Emergency Management Plans. This plan was prepared pursuant to Texas Commission on Environmental Quality rules. Some material is based on the existing drought contingency plans listed in Appendix A.

Questions regarding this Water Resource and Emergency Management plan should be addressed to the following:

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This Water Resource and Emergency Management plan is based on the Texas Administrative Code in effect on June 25, 2013.

**WATER RESOURCE AND EMERGENCY
MANAGEMENT PLAN
INSERT ENTITY NAME**

APRIL 2014



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APPENDICES

APPENDIX A **List of References**

APPENDIX B **Texas Commission on Environmental Quality Rules on Drought Contingency Plans**

- Texas Administrative Code Title 30, Part 1, Chapter 288, Subchapter B, Rule §288.20 – Drought Contingency Plans for Municipal Uses by Public Water Suppliers

APPENDIX C **Letters to Region C and Region D Water Planning Groups**

APPENDIX D **Adoption of Water Resource and Emergency Management Plan**

- Municipal Ordinance Adopting Water Resource and Emergency Management Plan
- Municipal Utility District Order Adopting Water Resource and Emergency Management Plan
- Special Utility District Order Adopting Water Resource and Emergency Management Plan
- Water Supply Corporation Resolution Adopting Water Resource and Emergency Management Plan

1. INTRODUCTION AND OBJECTIVES

This document has been prepared as a Model Water Resource and Emergency Management Plan, intended to be available for use by North Texas Municipal Water District (NTMWD) Member Cities and Customers as they develop their own plans. This model plan addresses all of the current TCEQ requirements for a drought contingency plan¹. This model plan will replace the plans dated August 2004, April 2006 and March 2008. The March 2008 model plan shall continue to apply until such time that the drought contingency or water emergency response stage currently in effect under the March 2008 model plan terminates and a less restrictive stage is applicable. At such time, this model plan shall take effect, replacing the March 2008 model plan, and the appropriate water resource management stage as provided in this model plan shall be initiated.

The measures included in this Model Water Resource and Emergency Management Plan are intended to provide short-term water savings during drought or emergency conditions. Water savings associated with ongoing, long-term strategies are discussed in the *Model Water Conservation Plan for North Texas Municipal Water District Member Cities and Customers*.²

The purpose of this model Water Resource and Emergency Management plan is as follows:

- To conserve the available water supply in times of drought and emergency
- To maintain supplies for domestic water use, sanitation, and fire protection
- To protect and preserve public health, welfare, and safety
- To minimize the adverse impacts of water supply shortages
- To minimize the adverse impacts of emergency water supply conditions.

The NTMWD supplies treated potable water to its Member Cities and Customers. This model plan was developed by NTMWD in consultation with its Member Cities and Customers. In order to adopt this model plan, each NTMWD Member City and Customer will need to adopt ordinance(s) or regulation(s) implementing the plan, including the determination of fines and enforcement procedures. The model plan calls for Member Cities and Customers to adopt water resource management stages initiated by NTMWD during a drought or water supply emergency. Member Cities and Customers may also adopt more stringent water resource management stages than NTMWD if conditions warrant.

In the absence of drought response measures, water demands tend to increase during a drought due to increased outdoor irrigation. The severity of a drought depends on the degree of depletion of supplies and on the relationship of demand to available supplies. The NTMWD considers a drought to end when all of its supply reservoirs refill to the conservation storage pool.

¹ Superscripted numbers match references listed in Appendix A.

2. DEFINITIONS

1. AQUATIC LIFE means a vertebrate organism dependent upon an aquatic environment to sustain its lifeⁱ.
2. ATHLETIC FIELD means a public sports competition field, the essential feature of which is turf grass, used primarily for organized sports practice, competition or exhibition events for schools, professional sports, or sanctioned league playⁱⁱ.
3. COMMERCIAL FACILITY business or industrial buildings and the associated landscaping, but does not include the fairways, greens, or tees of a golf courseⁱ.
4. COMMERCIAL VEHICLE WASH FACILITY means a permanently-located business that washes vehicles or other mobile equipment with water or water-based products, including but not limited to self-service car washes, full service car washes, roll-over/in-bay style car washes, and facilities managing vehicle fleets or vehicle inventoryⁱ.
5. COOL SEASON GRASSES are varieties of turf grass that grow best in cool climates primarily in northern and central regions of the U.S. Cool season grasses include perennial and annual rye grass, Kentucky blue grass and fescuesⁱⁱⁱ.
6. CUSTOMERS include those entities to whom NTMWD provides water on a customer basis that are not members of NTMWD.
7. DESIGNATED OUTDOOR WATER USE DAY means a day prescribed by rule on which a person is permitted to irrigate outdoorsⁱ.

ⁱ Definitions from City of Austin Water Conservation and Drought Contingency Ordinance adopted August 16, 2012.
http://www.austintexas.gov/sites/default/files/files/Water/Conservation/Planning_and_Policy/ProposedCodeRevision_DRAFT_with_watering_schedule-8-15-2012.pdf

ⁱⁱ Definition from City of San Antonio Water Conservation Ordinance adopted 2005.
http://saws.org/conservation/ordinance/docs/Ch34_Ordinance_2009.pdf

ⁱⁱⁱ Definition developed by Freese and Nichols, Inc.

8. DRIP IRRIGATION is a type of micro-irrigation system that operates at low pressure and delivers water in slow, small drips to individual plants or groups of plants through a network of plastic conduits and emitters; also called trickle irrigation. ^{iv}.
9. DROUGHT, for the purposes of this report, means an extended period of time when an area receives insufficient amounts of rainfall to replenish the water supply, causing water supply sources (in this case reservoirs) to be depleted^v.
10. EVAPOTRANSPIRATION abbreviated as ET represents the amount of water lost from plant material to evaporation and transpiration. The amount of ET can be estimated based on the temperature, wind, and relative humidityⁱⁱⁱ.
11. ET/SMART CONTROLLERS are irrigation controllers that adjust their schedule and run times based on weather (ET) data. These controllers are designed to replace the amount of water lost to evapotranspirationⁱⁱⁱ.
12. EXECUTIVE DIRECTOR means the Executive Director of the North Texas Municipal Water District and includes a person the Director has designated to administer or perform any task, duty, function, role, or action related to this plan or on behalf of the Executive Directorⁱⁱⁱ.
13. FOUNDATION WATERING means an application of water to the soils directly abutting the foundation of a building structureⁱ.
14. MEMBER CITIES include the cities of Allen, Farmersville, Forney, Frisco, Garland, McKinney, Mesquite, Plano, Princeton, Richardson, Rockwall, Royce City, and Wylie, Texas.
15. NEW LANDSCAPE means vegetation: installed at the time of the construction of a residential or commercial facility; installed as part of a governmental entity's capital improvement project; installed to stabilize an area disturbed by constructionⁱ.

^{iv} Amy Vickers: Handbook of Water Use and Conservation, Amherst Massachusetts, June 2002

^v Freese and Nichols, Inc.: Water Conservation and Drought Contingency and Water Emergency Response Plan, prepared for North Texas Municipal Water District, Fort Worth, March 2008.

16. ORNAMENTAL FOUNTAIN means an artificially created structure (up to six feet in diameter) from which a jet, stream, valves and emission devices or flow of water emanates and is not typically utilized for the preservation of aquatic lifeⁱ.
17. PERMANANTLY INSTALLED IRRIGATION SYSTEM means a custom-made, site-specific system of delivering water generally for landscape irrigation via a system of pipes or other conduits installed below groundⁱ.
18. RAIN/FREEZE SENSOR means a device designed to stop the flow of water to an automatic irrigation system when rainfall or freeze event has been detectedⁱⁱ.
19. RECLAIMED WATER means reclaimed municipal wastewater that has been treated to a quality that meets or exceeds the minimum standards of the 30 Texas Administrative Code, Chapter 210 and is used for lawn irrigation, industry, or other non-potable purposesⁱ.
20. SOAKER HOSE means a perforated or permeable garden-type hose or pipe that is laid above ground that provides irrigation at a slow and constant rateⁱ.
21. SPRINKLER means an above-ground water distribution device that may be attached to a garden hoseⁱ.
22. SWIMMING POOL means any structure, basin, chamber, or tank including hot tubs, containing an artificial body of water for swimming, diving, or recreational bathing, and having a depth of two (2) feet or more at any pointⁱⁱ.
23. WATER RESOURCE MANAGEMENT PLAN means a strategy or combination of strategies for temporary supply management and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies required by Texas Administrative Code Title 30, Chapter 288, Subchapter B. This is sometimes called a drought contingency planⁱ

3. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

The TCEQ rules governing development of drought contingency plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code, a current copy of which is included in Appendix B. For the purpose of these rules, a drought contingency plan is defined as “a strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies.”¹

Minimum Requirements

TCEQ’s minimum requirements for drought contingency plans are addressed in the following subsections of this report:

- 288.20(a)(1)(A) – Provisions to Inform the Public and Provide Opportunity for Public Input – Section 4.1
- 288.20(a)(1)(B) – Provisions for Continuing Public Education and Information – Section 4.2
- 288.20(a)(1)(C) – Coordination with the Regional Water Planning Group – Section 4.6
- 288.20(a)(1)(D) – Criteria for Initiation and Termination of Water Resource Management Stages – Section 4.3
- 288.20(a)(1)(E) – Water Resource Management Stages – Section 4.3
- 288.20(a)(1)(F) – Specific, Quantified Targets for Water Use Reductions – Section 4.3
- 288.20(a)(1)(G) – Water Supply and Demand Management Measures for Each Stage – Section 4.3
- 288.20(a)(1)(H) – Procedures for Initiation and Termination of Water Resource Management Stages – Section 4.3
- 288.20(a)(1)(I) - Procedures for Granting Variances – Section 4.4
- 288.20(a)(1)(J) - Procedures for Enforcement of Mandatory Restrictions – Section 4.5
- 288.20(a)(3) – Consultation with Wholesale Supplier – Sections 1, 4.2, and 4.3
- 288.20(b) – Notification of Implementation of Mandatory Measures – Section 4.3

- 288.20(c) – Review and Update of Plan – Section 4.7

4. WATER RESOURCE AND EMERGENCY MANAGEMENT PLAN

4.1 PROVISIONS TO INFORM THE PUBLIC AND OPPORTUNITY FOR PUBLIC INPUT

Member Cities and Customers will provide opportunity for public input in the development of this Water Resource and Emergency Management Plan by the following means:

- Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper, posted notice, and notice on the supplier's web site (if available).
- Making the draft plan available on the supplier's web site (if available).
- Providing the draft plan to anyone requesting a copy.
- Holding a public meeting.

4.2 PROVISIONS FOR CONTINUING PUBLIC EDUCATION AND INFORMATION

Member Cities and Customers will inform and educate the public about the Water Resource and Emergency Management Plan by the following means:

- Preparing a bulletin describing the plan and making it available at city hall and other appropriate locations.
- Making the plan available to the public through the supplier's web site (if available).
- Including information about the Water Resource and Emergency Management Plan on the supplier's web site (if available).
- Notifying local organizations, schools, and civic groups that staff are available to make presentations on the Water Resource and Emergency Management Plan (usually in conjunction with presentations on water conservation programs).
- At any time that the Water Resource and Emergency Management Plan is activated or the Water Resource and Emergency Management Plan changes, Member Cities and Customers will notify local media of the issues, the water resource management stage (if applicable), and the specific actions required of the public. The information will also be publicized on the supplier's web site (if available). Billing inserts will also be used as appropriate.

4.3 INITIATION AND TERMINATION OF WATER RESOURCE AND EMERGENCY MANAGEMENT STAGES

Initiation of a Water Resource Management Stage

The City Manager, General Manager, Mayor, Chief Executive, or official designee may order the implementation of a water resource management stage when one or more of the trigger conditions for that stage is met. The following actions will be taken when a water resource management stage is initiated:

- The public will be notified through local media and the supplier's web site (if available) as described in Section 4.2.
- Wholesale customers (if any) and the NTMWD will be notified by e-mail with a follow-up letter or fax that provides details of the reasons for initiation of the water resource management stage.
- If any mandatory provisions of the Water Resource and Emergency Management Plan are activated, Member Cities and Customers will notify the Executive Director of the TCEQ and the Executive Director of the NTMWD within 5 business days.
- Water Resource and Emergency Management Plan stages imposed by NTMWD action must be initiated by Member Cities and Customers.
- For other trigger conditions internal to a city or water supply entity, the City Manager, General Manager, Mayor, Chief Executive, or official designee may decide not to order the implementation of a water resource management stage or water emergency even though one or more of the trigger criteria for the stage are met. Factors which could influence such a decision include, but are not limited to, the time of the year, weather conditions, the anticipation of replenished water supplies, or the anticipation that additional facilities will become available to meet needs. The reason for this decision should be documented.

Termination of a Water Resource Management Stage

The City Manager, General Manager, Mayor, Chief Executive, or official designee may order the termination of a water resource management stage when the conditions for termination are met or at

their discretion. The following actions will be taken when a water resource management stage is terminated:

- The public will be notified through local media and the supplier's web site (if available) as described in Section 4.2.
- Wholesale customers (if any) and the NTMWD will be notified by e-mail with a follow-up letter or fax.
- If any mandatory provisions of the Water Resource and Emergency Management plan that have been activated are terminated, Member Cities and Customers will notify the Executive Director of the TCEQ and the Executive Director of the NTMWD within 5 business days.

The City Manager, General Manager, Mayor, Chief Executive, or official designee may decide not to order the termination of a water resource management stage even though the conditions for termination of the stage are met. Factors which could influence such a decision include, but are not limited to, the time of the year, weather conditions, or the anticipation of potential changed conditions that warrant the continuation of the water resource management stage. The reason for this decision should be documented.

Water Resource and Emergency Management Plan Stages and Measures

Stage 1

Initiation and Termination Conditions for Stage 1

- The NTMWD has initiated Stage 1, which may be initiated due to one or more of the following:
 - The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 1.
 - Water demand is projected to approach the limit of the permitted supply.
 - The storage in Lavon Lake is less than 55 percent of the total conservation pool capacity.
 - NTMWD's storage in Jim Chapman Lake is less than 55 percent of NTMWD's total conservation pool capacity.
 - The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Mild drought.
 - NTMWD has concern that Lake Texoma, the East Fork Raw Water Supply Project, or some other NTMWD source may be limited in availability in the next 6 months.
 - NTMWD water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days.
 - NTMWD water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate.
 - NTMWD's supply source becomes contaminated.
 - Supply source is interrupted or unavailable due to invasive species.
 - NTMWD's water supply system is unable to deliver water due to the failure or damage of major water system components.
- Supplier's water demand exceeds 95 percent of the amount that can be delivered to customers for three consecutive days.
- Supplier's water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate.

- Supply source becomes contaminated.
- Supplier's water supply system is unable to deliver water due to the failure or damage of major water system components.
- Supplier's individual plan may be implemented if other criteria dictate.

Stage 1 may terminate when NTMWD terminates its Stage 1 condition or when the circumstances that caused the initiation of Stage 1 no longer prevail.

Goal for Use Reduction and Actions Available under Stage 1

The goal for water use reduction under Stage 1 is a five percent (5%) reduction in the amount of water produced by NTMWD from the previous annual payment period prior to drought restrictions. **If circumstances warrant or if required by NTMWD, the City Manager, General Manager, Mayor, Chief Executive, or official designee can set a goal for greater or lesser water use reduction.** The City Manager, General Manager, Mayor, Chief Executive, or official designee may order the implementation of any or all of the actions listed below, as deemed necessary to achieve a five percent reduction. Measures described as "requires notification to TCEQ" impose mandatory requirements on customers. The supplier must notify TCEQ and NTMWD within five business days if these measures are implemented:

- Continue actions in the water conservation plan.
- Notify wholesale customers of actions being taken and request them to implement similar procedures.
- Initiate engineering studies to evaluate alternatives should conditions worsen.
- Further accelerate public education efforts on ways to reduce water use.
- Halt non-essential city government water use. (Examples include street cleaning, vehicle washing, operation of ornamental fountains, etc.)
- Encourage the public to wait until the current drought or emergency situation has passed before establishing new landscaping.
- All users are encouraged to reduce the frequency of draining and refilling swimming pools.

- **Requires Notification to TCEQ** – Limit landscape watering with sprinklers or irrigation systems at each service address to no more than two days per week on designated days between April 1 – October 31. Limit landscape watering with sprinklers or irrigation systems at each service address to once every week on designated days between November 1 – March 31. Exceptions are as follows:
 - An exception is allowed for landscape associated with new construction that may be watered as necessary for 30 days from the installation of new landscape features.
 - An exemption is also allowed for registered and properly functioning ET/Smart irrigation systems and drip irrigation systems from the designated outdoor water use days limited to no more than two days per week. ET/Smart irrigation and drip irrigation systems are however subject to all other restrictions applicable under this stage.
 - An exception for additional watering of landscape may be provided by hand held hose with shutoff nozzle, use of dedicated irrigation drip zones, and/or soaker hose provided no runoff occurs.
 - Foundations, new landscaping, new plantings (first year) of shrubs, and trees (within a ten foot radius of its trunk) may be watered by a hand-held hose, a soaker hose, or a dedicated zone using a drip irrigation system provided no runoff occurs.
- **Requires Notification to TCEQ** - Initiate a rate surcharge for all water use over a certain level.
- **Requires Notification to TCEQ** – Landscape watering of parks, golf courses and athletic fields using potable water are required to meet the same reduction goals and measures outlined in this stage. Exception for golf course greens and tee boxes which may be hand watered as needed.

Stage 2

Initiation and Termination Conditions for Stage 2

- The NTMWD has initiated Stage 2, which may be initiated due to one or more of the following:
 - The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 2.
 - Water demand is projected to approach or exceed the limit of the permitted supply.
 - The storage in Lavon Lake is less than 45 percent of the total conservation pool capacity.
 - NTMWD's storage in Jim Chapman Lake is less than 45 percent of NTMWD's total conservation pool capacity.
 - The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Moderate drought. (Measures required by SRA under a Moderate drought designation are similar to those under NTMWD's Stage 2.)
 - The supply from Lake Texoma, the East Fork Raw Water Supply Project, or some other NTMWD source has become limited in availability within the next 3 months.
 - NTMWD water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days.
 - NTMWD water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate.
 - NTMWD's supply source becomes contaminated.
 - NTMWD's water supply system is unable to deliver water due to the failure or damage of major water system components.
- Supplier's water demand exceeds 98 percent of the amount that can be delivered to customers for three consecutive days.
- Supplier's water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate.

- Supply source becomes contaminated.
- Supply source is interrupted or unavailable due to invasive species.
- Supplier’s water supply system is unable to deliver water due to the failure or damage of major water system components.
- Supplier’s individual plan may be implemented if other criteria dictate.
- Stage 2 may terminate when NTMWD terminates its Stage 2 condition or when the circumstances that caused the initiation of Stage 2 no longer prevail.

Goals for Use Reduction and Actions Available under Stage 2

The goal for water use reduction under Stage 2 is a reduction of ten percent (10%) in the amount of water obtained from NTMWD from the previous annual payment period prior to drought restrictions. **If circumstances warrant or if required by NTMWD, the City Manager, General Manager, Mayor, Chief Executive, or official designee can set a goal for greater or lesser water use reduction.** The City Manager, General Manager, Mayor, Chief Executive, or official designee may order the implementation of any or all of the actions listed below, as deemed necessary to achieve a ten percent reduction. Measures described as “requires notification to TCEQ” impose mandatory requirements on customers. The supplier must notify TCEQ and NTMWD within five business days if these measures are implemented:

- Continue or initiate any actions available under Stage 1.
- Notify wholesale customers of actions being taken and request them to implement similar procedures.
- Implement viable alternative water supply strategies.
- All users are encouraged to reduce the frequency of draining and refilling swimming pools.
- **Requires Notification to TCEQ** – Limit landscape watering with sprinklers or irrigation systems at each service address to once per week on designated days between April 1 – October 31. Limit landscape watering with sprinklers or irrigation systems at each service address to once every other week on designated days between November 1 – March 31. Exceptions are as follows:

- New construction may be watered as necessary for 30 days from the date of the installation of new landscape features. .
- Foundations, new plantings (first year) of shrubs, and trees (within a ten foot radius of its trunk) may be watered for up to two hours on any day by a hand-held hose, a dedicated zone using a drip irrigation system and/or soaker hose provided no runoff occurs.
- Public athletic fields used for competition may be watered twice per week.
- Locations using alternative sources of water supply only for irrigation may irrigate without day of the week restrictions provided proper signage is employed. However, irrigation using alternative sources of supply is subject all other restrictions applicable to this stage. If the alternative supply source is a well, proper proof of well registration with the North Texas Groundwater Conservation District or Red River Ground Water Conservation District is required. Other sources of water supply may not include imported treated water.
- An exemption is allowed for registered and properly functioning ET/Smart irrigation systems and drip irrigation systems from the designated outdoor water use day limited to no more than one day per week. ET/Smart irrigation and drip irrigation systems are however subject to all other restrictions applicable under this stage.
- Hand watering with shutoff nozzle, drip lines, and soaker hoses is allowed before 10 am and after 6 pm provided no runoff occurs.
- **Requires Notification to TCEQ** – Prohibit hydro seeding, hydro mulching, and sprigging.
- **Requires Notification to TCEQ** - Initiate a rate surcharge as requested by NTMWD.
- **Requires Notification to TCEQ** - Initiate a rate surcharge for all water use over a certain level.
- **Requires Notification to TCEQ** – If NTMWD has imposed a reduction in water available to Member Cities and Customers, impose the same percent reduction on wholesale customers.
- **Requires Notification to TCEQ** – Landscape watering of parks and golf courses using potable water are required to meet the same reduction goals and measures outlined in this stage. Exception for golf course greens and tee boxes which may be hand watered as needed.

Stage 3

Initiation and Termination Conditions for Stage 3

- The NTMWD has initiated Stage 3, which may be initiated due to one or more of the following:
 - The NTMWD Executive Director, with the concurrence of the NTMWD Board of Directors, finds that conditions warrant the declaration of Stage 3.
 - Water demand is projected to approach or exceed the limit of the permitted supply.
 - The storage in Lavon Lake is less than 35 percent of the total conservation pool capacity.
 - NTMWD's storage in Jim Chapman Lake is less than 35 percent of NTMWD's total conservation pool capacity.
 - The Sabine River Authority has indicated that its Upper Basin water supplies used by NTMWD (Lake Tawakoni and/or Lake Fork) are in a Severe drought or Emergency.
 - The supply from Lake Texoma, the East Fork Raw Water Supply Project, or some other NTMWD source has become severely limited in availability.
 - NTMWD water demand exceeds the amount that can be delivered to customers.
 - NTMWD water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate.
 - NTMWD's supply source becomes contaminated.
 - NTMWD's water supply system is unable to deliver water due to the failure or damage of major water system components.
- Supplier's water demand exceeds the amount that can be delivered to customers.
- Supplier's water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate.
- Supply source becomes contaminated.
- Supplier's water supply system is unable to deliver water due to the failure or damage of major water system components.
- Supplier's individual plan may be implemented if other criteria dictate.

- Stage 3 may terminate when NTMWD terminates its Stage 3 condition or when the circumstances that caused the initiation of Stage 3 no longer prevail.

Goals for Use Reduction and Actions Available under Stage 3

The goal for water use reduction under Stage 3 is a reduction of whatever amount is necessary in the amount of water obtained from NTMWD from the previous annual payment period prior to drought restrictions. **If circumstances warrant or if required by NTMWD, the City Manager, General Manager, Mayor, Chief Executive, or official designee can set a goal for greater or lesser water use reduction.**

The City Manager, General Manager, Mayor, Chief Executive, or official designee may order the implementation of any or all of the actions listed below, as deemed necessary. Measures described as “requires notification to TCEQ” impose mandatory requirements on member cities and customers. The supplier must notify TCEQ and NTMWD within five business days if these measures are implemented.

- Continue or initiate any actions available under Stages 1, and 2.
- Notify wholesale customers of actions being taken and request them to implement similar procedures.
- Implement viable alternative water supply strategies.
- **Requires Notification to TCEQ** – Initiate mandatory water use restrictions as follows:
 - Hosing and washing of paved areas, buildings, structures, windows or other surfaces is prohibited except by variance and performed by a professional service using high efficiency equipment.
 - Prohibit operation of ornamental fountains or ponds that use potable water except where supporting aquatic life or water quality.
- **Requires Notification to TCEQ** – Prohibit new sod, hydro seeding, hydro mulching, and sprigging.
- **Requires Notification to TCEQ** – Prohibit the use of potable water for the irrigation of new landscaping.
- **Requires Notification to TCEQ** – Prohibit all commercial and residential landscape watering, except that foundations and trees (within a ten foot radius of its trunk) may be watered for

two hours one day per week with a hand-held hose, a dedicated zone using a drip irrigation system and/or soaker hose provided no runoff occurs. ET/Smart irrigation systems and drip irrigation systems are not exempt from this requirement.

- **Requires Notification to TCEQ** – Prohibit washing of vehicles except at commercial vehicle wash facilities.
- **Requires Notification to TCEQ** – Landscape watering of parks, golf courses, and athletic fields with potable water is prohibited. Exception for golf course greens and tee boxes which may be hand watered as needed. Variances may be granted by the water provider under special circumstances.
- **Requires Notification to TCEQ** – Prohibit the filling, draining and refilling of existing swimming pools, wading pools, Jacuzzi and hot tubs except to maintain structural integrity, proper operation and maintenance or to alleviate a public safety risk. Existing pools may add water to replace losses from normal use and evaporation. Permitting of new swimming pools, wading pools, Jacuzzi and hot tubs is prohibited.
- **Requires Notification to TCEQ** – Prohibit the operation of interactive water features such as water sprays, dancing water jets, waterfalls, dumping buckets, shooting water cannons, or splash pads that are maintained for public recreation.
- **Requires Notification to TCEQ** – Require all commercial water users to reduce water use by a percentage established by the City Manager, General Manager, Mayor, Chief Executive, or official designee.
- **Requires Notification to TCEQ** – If NTMWD has imposed a reduction in water available to Member Cities and Customers, impose the same percent reduction on wholesale customers.
- **Requires Notification to TCEQ** - Initiate a rate surcharge for all water use over normal rates for all water use.

4.4 PROCEDURES FOR GRANTING VARIANCES TO THE PLAN

The City Manager, General Manager, Mayor, Chief Executive, or official designee may grant temporary variances for existing water uses otherwise prohibited under this Water Resource and Emergency Management Plan if one or more of the following conditions are met:

- Failure to grant such a variance would cause an emergency condition adversely affecting health, sanitation, or fire safety for the public or the person or entity requesting the variance.
- Compliance with this plan cannot be accomplished due to technical or other limitations.
- Alternative methods that achieve the same level of reduction in water use can be implemented.
- Variances shall be granted or denied at the discretion of the City Manager, General Manager, Mayor, Chief Executive, or official designee. All petitions for variances should be in writing and should include the following information:
 - Name and address of the petitioners
 - Purpose of water use
 - Specific provisions from which relief is requested
 - Detailed statement of the adverse effect of the provision from which relief is requested
 - Description of the relief requested
 - Period of time for which the variance is sought
 - Alternative measures that will be taken to reduce water use
 - Other pertinent information.

4.5 PROCEDURES FOR ENFORCING MANDATORY WATER USE RESTRICTIONS

Mandatory water use restrictions may be imposed in Stage 1, Stage 2 and Stage 3 Water Resource and Emergency Management Plan stages. The penalties associated with the mandatory water use restrictions will be determined by each entity.

Appendix D contains potential ordinances, resolutions, and orders that may be adopted by the city council, board, or governing body approving the Water Resource and Emergency Management plan and water response plan, including enforcement of same.

4.6 COORDINATION WITH THE REGIONAL WATER PLANNING GROUP AND NTMWD

Appendix C includes a copy of a letter sent to the Chairs of the Region C Water Planning Group and the North East Texas Water Planning Group with this model Water Resource and Emergency Management plan.

The suppliers will send a draft of its ordinance(s) or other regulation(s) implementing this plan to NTMWD for their review and comment. The supplier will also send the final ordinance(s) or other regulation(s) to NTMWD.

4.7 REVIEW AND UPDATE OF WATER RESOURCE AND EMERGENCY MANAGEMENT PLAN

As required by TCEQ rules, Member Cities and Customers must review the Water Resource and Emergency Management plan every five years. The plan will be updated as appropriate based on new or updated information.

APPENDIX D

NORTH TEXAS MUNICIPAL WATER DISTRICT

WATER UTILITY PROFILE BASED ON TCEQ FORMAT

APPENDIX D

North Texas Municipal Water District Water Utility Profile Based on TCEQ Format

Name of Utility: North Texas Municipal Water District
Address & Zip: P.O. Box 2408, Wylie, TX 75098
Telephone Number: (972) 442-5405
Fax Number: (972) 295-6440
Form Completed by: Denise Hickey
Title: Public Relations Coordinator
Signature: _____
Date: _____

Name and phone number of person responsible for implementing a water conservation program:

Name: Jim Parks
Phone Number: (972) 442-5405

I. CUSTOMER DATA

A. Population and Service Area Data

Service area map is included as Figure 3.2.

1. Service area size (square miles): 2,200 (Estimated 2012 total population of member cities and customers)
2. Current population of service area: 1,596,304
3. Current (2012) population served by utility:
water: 1,596,304
wastewater: 1,372,822
4. Population served by utility for the previous five years:

Year	Estimated Population
2008	1,413,059
2009	1,455,451
2010	1,464,391
2011	1,501,001
2012	1,596,304

Populations are based on estimates generated by NTWMD each year in preparing yearly Water Conservation Reports (Appendix D)

5. Projected population for service area in the following decades:

Year	Estimated Population
2020	1,797,279
2030	2,093,105
2040	2,454,133
2050	2,889,282
2060	3,333,931
2070	3,814,388

Projected 2020-2070 population for current and potential Member Cities and Customers from Region C projections for the 2016 regional water plan (as approved by TWDB)

6. List source(s)/method(s) for the calculation of current and projected population:

As described above, the estimates are total populations of current Member Cities and Customers, based on yearly estimates generated by NTWMD and projections made for the *2011 Region C Water Plan* and approved by the TWDB.

B. Customers Data

List the names of all wholesale customers, amount of annual contract, and amount of the annual use for each for the previous year:

Note: NTMWD is primarily a wholesale water provider. However, NTMWD does provide retail service to 41 customers.

Customer	Contracted Amount (Acre-Feet)	Year 2012 Water Delivered (Acre-Feet)
<u>Member Cities</u>		
Allen	Demand Based Contract with Minimum Take or Pay	16,842
Farmersville		677
Forney		4,385
Frisco		31,276
Garland		35,830
McKinney		29,303
Mesquite		18,644
Plano		65,287
Princeton		1,382
Richardson		26,379
Rockwall		8,994
Royse City		1,404
Wylie		5
Subtotal Members		
<u>Customers</u>		
Bonham		1,518
Caddo Basin SUD		927
Cash SUD		778
College Mound WSC		236
Copeville SUD		243
Crandall		508
East Fork SUD		1,041

Fairview		2,533	
Fate		1,036	
Forney Lake WSC		439	
Gastonia-Scurry SUD		749	
GTUA		213	
Josephine		1,549	
Kaufman		1,345	
Lavon WSC	Demand Based Contract with Minimum Take or Pay	792	
Little Elm		3,451	
Lucas		1,679	
Melissa		712	
Milligan WSC		363	
Mt. Zion WSC		328	
Murphy		3,701	
Nevada WSC		224	
N. Collin WSC		1,039	
Parker		1,354	
Prosper		2,731	
Rose Hill SUD		316	
Rowlett		7,857	
Sachse		3,304	
Seis Lagos MUD		308	
Sunnyvale		1,589	
Terrell		3,862	
Wylie NE SUD		499	
Subtotal Customers			47,224
<u>Retail Customers</u>			
Subtotal		12	
Total		287,644	

II. WATER USE DATA FOR SERVICE AREA

A. Water Delivery

Indicate if the water provided under wholesale contracts is treated or raw water and the annual amount for each for previous year.

Total amount sold for Year 2012 (acre-feet)

Treated	287,644
Raw	0

B. Water Accounting Data

- Total amount of water diverted at point of diversion(s) for previous five years (in acre-feet) for all water uses:

Diversions from Lavon Lake (and Lake Tawakoni) (acre-feet)

Year	2008	2009	2010	2011	2012
January	17,737	17,470	16,171	16,302	15,916
February	15,576	16,428	13,531	15,910	14,264
March	16,614	19,850	16,173	22,522	16,710
April	18,374	20,496	21,494	23,168	19,813
May	23,283	20,225	27,794	23,527	27,463
June	29,607	30,518	37,935	37,491	29,289
July	41,463	36,195	34,668	48,310	37,816
August	37,565	34,099	46,639	49,224	39,014
September	30,221	24,341	29,351	38,325	35,314
October	27,574	18,346	28,827	26,881	28,358
November	21,798	18,623	20,235	18,009	24,859
December	17,979	16,694	20,145	16,160	20,723
Total	297,791	273,282	312,962	335,828	309,540

- Wholesale population served and total amount of water diverted for **municipal** use for previous five years:

Year	Total Population Served	Total Annual Water Diverted for Municipal Use (Acre-Feet)
2008	1,413,059	296,145
2009	1,455,451	271,707
2010	1,464,391	311,318
2011	1,501,001	332,861
2012	1,596,304	303,446

C. Projected Water Demands

If applicable, project and attach water supply demands for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirement from such growth.

Year	Projected Demand (AF/Y) (with Plumbing Code Reductions)	Source of data
2020	371,743	2016 Region C Plan
2021	377,603	Interpolated
2022	383,462	Interpolated
2023	389,322	Interpolated
2024	395,181	Interpolated
2025	401,041	Interpolated
2026	406,900	Interpolated
2027	412,760	Interpolated
2028	418,619	Interpolated
2029	424,479	Interpolated
2030	430,338	2016 Region C Plan
2040	504,964	2016 Region C Plan
2050	582,350	2016 Region C Plan
2060	646,378	2016 Region C Plan
2070	710,535	2016 Region C Plan

Note: Projections are for current and potential customers. Projections include TWDB estimated reductions for plumbing fixtures. Projections are from Region C Water Planning Group information for the 2016 Plan, as approved by TWDB.

III. WATER SUPPLY SYSTEM DATA

A. Water Supply Sources

List all current water supply sources and the amounts available with each:

Type^a	Source	Amount Authorized (AF/Y)
Surface Water	Lavon Lake - municipal right	114,670
Surface Water	Lavon Lake - industrial or municipal	4,000
Surface Water	Lake Bonham	5,340
Surface Water	Lake Texoma ^b	197,000
Surface Water	Jim Chapman Lake	57,214
Surface Water	Upper Sabine Basin (contracted)	10,000
Indirect Reuse	Wilson Creek WWTP ^c	71,882
Indirect Reuse	East Fork Raw Water Supply ^c	157,393
Total		617,499

Notes: a. NTMWD does not have any groundwater supplies.

b. Availability from Lake Texoma is limited due to issues with zebra mussels and salt levels.

c. Availability from Wilson Creek WWTP and East Fork Raw Water Supply Project is limited to actual discharges and is currently less than amount authorized.

B. Treatment and Distribution System

1. Design daily capacity of system:

Plant 1	70 MGD
Plant 2	280 MGD
Plant 3	280 MGD
Plant 4	140 MGD
Lake Tawakoni	30 MGD
Lake Bonham	6 MGD
<hr/> Total	806 MGD

2. Storage capacity:

Elevated	<u>0</u>	MG
Ground	<u>74</u>	MG

3. If surface water, do you recycle filter backwash to the head of the plant?

Yes X No . Approximately 5 MGD.

4. Please describe the water system and attach. Include the number of treatment plants, wells,

and storage tanks. If possible, attach a sketch of the system layout.

Plate 1 at the back of the report is a map of the NTMWD water system. Raw water is diverted from Lavon Lake. (Raw water from Lake Texoma, Jim Chapman Lake, the East Fork Raw Water Supply Project, and the Upper Sabine Basin is pumped to the Lavon Lake watershed through pipelines and delivered by bed and banks of streams. Treated effluent from Wilson Creek WWTP is released into Wilson Creek and delivered to Lavon Lake by the bed and banks.) The raw water is treated at four water treatment plants with a total treatment capacity of 770 mgd, all located near Lavon Lake in Wylie. The treated water is delivered to NTMWD Member Cities and Customers through the system of pump stations and pipelines shown on Plate 1. Treated water is delivered to member cities and customers through air gaps into ground storage facilities owned by the member cities and customers.

IV. WASTEWATER SYSTEM DATA

A. Wastewater System Data (if applicable)

1. Design capacity of wastewater treatment plant(s): 126.755 MGD

2. Briefly describe NTMWD's wastewater systems. Identify treatment plants with the TCEQ name and number, the operator, owner, and, if wastewater is discharged, the receiving stream. Please provide a location map showing the plants. Plants are described below. Locations are shown on Plate 1:

Treatment Plant Name	TCEQ Number	Permitted Discharge (MGD)	Operator	Owner	Receiving Stream
Bear Creek	14577-001	0.250	NTMWD	World Land Developers	Bear Creek to Lake Ray Hubbard
Buffalo Creek	12047-001	2.250	NTMWD	NTMWD	Buffalo Creek thence East
Cottonwood Creek	10172-002	0.300	NTMWD	NTMWD	Cottonwood Branch to Lake
Farmersville #1	10442-001	0.225	NTMWD	NTMWD	Unnamed tributary of Elm
Farmersville #2	10442-002	0.530	NTMWD	NTMWD	Unnamed tributary of Elm
Floyd Branch	10257-001	4.750	NTMWD	NTMWD	Floyd Branch to Cottonwood
Muddy Creek	14216-001	5.000	NTMWD	NTMWD	Muddy Creek to Lake Ray
Panther Creek	14245-001	5.000	NTMWD	NTMWD	Unnamed tributary of
Rowlett Creek	10363-001	24.000	NTMWD	NTMWD	Rowlett Creek
Sabine Creek	14469-001	3.000	NTMWD	NTMWD	Parker Creek
Seis Lagos	11451-001	0.250	NTMWD	NTMWD	Unnamed tributary of Lavon
South Mesquite	10221-001	25.000	NTMWD	NTMWD	South Mesquite Creek
Squabble Creek	10262-001	1.200	NTMWD	NTMWD	Squabble Creek
Stewart Creek West	14008-001	5.000	NTMWD	NTMWD	Stewart Creek
Wilson Creek	12446-001	48.000	NTMWD	NTMWD	Lake Lavon Seg.# 0821
Wylie WWTP	10384-001	2.000	NTMWD	NTMWD	Muddy Creek

B. Wastewater Data for Service Area (if applicable)

1. Percent of water service area served by wastewater system: 62%
2. Monthly volume treated for previous three years (in 1,000 gallons):

Year	2010	2011	2012
January	1,410,476	1,227,707	1,413,885
February	1,579,695	1,150,275	1,139,140
March	1,558,821	1,116,601	1,432,752
April	1,151,705	1,159,584	1,097,959
May	1,095,664	1,367,492	1,101,447
June	1,036,124	1,070,548	1,176,674
July	1,142,571	983,061	1,031,512
August	1,085,631	959,558	1,107,059
September	1,290,595	943,647	1,060,828
October	1,097,052	1,078,004	1,108,391
November	1,195,716	969,354	1,026,706
December	1,114,127	1,253,781	1,107,901
Total	14,758,177	13,279,612	13,804,254

APPENDIX D1
Summary of NTMWD Water Use
Additional Information Not Required by TCEQ Water Utility Profile

Entity Reporting: NTMWD Summary
Filled Out By: Amy Kaarlela, Freese and Nichols, Inc.
Date Completed: 9/13/2012
Year Covered: 2012

NTMWD System Summary

Month	Municipal Raw Water Diversion (MG)	Amount of Reuse (MG)	Total Municipal Diversion (MG)	Industrial Raw Water Diversion (MG)	Percent of Municipal Supply from Reuse	Municipal Sales (MG)
January	1,368.222	3,603.604	4,971.826	0.000	72.48%	4,317.307
February	2,737.422	1,695.200	4,432.622	0.326	38.24%	4,221.266
March	2,556.166	2,653.314	5,209.480	2.282	50.93%	4,482.673
April	5,207.524	995.930	6,203.454	3.912	16.05%	6,085.772
May	7,461.814	1,147.520	8,609.334	5.868	13.33%	8,126.848
June	6,982.920	2,202.782	9,185.702	6.194	23.98%	8,857.113
July	10,038.518	2,139.538	12,178.056	7.824	17.57%	10,548.510
August	11,020.430	1,707.914	12,728.344	14.344	13.42%	10,982.036
September	9,731.100	1,771.158	11,502.258	4.564	15.40%	10,691.567
October	6,849.912	2,394.796	9,244.708	0.000	25.90%	8,010.067
November	6,123.910	1,980.124	8,104.034	0.000	24.43%	7,547.282
December	3,944.274	2,609.304	6,553.578	0.000	39.81%	5,468.538
TOTAL	74,022.212	24,901.184	98,923.396	45.314	25.17%	89,338.979

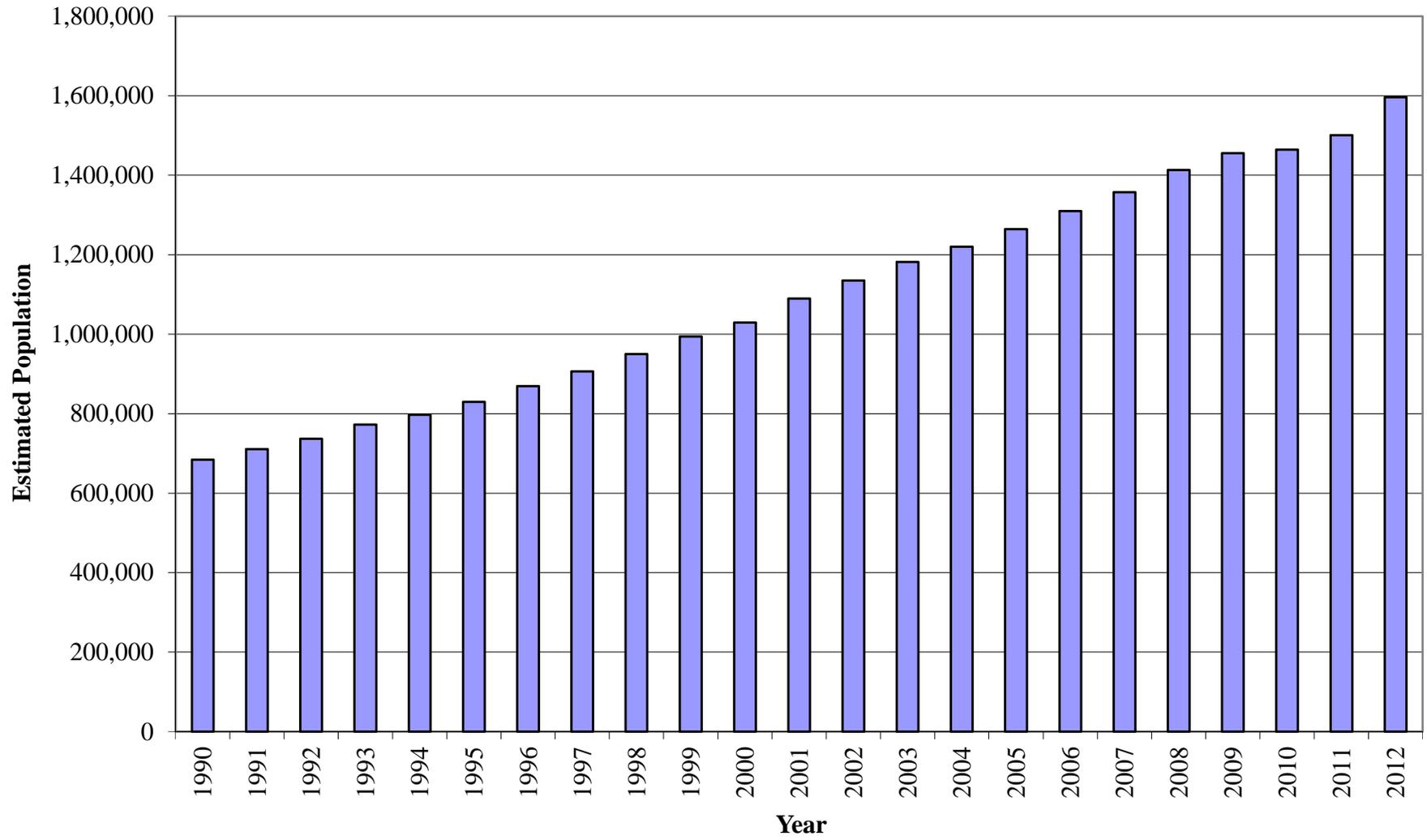
Historical Water Use Data for NTMWD

Year	Estimated Population	Raw Water & Reuse Diversions (MG)		Total Raw Water & Reuse Diversions (MG)	Reuse (MG)	Sales by Category (MG)		
		Municipal	Industrial			Municipal	Industrial Raw Water	Total
1990	684,435	46,544.324	280.686	46,825.010	0.000	46,483.362	280.686	46,764.048
1991	710,591	43,687.586	335.454	44,023.040	0.000	43,663.788	335.454	43,999.242
1992	736,859	44,488.242	367.076	44,855.318	2,004.574	43,426.134	367.076	43,793.210
1993	772,203	52,529.358	440.100	52,969.458	6,068.490	49,582.318	440.100	50,022.418
1994	797,386	47,542.536	478.894	48,021.430	6,976.400	47,091.026	478.894	47,569.920
1995	829,707	54,118.282	508.234	54,626.516	7,069.310	52,916.320	508.234	53,424.554
1996	869,142	59,779.924	429.668	60,209.592	7,418.456	55,655.046	429.668	56,084.714
1997	906,187	58,322.704	349.472	58,672.176	10,666.720	54,865.148	349.472	55,214.620
1998	949,808	71,851.378	444.664	72,296.042	12,218.806	69,444.846	444.664	69,889.510
1999	993,865	75,908.122	369.684	76,277.806	11,384.572	72,337.118	369.684	72,706.802
2000	1,028,985	84,090.070	402.936	84,493.006	10,672.914	81,991.608	402.936	82,394.544
2001	1,089,788	81,987.696	305.788	82,293.484	11,510.408	78,537.638	305.788	78,843.426
2002	1,135,190	79,444.896	277.426	79,722.322	11,426.626	77,732.092	277.426	78,009.518
2003	1,182,007	86,266.120	230.482	86,496.602	10,936.322	84,503.764	230.482	84,734.246
2004	1,220,396	80,629.906	237.328	80,867.234	12,930.790	78,797.460	237.328	79,034.788
2005	1,264,402	96,916.214	202.446	97,118.660	12,461.024	95,572.116	202.446	95,774.562
2006	1,309,994	97,888.346	188.754	98,077.100	13,735.684	93,524.510	188.754	93,713.264
2007	1,357,230	80,977.748	170.172	81,147.920	15,664.775	77,562.920	170.172	77,733.092
2008	1,413,059	96,543.270	48.248	97,050.873	13,384.982	89,584.077	48.248	89,632.325
2009	1,455,451	88,576.482	5.216	89,063.410	23,481.149	81,940.212	5.216	81,945.428
2010	1,464,391	101,489.668	43.032	101,995.312	23,302.908	91,600.759	43.032	91,643.791
2011	1,501,001	108,512.686	43.032	101,995.312	27,890.988	97,850.096	43.032	97,893.128
2012	1,596,304	98,923.396	45.314	109,447.284	26,163.631	89,338.979	45.314	89,384.293

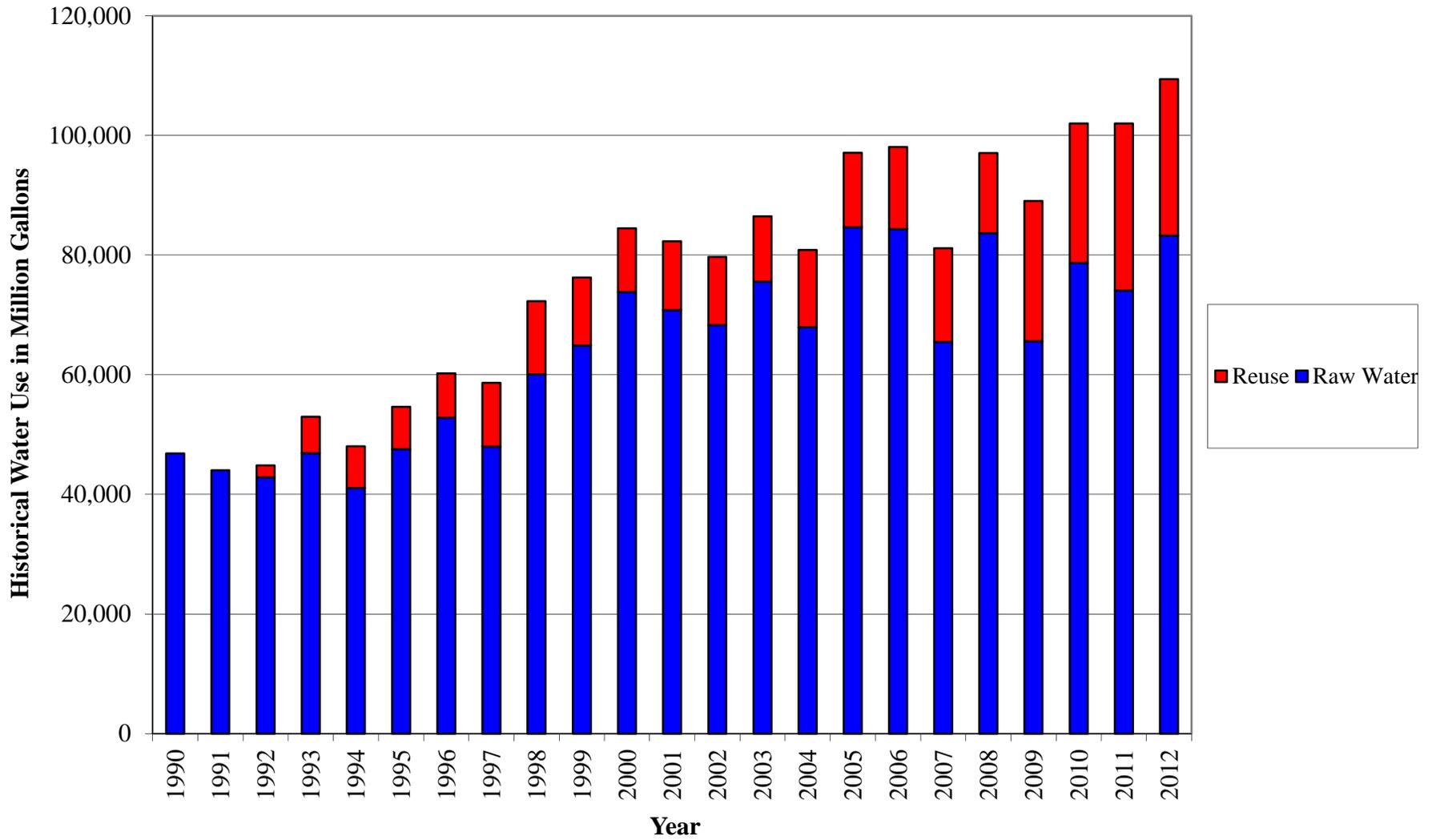
Historical Per Capita Use Data and Unaccounted Water for NTMWD

Year	Estimated Population	Municipal Raw Water & Reuse Diversions (MG)	Reuse (MG)	Industrial Sales by Customers (MG)	Municipal Treated Water Sales (MGD)	Unaccounted Water (MG)	% Unaccounted	% Reuse	Raw Water GPCD			Treated Water GPCD		
									Total gpcd	With Credit for Industrial Use	With Credit for Industrial Use and Reuse	Total gpcd	With Credit for Industrial Use	With Credit for Industrial Use and Reuse
1990	684,435	46,544.324	0.000	2,103.678	46,483.362	60.962	0.13%	0.00%	186	178	186	186	178	178
1991	710,591	43,687.586	0.000	1,585.990	43,663.788	23.798	0.05%	0.00%	168	162	168	168	162	162
1992	736,859	44,488.242	2,004.574	1,673.684	43,426.134	1,062.108	2.39%	4.51%	165	159	158	161	155	148
1993	772,203	52,529.358	6,068.490	1,768.550	49,582.318	2,947.040	5.61%	11.55%	186	180	167	176	170	148
1994	797,386	47,542.536	6,976.400	1,775.070	47,091.026	451.510	0.95%	14.67%	163	157	143	162	156	132
1995	829,707	54,118.282	7,069.310	1,804.084	52,916.320	1,201.962	2.22%	13.06%	179	173	158	175	169	146
1996	869,142	59,779.924	7,418.456	1,913.294	55,655.046	4,124.878	6.90%	12.41%	188	182	167	175	169	146
1997	906,187	58,322.704	10,666.720	2,126.172	54,865.148	3,457.556	5.93%	18.29%	176	170	150	166	159	127
1998	949,808	71,851.378	12,218.806	1,805.388	69,444.846	2,406.532	3.35%	17.01%	207	202	178	200	195	160
1999	993,865	75,908.122	11,384.572	2,072.708	72,337.118	3,571.004	4.70%	15.00%	209	204	182	199	194	162
2000	1,028,985	84,090.070	10,672.914	2,028.372	81,991.608	2,098.462	2.50%	12.69%	224	218	199	218	213	185
2001	1,089,788	81,987.696	11,510.408	2,030.980	78,537.638	3,450.058	4.21%	14.04%	206	201	181	197	192	164
2002	1,135,190	79,444.896	11,426.626	1,848.420	77,732.092	1,712.804	2.16%	14.38%	192	187	168	188	183	156
2003	1,182,007	86,266.120	10,936.322	1,434.400	84,503.764	1,762.356	2.04%	12.68%	200	197	177	196	193	167
2004	1,220,396	80,629.906	12,930.790	1,225.760	78,797.460	1,832.446	2.27%	16.04%	181	178	156	177	174	145
2005	1,264,402	96,916.214	12,461.024	1,215.980	95,572.116	1,344.098	1.39%	12.86%	210	207	186	207	204	177
2006	1,309,994	97,888.346	13,735.684	1,408.320	93,524.510	4,363.836	4.46%	14.03%	205	202	180	196	193	164
2007	1,357,230	80,977.748	15,664.775	1,285.913	77,562.920	3,414.828	4.22%	19.34%	163	161	138	157	154	122
2008	1,413,059	96,440.769	13,384.982	1,208.907	93,296.355	3,144.414	3.26%	13.88%	187	185	164	181	179	153
2009	1,455,451	88,535.998	23,481.149	1,205.649	86,756.525	1,779.472	2.01%	26.52%	167	164	134	163	161	117
2010	1,464,391	101,477.985	23,302.908	1,294.173	97,162.548	4,315.437	4.25%	22.96%	190	187	156	182	179	136
2011	1,501,001	108,812.975	27,890.988	1,737.330	104,429.475	4,383.501	4.03%	25.63%	199	195	160	191	187	137
2012	1,596,304	100,863.919	26,163.631	1,577.100	95,304.249	5,559.670	5.51%	25.94%	173	170	139	164	161	116

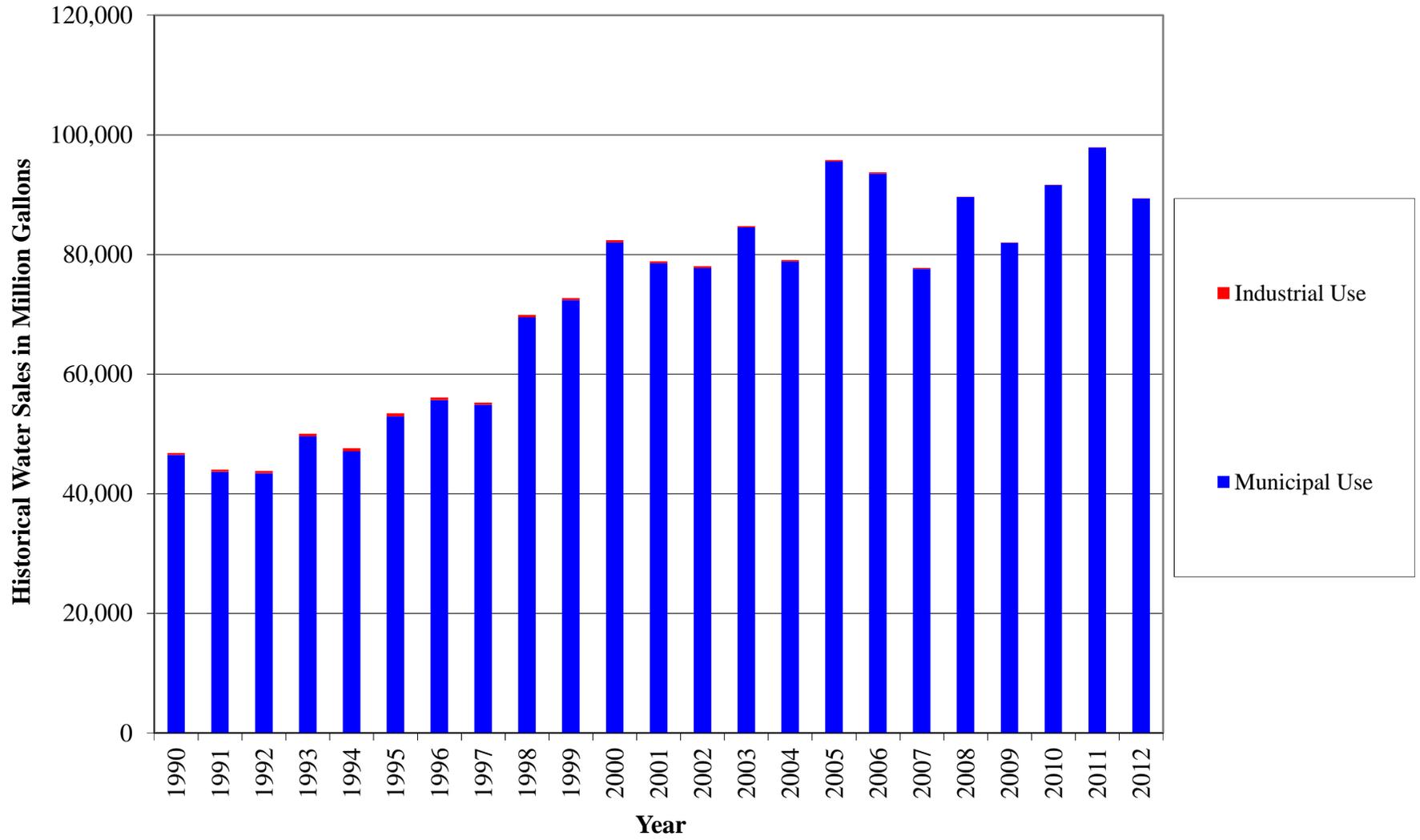
Estimated Historical NTMWD Service Area Population



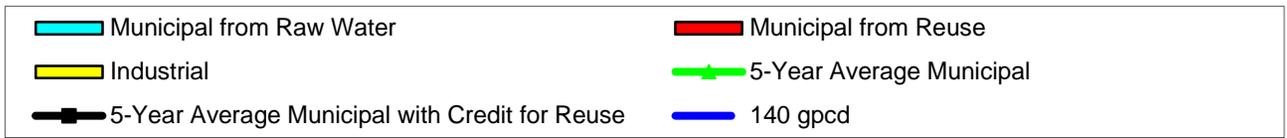
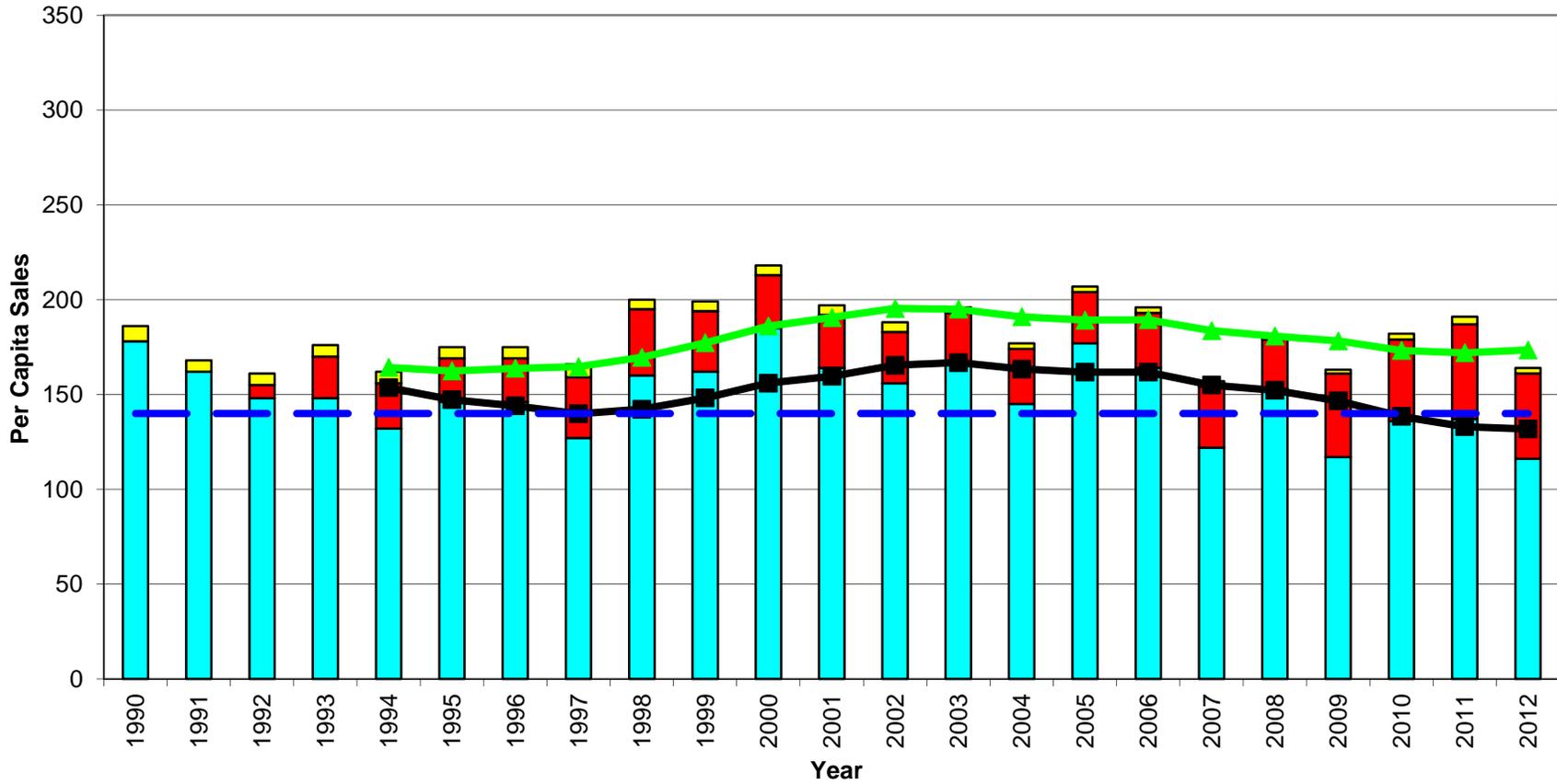
Historical NTMWD Raw Water & Reuse Diversions



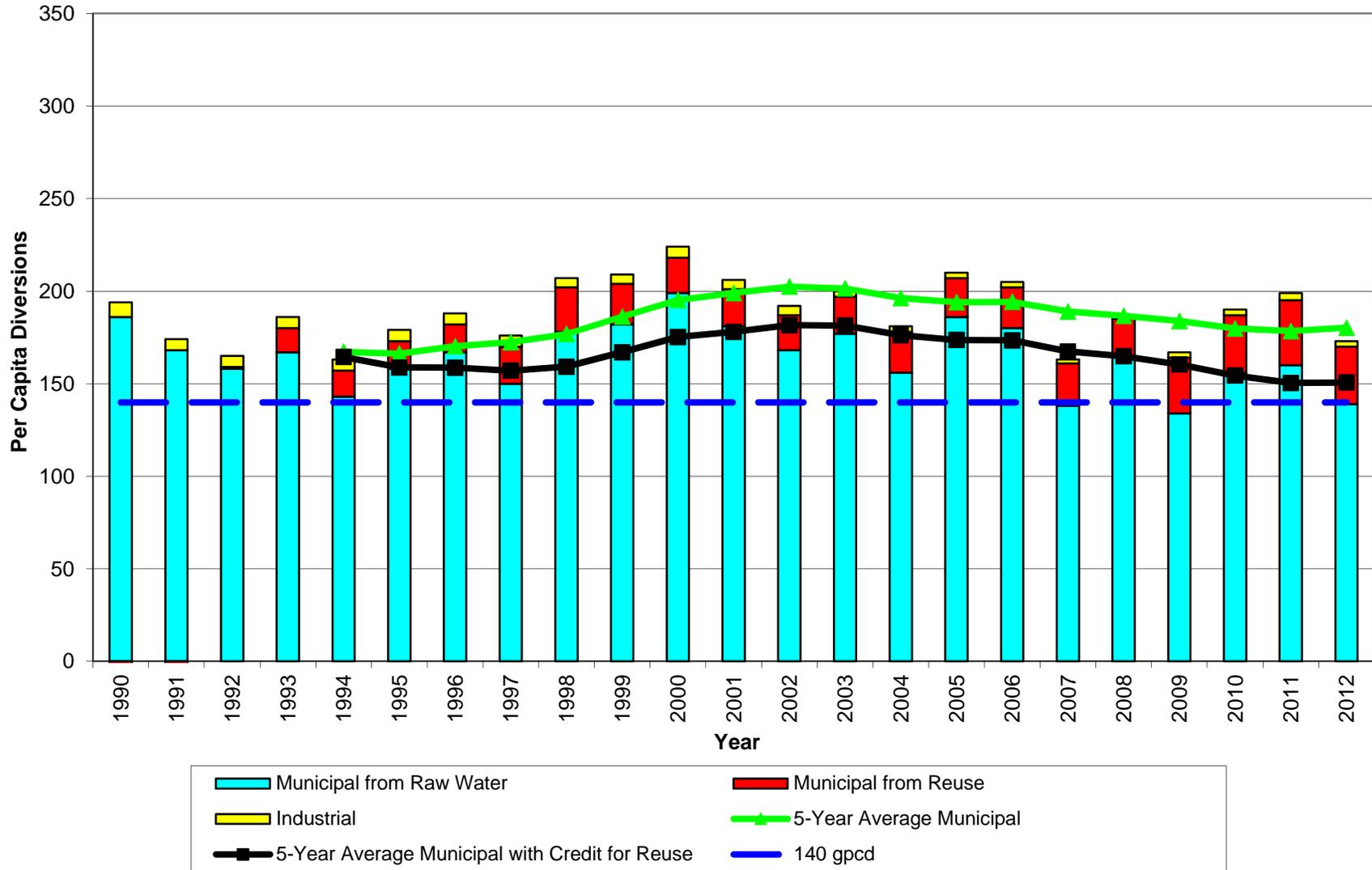
NTMWD Historical Water Sales by Classification



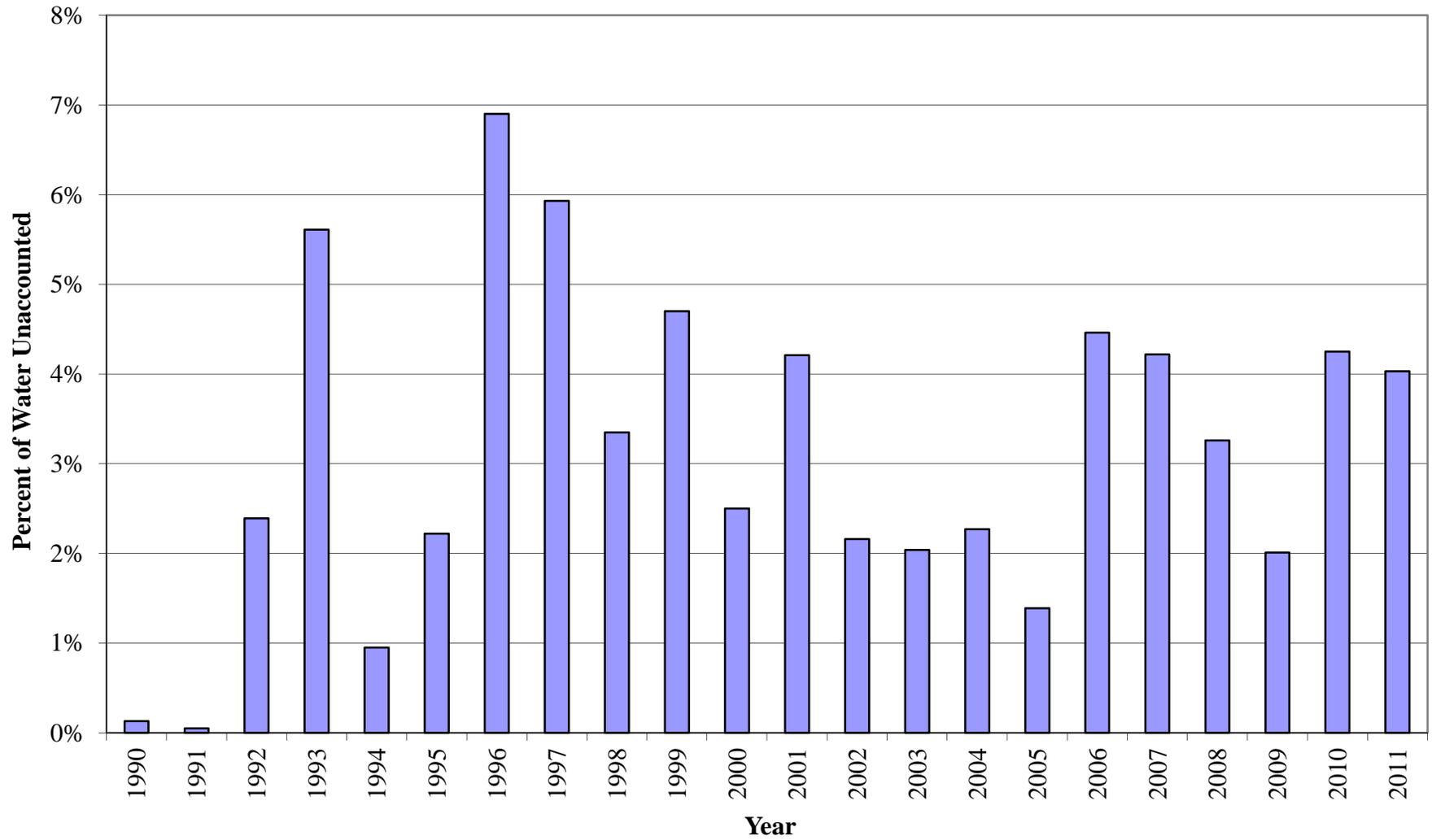
NTMWD Per Capita Treated Water Sales



NTMWD Per Capita Raw Water Diversions



NTMWD Historical Percent Unaccounted Water



APPENDIX E
NTMWD MEMBER CITY AND CUSTOMER ANNUAL WATER CONSERVATION
REPORT

APPENDIX E
NTMWD MEMBER CITY AND CUSTOMER WATER CONSERVATION REPORT

Due: March 31 of every year

Entity Reporting: _____
 Filled Out By: _____
 Date Completed: _____
 Year Covered: 2013
 # of Connections _____

Recorded Deliveries and Sales by Month (in Million Gallons):

Month	Deliveries from NTMWD	Other Supplies	Sales by Category						Total
			Residential	Commercial	Public/ Institutional	Industrial	Wholesale	Other	
January									0.000
February									0.000
March									0.000
April									0.000
May									0.000
June									0.000
July									0.000
August									0.000
September									0.000
October									0.000
November									0.000
December									0.000
TOTAL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Day Usage

Peak Day (MG) _____ Total peak day use (Peak day delivery from NTMWD + other supplies)
 Average Day (MG) 0.000 Average day use (Annual deliveries from NTMWD + other supplies / 365 days)
 Peak/Average Day Ratio #DIV/0! Total peak day use/average day use

Unaccounted Water (Million Gallons):

NTMWD Deliveries	0.000	from Table above
Other Supplies	0.000	from Table above
Total Supplies	0.000	from Table above
Total Sales	0.000	from Table above
Estimated Fire Use		estimated from best available data
Estimated Line Flushing Use		estimated from best available data
Unaccounted Water	0.000	
% Unaccounted	#DIV/0!	
Goal for % Unaccounted		

Per Capita Use (Gallons per person per day)

Total Use (MG)	0.000	from Table above (NTMWD deliveries+ other supplies - wholesale)
Municipal Use (MG)	0.000	from Table above (NTMWD deliveries+ other supplies - industrial sales - municipal sales - wholesale - other sales)
Residential Use (MG)	0.000	from Table above (NTMWD deliveries+ other supplies - commercial sales - public/institutional sales - i
Estimated Population		Source:
Total Per Capita Use (gpcd)	#DIV/0!	
Municipal Per Capita Use (gpcd)	#DIV/0!	
Residential Per Capita Use (gpcd)	#DIV/0!	
5-year Per Capita Goal (___)		
10-year Per Capita Goal (___)		

Recorded Wholesale Sales by Month (in Million Gallons):

Month	Sales to _____	Total Wholesale Sales							
January									0.000
February									0.000
March									0.000
April									0.000
May									0.000
June									0.000
July									0.000
August									0.000
September									0.000
October									0.000
November									0.000
December									0.000
TOTAL	0.000								

Information on Wholesale Customers:

Customer	Estimated Population
-----------------	---------------------------------

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Unusual Circumstances (use additional sheets if necessary):

--

Progress in Implementation of Conservation Plan (use additional sheets if necessary):

--

Conservation measures planned for next year (use additional sheets if necessary):

A large, empty rectangular box with a thin black border, intended for listing conservation measures planned for the next year.

Assistance requested from North Texas Municipal Water District (use additional sheets if necessary):

A large, empty rectangular box with a thin black border, intended for listing assistance requested from the North Texas Municipal Water District.

Other (use additional sheets if necessary):

A large, empty rectangular box with a thin black border, intended for providing other relevant information.

Historical Water Use Data for

Year	Connections	Estimated Population	Deliveries from NTMWD (MG)	Other Supplies (MG)	Metered Sales by Category (Million Gallons)					Total
					Residential	Commercial	Public/ Institutional	Industrial	Other	
1990										0.000
1991										0.000
1992										0.000
1993										0.000
1994										0.000
1995										0.000
1996										0.000
1997										0.000
1998										0.000
1999										0.000
2000										0.000
2001										0.000
2002										0.000
2003										0.000
2004										0.000
2005										0.000
2006										0.000
2007										0.000
2008										0.000
2009										0.000
2010										0.000
2011										0.000
2012										0.000
2013										0.000
2014										0.000
2015										0.000

Historical Per Capita Use Data and Unaccounted Water for

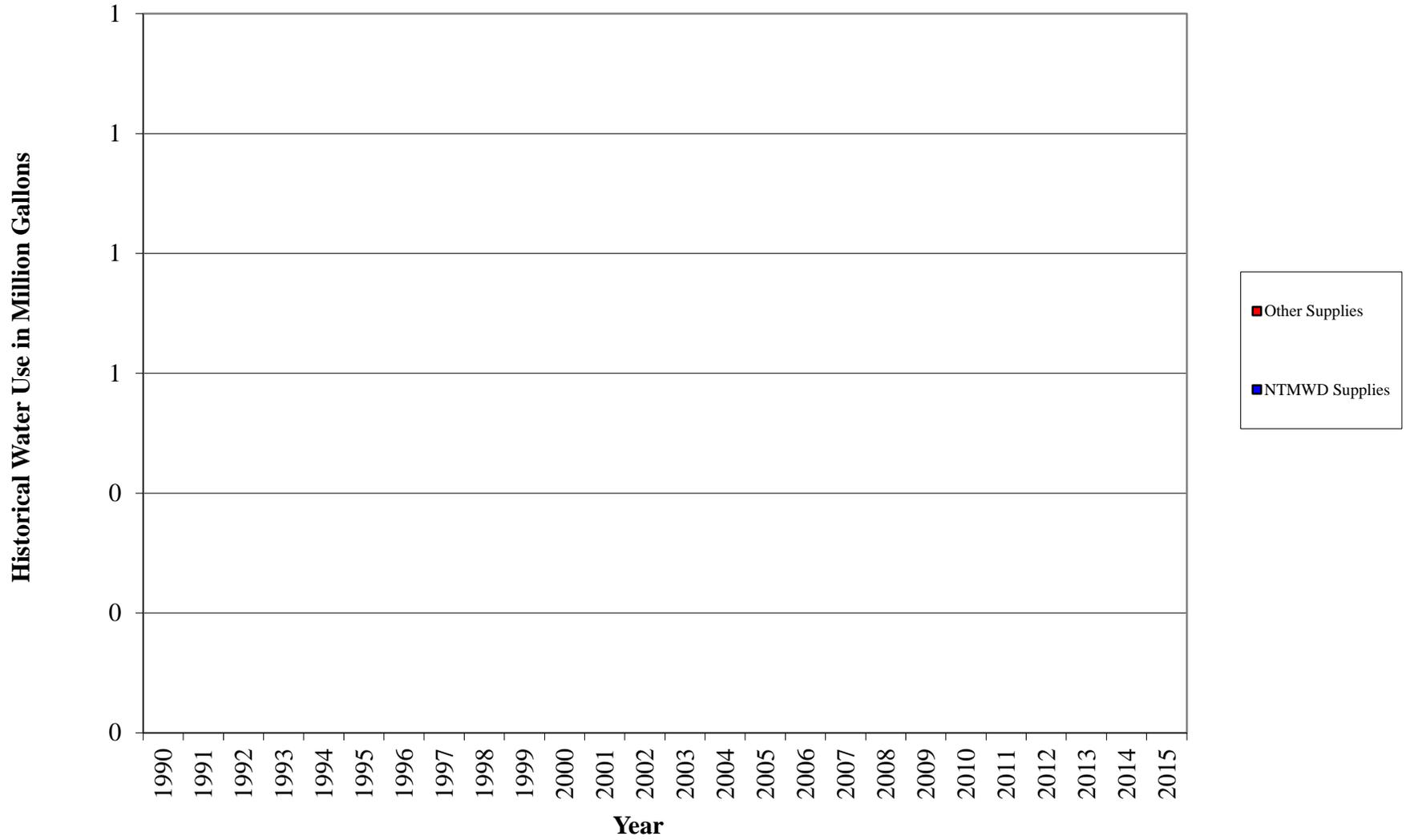
Year	Estimated Population	In-City Municipal Use (MG)	Per Capita Municipal Use (gpcd)	Deliveries from NTMWD (MG)	Other Supplies (MG)	Total Metered Sales (MG)	Estimated Fire Use (MG)	Estimated Line Flushing (MG)	Unaccounted Water (MG)	% Unaccounted
1995										#DIV/0!
1996										#DIV/0!
1997										#DIV/0!
1998										#DIV/0!
1999										#DIV/0!
2000										#DIV/0!
2001										#DIV/0!
2002										#DIV/0!
2003										#DIV/0!
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2005										#DIV/0!
2006										#DIV/0!
2007										#DIV/0!
2008										#DIV/0!
2009										#DIV/0!
2010										#DIV/0!
2011										#DIV/0!
2012	0	0.000	#DIV/0!	0.000	0.000	0.000			0.000	#DIV/0!
2013	0	0.000	#DIV/0!	0.000	0	0			0	#DIV/0!
2014	0	0.000	#DIV/0!	0.000	0	0			0	#DIV/0!
2015	0	0.000	#DIV/0!	0.000	0	0			0	#DIV/0!

Note: In-city municipal use = total water supplied less sales to industry, wholesale sales and other sales.

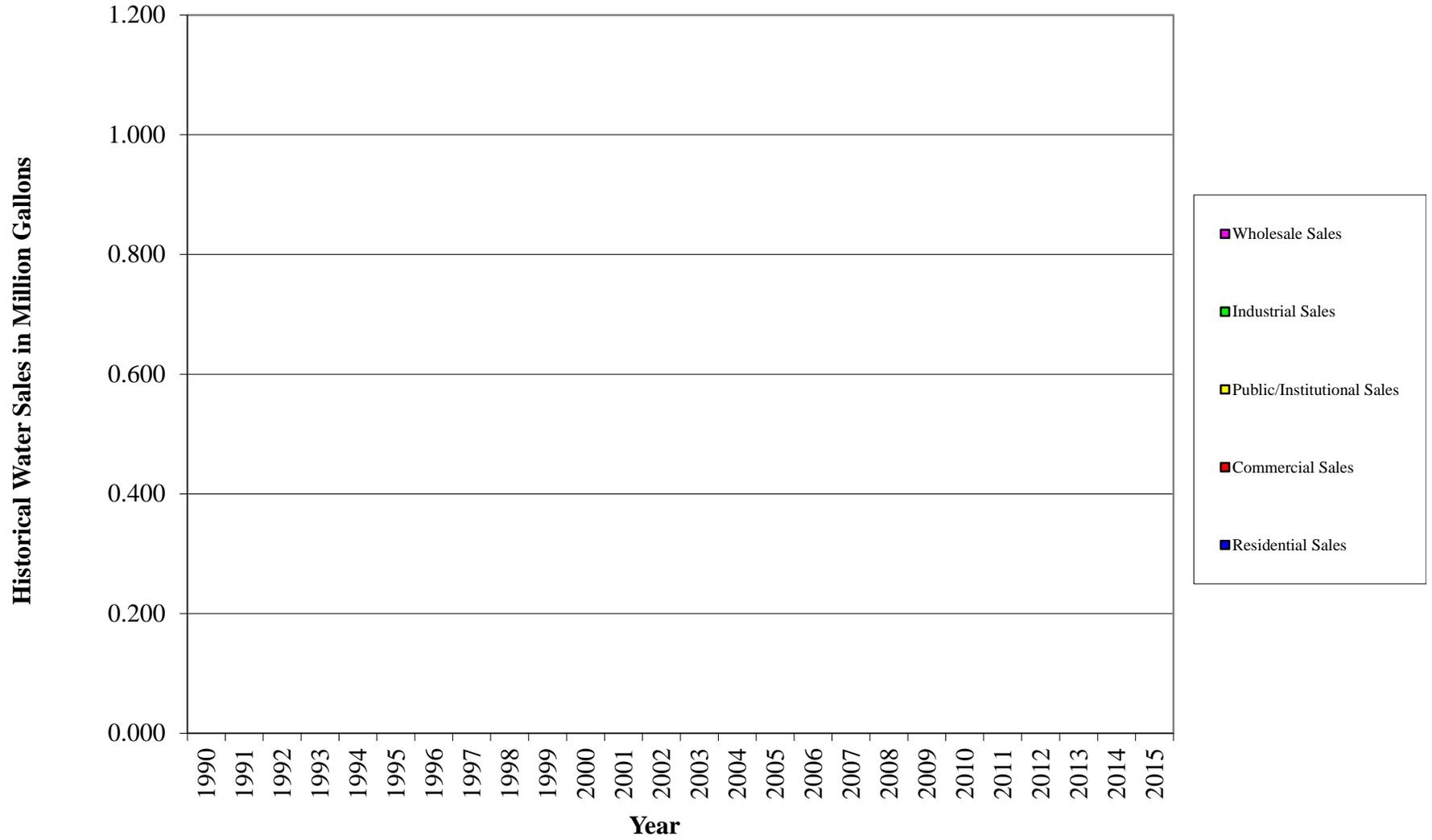
Estimated Historical Population



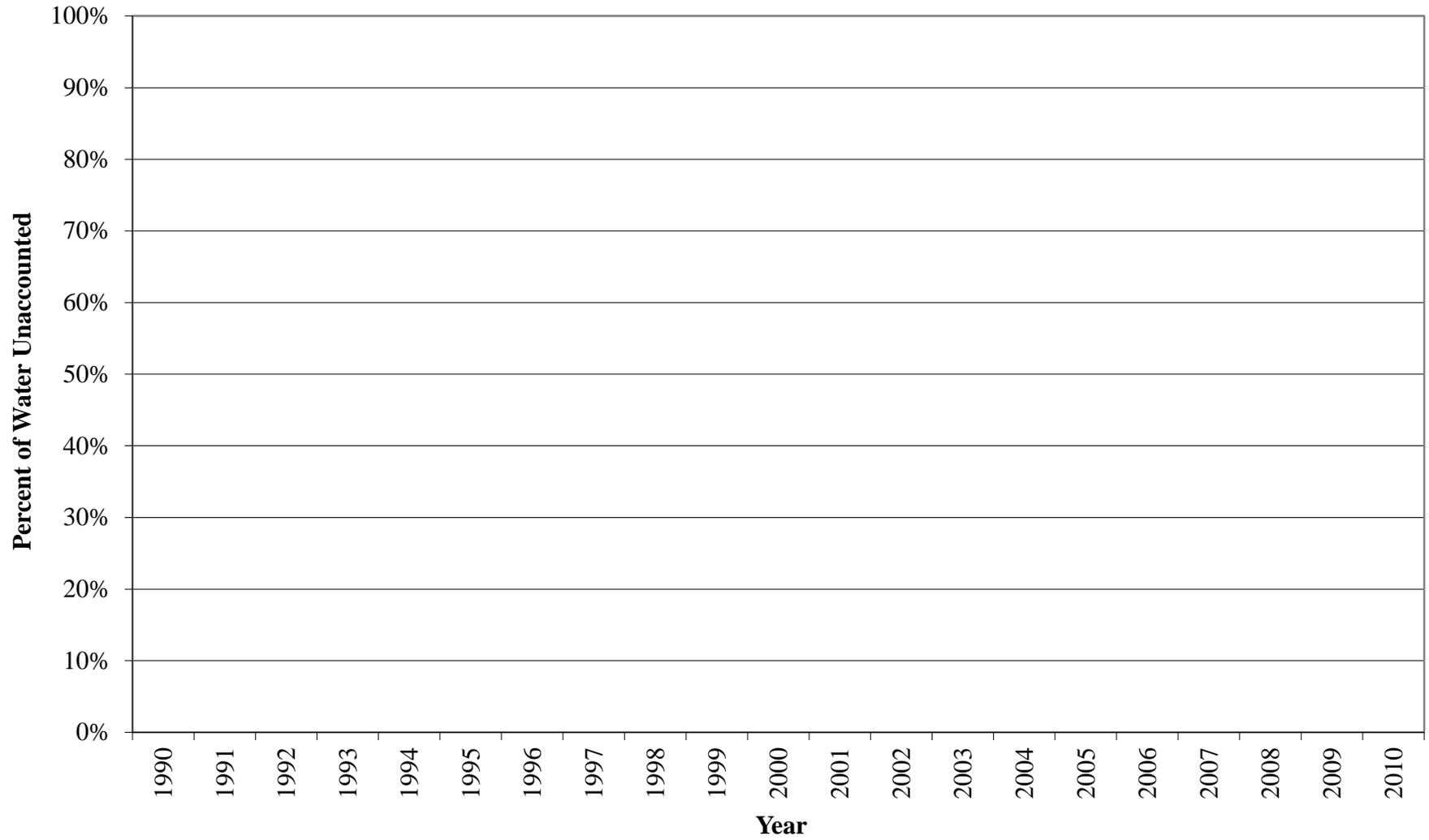
Historical Water Use



Historical Water Sales by Classification



Historical Percent Unaccounted Water



APPENDIX F
TCEQ WATER CONSERVATION
IMPLEMENTATION REPORT

APPENDIX G
LETTERS TO REGION C AND REGION D
WATER PLANNING GROUPS

APPENDIX G

LETTERS TO REGION C AND REGION D WATER PLANNING GROUPS

Date

Region C Water Planning Group
c/o North Texas Municipal Water District
P.O. Box 2408
Wylie, TX 75098

Dear Sir:

Enclosed please find a copy of the following documents:

- Model Water Conservation Plan for the Member Cities and Customers of the North Texas Municipal Water District
- Water Conservation Plan for the North Texas Municipal Water District

We are submitting a copy of these plans to the Region C Water Planning Group in accordance with the Texas Water Development Board and Texas Commission on Environmental Quality rules. The Board of the North Texas Municipal Water District adopted the attached plans on February 27, 2014.

Sincerely,

Jim Parks
North Texas Municipal Water District

Date

Mr. Brett McCoy
Chair, Region D Water Planning Group
700 CR3347
Omaha, TX 75571

Dear Mr. McCoy:

Enclosed please find a copy of the following documents:

- Model Water Conservation Plan for the Member Cities and Customers of the North Texas Municipal Water District
- Water Conservation Plan for the North Texas Municipal Water District

We are submitting a copy of these plans to the Region D Water Planning Group in accordance with the Texas Water Development Board and Texas Commission on Environmental Quality rules. The Board of the North Texas Municipal Water District adopted the attached plans on February 27, 2014.

Sincerely,

Jim Parks
Executive Director
North Texas Municipal Water District

APPENDIX H

**DATA REQUIRMENTS FOR WATER RIGHT APPLICATION FOR NEW OR
ADDITIONAL STATE WATER**

APPENDIX H

DATA REQUIREMENTS FOR WATER RIGHT APPLICATION FOR NEW OR ADDITIONAL STATE WATER

Texas Administrative Code (TAC) Title 30, Part 1, Rule 288.7(a) addresses water conservation plans that accompany an application for a water right:

§288.7. Plans Submitted With a Water Right Application for New or Additional State Water.

(a) A water conservation plan submitted with an application for a new or additional appropriation of water must include data and information which:

- (1) supports the applicant's proposed use of water with consideration of the water conservation goals of the water conservation plan;
- (2) evaluates conservation as an alternative to the proposed appropriation; and
- (3) evaluates any other feasible alternative to new water development including, but not limited to, waste prevention, recycling and reuse, water transfer and marketing, regionalization, and optimum water management practices and procedures.

H.1 Consideration of Water Conservation Goals - 288.7(a)(1)

The NTMWD provides wholesale treated water to customers within a nine-county area in North-Central Texas. The area served by the NTMWD is one of the fastest growing regions in the country. Population served by NTMWD has increased from 32,000 when the District was formed in 1951 to about 1.6 million today, and this growth is expected to continue. Using data from the *2011 Region C Water Plan*¹ (which was used to develop the *2012 State Water Plan*), NTMWD is expected to serve 3.1 million people by 2060. To meet the anticipated growth and increased water demands, the NTMWD is actively promoting water conservation measures with its Member Cities and Customers, and the NTMWD is currently implementing the largest wastewater reuse program in the State, and potentially the largest in the U.S. This section describes the NTMWD's conservation activities and water savings over the past eight years.

Highest Practicable Levels of Conservation and Efficiency

TAC Section 298.18(d)(2) addresses water right applications for interbasin transfers:

“the applicant for the interbasin transfer has prepared drought contingency and water conservation plans meeting the requirements of Chapter 288 of this title (relating to Water Conservation Plans, Drought Contingency Plans, Guidelines and Requirements) and has implemented a water conservation plan that will result in the highest practicable levels of water conservation and efficiency achievable within the jurisdiction of the applicant.”

The legislature directed the TWDB and the TCEQ to jointly develop model water conservation programs for different types of water suppliers that suggest best management practices for achieving “the highest practicable levels of water conservation and efficiency” in Texas Water Code Section 11.1271. Subsequent to this directive,

¹ 2011 Region C Water Plan, Freese and Nichols, Inc. et al., October 2010.

the TWDB and TCEQ adopted a *Water Conservation Best Management Practices Guide*². And, TCEQ has previously granted interbasin transfer permits to applicants that:

- Have adopted water conservation and drought contingency plans;
- Have included a suite of conservation strategies in the water conservation plan that is implementable and has been shown to be practicable and effective; and
- Actively monitor and implement the conservation measures identified in the conservation plan.

NTMWD has met all of the above considerations and more. The NTMWD Water Conservation Plan includes a variety of conservation measures that are actively implemented and monitored by the NTMWD. This suite of water conservation measures goes above and beyond the minimum requirements for conservation plans for a wholesale provider. In accordance with the Texas Administrative Code, Title 30, §288.5, the minimum requirements are:

- Description of the wholesaler's service area;
- Specification of quantifiable conservation goals;
- Description of the means to measure the amount of water from a source;
- Monitoring and record managing program;
- Metering, leak detection and repair program;
- Requirement that wholesale customers must develop and implement a water conservation plan that incorporates the measures in the wholesale water provider plan;
- Reservoir systems operation plan;
- Means for implementing and enforcing the plan; and
- Documentation of coordination with associated regional water planning groups.

The NTMWD Plan meets these minimum requirements, and specifies other conservation activities that the NTMWD and/or its Member Cities and Customers are undertaking to achieve the "highest practicable levels of conservation and efficiency":

- Water conservation workshops for wholesale customers;
- Model Water Conservation and Drought Contingency / Water Emergency Response Plans for Member Cities and Customers;
- Annual reports and tracking of customer water use;
- Reuse and recycling of wastewater;
- Public education and outreach programs;
- Zero discharge from water treatment plants;
- In-house conservation efforts; and
- Landscape water management measures.

Each of these measures is described in the NTMWD Water Conservation Plan.

Below is a brief discussion of some of the on-going conservation activities and the investments by the NTMWD and its Member Cities and Customers in conservation and reuse.

² *Water Conservation Best Management Practices Guide*, Report 362, Texas Water Development Board, November 2004.

Water conservation workshops and meetings. In 2003, the NTMWD began holding a series of conservation workshops with its Member Cities and Customers. These meetings were instrumental in developing the model water conservation and drought contingency/emergency response plans through education and consensus building among NTMWD's Member Cities and Customers. It also provided a forum for the NTMWD wholesale customers to share successes and difficulties encountered during implementation of some conservation measures. These meetings were the precursor to future stakeholder groups held to promote and foster water conservation efforts in North-Central Texas. In 2006, NTMWD was instrumental in the creation of the Water Efficiency Network of North Texas (WENNT), an organization formed to provide a forum to discuss conservation among the different water providers, cities and wholesale customers in the North Texas area. Attendance at the WENNT group meetings is not limited to NTMWD and its Member Cities and Customers, but attendance by NTMWD Member Cities and Customers is high. This is due, in large part, to NTMWD's active participation and initial activities regarding water conservation. WENNT meets monthly and typically provides informational speakers on conservation.

Reuse and Recycling. The NTMWD has a highly developed reuse and recycling program. This program includes indirect reuse of treated effluent from the NTMWD's Wilson Creek Regional Wastewater Treatment facility through Lake Lavon, and via the East Fork Raw Water Supply Project, as well as direct reuse of treated effluent for irrigation purposes in Rockwall and Collin Counties. With these projects, the NTMWD can currently reuse over 100,000 acre-feet per year of water. No other water provider in Texas reuses as much water as NTMWD.

This level of reuse represents about 25 percent of the NTMWD's current supplies. With population growth, the amount of wastewater that will be available for reuse will increase. The expected amount of reuse through the NTMWD's existing projects is projected to increase to over 176,000 acre-feet per year by 2040, which would represent about 40 percent of the NTMWD's currently permitted supplies³.

NTMWD continues to look for opportunities to reuse and recycle its treated wastewater. Treated wastewater is used at each of its 18 wastewater treatment plants for all necessary washdowns and site irrigation. At the NTMWD's water treatment plants, wastewater from plant operations are collected and recycled through the treatment process. NTMWD also provides treated wastewater for off-site irrigation to several customers.

Public education and outreach programs. The NTMWD's public education and outreach programs are designed to assist and supplement the public education efforts of its Member Cities and Customers. NTMWD routinely develops and presents programs to area cities, civic organizations and other groups concerning the need for conservation and strategies that can be implemented. From 1996 through 2006, NTMWD provided the "Learn to Be Water Wise" curriculum to area school districts. Since 2006, NTMWD has invested \$12.3 million in conservation outreach efforts, including development of the state's water conservation/education program, "Water IQ: Know Your Water", which includes television commercials, newspaper ads, radio spots, billboards, a website, community outreach events and other forms of communication. NTMWD uses its website to distribute information on water conservation, Texas Smartscape (a landscaping tool for using native plants), and the Water IQ program. Each of these programs and activities complement the activities of other major water providers in the area that have public media campaigns promoting water conservation across the Metroplex, saving development costs and reaching beyond the NTMWD service area. The NTMWD has received several awards for its public education campaigns on conservation, as detailed below.

Contract Rebate Program. This program provides rebates to those Member Cities and Customers that use less water than contracted. Member City and Customer rates are based on the capacity share plus variable costs for treatment and delivery. The variable costs are applied only to the water used, providing incentives to conserve

³ 2011 Region C Water Plan, Freese and Nichols, Inc. et al., October 2010.

water. The capacity cost is based on historical use and is necessary to fund the regional system infrastructure. This approach is a cost effective means to provide treated water supplies to Member Cities and Customers while encouraging conservation through the rebate program.

These conservation measures represent only some of the activities that the NTMWD has undertaken. Conservation measures that may be appropriate for wholesale water providers were considered and identified as part of the work by the Task Force on water conservation and published in a guide to water conservation best management practices (BMP).⁴

The Wholesale Water Provider BMPs were developed as a slate of potential strategies that a wholesale water provider may use to meet its conservation goals. The BMP Guide recognizes that not every element identified is applicable to every wholesale provider. “The specific measures listed as part of this BMP can be implemented individually or as a group.”⁵ The NTMWD has considered each element of the BMPs during the development of its water conservation plan and has adopted each of the applicable Best Management Practices that are implementable and relevant to its customers. A comparison of the adopted conservation measures by the NTMWD and the Task Force’s Wholesale Water Provider BMPs is shown in Table 1.

⁴ *Water Conservation Best Management Practices Guide*, Report 362, Texas Water Development Board, November 2004.

⁵ *Ibid.*

Table H-1: Water Conservation Implementation Task Force Wholesale Water Provider Best Management Practices

BMP Element of Strategy	Implement	Comment
Baseline Profile	✓	Included in Water Conservation Plan (Chapter 3 and Appendix C)
Wholesale agency goals (5- and 10-year)	✓	Included in Water Conservation Plan (Chapter 4)
Wholesale water system accounting and measurement	✓	Included in Water Conservation Plan (Chapter 5)
Description of practices/devices	✓	Included in Water Conservation Plan (Section 5.1)
Record management	✓	Included in Water Conservation Plan (Section 5.2)
Metering and leak detection	✓	Included in Water Conservation Plan (Section 5.3)
Requirement that every wholesale customer develop a conservation plan	✓	Included in Water Conservation Plan (Section 6.1)
Conservation-oriented rates	✓	While conservation oriented rates are more applicable to retail providers, and NTMWD is a wholesale provider of water to wholesale customers, NTMWD provides rebates to wholesale water customers that use less water than contracted. This rewards the conservation efforts of a retail provider.
<i>Wholesale customer assistance</i>		
Plans and program implementation	✓	NTMWD developed Model Conservation Plans for its wholesale customers
Methodologies for accounting water use and loss	✓	Model Conservation Plans
Coordination of conservation incentive activities	-	The incentive activities are selected by wholesale customers, which target retail customers. NTMWD encourages its customers to select the most appropriate incentives for their community.
Service area education and outreach programs	✓	NTMWD works closely with other wholesale water providers in the region promoting conservation. Customer conservation workshops and meetings
Cost Sharing of programs	✓	
Reuse/recycling of water	✓	NTMWD has the largest reuse program in the state.
<i>Any other practice deemed appropriate</i>		
In-House water conservation	✓	NTMWD has implemented an in-house conservation program that applies to its facilities, including drought tolerant landscapes, limited irrigation, and utilization of reuse water where feasible.
Zero discharge from Water Treatment Plants	✓	NTMWD water treatment plants operate under a “0” discharge permit. Water is recycled through the treatment process.
Means for implementing this BMP	✓	NTMWD has adopted ordinances and provided funding in support of these activities. NTMWD produces an annual report on conservation.

Conservation Water Savings Realized by NTMWD

NTMWD collects water use data annually from its Member Cities and Customers, and uses this information to track per capita water use. Figure H-1 shows the five-year running average municipal per capita use for NTMWD Member Cities and Customers from 1988 to 2012. [The values are plotted for the fifth year of the five-year running average (1992 – 2012).] This figure shows the per capita water use both with adjustments for reuse supplies and without this adjustment. Consistent with NTMWD's Plan, municipal per capita use is defined as the amount of water delivered, less industrial use and reuse, divided by the total service population. As shown on this figure, the average municipal per capita water use peaked during the early 2000s and has continued to decline over time.

Another tool NTMWD uses to assess conservation is a graph that compares the projected dry year water usage without conservation measures implemented after 2000 to actual water use (Figure H-2). This tool provides information for the expected water savings associated with the implemented conservation measures during dry years (2006, 2008, and 2011). Water use during normal and wet years is expected to be less than during a drought and would not be comparable to dry year demands. To estimate the projected dry year use, the year 2000 per capita water use (a dry year that occurred prior to significant conservation measures) is used as the basis for water use.

NTMWD's water use will continue to increase over time due to growth, but the actual water use is less than the potential water use without the implemented conservation measures. In the drier years since 2005, the actual water use is an average of 12% lower than the projected water use without conservation. In the two wetter years during this period (2007 and 2009), the actual water use is an average of 27% lower than the projected water use without the conservation measures implemented since year 2000.

Recognition for NTMWD Conservation Achievements

NTMWD has been recognized by its peers and state agencies for its achievement in conservation. The NTMWD was first recognized in 2007 by the Texas Public Relations Association and the Texas Section of the American Water Works Association (AWWA) for its public education and outreach program, "Water I.Q.: Know Your Water." More recently, the NTMWD was presented with the Texas Section AWWA Water Mark Award for the 2010 Water I.Q. campaign. This award recognizes communications excellence. By targeting the largest water users and implementing an effective communication program on water conservation, NTMWD is able to increase these users' knowledge of water efficiencies and ultimately affect their life style choices to conserve water.

In 2011 NTMWD received the Texas Environmental Excellence Awards for its Water I.Q. program and the East Fork Raw Water Supply Project, which is presented by the Texas Commission on Environmental Quality to honor the State's most outstanding waste reduction and pollution prevention projects. The Water I.Q. program was also the recipient of Large Supplier-Water Conservation and Stewardship Award given by the Texas Water Conservation Advisory Council.

More recent recognition of NTMWD's achievement in conservation and reuse was by the National Association of Environmental Professionals. In 2012, NTMWD was presented with the Environmental Stewardship Award for the East Fork Raw Water Supply Project. This project was recognized for

developing an environmental friendly approach to reclaim water through constructed wetlands for the purpose of augmenting a surface water supply. At the time, the East Fork Raw Water Supply Project represented the largest water reuse project in the United States. Again in 2013, NTMWD was recognized for its achievement in sustainable design for the East Fork Raw Water Supply Project. The North Central Texas Council of Government presented NTMWD with a CLIDE (Celebrating Leadership in Development Excellence) Award. This award is given to projects that demonstrate innovative practices to accommodate the expected growth in North Texas and promote a sustainable future.

Figure H-1

**5-Year Running Average GPCD
 Treated Water for NTMWD Member Cities and Customers**

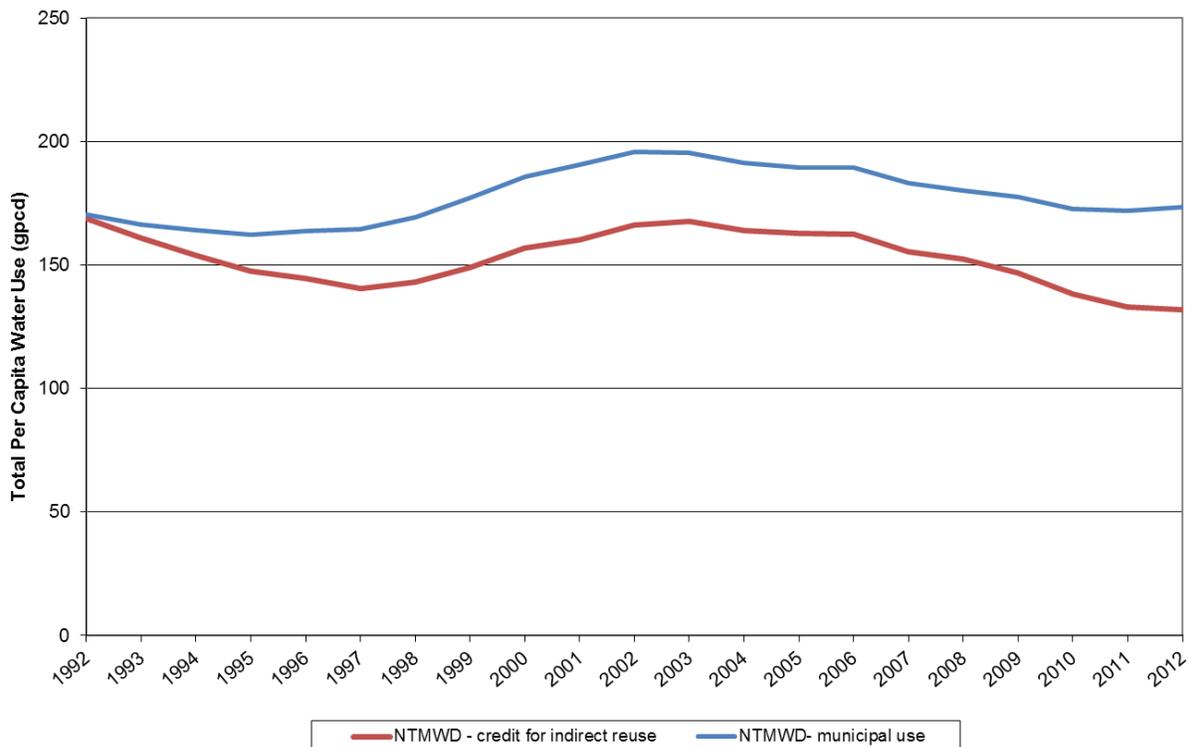
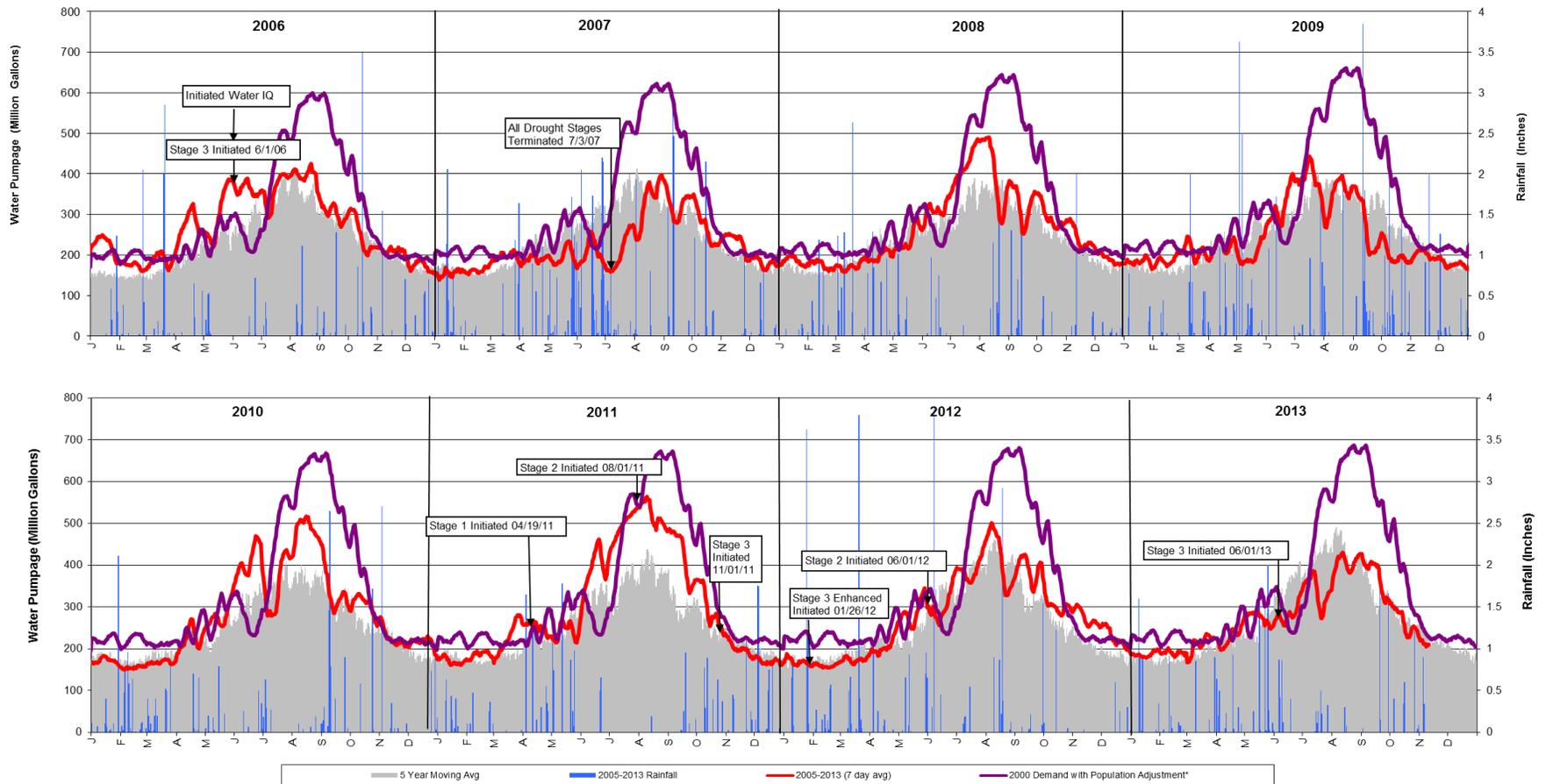


Figure H-2
 North Texas Municipal Water District
 Year 2000 with Projected Increases vs. 2006-2013 Actual Usage
 Daily Water Consumption



* 2000 Demand Plus 37.33% Increase to 2008. Plus 41.45% Increase to 2009. Plus 42.39% Increase to 2010. Plus 43.55% Increase to 2011. Plus 45.07% Increase to 2012. Plus 46.52% Increase to 2013.

H.2 Conservation as an Alternative to the Proposed Appropriation – 288.7 (a)(2)

The water demands for NTMWD totaled 336,000 acre-feet in 2011. According to the *2011 Region C Water Plan* and *2012 State Water Plan*, these demands are projected to double by the year 2060. Based on current water supplies, the District will need to develop an additional 370,000 acre-feet of supply. NTMWD expects to meet a portion of this demand via conservation and reuse. The *2012 State Water Plan* indicates that conservation will provide 27,100 acre-feet of NTMWD's total water supplies by 2020 and approximately 80,000 acre-feet by 2060. Combined, conservation and reuse are estimated to provide 109,000 acre-feet of water supplies in 2010 and 257,000 acre-feet of water supplies by 2060. Combined conservation and reuse efforts are estimated to meet approximately 31% of NTMWD's projected total water demand in 2060.

As is demonstrated by these projections, expanded conservation and reuse are integral strategies in NTMWD's ability to meet projected water demands by 2060. However, in light of NTMWD's projected total demand for 789,466 acre-feet of water by 2060, intensified conservation and reuse alone cannot provide enough water to address such demands. Thus, conservation and reuse strategies are part of the portfolio or suite of strategies that will be pursued by NTMWD in order to meet the rapidly rising demand for municipal water supplies in the NTMWD service area.

H.3 Feasible Alternatives to New Water Development – 288.7(a)(3)

As part of the 2012 state water planning process, many potential water management strategies were identified and evaluated. The *2012 State Water Plan* considered 19 different water management strategies to meet the projected water supply shortages for NTMWD through 2060. Of these considered strategies, eight strategies were recommended for implementation by the NTMWD.

Water supply strategies that are currently being implemented or that are no longer recommended due to changed conditions include:

- Water Conservation (implemented)
- Interim Purchase from GTUA (no longer considered due to changes in NTMWD's operations)
- Main Stem Trinity River Pump Station with Interim Treated Water Purchase from Dallas Water Utilities (partially implemented)

The other five strategies recommended in the *2012 Texas State Water Plan* for implementation include:

- Lower Bois d'Arc Creek Reservoir
- Additional Lake Texoma water with blending with new fresh water supply
- Marvin Nichols Reservoir
- Toledo Bend Reservoir
- Oklahoma water supply

Potential alternatives to a new water surface water appropriation that are not currently being implemented by NTMWD include developing other new reservoirs, transporting water from existing reservoirs, development of new groundwater supplies and desalination of brackish water. At a minimum, the other alternatives will require the construction of infrastructure to store and transport water supplies to the NTMWD service area.

Currently, NTMWD has a water right application before the TCEQ for the proposed Lower Bois d'Arc Creek Reservoir project. This discussion focuses on alternative strategies to a new surface water appropriation for Lower Bois d'Arc Creek Reservoir. Only alternative projects that have not been implemented are discussed here. Descriptions of potential project alternatives are presented below. A synopsis of the applicability of these potential strategies as practicable alternatives to the Lower Bois d'Arc Creek Reservoir is presented in Table H-2.

Each of potential project alternatives with the exception of the Upper Bois d'Arc Creek Reservoir was vetted through the State water planning process and the discussions herein are consistent with the *2011 Region C Water Plan* and the *2012 State Water Plan*. Strategies that are recommended for implementation by NTMWD are part of suite of strategies to meet NTMWD's water needs. As such, these strategies are not alternatives to Lower Bois d'Arc Creek Reservoir but rather complement this project. For completeness, all potential alternatives are discussed in this Appendix, including strategies that are recommended for implementation after Lower Bois d'Arc Creek Reservoir.

NTMWD's evaluation of the potential alternatives considered many factors, including cost of the water, quantity, reliability, the potential impacts of developing the project on the environment, natural resources and other water users, timing to develop the strategy, and potential implementation issues. A comparison of the unit costs for the alternative strategies is shown on Table H-3 and on Figure H-3.

The construction of Lower Bois d'Arc Creek Reservoir is the recommended approach for NTMWD to provide additional near-term water supplies. The NTMWD is projected to have water shortages of approximately 90,000 acre-feet per year by 2020. Some of this shortage could be met through conservation and possibly additional wastewater reuse made available through the Main Stem Trinity River Pump Station. At this time, however, the Main Stem Pump Station project has been delayed and the source of the return flows to be diverted therefrom have not yet been identified or secured through contract, which only further necessitates the need to develop additional water supplies. Lower Bois d'Arc Creek Reservoir would provide the remainder of the supply needed to meet the deficit in 2020. By 2030 the Reservoir would be fully utilized to help meet NTMWD's growing water needs. This source is the preferred alternative because it is located relatively close to the area with need, can provide sufficient water, and has a relatively low unit cost of water. The Lower Bois d'Arc Creek Reservoir could also serve as a fresh water supply to potentially blend with water diverted from Lake Texoma, thereby further extending currently available resources while conserving energy and costs.

Strategies that are not practicable alternatives to the proposed project typically have higher unit costs, greater uncertainty of reliable yield than Lower Bois d'Arc Creek Reservoir, cannot be constructed within the time frame of when the water is needed, provide a smaller amount of supply or may be committed to other users.

Table H-2: List of Potential Water Supply Alternatives for NTMWD

Strategy ¹	Practicable Alternative (Yes/No)	Comment
New Lake Texoma (Blend)	No	Requires additional new source of fresh water to blend to meet drinking water quality standards.
Marvin Nichols Reservoir	No	Greater environmental impacts than Lower Bois d’Arc Creek Reservoir. Requires other participates to make project cost effective. Cannot be implemented within the necessary time frame.
Toledo Bend Reservoir	No	High costs and energy use. Much greater carbon footprint impacts.
Oklahoma Water	No	Current political and legal impediments.
New Lake Texoma (Desalinate)	No	High costs and energy use. Reduced quantity.
Lake O’ the Pines	No	Water rights holders have not committed to selling water. Competing local interests.
Wright Patman - Texarkana	No	Water Right holder has not committed to selling water.
Wright Patman - Raise Pool	No	Impacts to White Oak Creek mitigation area. Conflicts with Dallas long-range water supply plan.
Wright Patman - System	No	Water rights holders not committed to sell water. Environmental impacts to mitigation area and conflicts with Dallas’ long-range plan. High costs and energy use.
Carrizo-Wilcox Groundwater	No	High cost and competing local interests for water.
George Parkhouse North	No	Similar size and impacts to Lower Bois d’Arc Creek Reservoir. Yield is impacted by potential upstream reservoirs. Cannot be implemented within the necessary time frame.
George Parkhouse South	No	Impacts to waters of U.S. Yield is impacted by upstream reservoir. Cannot be implemented within the necessary time frame.
Lake Livingston	No	Competing interests for water. High costs
Gulf of Mexico	No	Very high costs and high energy usage
Upper Bois d’Arc Creek Reservoir	No	Does not provide the amount of supply needed.

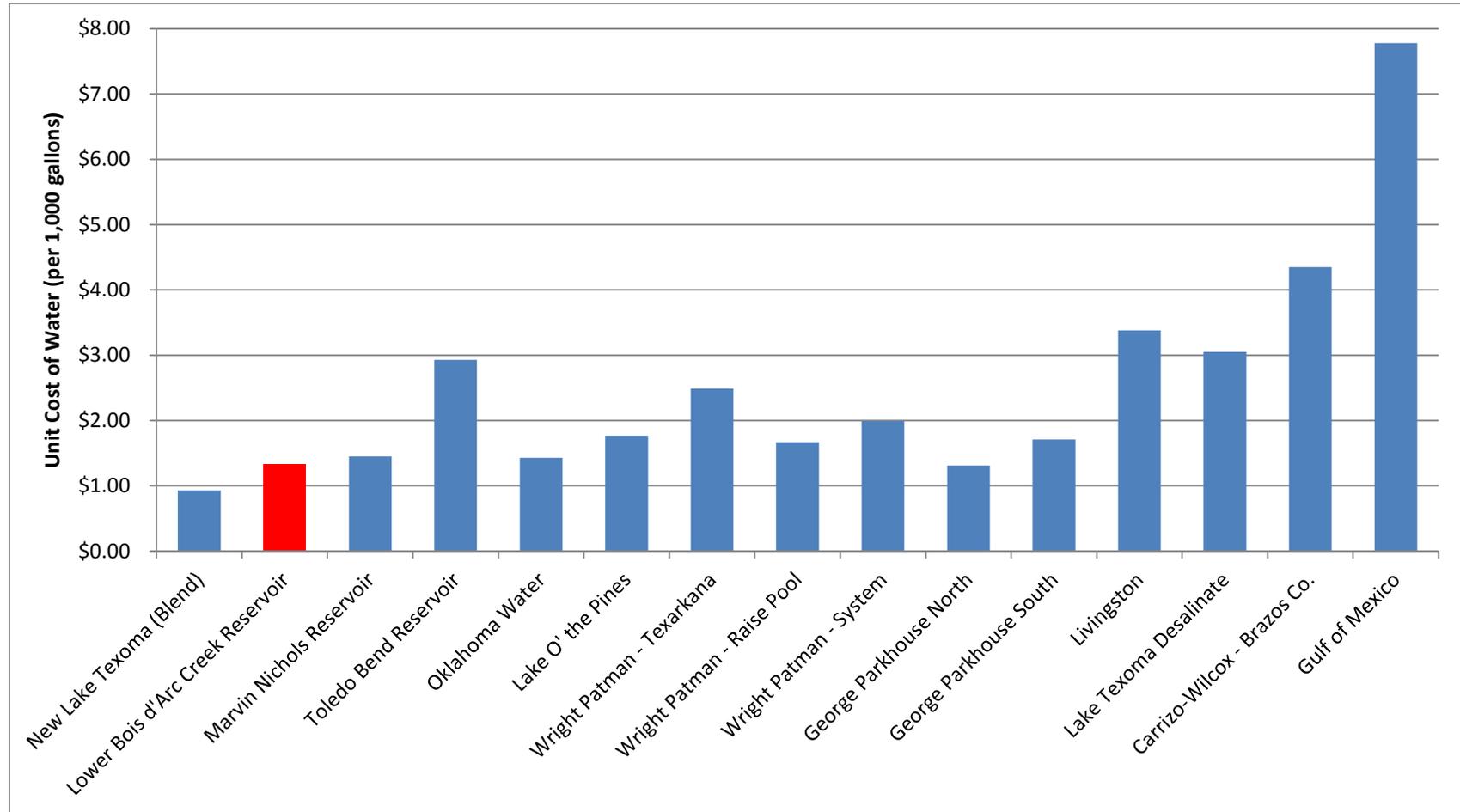
1. Each of these strategies, with the exception of the Upper Bois d’Arc Creek Reservoir, was vetted through the State water planning process. Strategies that are recommended for implementation by NTMWD are part of suite of strategies to meet NTMWD’s water needs. Some strategies that are identified as not practicable at this time may be a viable water supply project in the future.

Table H-3: Costs for Potential Supply Alternatives

Strategy	Texas State Water Plan Costs ¹		
	NTMWD Share of Capital Cost	Unit Cost for NTMWD (\$/kGal.)	
		Pre-Amort.	Post-Amort.
Implemented at same time as Lower Bois d'Arc Creek Reservoir			
New Lake Texoma (Blend)	\$336,356,000	\$0.93	\$0.27
Lower Bois d'Arc Creek Reservoir	\$615,498,000	\$1.33	\$0.21
Potential Alternatives			
Marvin Nichols Reservoir	\$830,894,000	\$1.45	\$0.39
Toledo Bend Reservoir	\$929,822,000	\$2.93	\$0.86
Oklahoma Water	\$210,354,000	\$1.43	\$0.49
Lake O' the Pines	\$402,431,000	\$1.77	\$0.75
Wright Patman - Texarkana	\$684,966,000	\$2.49	\$0.97
Wright Patman - Raise Pool	\$905,929,000	\$1.67	\$0.55
Wright Patman - System	\$781,741,000	\$1.99	\$0.65
George Parkhouse North	\$516,585,000	\$1.31	\$0.35
George Parkhouse South	\$645,810,000	\$1.71	\$0.39
Livingston	\$2,115,111,000	\$3.38	\$1.03
Lake Texoma Desalinate	\$796,532,000	\$3.05	\$1.36
Carrizo-Wilcox - Brazos Co.	\$913,344,000	\$4.35	\$1.80
Gulf of Mexico	\$4,367,727,000	\$7.78	\$2.91

1. Only projects considered in the 2012 State Water Plan are included in Table H-3 and Figure H-3. Costs for the 2012 State Water Plan are reported in September 2008 dollars.

Figure H-3 Cost Comparison of Potential Alternatives to Lower Bois d'Arc Creek Reservoir



Supply from New (undeveloped) Reservoirs

Marvin Nichols Reservoir Alternative

The Marvin Nichols Reservoir is a proposed reservoir in the Sulphur River Basin, and is a recommended strategy in the 2012 Texas State Water Plan for NTMWD, the Tarrant Regional Water District (TRWD), and the Upper Trinity Regional Water District (UTRWD). The total yield of Marvin Nichols Reservoir is 612,300 acre-feet per year, assuming that Lake Ralph Hall is constructed and that Marvin Nichols Reservoir is operated as a system with Wright Patman Lake.

The proposed reservoir, if constructed, would be the largest lake contained completely within the State of Texas. At the recommended conservation pool elevation of 328 feet msl, the reservoir would inundate approximately 67,400 acres. The U.S. Fish and Wildlife Service has classified some of this acreage as Priority 1 bottomland hardwoods, which is the highest quality classified by USFWS (USFWS, 1984). Previous studies indicate that approximately 39 percent of the reservoir site is classified as bottomland hardwood forest, 20 percent upland deciduous forest and 19 percent grasslands (HDR, Inc. *et al*, 2007). Additional studies are needed to confirm the quality and extent of these resources.

The Marvin Nichols Reservoir site is located approximately 29 miles upstream of an ecologically significant stream segment as identified by the Texas Parks and Wildlife Department, but is not directly located on a classified stream segment. The site will impact three known cemeteries, approximately 22 miles of oil and gas pipelines and 4 miles of state and federal highways (HDR, Inc. *et al*, 2007).

The Marvin Nichols Reservoir would provide considerable amounts of new water supply to the North Texas area at a relatively low cost. However, the development of this strategy will have greater environmental impacts than the proposed Lower Bois d'Arc Creek Reservoir. The inundation area of Marvin Nichols Reservoir is more than four times the inundation area of the Lower Bois d'Arc Creek Reservoir. Preliminary estimates of impacted wetlands and bottomland hardwoods for this alternative are considerably greater than the acreage determined for the proposed project. Development of the Marvin Nichols Reservoir also requires multiple participants to effectively achieve the cost benefits and full utilization of the available supply. As a result, the timing for this strategy is dependent upon the needs of other participants. In the 2012 Texas State Water Plan, this strategy is planned in phases, with Phase I being completed in 2030 and Phase II by 2050. Due to the permitting requirements and current opposition to this project, it is unlikely that this reservoir site could be permitted and developed by 2020 as an alternative to the Lower Bois d'Arc Creek Reservoir, and thus, not available within the required timeline. With these considerations, the Marvin Nichols Reservoir could not meet the NTMWD's projected water shortages over the next 10 to 20 years.

The Marvin Nichols Reservoir is not a practicable alternative to the Lower Bois d'Arc Creek Reservoir project because it has greater environmental impacts and cannot be implemented within the time frame required to satisfy the purpose and need of this project.

George Parkhouse South Lake Alternative.

George Parkhouse Lake (South) is a potential reservoir located on the South Sulphur River in Hopkins and Delta Counties. It is located immediately downstream from Jim Chapman Lake and would yield 122,000 acre-feet per year. At conservation elevation 401 feet msl, George Parkhouse Lake (South) would inundate approximately 29,000 acres and store 652,000 acre-feet. The yield of George Parkhouse

Lake (South) would be reduced substantially by the development of Marvin Nichols Reservoir. The yield studies conducted as part of the Reservoir Site Protection Studies indicate the yield of this lake would be reduced by 60 percent to 48,400 acre-feet per year if constructed after Marvin Nichols (HDR *et al*, 2007).

The lake, as currently configured, would abut the dam for Jim Chapman Lake and over fifty percent of the land impacted would be bottomland hardwood forest or marsh (HDR *et al*, 2007). Costs for this project are estimated at \$1.71 per thousand gallons of reservoir yield, which is about 28 percent higher than the estimated costs for the Lower Bois d'Arc Creek Reservoir (\$1.33) However, should the yield of George Parkhouse (South) be reduced due to other developments, the costs to NTMWD would increase.

The proposed George Parkhouse Lake (South) is not a practicable alternative due to the uncertainty of the reliable supply with the development of other reservoirs in the river basin and the environmental impacts. Also, the project likely could not be implemented within the time frame needed for additional water for NTMWD. Since the Marvin Nichols Reservoir is part of long-range water supply plan for NTMWD and other North Texas water suppliers,, it is highly unlikely that George Parkhouse (South) Lake or George Parkhouse (North) Lake will also be developed.

George Parkhouse North Lake Alternative

George Parkhouse Lake (North) is a potential reservoir located on the North Sulphur River in Lamar and Delta Counties, about 15 miles east of the City of Paris. At a proposed conservation elevation of 410.0 feet msl, the reservoir would store 330,871 acre-feet of water and inundate 14,387 acres. The firm yield would be 144,300 acre-feet per year, but its yield would be reduced substantially by the development of Lake Ralph Hall and/or Marvin Nichols Reservoir. A sensitivity study of the reservoir yield found that the yield of George Parkhouse North could range from 32,100 acre-feet per year (assuming both Lake Ralph Hall and Marvin Nichols Reservoir are constructed prior to George Parkhouse North) to 117,400 acre-feet per year, assuming only Lake Ralph Hall is constructed prior to George Parkhouse North (HDR *et al*, 2007).

The reservoir site is located upstream of a designated Priority 1 bottomland hardwood preservation site known as Sulphur River Bottoms West. Most of the land impacted by this alternative is grassland or agricultural lands. Only about 200 acres are classified as bottomland hardwood forest (HDR *et al*, 2007). However, the amount of affected wetlands would require field surveys and verification.

Similar to the George Parkhouse South Lake alternative, the economic viability of the project is dependent upon the ultimate yield of the project. The proposed reservoir is not a practicable alternative to Lower Bois d'Arc Creek Reservoir due to the uncertainty of the reliable supply with the development of other reservoirs in the river basin. Also, the project likely could not be implemented within the time frame needed for additional water for NTMWD.

Upper Bois d'Arc Creek Reservoir

Other potential dam site locations on Bois d'Arc Creek have been considered in previous studies. Most of these sites were studied as potential flood measures to reduce flooding along Bois d'Arc Creek and in the City of Bonham. An Upper Bois d'Arc Creek reservoir site was studied by the USACE in 1968, and subsequently reviewed again by the USACE in 2000 (USACE, 1968 and USACE, 2000). The proposed Upper Bois d'Arc Creek Reservoir would be located about 3.5 miles south of the City of Bonham. It would have a controlled drainage area of 108 square miles, which is about one third of the drainage

area of the proposed project. The proposed reservoir would have a total storage of 137,500 acre-feet, with 82,040 acre-feet dedicated to water supply. Based on the USACE analyses, the Upper Bois d'Arc Creek reservoir would provide flood protection for the 50-year storm event and 24 mgd of water supply. Due to the smaller drainage area and smaller storage in the reservoir, this alternative cannot provide the amount of water supply needed for NTMWD. Also, the project likely could not be implemented within the time frame needed for additional water for NTMWD. A reservoir site upstream of the City of Bonham is not a practicable alternative to the proposed project.

Other New Reservoirs

Several other proposed reservoirs were recommended or considered in the *2012 Texas State Water Plan*, but were not considered for NTMWD because of commitments to other users. The proposed reservoirs include Lake Columbia, Lake Tehuacana, and Lake Ralph Hall. Most of the water from Lake Columbia is committed to users in the Neches River Basin; Lake Tehuacana is located adjacent to Richland-Chambers Reservoir, and would be operated by the Tarrant Regional Water District for its use; and Lake Ralph Hall would be developed and used by the Upper Trinity Regional Water District (UTRWD). A water right for Lake Ralph Hall was recently granted to UTRWD.

Transporting Water From Existing Reservoirs

Transporting water from existing reservoirs to NTMWD's service area requires agreements with the owner of the existing water supplies and often long transmission pipelines. Existing reservoirs that may have uncommitted supplies are commonly located in the eastern part of the State where there is more available surface water. However, most of these sources would require transporting the water over long distances with substantial vertical lift. NTMWD considered the following alternatives:

Lake Texoma Alternatives

Lake Texoma is an existing USACE reservoir on the Red River on the border between Texas and Oklahoma. NTMWD has water rights to divert up to 197,000 acre-feet per year of water from Lake Texoma. Water from Lake Texoma is relatively high in dissolved salts and does not meet secondary drinking water standards. Until 2009, NTMWD diverted up to 84,000 acre-feet of Texoma water and blended the water in Lake Lavon for subsequent use. With the detection of zebra mussels in Lake Texoma, this practice has ceased. Currently, NTMWD is building new infrastructure from Lake Texoma to the Wylie Water Treatment Plant to blend the water with its other sources to make it suitable for municipal use. However, the amount of water that can be blended and still meet secondary drinking water standards is limited.

The options to fully utilize this source include:

- The development of new fresh water supplies to blend at a treatment facility; or
- The construction of a new desalination water treatment facility.

These implementation methods are very different and are considered two different alternatives to Lower Bois d'Arc Creek Reservoir. Each alternative is discussed below.

Transport and Blend Lake Texoma Water with New Fresh Water Supplies

The elevated dissolved salts in Lake Texoma would have some environmental impacts whether the water is used by blending or desalination. Due to environmental concerns and additional costs

associated with large desalination projects, the NTMWD's preferred use of this water source is to blend the Texoma water with a new fresh water supply. It is anticipated that Texoma water would be blended in a constructed balancing reservoir near a treatment facility and not in an existing lake or stream. This would reduce potential impacts of added dissolved solids to local lakes or streams.

At this time, there are no readily available fresh water supplies in the amount needed to blend with the new water supply from Lake Texoma, and existing supplies are not sufficient to provide a blended water of acceptable quality for municipal use. Therefore, the blended alternative cannot be implemented without also implementing another water supply alternative to provide fresh water to NTMWD for blending. NTMWD does plan to make use of water supplies from this source, but only after development of other significant fresh water sources (such as Lower Bois d'Arc Creek Reservoir). Blending cannot be considered an alternative to Lower Bois d'Arc Reservoir in the next 20 years without implementation of another water supply source; thus blending of Lake Texoma water with existing fresh water supplies is not a practicable alternative.

Transport and Desalinate Lake Texoma Water

One option to use Lake Texoma water for municipal purposes is to desalinate the water using reverse osmosis water treatment or another similar treatment method. Desalination can result in the loss of up to one third of the raw supply to the treatment process. With the proposed quantity of 100 million gallons per day (mgd), this option may require disposal of up to 30 mgd of highly salty water. If the desalinated water is partially blended with conventionally treated raw water, the brine discharge would be less. Disposal options include deep injection wells, discharge to a stream, or evaporation ponds.

Desalination is also a more expensive strategy than blending, and there are considerable uncertainties in the operation and long-term costs of a large-scale desalination facility. The estimated costs for desalination of water from Lake Texoma are based on current cost information for large desalination facilities. However, they are more uncertain than other cost estimates developed for the potential alternatives, for the following reasons:

- Most of the large desalination facilities built to date are located on or near the coast. If a 100-mgd or larger plant were to be developed for Lake Texoma water, it would be the largest inland desalination facility in the world. To date large scale inland desalination facilities (greater than 50 mgd) have not been permitted or constructed in Texas or the United States. The Fort Bliss/ El Paso Water Utilities desalination facility, which is the largest inland desalination plant in the United States, produces 27.5 mgd.
- The method, cost and regulatory requirements of brine disposal for such a facility are uncertain. Depending upon the disposal method, brine disposal has the potential to significantly increase the estimated cost for desalination. Deep well injection will likely require multiple sites to accommodate the quantity of discharge required.

The desalination alternative will only provide the equivalent of about 60 percent of reliable treated water supply from the Lower Bois d'Arc Creek Reservoir. There are also environmental, cost and permitting issues associated with the brine disposal for a large-scale inland desalination facility. Estimated costs for desalination of Lake Texoma water is about 1.5 times that of treated water from Lower Bois d'Arc Creek Reservoir. Desalination is also a much more energy intensive process than conventional water treatment. As energy costs continue to increase, these differences are expected to

increase. Large scale desalination of Lake Texoma water (>100 mgd) is not a practicable alternative to the proposed project due to the cost uncertainty, smaller water supply and the greater energy usage associated with large-scale brine operations.

While large scale desalination of Texoma water is currently not a practicable alternative to Lower Bois d'Arc Creek Reservoir, there are some potential options to use a portion of the Texoma water through desalination and blending, but without the development of new fresh water supplies the quantity would be limited. As such, a smaller scale project is not an alternative to the Lower Bois d'Arc Creek Reservoir, but rather a complement to NTMWD's water supply and the proposed Lower Bois d'Arc Creek Reservoir.

Toledo Bend Reservoir Alternative

Toledo Bend Reservoir is an 181,600 acre lake located in East Texas on the Texas-Louisiana state line. The total permitted supply from this source for Texas is 750,000 acre-feet per year. The Sabine River Authority of Texas operates the Texas portion of this lake. In the *2012 Texas State Water Plan* the transport of water from Toledo Bend Reservoir to the North Texas area is a recommended joint strategy for the NTMWD, TRWD, and the Sabine River Authority (SRA). This project, as presented in the *2012 Texas State Water Plan*, could deliver a total of 500,000 acre-feet per year, with 200,000 acre-feet per year for NTMWD.

This alternative will require multiple transmission pipelines to transport the water approximately 200 miles to North Texas. The current concept for this project includes the use and storage of existing reservoirs as part of the transmission system. This transfer of water is anticipated to have a low to medium low impact on the receiving reservoirs.

This strategy requires greater capital costs and energy usage associated with the long transmission pipelines. NTMWD's share of the estimated pumping costs for this alternative is nearly \$38 million per year to transport 200,000 acre-feet per year to its service area. For a comparable quantity of supply to the Lower Bois d'Arc Creek Reservoir project (126,000 acre-feet per year), the estimated pumping costs for water from Toledo Bend Reservoir would be approximately \$24 million as compared to \$4.6 million for water from Lower Bois d'Arc Creek Reservoir. As energy costs continue to increase, the operating costs for water from Toledo Bend Reservoir will increase by a larger amount than estimated for the Lower Bois d'Arc Creek Reservoir. The higher energy usage also places additional burdens on existing and future electrical generating facilities, which creates additional environmental impacts to those directly associated with this project. A carbon footprint analysis indicated that over the 100-year life of a water project, the Toledo Bend pipeline project would have about 5 times the total carbon impacts than the Lower Bois d'Arc Creek Reservoir project. Most of these impacts are associated with the operations.

The Toledo Bend project is not a practicable alternative to the Lower Bois d'Arc Creek Reservoir project because it has significantly higher capital costs, greater energy usage, and greater long-term operating costs than the costs for the Lower Bois d'Arc Creek Reservoir project.

Water from Oklahoma Alternative

Another potential alternative is the use of water from Oklahoma. At the present time, the Oklahoma Legislature has established a moratorium on the export of water from the state. Assuming the moratorium is lifted in the future, the *2012 Texas State Water Plan* recommends that the NTMWD, the TRWD, and the UTRWD jointly develop a project to use water from Oklahoma. The recommended

project is planned for 2060 and includes 50,000 acre-feet per year each for TRWD and NTMWD and 15,000 acre-feet per year for UTRWD.

The NTMWD has applied for water from the Kiamichi River, Muddy Boggy Creek, and stored water in Lake Hugo. At this time, the state cannot act upon these permits without further direction from the Oklahoma Legislature.

Due to the uncertainty of the Oklahoma moratorium on export of water to Texas and the status of the Oklahoma water rights permit, this strategy would likely not be able to be implemented in a timely manner to meet NTMWD's near-term water needs. Thus, it is not a practicable alternative to Lower Bois d'Arc Creek Reservoir.

Lake O' the Pines Alternative

Lake O' the Pines is an existing USACE reservoir in the Cypress River Basin with Texas water rights held by the Northeast Texas Municipal Water District (NETMWD). The NTMWD has explored the possibility of purchasing supplies in excess of local needs from the Cypress Basin. According to the *2012 Texas State Water Plan*, there could be as much as 89,600 acre-feet per year available for export from the basin. There are competing interests for this supply, however, including increased demands for steam electric power in the vicinity of this lake (northeast Texas). The *2012 Texas State Water Plan* shows this source nearly fully allocated to existing users.

Development of this source would require contracts with the NETMWD and other Cypress River Basin suppliers with excess supplies. At this time, NETMWD and other suppliers have not committed to selling this amount of water. Estimated costs indicate water from the Lake of the Pines would be about 33 percent more expensive than water from Lower Bois d'Arc Creek Reservoir during the amortization period and more than three times higher after debt service. The higher costs are associated with the transmission costs and water purchase price. Lake O' the Pines is about 120 miles from the Metroplex, and the distance, the resulting transmission cost, as well as limited supply and uncertainty of reaching agreements with existing water rights holders make this supply uncertain. Due to the distance of this water source from the NTMWD service area it is also expected that the carbon footprint impacts of this strategy would be considerably higher than the Lower Bois d'Arc Creek Reservoir. Therefore, Lake O' the Pines is not a practicable alternative to Lower Bois d'Arc Creek Reservoir.

Lake Wright Patman Alternatives

Lake Wright Patman is an existing reservoir in the Sulphur River Basin, about 150 miles from the NTMWD service area. It is owned and operated by the USACE. The City of Texarkana has contracted with the USACE for storage in the lake and a supply of 13 MGD (14,568 acre-feet per year). Texarkana holds a Texas water right to use up to 180,000 acre-feet per year from the lake. However, to obtain a reliable supply of 180,000 acre-feet per year from Lake Wright Patman, Texarkana would need to activate a contract with the USACE to increase the conservation storage in the lake. Implementation of this contract may require an environmental evaluation of the change in operation of the reservoir as required by the National Environmental Policy Act. The USACE contract specifies that the maximum supply from this operational change is 84 MGD, or about 94,132 acre-feet per year, resulting in a total supply of 108,800 acre-feet per year. Accessing the full 180,000 acre-feet per year in the Texas water right would require additional modifications to the USACE contract.

There are three different strategies by which water could be made available to the NTMWD from Wright Patman Lake:

- Water could be purchased from the City of Texarkana under its existing water right.
- Flood storage in Wright Patman Lake could be converted to conservation storage, and the NTMWD could use the increased yield.
- Wright Patman Lake could be operated as a system with Jim Chapman Lake (formerly Cooper Lake) upstream to further increase yield.

The cost for each of these options is greater than the estimated costs for the Lower Bois d'Arc Creek Reservoir project. There are also other implementation issues that affect the viability of the strategies. Each strategy is discussed in more detail below.

Purchase from Texarkana. Of the 180,000 acre-feet per year for which Texarkana currently has a water right, Texarkana could sell 100,000 acre-feet per year and still have sufficient supplies to meet its projected needs. Development of this supply would require activating the contract between Texarkana and the USACE for additional conservation storage (which would require some environmental studies and mitigation) and improvements to Texarkana's pump station on the lake. This strategy would require Texarkana to be willing to sell water to NTMWD. To date, Texarkana has not committed to selling water. Without such commitments and approval from the USACE to change the current operations, this strategy is not a practicable alternative to the Lower Bois d'Arc Creek Reservoir.

Raise Flood Pool. According to a recent study conducted for the USACE, increasing the top of conservation storage in Wright Patman Lake to elevation 228.64 feet msl and allowing diversions as low as elevation 215.25 feet msl would increase the yield of the project to about 364,000 acre-feet per year (Freese and Nichols, 2003). It was assumed that 180,000 acre-feet per year of the additional supply developed could be made available to water suppliers in North Texas. The remainder of the supply would be reserved for local use. The studies found that increasing the elevation above 228.64 feet msl would inundate portions of the White Oak Creek Mitigation Area, located upstream from Wright Patman Lake. (Approximately 500 acres of the mitigation area are below elevation 230 feet msl, and about 3,800 acres are below elevation 240 feet msl.) This strategy would require changes to the USACE operation of Wright Patman. Also, this strategy is recommended for Dallas in the City's long-range water supply plan and the 2012 *Texas State Water Plan*. Due to the available quantity of water from this source, it is unlikely that both NTMWD and Dallas would pursue this strategy.

Purchase from Texarkana, Raise Flood Pool, and System Operation. The recent study conducted for the USACE indicated that system operation of Lake Wright Patman and Jim Chapman Lake could increase the yield from the two projects by about 108,000 acre-feet per year. It was assumed that the combination of purchasing water from Texarkana, converting flood storage to conservation storage, and system operation with Jim Chapman Lake could make 390,000 acre-feet per year available from Lake Wright Patman. The 2012 State Water Plan assumed that this strategy would be developed jointly with multiple water providers in North Texas. The amount of supply for the NTMWD would be 130,000 acre-feet per year. Other suppliers have not committed to participating with this strategy. In addition to the uncertainty of multiple participating entities, this strategy would have the same implementation and environmental concerns noted for the other Wright Patman alternatives: contractual changes between the USACE and Texarkana, willing sellers, impacts to the White Oak Mitigation Area, changes to USACE

operations of the lake, and conflicts with other potential users.

Comparisons of costs for the Wright Patman alternatives show higher costs than for the Lower Bois d'Arc Creek Reservoir project. The operational costs for the Wright Patman alternatives range from \$0.55 to \$0.95 per 1,000 gallons, which represents 2.6 to 4.6 times the operational cost of the Lower Bois d'Arc Creek Reservoir (\$0.21/1,000 gallons). Over time, it is expected that the cost differential will increase due to higher transmission costs. Due to the distance of this water source from the NTMWD service area it is also expected that the carbon footprint impacts of the Wright Patman strategies would be considerably higher than those for the Lower Bois d'Arc Creek Reservoir.

Due to the uncertainty of reaching contractual agreements with existing water rights holders within the time frame needed for additional supplies, environmental impacts to the White Oak Mitigation Area and surrounding area, conflicts with other water suppliers, and the higher energy and operational costs, water supply from Wright Patman Lake is not considered a practicable alternative to the Lower Bois d'Arc Creek Reservoir at this time.

Lake Livingston Alternative

Lake Livingston is an existing reservoir on the Trinity River. The larger portion of the lake is located in Polk and San Jacinto Counties. The Trinity River Authority (TRA) and the City of Houston hold the water rights for Lake Livingston. The TRA has indicated that as much as 200,000 acre-feet per year might be available to water suppliers in North Texas from the lake. However, according to the 2012 *Texas State Water Plan*, much of this available supply is expected to be used to meet projected needs in the greater Houston area and would not be available for NTMWD. Lake Livingston is about 180 miles from the Metroplex. Due to the distance to NTMWD, this is a relatively expensive strategy. Capital costs for this project are estimated at over \$2 billion, and operating costs are \$1.03 per 1,000 gallons. The operating costs of the Lake Livingston project are nearly 5 times the costs for the Lower Bois d'Arc Creek Reservoir.

This alternative is similar to the Toledo Bend alternative in distance from NTMWD, and as such, it is expected that the carbon footprint impacts would also be similar and considerably higher than the Lower Bois d'Arc Creek Reservoir. These considerations, including the higher costs of this strategy and the competition with other users for supply make this strategy less desirable than the proposed project. The Lake Livingston project is not a practicable alternative to the Lower Bois d'Arc Creek Reservoir.

Other Existing Lakes

Other existing lakes in the vicinity of NTMWD service area include Lake Ray Hubbard, Ray Roberts Lake, Lewisville Lake, Lake Grapevine, Lake Fork, Cedar Creek Reservoir, Richland-Chambers Reservoir, Lake Palestine and Sam Rayburn Reservoir. Each of these sources is fully committed to existing customers. Lakes Ray Hubbard, Ray Roberts, Lewisville, Grapevine, Fork and Palestine are water supply sources for the City of Dallas, and these sources are needed to meet the demands of the City, its customers and other holders of water rights in the lakes. Cedar Creek and Richland-Chambers reservoirs are owned and operated by the TRWD. These water sources are fully committed to meet the water demands of the TRWD. Sam Rayburn is owned by the Lower Neches Valley Authority and it is currently being used by existing customers. Large quantities of water, as needed by NTMWD, are not available from these sources and therefore, purchase of water from these lakes is not a practicable alternative to Lower Bois d'Arc Creek Reservoir.

New Groundwater Supplies

There are limited new groundwater sources that could supply the quantity of water needed by NTMWD. The Ogallala Aquifer in the Texas Panhandle has large quantities of water, but much of this supply is committed to users in the area, including agricultural users and local municipalities. Another potential source is the Carrizo-Wilcox Aquifer. This aquifer is also heavily used by local entities.

Carrizo-Wilcox Aquifer Groundwater Alternative.

The Carrizo-Wilcox aquifer covers a large area of east, central, and south Texas. Organizations and individuals have been studying the development of water supplies in Brazos County and surrounding counties for export. Brazos County is about 150 miles from the NTMWD service area. There are some uncertainties about developing such a large quantity of groundwater and exporting this water to North Texas. The Modeled Available Groundwater values adopted through the Groundwater Joint Planning Process for the Carrizo-Wilcox in Brazos County are less than 40,000 acre-feet in 2020. Also, the costs to develop this alternative are about 48 percent greater than the Lower Bois d'Arc Creek Reservoir and unit costs of water are more than twice that of water from Lower Bois d'Arc Creek Reservoir. Similar to the other long transmission projects, the carbon footprint impacts of this strategy would be considerably higher than the impacts associated with the Lower Bois d'Arc Creek Reservoir. Due to cost considerations, energy impacts and competition for this water source, the Carrizo-Wilcox groundwater alternative is not a practicable alternative to the proposed action.

Desalination of Seawater

Gulf of Mexico With Desalination Alternative

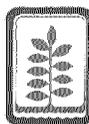
The State of Texas has sponsored initial studies of potential seawater desalination projects, and this is seen as a potential future supply source for the state. Because of the distance to the Gulf of Mexico, seawater desalination is not a particularly promising source of supply for NTMWD. The supply from seawater desalination is essentially unlimited, but this is a high energy use strategy and the cost is much higher than the cost of other water management strategies for NTMWD. The capital costs alone for this alternative are over \$4 billion. The unit cost of water from Gulf of Mexico Desalination is nearly 4 times the cost of water from Lower Bois d'Arc Creek Reservoir. Similar to the other long transmission projects and highly energy intensive projects, it is expected that the carbon footprint impacts of this strategy would be considerably higher than the Lower Bois d'Arc Creek Reservoir. This strategy is not a practicable alternative to the proposed project.

Conclusion

Based upon the aforementioned information and analysis, there are no practicable alternatives to Lower Bois d'Arc Creek Reservoir at this time that can meet the amount of water supply needed by NTMWD within the necessary time frame. Furthermore, based upon the information presented above, NTMWD has determined that conservation and reuse alone are insufficient to meet its future water needs.

APPENDIX I

NORTH TEXAS MUNICIPAL WATER DISTRICT BOARD MINUTES SHOWING ADOPTION OF THE WATER CONSERVATION AND WATER RESOURCE AND EMERGENCY MANAGEMENT PLAN



NORTH TEXAS MUNICIPAL WATER DISTRICT

505 E. Brown Street • Wylie, Texas 75098
(972) 442-5405 – Phone • (972) 295-6440 – Fax

MINUTES OF A REGULAR MEETING OF THE BOARD OF DIRECTORS HELD ON THURSDAY, FEBRUARY 27, 2014 IN THE NTMWD ADMINISTRATIVE OFFICES, WYLIE, TEXAS

The North Texas Municipal Water District Board of Directors met in Regular Session on Thursday, February 27, 2014, at 4:00 p.m. in the Administrative Offices, 505 East Brown Street, Wylie, Texas. Notice of the meeting was legally posted in accordance with Government Code, Title 551, Open Meetings.

President Bill Lofland called the meeting to order. President Bill Lofland advised that Director Larry Parks will be abstaining from voting on Agenda Item Nos. V. B., and VI. E., J., N., R., X., and Z.

I. INVOCATION

Director Jerry Yancey offered the invocation.

II. ROLL CALL

Secretary Joe Joplin conducted a roll call. No Directors were absent. The following Directors were present for the February 27, 2014, Board meeting:

Terry Anderson	Jim Mellody
Don Cates	John Murphy
Gary Downey	Patrick Nicklen
Joe Farmer	Larry Parks
Marvin Fuller	Bobby Robinson
Don Gordon	Richard Sheehan
Darrell Grooms	Lynn Shuyler
Bill Harrison	Shep Stahel
Joe Joplin	John Sweeden
James Kerr	Bob Thurmond
Bill Lofland	Darwin Whiteside
Jack May	Jerry Yancey
Charles McKissick	

The following NTMWD consultants attended the meeting:

Shannon Kackley – Gay McCall Isaacks Gordon & Roberts
David Medanich – First Southwest Company

III. RECOGNITION OF GUESTS

A. Registered Guests

There were no registered guests recognized.

IV. PUBLIC COMMENTS

There were no public comments.

V. CONSENT AGENDA ITEMS

Upon a motion by Director John Murphy and a second by Director James Kerr, the Board of Directors voted unanimously to approve the consent agenda items as follows:

- A. Consider Approval of Board of Directors Meeting Minutes – January 23, 2014
(Please refer to Consent Agenda Item No. 14-02-01)
- B. Consider Approval of Board of Directors Special Meeting Minutes – February 1, 2014
(Please refer to Consent Agenda Item No. 14-02-02)
- C. Consider Approval of Board of Directors Planning Retreat Minutes – February 1, 2014
(Please refer to Consent Agenda Item No. 14-02-03)
- D. Consider Authorization to Make Final Payment on Project No. 280, Floyd Branch Regional Wastewater Treatment Plant, 2012 Odor Control Improvements
(Please refer to Consent Agenda Item No. 14-02-04)
- E. Consider Authorization to Make Final Payment on Project No. 313, Union Pacific Railroad Crossing Protection of the Existing 72-Inch Texoma Pipeline
(Please refer to Consent Agenda Item No. 14-02-05)
- F. Consider Authorizing Change Order No. 2 and Authorization to Make Final Payment on Project No. 229, Wylie Water Treatment Plant Security Enhancements, Phase 2
(Please refer to Consent Agenda Item No. 14-02-06)
- G. Consider Authorizing Additional Engineering Services on Project No. 233, 121 Regional Disposal Facility Fleet Maintenance Weld Services Building
(Please refer to Consent Agenda Item No. 14-02-07)
- H. Consider Authorizing Funding for Retirement Dinner in Honor of NTMWD's Executive Director
(Please refer to Consent Agenda Item No. 14-02-08)

VI. AGENDA ITEMS FOR INDIVIDUAL CONSIDERATION

- A. Consider Authorizing Funding for the Texas Water Smart Coalition Awareness Campaign
(Please refer to Administrative Memorandum No. 4126)

Upon a motion by Director Terry Anderson and a second by Director Jim Mellody the Board of Directors voted unanimously to continue to partner with the Texas Water Smart Coalition by funding the Texas Water Smart Coalition Awareness Campaign in a not-to-exceed amount of \$100,000 on behalf of the NTMWD, Member Cities, and Customers.

- B. Consider Authorizing Additional Engineering Services for Project No. 301, NTMWD Administration Building Structural Repairs, Building Renovations, and Building Additions
(Please refer to Administrative Memorandum No. 4127)

Upon a motion by Director Darrell Grooms and a second by Director Jerry Yancey, the Board of Directors voted unanimously to authorize a change in the scope of services for the NTMWD administration building additions to include design and construction of a standalone building west of the existing administration building and authorize an increase to the engineering services agreement with Huitt-Zollars, Inc., for Project No. 301, NTMWD Administration Building Structural Repairs, Building Renovations, and Building Additions in the not-to-exceed amount of \$45,125, for a revised total engineering services fee of \$588,390.

- C. Consider Authorizing Change Order No. 1 on Project No. 301, NTMWD Administration Building Structural Improvements, Task No. 1
(Please refer to Administrative Memorandum No. 4128)

Upon a motion by Director Lynn Shuyler and a second by Director Joe Farmer, the Board of Directors voted unanimously to authorize Change Order No. 1 for an increase of \$20,634 resulting in a revised contract amount of \$67,634 and a 21-day contract time extension, resulting in a revised final completion date of April 27, 2014, for the NTMWD Administration Building Structural Improvements, Task No. 1, Project No. 301.

- D. Consider Authorizing Amending and Renaming NTMWD's Water Conservation and Drought Contingency/Water Emergency Response Plans, March 2008, and Amendment to District Policy No. 24, Water Conservation and Drought Contingency/Water Emergency Response Plans
(Please refer to Administrative Memorandum No. 4129)

Upon the recommendation of the Water Committee, a motion by Director Terry Anderson, and a second by Director Larry Parks, the Board of Directors voted unanimously to amend and rename the NTMWD's Water Conservation and Drought Contingency/Water Emergency Response

Plans, March 2008, and amend District Policy No. 24, Water Conservation and Drought Contingency/Water Emergency Response Plans.

- E. Consider Authorizing Engineering and Legal Assistance for Project No. 351, Lower Bois d’Arc Creek Reservoir, Phase IIIB
(Please refer to Administrative Memorandum No. 4130)

Upon a motion by Director Darrell Grooms and a second by Director Patrick Nicklen, the Board of Directors voted unanimously to authorize funding for Freese and Nichols, Inc., and Lloyd, Gosselink, Rochelle & Townsend, PC, to perform engineering and legal services for Lower Bois d’Arc Creek Reservoir Phase IIIB, Project No. 351, in the not-to-exceed total amount of \$1,000,000 (funding of \$500,000 for Freese and Nichols, Inc., and funding of \$500,000 for Lloyd, Gosselink, Rochelle & Townsend, PC).

- F. Consider Authorizing Award of Construction Contract on Project No. 335, 121 Site Facility Water Transmission Pipeline Relocation at State Highway 121
(Please refer to Administrative Memorandum No. 4131)

Upon a motion by Director Darrell Grooms and a second by Director John Murphy, the Board of Directors voted unanimously to authorize award of a construction contract to Vessels Construction, A Division of Vescor, Inc., for 121 Site Facility Water Transmission Pipeline Relocation at State Highway 121, Project No. 335, in the amount of \$90,878.

- G. Consider Authorizing Change Order No. 4 on Project No. 277, Water Treatment Plant III, Filter Underdrain Improvements and Conversion to Biologically Active Filters
(Please refer to Administrative Memorandum No. 4132)

Upon a motion by Director James Kerr and a second by Director Joe Farmer, the Board of Directors voted unanimously to authorize Change Order No. 4 for the Water Treatment Plant III Filter Underdrain Improvements and Conversion to Biologically Active Filters, Project No. 277, for an increase in the amount of \$135,947.24, resulting in a revised contract amount of \$6,815,140.95. The final completion date for this project remains January 9, 2016.

- H. Consider Authorizing Additional Engineering Services on Project No. 308, Upper Rowlett and Cottonwood Creek Parallel Force Main Design
(Please refer to Administrative Memorandum No. 4133)

Upon a motion by Director Joe Farmer and a second by Director Lynn Shuyler, the Board of Directors voted unanimously to authorize additional engineering services to Cobb, Fendley & Associates, Inc., for professional services associated with design of the Upper Rowlett and Cottonwood Creek Parallel Force Main, Project No. 308, in the not-to-exceed amount of \$97,785, resulting in a not-to-exceed engineering services fee of \$619,517.

- I. Consider Authorizing Change Order No. 1 on Project No. 278, Wilson Creek Gravity Interceptor Improvements, Phase 1
(Please refer to Administrative Memorandum No. 4134)

Upon a motion by Director Marvin Fuller and a second by Director Patrick Nicklen, the Board of Directors voted unanimously to authorize Change Order No. 1 for an increase of \$61,124.08, resulting in a revised contract amount of \$3,105,029.18 and an additional 150 calendar days of contract time, resulting in a revised final completion date of November 5, 2014, for the Wilson Creek Gravity Interceptor Improvements, Phase 1, Project No. 278.

- J. Consider Authorizing Additional Engineering Services for Fiscal Year 2014 Water Supply Planning Assistance
(Please refer to Administrative Memorandum No. 4135)

Upon a motion by Director Bobby Robinson and a second by Director Lynn Shuyler, the Board of Directors voted unanimously to authorize an increase to the engineering services agreement with Freese and Nichols, Inc., for Fiscal Year 2014 Water Supply Planning Assistance in the not-to-exceed amount of \$150,000 for a revised total engineering services fee of \$350,000.

- K. Consider Authorizing Change Order No. 1 and Authorization to Make Final Payment on Project No. 310, Wylie-McKinney 20-Inch Waterline Relocation at Stinson Road
(Please refer to Administrative Memorandum No. 4136)

Upon a motion by Director Lynn Shuyler and a second by Director Don Gordon, the Board of Directors voted unanimously to authorize Change Order No. 1 for an increase of \$26,566, resulting in a revised contract amount of \$153,828, and authorize final payment to Dowager Utility Construction, Ltd., in the final contract amount of \$153,828 for the Wylie-McKinney 20-Inch Waterline Relocation at Stinson Road, Project No. 310.

- L. Consider Authorizing Award of Construction Contract on Project No. 314, Farmersville Pump Station Pump No. 2
(Please refer to Administrative Memorandum No. 4137)

Upon a motion by Director Patrick Nicklen and a second by Director Joe Farmer, the Board of Directors voted unanimously to authorize award of a construction contract to Crescent Constructors, Inc., for the Farmersville Pump Station Pump No. 2, Project No. 314, in the amount of \$143,700.

- M. Consider Authorizing Additional Engineering Services for Project No. 285, Cooper Pipeline Embankment Improvement Near FM 3218 in Commerce, Texas
(Please refer to Administrative Memorandum No. 4138)

Upon a motion by Director John Murphy and a second by Director Patrick Nicklen, the Board of Directors voted unanimously to authorize additional engineering services to Lockwood, Andrews & Newnam, Inc., for the Cooper Pipeline Embankment Improvement Near FM 3218 in Commerce, Texas, Project No. 285, in the not-to-exceed amount of \$22,733 for a not-to-exceed total of \$141,733.

- N. Consider Authorizing Change Order No. 3 and Authorization to Make Final Payment on Project No. 207, Expand Frisco/McKinney Pump Station to 130 MGD
(Please refer to Administrative Memorandum No. 4139)

Upon a motion by Director Shep Stahel and a second by Director Bobby Robinson, the Board of Directors voted unanimously to authorize Change Order No. 3 for a decrease of \$72,624.12, resulting in a revised contract amount of \$6,520,067.42 and an additional 131 days for final completion resulting in a final completion date of January 15, 2014, and authorize final payment to Archer Western Contractors, Ltd., in the final contract amount of \$6,520,067.52, for Project No. 207, Expand Frisco/McKinney Pump Station to 130 MGD.

- O. Consider Authorizing Change Order No. 2 on Project No. 227, Contract A, Upper White Rock Creek Parallel Force Main
(Please refer to Administrative Memorandum No. 4140)

Upon a motion by Director Shep Stahel and a second by Director Patrick Nicklen, the Board of Directors voted unanimously to authorize Change Order No. 2 for a net decrease of \$41,368.09, resulting in a revised contract amount of \$3,200,390.13 and an additional 30 calendar days resulting in a revised final completion date of April 20, 2014, for the Upper White Rock Creek Parallel Force Main, Project No. 227 (Contract A).

- P. Consider Authorizing Execution of Engineering Services Agreement on Project No. 352, Water System Operations Center
(Please refer to Administrative Memorandum No. 4141)

Upon a motion by Director Don Gordon and a second by Director Charles McKissick, the Board of Directors voted unanimously to table this item.

- Q. Consider Authorizing Change Order No. 24 on Project No. 153, Water Treatment Plants I, II, III, and IV Ozonation
(Please refer to Administrative Memorandum No. 4142)

Upon a motion by Director Darrell Grooms and a second by Director Marvin Fuller, the Board of Directors voted unanimously to authorize Change Order No. 24 for Project No. 153, Water Treatment Plants I, II, III, and IV Ozonation, an increase in the amount of \$38,373.02, resulting in a revised contract amount of \$110,945,965.57.

- R. Consider Authorizing Change Order No. 3 on Project No. 128, Lake Texoma Pump Station Modifications
(Please refer to Administrative Memorandum No. 4143)

Upon a motion by Director Jerry Yancey and second by Director Shep Stahel, the Board of Directors voted unanimously to authorize Change Order No. 3 to the Lake Texoma Pump Station Modifications, Project No. 128, for an increase of \$51,095.65 resulting in revised contract amount of \$6,649,959.78.

- S. Consider Authorizing Additional Engineering Services on Project No. 312, Lake Tawakoni Water Treatment Plant Sludge Lagoon Improvements
(Please refer to Administrative Memorandum No. 4144)

Upon a motion by Director Shep Stahel and a second by Director John Murphy, the Board of Directors voted unanimously to authorize additional engineering services for Black & Veatch Corporation for professional services associated with design for the Lake Tawakoni Water Treatment Plant Sludge Lagoon Improvements, Project No. 312, in the not-to-exceed amount of \$23,958, resulting in a revised engineering services fee amount of \$451,168.

- T. Consider Authorizing Execution of Inspection Services Agreement on Project No. 312, Lake Tawakoni Water Treatment Plant Sludge Lagoon Improvements
(Please refer to Administrative Memorandum No. 4145)

Upon a motion by Director Lynn Shuyler and a second by Director Shep Stahel, the Board of Directors voted unanimously to authorize the Executive Director to execute an inspection services agreement with Dietz Engineering in the not-to-exceed amount of \$105,000 for the Lake Tawakoni Water Treatment Plant Sludge Lagoon Improvements, Project No. 312.

- U. Consider Authorizing Reimbursement to Grayson County for Road Damage, Project No. 268, Lake Texoma Outfall to Wylie Water Treatment Plant Raw Water Pipeline
(Please refer to Administrative Memorandum No. 4146)

Upon the recommendation of the Water Committee, a motion by Director Shep Stahel, and a second by Director James Kerr, the Board of Directors voted unanimously to authorize reimbursement to Grayson County in the amount of \$793,700 for damage to county roads as a result of construction

material delivery for the Lake Texoma Outfall to Wylie Water Treatment Plant Raw Water Pipeline, Project No. 268, per the "Interlocal Agreement between Grayson County and the NTMWD for Road Repairs" dated October 16, 2012.

- V. Consider Authorizing Execution of Engineering Services Agreement on Project No. 330, Wylie Water Treatment Plant II Clearwell and Disinfection Modifications
(Please refer to Administrative Memorandum No. 4147)

Upon the recommendation of the Water Committee, a motion by Director Terry Anderson, and a second by Director John Murphy, the Board of Directors voted unanimously to authorize the Executive Director to execute an engineering services agreement with CH2M HILL Engineers, Inc., for professional services associated with design and construction for the Wylie Water Treatment Plant II Clearwell and Disinfection Modifications, Project No. 330, in the not-to-exceed amount of \$1,350,000.

- W. Consider Authorizing Additional Engineering Services for Project No. 286, Rockwall No. 2 Flow Meter Improvements
(Please refer to Administrative Memorandum No. 4148)

Upon a motion by Director Larry Parks and a second by Director Jerry Yancey, the Board of Directors voted unanimously to authorize an increase to the engineering services agreement with KSA Engineers, Inc., for Rockwall No. 2 Flow Meter Improvements, Project No. 286, in the not-to-exceed amount of \$37,000, for a revised total engineering services fee of \$64,336.

- X. Consider Authorizing Change Order No. 1 on Project No. 188, Expand High Service Pump Station 3-1 to 350 MGD
(Please refer to Administrative Memorandum No. 4149)

Upon a motion by Director James Kerr and a second by Director Darrell Grooms, the Board of Directors voted unanimously to authorize Change Order No. 1 for an increase of \$136,720.94, resulting in a revised contract amount of \$7,857,298.94, and approve an additional 75 calendar days of contract time for Project No. 188, Expand High Service Pump Station 3-1 to 350 MGD.

- Y. Consider Authorizing Additional Engineering Services for Project No. 320, Wylie Water Treatment Plant II, Improvements for Basin Nos. 3 and 4
(Please refer to Administrative Memorandum No. 4150)

Upon a motion by Director Shep Stahel and a second by Director Darrell Grooms, the Board of Directors voted unanimously to authorize additional engineering services for Black & Veatch Corporation for professional services associated with design for the Wylie Water Treatment Plant II Improvements for Basin Nos. 3 and 4, Project No. 320, in the not-to-exceed

amount of \$26,250, resulting in a revised engineering services fee of \$277,150.

- Z. Consider Authorizing Change Order No. 1 on Project No. 275, Chapman Lake Water Access, Task B (Dredging)
(Please refer to Administrative Memorandum No. 4151)

Upon a motion by Director Shep Stahel and a second by Director Don Gordon, the Board of Directors voted unanimously to authorize Change Order No. 1 for an increase of \$56,033.75, resulting in a revised contract amount of \$1,818,239.75 and an additional 20 calendar days of contract time, resulting in a revised final completion date of June 25, 2014, for the Chapman Lake Water Access, Task B (Dredging), Project No. 275.

- AA. Consider Authorizing Change Order No. 5 on Project No. 259, Water Treatment Plant I Conversion to Biologically Active Filtration and Improvement of Existing Underdrains
(Please refer to Administrative Memorandum No. 4152)

Upon a motion by Director Shep Stahel and a second by Director Joe Farmer, the Board of Directors voted unanimously to authorize Change Order No. 5 for the Water Treatment Plant I Conversion to Biologically Active Filtration and Improvement of Existing Underdrains, Project No. 259, for an increase in the amount of \$104,627, resulting in a revised contract amount of \$8,144,796.75.

VII. ADJOURNMENT

There being no further business, the meeting adjourned at approximately 5:22 p.m. The next regular meeting of the NTMWD Board of Directors will be held Thursday, March 27, 2014, at 4:00 p.m. in the NTMWD Administrative Offices, 505 E. Brown Street, Wylie, Texas.

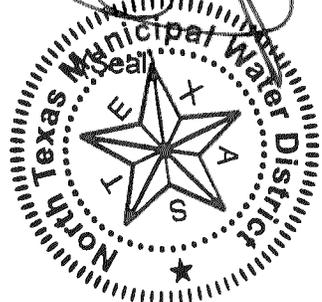
APPROVED:



BILL LOFLAND, President

ATTEST:



JOE JOPLIN, Secretary

APPENDIX J
TEXAS WATER CODE SECTION 11.039

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TEXAS WATER CODE SECTION 11.039

§ 11.039. DISTRIBUTION OF WATER DURING SHORTAGE.

(a) If a shortage of water in a water supply not covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the water to be distributed shall be divided among all customers pro rata, according to the amount each may be entitled to, so that preference is given to no one and everyone suffers alike.

(b) If a shortage of water in a water supply covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the person, association of persons, or corporation owning or controlling the water shall divide the water to be distributed among all customers pro rata, according to:

(1) the amount of water to which each customer may be entitled; or

(2) the amount of water to which each customer may be entitled, less the amount of water the customer would have saved if the customer had operated its water system in compliance with the water conservation plan.

(c) Nothing in Subsection (a) or (b) precludes the person, association of persons, or corporation owning or controlling the water from supplying water to a person who has a prior vested right to the water under the laws of this state.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 2001, 77th Leg., ch. 1126, § 1, eff. June 15, 2001.