First Amended General Guidelines for Regional Water Plan Development

- October 2012 -

Fourth Cycle of Regional Water Planning

Contents

Background

The fourth cycle of regional and state water planning as defined by Senate Bill 1 of the 75th Texas Legislature commenced in 2011 and will extend through 2016. Regional Water Planning Groups (RWPGs) must prepare the 2016 Regional Water Plans (RWPs) that, once approved, shall become the basis for the 2017 State Water Plan. The RWP guidance and format requirements have been updated and are intended to incorporate new statutory and rule requirements that clarify required content, make it easier for TWDB staff to review the RWPs, and to make it easier for the public to find and understand the information contained in all 16 RWPs.

Regional water planning is based on the Texas Water Code. The principles guiding regional water planning are further detailed in 31 TAC Chapters 358 and 357 and apply broadly to all activities addressed in this guidance document. See the TWDB pamphlet: "***Statute and Administrative Rules Governing Regional Water Planning in Texas***" for all statutory and TAC references relevant to regional water planning.

Other referenced sources throughout this document provide additional guidance and clarification including the TWDB documents entitled "***Guidelines for Regional Water Planning Data Deliverables***" which also contains important supplementary information regarding estimating and reporting water supply availability and other data and the TWDB "***Regional Water Planning Public Notice Quick-Reference***" which are available at the TWDB's website. Any future revisions to 31 TAC 355, 357, and or 358 adopted by the TWDB may result in changes to these planning guidelines.

Purpose

These guidelines provide additional information on the required methods, content, and format of information to be contained in each RWP. The Initially Prepared Plans (IPPs) and adopted RWPs will be reviewed by TWDB staff based on statute, regional water planning rules; requirements in this and all other Contract documents including the Scope of Work.

The following document summarizes guidelines for developing RWPs for the current planning cycle. These guidelines include specific 'shall' requirements that must be complied with by RWPGs as they prepare the RWP. This guidance includes some 'may' or 'consider' language that leaves certain considerations to the discretion of the RWPGs.

Included in this document are sections specifically addressing the following tasks as specified in statute and agency rules:

1.0 - Description of the Regional Water Planning Area **[31 TAC §357.30.]**

2.0 - Projected Population and Water Demands **[31 TAC §357.31.]**

3.0 - Water Supply Analysis **[31 TAC §357.32.]**

4.0 - Needs Analysis: Comparison of Water Supplies and Demands **[31 TAC §357.33.]**

5.0 - Identification and Evaluation of Potentially Feasible Management Strategies Water **[31 TAC §357.34.]**; Recommended Water Management Strategies and Alternative Water Management Strategies **[31 TAC §357.35.]**

6.0 - Impacts of Regional Water Plan **[31 TAC §357.40.];** Consistency with Long-term Protection of Water Resources, Agricultural Resources, and Natural Resources **[31 TAC §357.41.]**

7.0 - Drought Response Information, Activities, and Recommendations **[31 TAC §357.42.]**

8.0 - Regulatory, Administrative, or Legislative Recommendations **[31 TAC §357.43.]**

9.0 - Infrastructure Financing Analysis **[31 TAC §357.44.]**

10.0 - Adoption, Submittal, and Approval of Regional Water Plans **[31 TAC §357.50.]**

11.0 - Implementation and Comparison to the Previous Regional Water Plan **[31 TAC §357.45.]**

12.0 - Deliverables

13.0 - Guidance for Scoping Task 4D

This document augments existing statute and rules that govern regional water planning. **Provisions of Title 31 of the Texas Administrative Code (TAC) Chapters 355, 357, and 358 serve as the foundation for information in this document and are not superseded or abridged by anything contained within or excluded from this document.**

Acronyms

The following acronyms, used in this document, have the following meanings:

- Executive administrator (EA) – The executive administrator of the Texas Water Development Board or a designated representative.
- Initially Prepared Plan (IPP) – Draft RWPs that are presented at a public hearing and submitted for Board review and comment.
- Regional water plan (RWP) – The plan adopted or amended by a regional water planning group pursuant to Texas Water Code, §16.053 (relating to Regional Water Plans) and this chapter.
- Regional water planning area (RWPA) – Area designated pursuant to Texas Water Code, §16.053.
- Regional water planning group (RWPG) – Group designated pursuant to Texas Water Code, §16.053.
- Water Management Strategy (WMS) – A plan or specific project to meet a need for additional water by a discrete user group, which can mean increasing the total water supply or maximizing an existing supply.
- Water User Group (WUG) – Identified user or group of users for which water demands and water supplies have been identified and analyzed and plans developed to meet water needs.

- Wholesale Water Provider (WWP) - Person or entity, including river authorities and irrigation districts, that had contracts to sell more than 1,000 acre-feet of water wholesale in any one year during the five years immediately preceding the adoption of the last RWP.

Cross Reference for Fourth Cycle Contract and Regional Water Plan Documents

For convenience, Table 1 below illustrates how Contract tasks, guidance, Administrative Rules, and RWP chapters generally relate.[1] The chapter breakdown for each RWP is specifically required under 31 TAC §357.22(b). Plans that are not organized in this manner shall be considered administratively incomplete and shall not be reviewed.

[1] Some rules (e.g., TAC §358; §357.22) apply more broadly to all regional water planning activities.

Table 1 – General Document Cross-Reference

Regional Water Planning Contract Document References			2017 Regional Water Plan Chapter, Associated TAC Sections, and Content		
TWDB Contract Reimbursement Accounting Number ('TXWise')	Exhibit A - Contract SOW Task	Exhibit C - General Guidelines for Regional Water Plan Development	**Regional Water Plan Chapter Number**	Primary TAC Section	General Content
9	1	1	**1**	§357.30	Description of the Regional Water Planning Area
1	2A	2	**2**	§357.31	Projected Non-Municipal Water Demands
2	2B			§357.31	Projected Population and Municipal Water Demands
3	3	3	**3**	§357.32	Water Supply Analysis
4	4A	4	**4**	§357.33	Identification of Water Needs
5	4B	5	**5**	§357.34	Identification of Potentially Feasible Water Management Strategies (WMSs)
7	4D			§357.34; §357.35	Evaluations of Potentially Feasible WMSs and Recommended WMSs and Alternative WMSs
10	5			§357.34	Conservation Recommendations *[as subchapter]*
11	6	6	**6**	§357.40	Impacts of Regional Water Plan
				§357.41	Consistency with Protection of Water Resources, Agricultural Resources, and Natural Resources
12	7	7	**7**	§357.42	Drought Response Information, Activities, and Recommendations
13	8	8	**8**	§357.43	Policy Recommendations & Unique Sites
14	9	9	**9**	§357.44	Infrastructure Financing Analysis
15	11	11	**11**	§357.45	Implementation and Comparison to the Previous Regional Water Plan
8	10	10	**10**	§357.21; §357.50	Public Participation and Plan Adoption
6	4C	12	na	contract	Technical Memorandum

1.0 Planning Area Description[2]

Chapter 1 is a summary of the RWPA that addresses items described in 31 TAC §357.30 and any other significant aspects of the RWPA that are considered relevant to the RWP update.

Information compiled by the TWDB from water loss audits may be presented, for example, as a summary in tabular form along with a description of the information and how the RWPG considered the information in developing the RWP.

When presenting historic drought(s) of record, the RWPG may identify other relevant (e.g., basin-level) droughts of record that impact RWPA water supplies in addition to identifying the overall historic drought of record in the RWPA .

2.0 Population and Water Demand Projections[3]

For the fourth cycle of regional water planning, the 2010 U.S. Census data for county-level population projections will become generally available in late 2011. Draft Water User Group level (WUG) projections are anticipated to be provided by TWDB to RWPGs in 2012. These draft WUG-level projections shall be used as the basis for conducting a full-scale revision of RWPs including the associated population and municipal water demand projections for these 2016 RWPs, including the extension of the planning horizon and projection period out from 2020 to the year 2070.

Draft non-population related water demand projections (e.g. mining, manufacturing, irrigation, steam-electric power, and livestock) were made available for review and comment by RWPGs in late 2011. The TWDB relied on a recent study[4] with the Bureau of Economic Geology at the University of Texas at Austin to prepare draft mining water demand projections for each planning region.

TWDB staff, in conjunction with the Texas Commission on Environmental Quality (TCEQ), Texas Parks and Wildlife Department (TPWD), and Texas Department of Agriculture (TDA) will prepare draft population and water demand projections for all water demands including: municipal, county-other, mining, manufacturing, irrigation, steam-electric power, and livestock. TWDB staff will update population and water demand projections for all associated Water User Groups (WUGs) and provide these draft projections to RWPGs for their review and input. The new population projections to be used in the 2016 RWPs will increase population projections in some locations while decreasing population projections in other locations, relative to the population projections in the 2011 RWPs. TWDB will directly populate the Regional Water Planning Application (DB17) with all WUG-level draft projections and make related changes to DB17 if adjustments are approved by the TWDB.

The TWDB will consider requests for changes to draft population and draft water demand projections if warranted. Entities wishing to adjust draft projections shall address their requests through their respective RWPG. If the RWPG concurs, it will submit a request to the EA of the TWDB for consideration.

[2] Primarily related to 31 TAC §357.30
[3] Primarily related to 31 TAC §357.31
[4] 2011, *Current and Projected Water Use in the Texas Mining and Oil and Gas Industry*, TWDB Report 0904830939.

Requests for adjustments shall be accompanied by supporting data, analyses, and documentation. TWDB staff will coordinate reviews of each request with the TCEQ, TPWD, and the TDA. All requests to adjust draft population or water demand projections shall be submitted along with associated data in an electronic format determined by TWDB (e.g**., fixed format spreadsheets**). TWDB staff will make adjustments considered justified by the supporting data submitted prior to Board consideration of adoption.

Population and water demand projections are expected to be formally adopted by the TWDB in 2013 after receiving input from the RWPGs and the TCEQ, TPWD, and TDA. The adopted projections will then be provided to RWPGs. RWPGs must use the Board-adopted projections when preparing their 2016 RWPs.

2.1 Population Projections

County-Level Population
TWDB staff will project population by decade for each county in the State and then sum the county populations to a regional total. Any adjustments to a county-level population must involve a justifiable redistribution of projected county populations within the region so that the summed regional total remains the same.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the county population projections:

a) A possible Census undercount took place in the county and action is currently being pursued to request a Census Bureau correction.
b) If there is evidence that the 2010-2020 net migration rate will be significantly different than the net migration rate used for the original projection.
c) There are statistically significant birth and survival rate differences (by appropriate cohorts) between the county and the State.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the county-level population projections:

1. Documentation of an action requesting the Census Bureau correct an undercount of population within a county.
2. Projected in-migration and out-migration of a county, indicating that the net migration of a county will be significantly different than the net migration rates previously used.
3. Birth and/or survival rates for a county population between 2000-2010 by gender, race/ethnicity and single-year age cohorts.
4. Other data that the RWPG believes is important to justify any changes to the population projections.

Water User Group Population
The projected population growth throughout the planning period for the cities, utilities and rural area (county-other) within a county is a function of a number of factors, including the entity's share of the county's growth between 2000 and 2010, as well as local information provided by RWPGs. The total county population, as projected by TWDB will act as a control total for the populations within the county. Any adjustments to a city, utility or remaining county- other population must involve a justifiable redistribution of projected populations within the county so that the county total remains the same.

Criteria: One or more of the following criteria must be verified by the RWPG and the EA for consideration of adjusting the WUG population projections:

a. Official adjustment to the census population for a city or an adjustment to the population estimate for non-city municipal WUGs (utilities or collective reporting units)

b. The population growth rate for a city, utility or county-other over the most recent five years is substantially greater than the growth rate between 2000 and 2010.
c. Identification of areas that have been annexed by a city since the 2010 Census.
d. Identification of the expansion of a utility's CCN or service area since April 2010
e. Identification of growth limitations or build-out conditions in a city or utility that would result in maximum population that is less than was originally projected.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustment to the WUG population projections:

1. Population estimates for cities developed and published by the State Data Center or by a regional council of governments will be used to verify criteria (b) for cities.
2. The verified number of residential connections and permanent population served will be used to verify criteria (a or b) for utilities.
3. The estimated population of an area that has been annexed by a city (for criteria c) or has become part of a CCN or service area for a water utility (for criteria d). In addition, the geographical boundary of the area must be presented in an acceptable map or ArcView shapefile.
4. Documentation from an official of a city or utility describing the conditions expected to limit population growth and estimating the maximum expected population will be used to verify criteria (d).
5. Other data that the RWPG believes is important to justify any changes to the population projections.

2.2 Municipal Water Demand Projections

Dry Year Designation
Water demand projections are to be based upon dry-year conditions, so the base year for the projections is intended to be the driest year from 2006 onwards. Based upon quarterly drought indices from the National Drought Mitigation Center, staff have determined that 2006 or 2009 will be used as the dry-year base for the water demand projections. The 2009 water use data will be available in August 2011 for analysis and review.

Municipal Water Use
Municipal water use is defined as residential and commercial water use. Residential use includes single and multi-family residential household water use. Commercial use includes water used by business establishments, public offices, and institutions, but does not include industrial water use. Residential and commercial water uses are categorized together because they are similar types of uses, i.e., each category uses water primarily for drinking, cleaning, sanitation, cooling, and landscape watering. Reported municipal water use data through the TWDB Water Use Survey for the designated dry year will be used to calculate the base per capita water use for each city.

The municipal water demand projections shall incorporate anticipated future water savings due to the natural installation of plumbing fixtures and appliances to more water-efficient fixtures and appliances, as detailed in relevant legislation. All other future water savings due to conservation programs undertaken by cities, utilities or county-other will be classified as WMSs by the RWPG.

Criteria: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the municipal water demand projections:

1. Errors identified in the reporting of municipal water use for an entity.
2. Evidence that the dry year water use was abnormal due to temporary infrastructure constraints.
3. Evidence that per capita water use from a different year between 2005-2009 would be more appropriate because that year was more representative of below-normal rainfall conditions.

4. Trends indicating that per capita water use for a city, utility or rural area of a county have increased over the latest period of analysis, beginning in 2000, and evidence that these trends will continue to rise in the short-term future.
5. Evidence that the number of fixture installations to water-efficient fixtures between 2000 and 2010 is different than the TWDB schedule.

An adjustment of the dry year population estimate will require adjustment of the city's annual per capita water use. Any changes to the population projections for an entity will require adjustments to the municipal water demand projections.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA of the TWDB for justifying any adjustments to the municipal water demand projections:

1. Annual municipal water production (total surface water diversions and/or groundwater pumpage and water purchased from other entities) for an entity measured in acre-feet.
2. The volume of water sales by an entity to other water users (cities, industries, water districts, water supply corporations, etc.) measured in acre-feet.
3. Net annual municipal water use, defined as total water production less sales to other water users (cities, industries, water districts, water supply corporations, etc.) measured in acre feet.
4. Documentation of temporary infrastructure constraints.
5. Drought index or growing season rainfall data to document a year different than the designated dry year as a more appropriate base year for projections.
6. Documentation of the number of water-efficient fixtures replaced between 1990 and 2010.
7. To verify increasing per capita water use trends for a city or rural area of a county and therefore revising projections of per capita water use to reflect this increasing trend, the following data must be provided with the request from the RWPG:
   a) Historical per capita water use estimates based on net annual municipal water use for the city, utility or rural area of a county, beginning in 2000.
   b) A trend analysis which must take into account the variation in annual rainfall.
   c) Revised projections of per capita water use for a city, utility or rural area of a county will be submitted by the RWPG, where an increasing trend in per capita water use has been verified for a city or rural area of a county.
   d) Growth data in the residential, commercial and/or public sectors that would justify an increase in per capita water use.
8. Other data the RWPG believes is important to justify any adjustments to the State Water Plan municipal water use projections.

2.3 Industrial (Manufacturing, Steam-Electric, Mining) Water Demand Projections

Industrial Water Use
Industrial water use is defined as water used in the production process of manufactured products, steam-electric power generation, and mining activities, including water used by employees for drinking and sanitation purposes.

Criteria: One or more of the following criteria must be verified by RWPG and the EA for consideration of revising the industrial water use projections:

a. An industrial facility which has recently located in a county and may not have been included in the Board's database. Documentation and analysis must be provided that justify that the new industrial facility will increase the future industrial water use for the county above the industrial water use projections.

b. An industrial facility has recently closed its operation in a county.
c. Plans for the construction of an industrial facility in a county at some future date.

Data Requirements: The RWPG must provide the following data associated with the identified criteria for justifying any adjustments to the industrial water use projections.

1. The quantity of water used on an annual basis by an industrial facility that has recently located in a county and was not included in the Board's database.
2. The North American Industrial Classification (NAIC) of the industrial facility that has recently located in a county. The NAIC is the numerical code for identifying the classification of establishments by type of activity in which they are engaged as defined by the U.S. Office of Management and Budget and is a successor of the Standard Industrial Classification (SIC).
3. Documentation of plans for an industrial facility to locate in a county at some future date will include the following data:
    a. Confirmation of land purchased for the facility or lease arrangements for the facility.
    b. The quantity of water required by the planned facility on an annual basis.
    c. The proposed construction schedule for the facility including the date the facility will become operational.
    d. The NAIC for the planned facility.

2.4 Irrigation Water Demand Projections

Irrigation Water Use
TWDB annual Irrigation water use estimates are produced by calculating a crop water need based on evapotranspiration and other climatic factors, this need per acre is then applied to irrigated acreage data obtained from the Farm Service Agency (FSA) in order to determine estimated irrigation water use by TWDB crop category. These estimates are then made available to Groundwater Conservation Districts for comment.

Criteria: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the irrigation water use projections:

a) Evidence that a different year between 2005-2009 would be more representative of typical irrigated acreage or below-normal rainfall than the designated dry year.
b) Evidence that irrigation water use estimates for a county from another source are more accurate than those used by TWDB.
c) Evidence that the expectation of conditions in the region are such that the projected annual rates of change for irrigation water use in the 2012 State Water Plan are no longer valid.

Data Requirements: The RWPG must provide the EA the following data associated with the identified criteria for justifying any adjustments to the irrigation water demand projections:

1) Acreage and water use data for irrigated crops grown in a region, as published by the Texas Agricultural Statistics Service, the Texas Agricultural Extension Service, or the Farm Service Agency (USDA), for the designated dry year and/or a different year that the RWPG wishes to present for consideration.
2) Any economic, technical, and/or water supply-related evidence that may show cause for adjustment in the future rate of change in irrigation water use.

2.5 Livestock Water Demand Projections

Livestock Water Use
Livestock water use will be defined as water used in the production of livestock, both for drinking and for cleaning or environmental purposes.

Criteria: One or more of the following criteria must be verified by the RWPG and the EA of the TWDB for consideration of revising the livestock water use projections:

a) Plans for the construction of a confined livestock feeding operation in a county at some future date.
b) Other evidence of change in livestock inventory or water requirements that would justify a adjustment in the projected future rate of change in livestock water use.

Data Requirements: The RWPG must provide the following data associated with the identified criteria for justifying any adjustments to the livestock water demand projections:

1. Documentation of plans for the construction of a confined livestock feeding facility in a county at some future date will include the following:
   a. Confirmation of land purchase or lease arrangements for the facility.
   b. The construction schedule including the date the livestock feeding facility will become operational.
   c. The daily water requirements of the planned livestock feeding facility.
2. Other evidence that would document an expected increase or decrease in the livestock inventory in the county.

2.6 The Sub-WUG Planning Option

At the discretion of each RWPG, certain WUGs may be subdivided into 'sub-WUG' level units for purposes of doing more detailed analysis and accounting. If a RWPG chooses to do this more refined analysis, please discuss with TWDB staff early on to ensure compatibility with DB17 and guidance. DB17 is capable of incorporating sub-WUG data with some limited parameters (e.g., the sub-WUG water demand units must sum to equal the full WUG demand). Although it may require additional effort, this flexibility to include higher resolution in water needs analyses may allow some RWPGs to better account for and present water supplies and water needs within, for example, County-Other WUGs.

3.0 Water Availability and Existing Water Supplies

3.1 Definitions

Availability is defined as the maximum amount of water available during the drought of record, regardless of whether the supply is physically or legally accessible by a WUG or WWP.[5] This is a source-based analysis.

RWPGs shall identify all water sources and their associated availability volumes within the RWPA even if such sources are not currently connected or being used but are potentially available for existing use or in the future.

Water availability may be increased (or decreased) through a future project or action, for example, by building a new reservoir or by modifying a DFC that changes a MAG.

[5] One exception is that for surface water, the existing permits to divert and store water do limit availability.

Existing Water Supply is defined as the maximum amount of water from existing sources for use during drought of record conditions that is physically and legally obtainable for use by WUGs. This is a WUG-based analysis the results of which are limited by:

- the portion of each water source's availability that could be accessed for supply by each WUG in the event of drought;
- legal or policy constraints regarding access to the water (e.g., by contract or water right); and,
- physical constraints such as transmission or treatment facility capacity that would limit the volume of delivery of treated supplies to WUGs.

To be considered 'existing' a water supply must not only be legally accessible but must be connected to the WUG or WWP, meaning that it currently has infrastructure for conveying water to the WUG or it is anticipated that the WUG will have access by the conclusion of the current planning cycle (by 2016). All WUG existing water supplies shall be directly associated with one or more water sources. The water rights which are the basis for surface water availability volumes shall be presented in the IPP and adopted regional water plans.

By definition, the sum of existing WUG water supplies associated with a particular source shall not exceed the total availability for that same source. Water availability volumes associated with a water source shall not be counted more than once as a basis for an existing supply. **Over-allocation of any water source in a RWP is strictly prohibited under this guidance.**

3.2 Introduction

RWPGs shall evaluate 'existing water supplies' for entities including water user groups (WUG) and wholesale water providers (WWP) as defined in statute and administrative rules [31 TAC §357.32].[6] This requires first determining water availability at the source.

The water availability at each source and the existing water supply information for each WUG and WWP shall be presented in the RWP and provided through DB17. RWPGs shall report both a) water availability data and b) existing water supply data in the Tech Memo, IPP and RWP.

Regardless of whether the EA authorizes modifications to WAM or GAM models to evaluate water source availability and/or existing water supplies for development of the RWP, it is the responsibility of the RWPG to ensure that the resulting estimates of a) water availability and b) existing water supplies are reasonable for drought planning purposes and shall reflect conditions expected to occur in the event of actual drought conditions and in all other regards shall be evaluated in accordance with this guidance document.

Technical Memos, IPPs, and RWPs shall include a written summary of all WAM and GAM models on which the surface and groundwater availability in the RWP is based (except for availability associated with MAGs), to include:

- the named/labeled version (including date) of each model used;
- a summary of any modifications to each model and the date these modifications were approved by the EA;
- name of the entity/firm that performed the model run; and
- the dates of the model runs.[7]

[6] In addition to material regarding water supplies in this document, RWPGs should refer to the TWDB's "*Guidelines for Regional Water Planning Data Deliverables*" for additional information for estimating existing water supplies.

All surface water availability shall be based on WAM model runs. For groundwater availabilities that are not based on GAM model runs, the RWP shall include a table summarizing the basis of these groundwater availabilities.

3.3 Determination of Existing Water Supplies for WUGs and WWPs

Calculation of existing water supplies shall consider and be based on:

- Availability of water at the source as determined under Section 3.4 through 3.7 of this document. Existing water supplies must be based on water that is available in every year throughout a drought of record (e.g., interruptible permit volumes based on TCEQ's 75%/75% criteria would not automatically qualify as a supply that is available during a drought of record except for that portion of the water volume that is actually anticipated to be present throughout drought conditions. Therefore, interruptible supplies that are not anticipated to be available during drought of record conditions shall not be included in a RWP as the basis for an existing supply).

- Existing water rights, permits, surface water storage rights, contracts and option agreements, and/or other planning and water supply studies.

- Contracted agreements and associated terms of contracts, which shall be assumed to renew upon a contract's termination date if contract holders contemplate renewals or extension or if the contract provides for renewal or extensions.

- Contracts already in existence that, if infrastructure also exists to deliver the water, the full volume of which must be shown as existing supply in the earliest planning decade. Existing water supplies shall not be underrepresented in early decades and increased over time simply based on expected demand increases if the full amount would be accessible in earlier decades.

- Net water volume delivered to the WUG after transmission losses.

- Net water that a WUG will have to meet its own WUG demands (gross volume of water minus water it must provide to other entities).

- Existing supplies in future decades assuming that current infrastructure for existing water supplies does not change through time (but is adequately maintained).

- The current infrastructure capacity - excluding internal water distribution systems – shall be considered to determine how much water may be transported, treated, and delivered to the intake of the WUG's distribution system**. This may include physical limitations associated with the horizontal location and or elevation of a provider's intake facility within a reservoir, for example, or the depth of an existing well.**

- Sources of existing water supplies that may include surface waters such as reservoirs and rivers, groundwater, water reuse, and/or a combination of several different sources including desalinated sources.

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[7] All input files of WAM models used to develop the RWP shall be included as an electronic appendix per Section 12 of this document.

- The ability to make minor operational changes that are not strictly precluded by a physical or legal constraint (e.g., the supply associated with a decision to turn on a groundwater pump, for example, shall be considered as part of an existing supply, not a WMS, if the pump and groundwater is already installed and accessible to the user).

- Functional, existing infrastructure and associated water supply regardless of whether it is currently being used. Note that an identified water need shall not be based on an assumption or expectation that a current existing water supply, either at the WWP or WUG level, is simply not used even though it could be used in the event of drought.

- The assumption that all existing water supply, transmission, and treatment infrastructure will be adequately maintained, rehabilitated, or replaced as a part of regular operation and maintenance into the future to maintain existing water supplies.[8] An identified water need shall not be based on the assumption or expectation that existing infrastructure not continue in service and that associated water supplies will no longer be available in the future as a result of neglect or lack of maintenance of infrastructure.[9]

- Consideration of the current and future water quality of the source.

- The greatest annual amount of water obtainable from the source without violating the most restrictive physical and/or regulatory conditions, including infrastructure, and limiting withdrawals under drought of record conditions.

- Consideration of information from the previous RWPs.

- Existing supplies from run-of-river diversions based on the county-basin location of the diversion point and associated use. List the diversion volumes based on a) the county-basin location of the diversion point and, b) the WUG use category.[10] Run-of-river diversions may be aggregated into a single 'run-of-river diversion' source type based on a) the county-basin and b) WUG use category, regardless of the size or number of the associated water rights. Do not list water right volumes individually unless required to track source water for specific WUGs.

- Unnamed 'Local Supplies[11]' shall be firm supplies during drought of record and may be included with a description of the source; these may not be associated with municipal users, including County-Other. The RWP shall include a single table that lists each Local Supply with a) an explanation for the basis of the supply itself, and b) the basis for the volume of supply. For unpermitted supplies, list the source as the sum of unpermitted surface water by county-basin split. Any unpermitted local supplies shall be listed individually as well with explanation and may be aggregated at the county-basin level when appropriate.

[8] An exception would be that it should not necessarily be assumed that reservoirs would be dredged to remove silt. If anticipated, future dredging of a reservoir should be shown as a WMS.
[9] Planned decommissioning of WTPs that will be replaced, for example, should not be considered the basis for an 'identified water need'.
[10] Although all surface water supplies must be based on permitted diversions and storage, RWPGs will not be required to present specific water right information in the RWPs or DB17.
[11] **Local Supplies** are limited, unnamed individual surface water supplies that, separately, are available only to particular non-municipal WUGs.

3.4 Evaluation of Surface Water Availability

Unless otherwise approved by the TWDB EA, available surface water shall be described by the permitted portion of firm yields for reservoirs and permitted portion of firm diversions for run-of-river supplies.[12]

In general, the availability of surface water is based on the permitted reservoir firm yield at the source or other permitted yield at the source (e.g., share of permitted run-of-river availability volume that can actually be diverted by the surface water intake facility and is available throughout a drought).

Reservoir firm yield is the maximum annual volume of water a reservoir can provide every year throughout a drought of record with existing water right permits using original reservoir capacity and under the assumption that senior water rights are satisfied first. "Firm" means that the use-appropriate monthly percentage of the annual firm diversion amount must be satisfied in each and every month of the estimation period (or a shorter period if it is used in the estimation) for all surface water diversions.

If the use of safe yield is approved by TWDB to evaluate surface water availability, both firm yield and safe yields must be reported for each reservoir in the RWP.

Run-of-river firm diversions are the annual diversion available at the diversion river location through a drought of record with existing water right permits assuming that all upstream and downstream senior water rights are satisfied first. "Firm" run-of-river diversion means that the use-appropriate monthly percentage of the annual firm diversion must be satisfied in each and every month of the simulation period for all surface water diversions. This is not a "minimum annual diversion" in which one or more months might actually have no authorized diversions at all.

It is important that RWPGs do not over-estimate reliable run-of-river water availability during drought, for example, by overlooking the need for additional storage and/or alternative sources of water supply necessary to bridge potential seasonal water shortages. If an intra-year shortage is identified, based on the reasonable monthly diversion distribution pattern, the annual firm diversion amount to be reported is that for which the monthly diversion amounts are met in each every month.

For surface waters bordering neighboring states or countries, RWPGs shall analyze and report available water supplies taking into account existing legal agreements. For surface water withdrawals that do not require permits, such as domestic and livestock uses, estimate water available under drought of record conditions based on available information.

For interstate and international reservoirs, RWPGs shall report water amounts available to Texas according to existing legal agreements.

TCEQ emergency curtailment rules shall not be considered as in effect during drought conditions and therefore shall be ignored for the purpose of evaluating existing WUG supplies for regional water planning purposes.

[12] Upon approval by the EA, existing sedimentation may be taken into account through WAM models when estimating both existing supplies and WMSs yields.

3.4.1 Water Availability to Determine Existing Surface Water Supplies

3.4.1.1 Required WAM Models

RWPGs are required to use an unmodified TCEQ Surface Water Availability Model (WAM) RUN#3 to estimate firm yield and firm run-of-river diversions (availability) for existing surface water supply as a default. Upon written request, however, modifications may be approved by the EA in writing if considered by the EA as necessary and/or appropriate to more accurately reflect existing surface water supplies. RWPGs should consider requesting model modification for any issue that is expected to have significant effects on the existing supplies including:[13]

1) Recognition of a new drought-of-record;
2) Updated reservoir storage volume based on hydrographic survey data;
3) Return flows that are reasonably expected to be available during the drought of record period;
4) Operational conditions such as placing diversions at their actual diversion locations instead of assumed locations at lakesides;
5) Less than full diversion rates during drought if in approved operation plans if RWPGs can provide adequate documentation to the TWDB demonstrating demands significantly lower than legal maximum diversions;
6) Reservoir minimum level below the top of dead pool;
7) Reservoir maximum above the top of conservation pool (e.g., use of flood pool);
8) Water yield gained from operating reservoirs as systems;
9) Conjunctive use of surface water and ground water; and
10) Other assumptions that are approved as appropriate by the EA.

RWPGs may use a model other than an unmodified TCEQ WAM RUN#3 when evaluating existing surface water supply if the EA concurs in writing.

RWPGs may base existing water supplies on special operational procedures if approved in writing by the EA (e.g., USACOE, IBWC, water master operations).

To obtain written EA approval for use of hydrologic models other than an unmodified TCEQ WAM RUN#3 (along with any associated assumptions) RWPGs must first provide documentation to TWDB justifying any proposed variances from the model. RWPGs must adequately describe special conditions that might justify modifications to these standard hydrologic model requirements. EA approval will be based on the reasonableness of these requested modifications. Regardless of whether the EA authorizes modifications to WAM models or associated assumptions to evaluate existing water supplies for development of the RWP, it is the responsibility of the RWPG to ensure that the resulting estimates of existing water supply quantities of WUGs are reasonable for drought planning purposes and shall reflect conditions expected in the event of actual drought conditions and in all other regards shall be evaluated in accordance with this guidance document.

3.4.1.2 Standard Criteria and Assumptions for Modeling

When estimating availability associated with firm yields or firm diversions, the following criteria must be met if applicable:

[13] All require written EA approval.

1) Available inflows to reservoirs are the remainder of naturalized stream flows after upstream (and downstream) senior water rights are met unless the use of lower diversion rates for a upstream right is approved by TWDB;
2) downstream senior water rights must be met; however, this does not require releases of legally stored water unless specifically stated in existing water rights;
3) all special conditions of water rights must be considered , including, but not limited to:
   a. bay and estuary and instream flow requirements;
   b. TCEQ environmental flow standards and associated TCEQ rules (e.g. instream flow set-asides); or
   c. other relevant limitations.
4) minimum allowable reservoir levels are the top of dead pool unless the use of a lower level is approved by TWDB;
5) maximum allowable reservoir levels are the top of conservation pool unless the use of a higher level is approved by TWDB;
6) evaporative losses are based on evaporation rate data that best coincide with the location of the reservoir and the period of record and time steps for inflows;
7) annual water supply demands are constant for all years; the distribution of annual demands within a given year are constant in all years and shall reflect the patterns of different types of water use expected; and
8) model run time steps shall not be longer than one month.

3.4.2 Water Management Strategies

When evaluating WMSs associated with surface water to meet identified water needs:

- Analyses must be based on firm yield and firm diversion;

- RWPGs shall analyze every WMS using **an unmodified TCEQ WAM RUN#3** to determine availability and WMS project yields. This analysis reflects conditions under which an associated permit application will be evaluated;

- Analyses must be in accordance with 31 TAC §357.34, §357.35, and Section 5 of this document.

- Analyses must be in accordance with Senate Bill 3 environmental flow standards and associated TCEQ rules (e.g., flow set-asides) or, if there are no TCEQ environmental flow standards, other relevant limitations (e.g. pass-throughs required by the 1997 *Consensus Criteria for Environmental Flow Needs)* (see Appendix 2.0).

- The exception to using an unmodified TCEQ WAM RUN#3 shall be when the WMS being evaluated (as well as the anticipated permitting process associated with the WMS) is based on a new water right (that must be added into the model); an amendment of an existing water right; a proposed subordination agreement; or, a proposed new use of return flows. In these instances, the TCEQ WAM RUN#3 may be modified only to the degree required to allow the simulation of these WMSs. The resulting, modified WAM, however, shall not then be used as the basis for evaluating other WMSs unless, for example, they are anticipated to be implemented in combination.

- The RWP shall clearly indicate in the RWP which, if any, WMSs are assumed to rely on or to mutually exclude another WMS and explain how the interaction may impact the estimated both the water availability and the WMS yield associated with each WMS.

- Consider that water needs based on unreliable run-of-river supplies resulting from intra-year shortages might be met in some cases, for example, by a recommended WMS that adds an amount of off-channel storage sufficient to increase the firm diversion amount (i.e., to firm up the associated water supply in all months and in all years).

- Conjunctive WMSs (i.e., using both surface water and groundwater) must have an overall firm supply as a WMS project but may be associated with less than firm surface water volumes during certain periods as long as the groundwater availability offsets the surface water availability sufficiently to ensure a firm WMS project yield.

- That portion of reservoir firm yield that is unpermitted, if any, may not be shown as currently available water from a source. However, RWPGs may evaluate and include a WMS that relies on the unpermitted portion of a reservoir's firm yield if the WMS is based on an associated increase to the available water supply brought about through a permit amendment, for example.

- If there are factors that could potentially limit the yield of a WMS that are not reflected in the TCEQ WAM RUN#3 and that the RWPG considers significant to a recommended WMS, RWPGs may consider validating the WMS yield through the underlying model(s) that were used to evaluate existing surface water supply per Section 3.4.1. This does not include applying the same assumptions to the WMS being validated (i.e., safe yield procedures used to evaluate existing availability would not have to be applied to new reservoirs). This analysis may be performed to confirm that a WMS being recommended could be reasonably expected to provide the estimated supply under the same drought conditions on which existing water supplies were evaluated. If considered appropriate by the RWPG, this validation could be the basis for reducing an estimated WMS project yield but shall not be used as the basis for increasing a WMS yield above that determined using an unmodified TCEQ WAM RUN#3. This validation, if applied, is intended to provide a conservative measure to ensure that WMS supplies are not over-estimated for drought planning purposes.

3.5 System Availability and Related WMSs

Water supply sources may be aggregated and categorized as systems if they meet one or more of the following criteria:

1) a source includes groundwater and surface water and or reuse;
2) several reservoirs operate together under permit, but supplies from a specific reservoir cannot be tracked directly to an end user; and/or
3) two or more reservoirs operate as a system resulting in a system gain in firm yield.

System gain is the amount of permitted water a system creates that would otherwise be unavailable if the reservoirs were operated independently and must be reported separately. For multi-reservoir systems, the minimum system gain during drought of record conditions may be considered additional water available, if permitted. Total existing water from a system shall not exceed the sum of the system gain plus the firm yields of individual reservoirs in a system. RWPGs must adequately describe methods used to calculate system gains (to be permitted) if considering new system operations as a WMS.

Operation of multiple reservoirs as a new 'system' or changes to operational procedures to existing reservoir systems to provide additional yield may be evaluated as a potential WMS. Such a WMS analysis shall include discussion regarding any associated permit changes that would be required.

3.6 Reuse Availability and Related WMSs

RWPGs shall quantify existing water supplies from reuse as either direct or indirect. Indirect reuse is process water that reenters rivers or stream systems and is diverted and used again downstream. For indirect reuse, RWPGs shall base this analysis on currently permitted reuse projects that have the associated infrastructure in place required to divert and use this water in accordance with permits issued by the TCEQ. Potential sources for indirect reuse in the future that will require new permits and additional infrastructure and shall be presented as a WMS in the RWP. RWPGs shall explain the methods used to estimate the amount of water that such strategies would generate in the future.

Direct reuse is process water recirculated within a given system. For direct reuse, RWPGs shall use the amount of water from direct reuse sources that they expect will be available during drought of record conditions from currently installed wastewater reclamation infrastructure. These amounts shall not exceed the amounts of water available to utilities generating the wastewater. RWPGs shall treat potential future sources of direct reuse as WMSs, and shall provide adequate justification to explain methods for estimating the amount of reused water available from such sources.

3.7 Evaluation of Groundwater Availability

Groundwater availability shall be based on the Modeled Available Groundwater (MAG) volumes that may be produced on an average annual basis to achieve a Desired Future Conditions (DFC) as adopted by Groundwater Management Areas (GMAs) (per Texas Water Code 36.001). Groundwater availability is not limited by permits currently issued. MAG volumes for each aquifer will be provided by TWDB through the DB17 interface, split into discrete geographic-aquifer units by: Aquifer/Region/County/ Basin and, where applicable, by Groundwater Conservation District (GCD).

MAGs shall be the basis for groundwater availability in all locations that have a DFC. Every available MAG must be used for all geographic areas in the RWPA regardless of whether there is a GCD in that location.

The groundwater availability (and the associated existing and future supplies based on it) for any given Aquifer/Region/County/Basin split in the RWPs shall not exceed the MAG value as provided in DB17. Any reallocation of MAG amounts between Aquifer/Region/County/Basin splits must be consistent with the relevant MAG and requires written pre-approval from the EA. Requests to reallocate MAG amounts between discrete geographic-aquifer units must be in writing from the RWPG and include a table with the proposed changes for each geographic-aquifer unit, for each decade, along with an explanation of:

- the basis for the reallocation request;
- how DFCs at that location as well as the DFCs in any surrounding areas shall be achieved under the reallocation;
- how the reallocation is consistent with the relevant MAG and GCD management plan(s); and,
- the long-term impact that pumping based on the reallocation would have on the DFC at that location.

If approved by the EA, the reallocation of MAG between discrete geographic-aquifer units shall be performed by TWDB staff only within DB17.

Most areas with groundwater availability volumes occur within a recognized major or minor aquifer or other aquifer (i.e., not major or minor) that have associated DFCs and will therefore have an associated MAG volume. In limited locations, there will be some groundwater availability volumes that are not associated with DFCs as follows:

1. areas of major or minor aquifers that do not have a DFC or associated MAG volume; and,
2. areas not associated with major or minor aquifers (e.g., 'local' groundwater) and that do not have a DFC or associated MAG volume.

In areas that were not considered in the DFC process or were considered "non-relevant" by the associated GMA[14] and therefore do not have MAG volumes but have groundwater supplies, use the availability as determined in the local GCD management plan. If no GCD exists, use TWDB GAM models, if available, or other means to develop estimates of groundwater availability (e.g., based on previous RWP estimates). RWPGs shall document and justify the method(s) used.

For existing supplies from groundwater for WUGs, RWPGs shall calculate the greatest annual amount of water available from an aquifer without violating the most restrictive physical and/or regulatory conditions, including infrastructure and limiting withdrawals under drought of record conditions. Regulatory conditions refer to limits on water withdrawals imposed by groundwater conservation districts.

Existing groundwater supplies shall not be set equal to demands just for convenience. If an existing groundwater supply (and underlying availability) is sufficient to meet a growing demand through 2070, the 2020 existing groundwater supply shall reflect the full 2070 existing supply if the infrastructure and rights to the water already exist in 2020 to meet 2070 demands. The allocation of available groundwater supplies as existing WUG supplies, however, may be adjusted to adhere to MAG limits or other limits as necessary.

3.7.1 Overdrafting[15]

TWDB staff will review IPPs and final RWPs to ensure that MAG annual volumes (groundwater availability) are not exceeded during any decade or for any discrete geographic-aquifer unit by existing supplies and/or WMS supplies. **WMSs that would require overdrafting shall not be included in a RWP.**

3.7.2 Permitting Uncertainty

In instances where more than a single WUG and/or WWP seek to include recommended groundwater based WMSs that, combined, would exceed the MAG volume and therefore will likely not both be

[14] 'Non-relevant aquifers' resulted in a number of MAG volumes that only address a portion of the associated Aquifer/Region/County/Basin split. As a result, the associated Aquifer/Region/County/Basin splits include one sub-portion that has a MAG and another sub-portion that does not have any MAG because the sub-portion of the Aquifer/Region/County/Basin split was considered a non-relevant aquifer by the GMA. To assist RWPGs, all of the associated MAG volumes that only cover a sub-portion of an Aquifer/Region/County/Basin split will be flagged in DB17. This means that the associated Aquifer/Region/County/Basin splits may or may not have an additional groundwater availability volume (as determined by the RWPG) associated with it.

[15] The term 'overdraft', as used in the regional water planning process, is a planning term, not a hydrologic term. It simply indicates that a project would rely on more water than was designated as 'available' for use by the RWPGs in the water plans; in this case, more than the annual MAG volumes. Availability is subject to change.

permitted by a GCD, RWPG(s) may not include these recommended WMSs simultaneously in the regional plan(s).[16]

4.0 Identification of Water Needs[17]

TWDB will perform an initial numerical calculation of water needs for each WUG based on projected demands and existing water supplies without implementation of any WMSs (WMSs). The resulting DB17 report shall be included, without modification, in the IPP and adopted RWP.

RWPs are based on decadal 'snapshots' (e.g. 2020, 2030). These snapshots represent conditions for that year and the subsequent years prior to the next decade (e.g. 2010 needs shall be assumed to carry through 2019). This also means that if a municipal water need is identified for the 2030 decade, a WMS would have to be developed and operating by the year 2030 if it was to meet that water need.

Water needs of individual WUGs may result from availability limits, infrastructure limitations, or legal limits. Identified, decadal water needs may arise within any planning decade for a variety of reasons including, but not limited to:

- water demands that exceed supplies in the first decade
- increases in water demands that eventually exceed existing water supplies;
- a foreseeable decline in existing water supply volumes over time for example, due to:
    - the anticipated loss of the use of water wells due to lowered water quality in that geographic area;
    - reservoir sedimentation;
    - the inability to reach available groundwater supplies using existing wells due to a declining water table; or
- unreliable existing water supplies for example, due to:
    - an intra-year monthly run-of-river water shortage that occurs, for example, only during summer months;
    - the inability to reach available surface water during drought due to an existing intake elevation or location in a reservoir;
- the inability to convey available water to a WUG
- a lack of capacity to treat the available water at the WUG.

Once conservation and direct reuse WMSs are identified and recommended by the RWPG, RWPGs are to notify TWDB staff. TWDB staff will then provide a second-tier water needs analysis to determine water needs that would remain if recommended conservation and direct reuse strategies were fully implemented. This second-tier needs analysis will provide additional information that RWPGs may consider when identifying and recommending water supply projects. These second-tier needs estimates may be considered when performing technical evaluations of WMSs including anticipated unit costs of water.

The resulting DB17 report for the second-tier needs analysis shall be included in the IPP and adopted RWP.

[16] Applies both intra-regionally and inter-regionally.

[17] Primarily related to 31 TAC §357.33

5.0 Water Management Strategies[18]

RWPGs shall identify and evaluate potentially feasible WMSs for each WUG and WWP where future water supply needs exist [as required by statute and administrative rules 31 TAC §357.34; 357.35]. A need for water is identified when existing water supplies are less than projected water demands for that same WUG within any planning decade. If no potentially feasible WMSs are identified or recommended the RWP shall document the reason.

As required by Texas Water Code 16.053(d)(5), the regional water plans shall consider, but not be limited to, the following potentially feasible water management strategies for all identified water needs:

- improved conservation;
- reuse;
- management of existing water supplies;
- conjunctive use;
- acquisition of available existing water supplies;
- development of new water supplies;
- developing regional water supply facilities or providing regional management of water supply facilities;
- voluntary transfer of water within the region using, but not limited to, regional water banks, sales, leases, options, subordination agreements, and financing agreements; and
- emergency transfer of water under Section 11.139.

The IPP and adopted regional water plan shall include:

a) the documented process used by the RWPG to identify potentially feasible WMS; and,

b) the list of all identified WMS that were considered potentially feasible for meeting a need in the region per 31 TAC 357.12(b). Potentially feasible WMSs shall include those listed above and **may also include, but is not limited to,** those listed in 31 TAC 357.34(c). An example template for documenting WMSs considered to meet needs is provided in Appendix 1.0 as Table E.

All potentially feasible WMSs must be evaluated in accordance with 31 TAC 357.34.

This information shall be included in Chapter 5 of the IPP and adopted regional water plan along with additional narrative description and other relevant materials and documentation associated with the RWPG's identification of potentially feasible WMSs considered for the region.

As necessary, RWPGs shall update or redevelop any previous WMS evaluations (e.g., developed for other RWPs) to: meet current rule and guidance requirements; reflect changed physical or socioeconomic conditions that have since occurred; reflect changes in water project configurations or conditions; consider newly identified WUGs or WWPs; or to accommodate changes in identified water needs.

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[18] Primarily related to 31 TAC §357.34 & 357.35

Existing water rights, water contracts, and option agreements shall be protected, although amendments to these may be recommended realizing that consent of owners would be needed for implementation. RWPGs shall also consider water loss audit information provided by TWDB [31 TAC §357.34(f)(2)(D)].

Water management strategy data shall be structured in a way that is compatible with DB17.

5.1 Evaluations

RWPGs shall evaluate WMSs based on criteria specified in 31 TAC §357.34 and 357.35 including water quantities generated by strategies, the reliability of strategies, financial costs, and environmental impacts.

For all WMS identified in the 2016 RWPs, RWPGs shall develop and/or update financial costs using the costing tool provided by TWDB. For remaining evaluation criteria, each RWPG shall determine the degree to which conditions have changed and update WMS evaluations accordingly. All evaluation criteria shall also be met for newly identified WMSs.

Water conservation strategies, drought management strategies, and WMS related to reducing water losses are to be considered~~evaluated~~ along with all other categories of WMSs.

When evaluating and recommending WMSs, each RWPG shall consider "active" water conservation as potentially feasible WMSs for WUGs for which the water conservation requirements contained in TWC §11.1271 apply and must consider active water conservation strategies for WUGs with needs. Active water conservation strategies are those that conserve water over and beyond what would happen anyway as result of "passive" water conservation measures that stem from federal and state legislation requiring more efficient plumbing fixtures in new building construction. If a RWPG does not adopt active water conservation strategies to meet needs, they shall document their reasons. If applicable, RWPGs shall determine the "highest practicable level" of water conservation and efficiency achievable (as existing conservation or proposed within a WMS) for each WUG that relies on a WMS involving an interbasin transfer to which TWC 11.085 applies.[19] Recommended conservation WMSs associated with this analysis shall be presented by WUG.

A separate subchapter (in accordance with 31 TAC §357.34(g)) shall consolidate and present conservation recommendations for the region.

RWPGs shall consider WMSs to address any issues identified in the information compiled by TWDB from the water loss audits performed by retail public utilities pursuant to 31 TAC §357.34(f)(2)(D).

RWPGs shall also consider drought management strategies for identified water needs, and whenever applicable, drought management strategies shall be consistent with guidance provided by the Texas Commission on Environmental Quality [TWC §11.1272]. Drought management strategies decrease water demand requirements. Strategies for drought management are similar to those for water conservation, although there are some basic differences. For example, water conservation and drought management strategies differ in their longevity. Water conservation strategies are generally implemented on a permanent basis, whereas drought management practices are implemented during times of severe drought or other emergencies that can limit water supplies. If a RWPG does not select drought management as a WMS, they shall document the reason.

[19] Each WMS analysis shall indicate whether the WMS will include an IBT under 11.085.

5.1.1 Quantity and Reliability

Water quantities produced by recommended surface and groundwater WMSs shall be based on water availability in accordance with Section 3.

Groundwater desalination project supply volumes shall be within the availability of the associated MAG volumes available in the project location.

WMS yields shall take into account:

- Senate Bill 3 environmental flow standards and associated TCEQ rules (e.g., flow set-asides) or, if there are no TCEQ environmental flow standards, other relevant limitations (e.g. pass-throughs required by the 1997 *Consensus Criteria for Environmental Flow Needs)*.
- Limitations associated with MAG volumes resulting from adopted Desired Future Conditions (DFCs).
- Other recommended WMSs[20] (e.g., two recommended WMSs shall not rely on the same water availability volume thereby becoming mutually exclusive with regard to their source water).
- Anticipated water losses associated with each strategy. Technical evaluations of WMSs shall present:
    a) total intake volumes at the supply source;
    b) total net volume delivered to the water users (e.g., WUGs) with the difference being water losses (e.g., due to conveyance losses); and
    c) the calculated percent water losses.
- Calculated unit costs shall be based on the net volume of water delivered at the WUGs.

If applicable, RWPs must provide a justification for including a~~A~~ recommended or alternative WMS that does not ~~is not associated with a~~ provide a firm, quantified increase to ~~firm~~ water supply volumes during a drought of record ~~shall not be included as a recommended or alternative WMS~~.

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5.1.2 Financial Costs

Cost evaluations for new and existing WMSs shall include capital costs, debt service, and annual operating and maintenance expenses over the planning horizon. TWDB is currently funding the development of a WMS costing tool that shall be used by RWPGs (see Section 5.1.2.1). Reported costs shall only include expenses associated with infrastructure needed to convey water from sources and treat water for end user requirements; however, reported costs shall not include expenses associated with internal distribution networks (e.g., beyond treatment plants and major transmission/conveyance facilities). RWPGs shall report capital costs and average annual operation and maintenance costs as separate items in the Regional Water Planning Data Web Interface (see the TWDB's "*Guidelines for Regional Water Planning Data Deliverables"* for further information).

Costs of WMSs shall be prepared and presented separately and discretely for each separate WMS and shall not be aggregated and presented as a single capital cost representing multiple projects that would actually be located in multiple locations and funded by separate sponsors. RWPGs shall not aggregate

[20] Does not necessarily apply to 'alternative' water management strategies since these would replace certain 'recommended' water management strategies.

multiple facilities into a single cost estimate and then allocate shares of the resulting total cost, for example, pro rata across several entities or locations.

Capital Costs

Capital costs consist of construction funds and other capital outlays including, but not limited to, costs for engineering, contingencies, financial, legal, administration, environmental permitting and mitigation, land, and interest during construction.

1) Construction costs, if applicable, shall be based on September 2013 price indices for commodities such as cement and steel as reported in the "*Engineering News Record (ENR) Construction Cost Index*" and shall include expected construction bid prices for the following types of infrastructure:
   - pump stations,
   - pipelines,
   - water intakes,
   - water treatment and storage facilities,
   - well fields;
   - relocation of existing infrastructure such as roads and utilities; and
   - any other significant construction costs identified by each RWPG.

2) Note that if construction cost estimates are available for some WMSs based on prior cost estimates that are more detailed than those provided by the costing tool provided by TWDB, these more detailed cost estimates may be updated by adjusting them based on the September 2013 price indices for commodities such as cement and steel as reported in the "*Engineering News Record (ENR) Construction Cost Index.*"

3) Interest during construction is based on total project costs drawn down at a constant rate per month during a construction period. Interest is the total interest accrued at the end of a construction period using a 4.0 percent annual interest rate less a 1.0 percent rate of return on investment of unspent funds.

If applicable, other capital costs include[21]:

4) engineering and feasibility studies , legal assistance, financing, bond counsel, and contingencies (engineering, contingencies, financial, and legal services may be lumped together and estimated as 30 percent of total construction costs for pipeline projects and 35 percent for other facilities unless more detailed project and/or site specific information is available);

5) permitting and mitigation activities including, but not limited to, those associated with:
   - Archeological/historic resources
   - Environmental analyses and biological assessments
   - Mitigation activities including: evaluation, land acquisition, implementation, monitoring, financial assurances, and adaptive management
   - Other permitting and mitigation costs

6) land purchase costs not associated with mitigation;

[21] These development costs may vary by project category based on the WMS costing tool being developed by TWDB.

7) easements costs (easement costs for pipelines shall include a permanent easement plus a temporary construction easement as well as rights to enter easements for maintenance); and,

8) purchases of water rights.

Note that costs and land areas associated with development of reservoirs, in particular, shall be broken out within the aforementioned costing items to show separate lines items for:

- the land area of the reservoir footprint (conservation pool only) alongside the estimated land purchase cost;
- mitigation land area and associated estimate of purchase cost; and,
- construction costs of embankment/dam facilities (separate from transmission facilities).

Debt Service

For WMSs other than reservoirs the length of debt service is 20 years unless otherwise justified. For reservoirs, the period is 40 years. Level debt service applies to all projects, and the annual interest rate for project financing is 5.5 percent. Terms of debt service shall be reported in the TWDB's Regional Water Planning Data Interface.

Annual Operating and Maintenance Costs

Operations and maintenance unit costs shall be based on the associated quantity of water supplied. Unless more accurate, project-specific data are accessible, RWPGs shall calculate annual operating and maintenance costs as 1.0 percent of total estimated construction cost for pipelines, 2.5 percent of estimated construction costs for pump stations, and 1.5 percent of estimated construction costs for dams. Costs shall include labor and materials required to maintain projects such as regular repair and/or replacement of equipment. Power costs shall be calculated on an annual basis using calculated horsepower input and a power purchase cost of $0.09 per kilowatt hour; however, each RWPG may adjust this figure based on local and regional conditions if they specify and document their reasons. RWPGs shall include costs of water if WMSs involve purchases of raw or treated water on an annual basis (e.g. leases of water rights).

Unit Costs of Water

RWP shall present the unit costs of the net volume of water anticipated to be delivered to water users (after water losses) in dollars per acre-foot. Unit costs of WMSs must be evaluated, compared, and presented in an 'apples-to-apples' manner. For example, RWPGs should not compare firm yield unit water costs of one reservoir to the safe yield unit water costs of another reservoir within the same river basin.

5.1.2.1 Costing Tool for Regional Water Planning

TWDB is currently developing a spreadsheet-based WMS costing tool that will become available for use by RWPGs in 2013. The spreadsheet-based costing tool will provide a broad set of historical costs linked to costing curves that will be utilized to develop costs for typical elements of water projects (e.g., pump stations, pipelines, and treatment plants). The tool will reflect the requirements of these guidelines and present output cost data accordingly. It is anticipated that the tool will be flexible with the ability to

incorporate local knowledge and some project specific data**. In the absence of more accurate and detailed, project-specific cost estimates, RWPGs shall utilize this costing tool for every cost estimate presented in the RWPs including updating cost estimates developed in the 2011 RWPs.**

5.1.2.2 Infrastructure/Costs to Include in Regional Water Plans

The WMS components that are included in RWPs shall be limited to the infrastructure and costs that are required to develop and convey increased water supplies from water supply sources and to treat the water for end WUG requirements. This may include treatment facilities at the WUG delivery point or treatment facilities at a point prior to transmission to the WUG, for example, at a wholesale water provider location. Costs shall also include conservation WMSs that have associated infrastructure or other costs (e.g., to address water loss; plumbing retrofits) or WMS needed to address infrastructure bottlenecks in an existing water supply conveyance system; the removal of which will increase the water supply volume delivered to a WUG.

The types of facilities and associated capital or other costs that ***shall*** be included in a RWP[22] are directly associated with development of new water sources, 'supplies' resulting from more efficient use of existing supplies (i.e., conservation), or volumetric increases to existing water supplies delivered to WUGs. Such strategies include but are not limited to:

- Facilities associated with a new water supply (e.g., new reservoir, new well field, intakes, pump stations).
- Facilities required to increase water supply from an existing water supply source (e.g., a new water transmission pipeline from an existing reservoir).
- Expansion of existing facilities to accommodate increased supply capacity to treat increased water supply for wholesale providers or WUGs (e.g. water treatment plant capacity expansion).
- Facilities associated with increasing overall water supply yields, for example, by blending new sources of water with existing water sources (e.g., conjunctive use).
- Expanded infrastructure required to fully utilize existing water rights/supplies (e.g. expansion of an undersized raw water intake or expansion of a water treatment plan).
- New facilities required to obtain water from an existing water source that may be changing (e.g., replacement of groundwater wells to obtain water from an existing groundwater supply in an aquifer that is being drawn down below existing wells).
- Infrastructure associated with water (raw or treated) supply transmission lines from wholesale water suppliers to WUGs.
- Water supply storage facilities associated with increasing water supply source yields (e.g., reservoirs, some ASR facilities).
- Costs associated with conservation WMSs that have capital or other costs. This shall include costs of plumbing retrofits or replacement of portions of an existing water transmission or supply distribution network that is the source of major water loss based on significant, measureable water losses. Replacement of such pipelines, however, must provide an immediate, quantifiable increase in water supply.
- Costs associated with the increased wastewater treatment requirements needed to provide additional reuse water supplies.

[22] RWPGs must report capital and O&M costs in the Regional Water Planning Data Web Interface (see the TWDB's "*Guidelines for Regional Water Planning Data Deliverables*" for further information).

- Costs of drought management strategies.[23]

5.1.2.3 Infrastructure/Costs That Shall Not be Included in Regional Water Plans

If an infrastructure component is not required to increase the treated water supply volume delivered to a WUG either as new supply or through demand reduction, the component and its costs shall not be included in the RWP. Types of items and associated cost that *shall not* be incorporated into a RWP included, but are not limited to:

- New facilities associated with internal distribution networks. (e.g., retail distribution within a WUG's system) and that do not convey additional water supply volumes to a WUG.
- Internal distribution facilities associated with reuse water.
- Wastewater collection systems associated with a direct reuse project.
- Water system improvements to address compliance issues related to water quality or water pressure.
- New wells that are required simply to replace aging wells (i.e., maintenance).
- Maintenance of, or upgrades to, existing equipment or facilities that do not directly increase volumetric water supply (e.g., for improving water treatment processes at existing water treatment plants; replacement of electrical systems; replacement of pumps; or installation of cathodic protection on existing facilities).
- Preventative measures to protect or maintain infrastructure against future water loss or degradation.
- Water storage facilities directly associated with retail water distribution networks.

5.1.3 Environmental Impacts and Limitations on WMSs

RWPGs shall evaluate and provide a quantitative reporting of how WMSs could affect environmental and cultural resources including impacts to environmental water needs, wildlife habitats, cultural resources, and the effects of upstream development on the bays, estuaries, and arms of the Gulf of Mexico. RWPGs shall develop and document an overall methodology for evaluating impacts; however, for environmental flows, and incorporating appropriate limitations on WMS yields, RWPGs must, in the following order:

- follow TCEQ environmental flows standards and associated rules;
  and in the absence of these flow standards,
- use site specific studies when available; and/or
- apply the 1997 "*Consensus Criteria for Environmental Flow Needs"*

to evaluate WMSs involving surface water development and those requiring permits from the Texas Commission on Environmental Quality, including associated limitations to firm yield associated with releases or pass-throughs based on these criteria.

The 1997 consensus criteria were developed through extensive collaboration among scientists and engineers from the state's natural resource agencies including TWDB, the Texas Parks and Wildlife Department, and the Texas Commission on Environmental Quality, as well as academic professionals, engineering consultants, and informed members of the public. More specifically, the criteria are multi-

[23] Estimated costs of probable economic impacts due to drought management strategy implementation may be presented for WMS evaluation and comparison purposes within technical analyses but shall~~hould~~ not be included in water plans as a capital~~financial~~ cost of the plan. The costing tool being developed by TWDB will include a drought management strategy component that may be used to estimate economic impacts associated with demand reductions for the purpose of comparing to costs of WMSs.

stage rules for environmentally safe operation of impoundments and diversions during above normal flow conditions, below normal flow conditions, and during drought of record conditions. Documentation describing the methodology and its application is available in Appendix 2.0.

5.1.4 Allocating WMS Supplies

Sources (including WMSs which will be treated similarly to sources in DB17) will have an availability (future) that will be the full yield of the project. This future availability shall be allocated in accordance with the following:

a) may be fully allocated to the WWP/WUG and then its customers; or,
b) may not be fully allocated and left associated with the WMS project or source only; or,
c) it may be allocated to the WWP only, with no customer WUGs relying on it.

5.1.5 Recommended and Alternative Water Management Strategies

RWPs shall include in the RWP Executive Summary the *TWDB DB17 Recommended Water Management Strategy*[24] report which shall list the **recommended** WMSs that are included in the IPP and adopted RWP. The TWDB-generated report shall be included in a single table within the RWP. It shall include each strategy name, an expected implementation date, the total yield of the strategy[25] on a decadal basis, and the capital costs of the WMS.

RWPs shall include in the RWP Executive Summary the *TWDB DB17 Alternative Water Management Strategy* report which shall list **evaluated alternative** WMSs that are included in the IPP and adopted RWP. The TWDB-generated report shall be included in a single table within the RWP. It shall include each strategy name, an expected implementation date, the total yield of the strategy[26] on a decadal basis, and the capital costs of the WMS. All alternative WMSs shall be evaluated based on criteria specified in 31 TAC §357.34 & §357.35. Technical evaluations of each alternative management strategies must have a generally defined delivery point for the water.

After RWP adoption, RWPGs may substitute an evaluated alternative WMS for a strategy previously recommended, if the previously recommended strategy is no longer feasible**.**

5.2 Management Supply Factor

The IPP and adopted RWP shall include a TWDB-provided table that presents the calculated decimal 'management supply factors' for each decade and for each WUG and WWP as follows:

[total volume of: existing water supply + recommended WMSs supply associated with WUG or WWP] /
[total identified water demand to be met by both the existing supply + recommended WMSs) for WUG or WWP]

For example, all existing water supplies + all supplies from recommended WMSs to be provided to a WUG are divided by the WUG water demand that would be met with these supplies. If existing water

[24] All '*TWDB DB17…*' reports are based on data entered by RWPGs into the database. These reports will be provided by TWDB through DB17 web interface as a customizable report that can be downloaded by RWPGs and must be included as part of every Technical Memorandum, IPP and adopted RWP.
[25] See *Guidelines for Regional Water Planning Data Deliverables*
[26] See *Guidelines for Regional Water Planning Data Deliverables*

supplies + all recommended WMSs supplies would provide 11,000 acre-ft/yr of supply to a WUG with 10,000 acre-ft/yr in water demands, the factor would be '1.1' (i.e., 11,000/10,000).

WUGs with unmet needs, for example associated with irrigation demands, will result in management supply factors less than 1.0.

Management supply factors of all WWPs shall be presented individually, by decade. WUGs may be grouped by category and similar management supply factors in a summary format when appropriate. If the management supply factor was predetermined by the RWPG, the underlying basis for this magnitude of the management supply factor shall be explained in the RWP and may be summarized within the management supply factor table.

To address uncertainty in the planning and project implementation process over the current planning horizon and/or to address potential water needs beyond the planning horizon, RWPGs may incorporate a predetermined water management supply factor (e.g., beyond just meeting identified water needs) for WUGs and WWPs when developing the RWP.

Management supply factors may be used to take into account uncertainties associated with:

- projections of populations;
- projections of water demands;
- climate variability;
- yield of recommended WMSs;
- permitting or other uncertainties impacting implementation of projects; and/or
- other uncertainties.

The RWPG may choose to predetermine appropriate management supply factors as the basis for recommending WMSs that, together, provide water volumes in excess of the identified water needs. RWPGs shall provide an explanation for any predetermined management supply factors and may present these factors based, for example, on sizes of water users, types of water uses, types of WMSs, or any other factors the RWPG considers relevant at the project or water user level.

If a RWPG chooses not to predetermine or standardize management supply factors, the management supply factors will simply be reported in the RWP based on the recommended WMSs.

5.3 Water Conservation Recommendations

A separate subchapter (in accordance with TAC §357.34(g)) shall consolidate and present conservation recommendations that may include considerations of Best Management Practices appropriate for the region. Model water conservation plans may be referenced, instead of included in hard copy, in this subchapter, for example, using internet links.

If applicable, the subchapter must summarize reasons that conservation WMSs were not recommended for WUGs that had identified water needs.

6.0 Impacts of the Regional Water Plan[27]

RWPGs shall describe anticipated various impacts of the RWP including potential impacts on navigation and the socioeconomic impacts of not meeting needs.

6.1 Impacts of Water Management Strategies on Key Water Quality Parameters in the State and Impacts of Moving Water from Agricultural and Rural Areas

Each RWPG shall describe how implementing recommended and alternative WMSs could affect key parameters of water quality in Texas. RWPGs should base water quality impacts on parameters important to water uses in each region. RWPGs shall also discuss how WMSs could have long-term affects on: 1) agricultural resources including analyses of third-party impacts of moving water from rural and agricultural areas; 2) water resources of the state including groundwater and surface water inter-relationships; and 3) other factors deemed relevant by RWPGs such as recreational impacts. Furthermore, RWPGs should consider statutory provisions regarding interbasin transfers of surface water [TWC §11.085]. At minimum, considerations should include a summation of water needs in basins of origin and receiving basins based on water needs in approved regional plans.

6.2 Descriptions of how Regional Water Plans are Consistent with the Long-term Protection of the State's Water, Agricultural, and Natural Resources

RWPGs shall describe how RWPs are consistent with the long-term protection of Texas' water, agricultural, and natural resources including the requirement that planning analyses and recommendations honor all existing water rights and contracts. Although much of the analysis pertaining to this requirement shall be developed for other tasks, including tasks associated with estimating the environmental and water quality impacts of WMSs, RWPGs are encouraged to identify the specific resources important to their RWPAs and describe how these resources are protected through the regional water planning process.

7.0 Drought Response Information, Activities, and Recommendations[28]

This chapter of the RWP shall consolidate existing information on droughts of record and drought preparations in the region and present a variety of recommendations developed by the RWPG.

7.1 Descriptions of Current Preparations for Drought in the Region

The RWP shall consolidate and present:

1) an overall assessment of current drought preparations and planned responses to drought conditions in the region (this may include information from local drought contingency plans);
2) summary of the current triggers used for initiating drought responses in the region; and

[27] Primarily related to 31 TAC §357.40
[28] Primarily related to 31 TAC §357.42

3) description of how water suppliers in the region both a) identify and b) respond to the onset of drought including the role of drought contingency plans.

7.2 Drought(s) of Record

The RWP shall present and summarize information regarding the current drought(s) of record for the region and any other relevant sub-regional or basin-specific drought of record periods that impact the existing RWPA water supplies. This summary may include relevant sub-regional, basin-based, and or sub-basin droughts of record.

The RWP may present information supporting recognition of potential new droughts of record for the region or a sub-region and or for individual river basins that impact the RWPA water supplies.

7.3 Existing and Potential Emergency Interconnects[29]

RWPGs shall collect and summarize information on existing major water infrastructure facilities that may be used for emergency interconnects and provide this information to the EA confidentially and separately from the RWP document.

This information may be collected in a tabular format that shows the potential user(s) of the interconnect, the potential supplier(s), the estimated potential volume of supply that could be provided via the interconnect (including the source name), and a general description of the facility/infrastructure and its location.

7.4 RWPG Recommendations Regarding Triggers & Actions to be Taken In Drought[30]

RWPGs shall develop and present drought response recommendations for existing surface water and groundwater sources on which the region relies. This includes the RWPG developing recommendations for both drought triggers and responses for each water source on which the region relies. The RWPG shall identify and recommend actions to be taken as part of the drought response by:

1) the manager of each water source; and
2) the entities relying on each source.

The RWPG shall make recommendations regarding the number of drought stages and degrees of water use reduction that should be considered by users and providers. RWPGs may consider existing triggers and actions when developing its recommendations.

In general, RWPGs should consider multiple drought response stages but, at a minimum, RWPGs shall develop and recommend two distinct sets of triggers and drought stages for a) 'severe' and b) 'critical/emergency' conditions. See Appendix 1.0, Table A for an example format.[31]

Note that drought triggers and responses for multiple minor water supplies (e.g., small run-of-river water rights) may be aggregated in the table based on their association with a common water source and/or use (e.g., irrigation), if appropriate.

[29] Per 31 TAC §357.42(d)
[30] Primarily related to 31 TAC §357.42(c)
[31] May be incorporated into DB17 if sufficient TWDB resources are available.

7.5 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply[32]

The RWPGs shall evaluate potential emergency responses to local drought conditions or loss of existing water supplies. These shall include temporary responses that may or may not require some temporary and/or permanent infrastructure (e.g., surface-laid pipes; wells). For the purpose of this analysis, it shall be assumed that the entities being evaluated have approximately 180 days or less of remaining water supply.

The analysis shall be a limited, high-level review to serve as a general indicator of the universe of potential options, or lack thereof, for each municipal entity evaluated. The results are to provide basic guidepost 'arrows' indicating potential solutions that might be considered in the event of local emergency. The information may reveal municipal water users that are most vulnerable in the event of a loss of supply. These screening-level evaluations do not require technical analyses or evaluations in accordance with 31 TAC §357.34 and §357.35 (WMS evaluation criteria).

RWPGs shall evaluate, at a minimum, all municipal WUGs in the region that:

1) have 2010 populations less than 7,500 and rely on a sole source for its existing water supply regardless of whether that water is provided by a WWP; and
2) all county-other WUGs, regardless of population or number of sources.

See Appendix 1.0, Table B for an example format.[33]

7.6 Other Drought-Related Considerations and RWPG Recommendations

The RWP shall present:

1) all drought management WMSs that were:
    a. considered and/or evaluated as potentially feasible (including those not recommended);
    b. included in the RWP as alternative WMSs; and
    c. recommended in the RWP (including the associated triggers for implementing each WMS).
2) any other drought management measures or activities that were considered and/or recommended by the RWPG;
3) recommendations developed by the RWPG regarding the State's Drought Preparedness Council and/or State Drought Preparedness Plan;
4) recommendations developed by the RWPG regarding development of, content of and implementation of drought contingency plans in the region;
5) recommendations developed by the RWPG regarding actions to be considered by water providers in the event of drought; and
6) any other general recommendations regarding drought management in the region or state.

7.7 Development of Region-Specific Model Drought Contingency Plans

The RWPGs shall develop region-specific model drought contingency plans that shall be presented in the RWP. Model plans shall be consistent with 30 TAC Chapter 288 requirements. Model plans may be prepared based, for example, on user categories, user sizes, and/or types of water source. At a minimum, model plans shall address triggers for and responses to 'severe' and 'critical/emergency' drought conditions.

[32] Primarily related to 31 TAC §357.42(g)
[33] May be incorporated into DB17 if sufficient TWDB resources are available.

8.0 Unique Stream Segments and Reservoir Sites and Other Recommendations

8.1 Unique Stream Segments

RWPGs may recommend all or parts of river and stream segments in their respective regions as having "unique ecological values." To recommend this designation, RWPGs must justify it based on the following criteria:

- biological function measured as stream segments displaying significant habitat value including both quantity and quality considering degrees of biodiversity, age, and uniqueness including terrestrial, wetland, aquatic, or estuarine habitats;

- hydrologic function measured as stream segments fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;

- riparian conservation areas measured as stream segments fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments fringed by other areas managed for conservation purposes under governmentally approved conservation plans;

- high water quality, exceptional aquatic life, high aesthetic value and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or

- threatened or endangered species and unique communities defined as sites along streams where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species, and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.

RWPGs seeking a designation shall forward a recommendation package to the Texas Parks and Wildlife Department, who will in turn provide a written evaluation of the proposal within 30 days. Packages shall contain a description of a site's location along with maps, photographs, and documentation with supporting literature and data that characterizes a site's unique ecological value addressing criteria in 31 TAC 357.43(b). Adopted RWPs shall include, if available, the Texas Parks and Wildlife Department's written evaluation.

If the Texas Legislature designates a stream or river segment as unique; or if a RWPG recommends that a stream or river segment be classified as unique, each RWPG must quantitatively assess how recommended WMSs in a RWP would affect flows deemed important (by RWPGs) to the stream or river segment in question. Furthermore, assessments shall describe how a RWP would affect the unique features and criteria cited by a region as the impetus for a legislative designation.

8.2 Unique Reservoir Sites

RWPGs may recommend sites for reservoir construction that have "unique value" by including a description of the site, reasons for the unique designation and expected beneficiaries of water supplies developed at a given site. The following criteria shall be used to determine if a site is unique:

- site specific reservoir development is recommended as a specific WMS or as a unique reservoir site in an adopted RWP; or
- factors such as location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics make a site uniquely suited for either reservoir development to provide water supply for the current planning period; or where it might reasonably be needed to meet water needs beyond the 50-year planning period.

8.3 Other Legislative Recommendations

RWPGs may develop and include in the RWP regulatory, administrative, or legislative recommendations that will facilitate the orderly development, management, and conservation of water resources in Texas, and will facilitate more voluntary water transfers and help the state prepare for and respond to droughts. In addition, they may develop information regarding the potential impacts of recommendations enacted into law once proposed changes are in effect.

9.0 Reporting of Financing Mechanisms for Water Management Strategies

RWPGs shall assess how local governments, regional authorities, and other political subdivisions would finance the implementation of WMSs via an online survey administered by TWDB and performed by each RWPG. TWDB will develop a survey instrument and methodology. Each RWPG shall conduct a survey and report findings to TWDB. The approach will be similar to how the infrastructure financing survey was conducted during the 2011 Regional Water Planning cycle. TWDB will provide additional instructions and documentation describing the survey methodology and formats for reporting resulting data.

10.0 Adoption of Plan and Public Participation

RWPGs shall adopt RWPs and allow for public participation in the RWP adoption process in accordance with administrative rules, the Contract, statute and the RWPG bylaws. Please see the latest TWDB "***Regional Water Planning Public Notice Quick-Reference***" document for a summary of notification requirements.

11.0 Implementation and Comparison to the Previous Regional Water Plan

11.1 Implementation of Previous Regional Water Plan

As a result of new statutory requirements from SB660 (82nd Legislative Session) the planning rules (31 TAC §357.45(a)) require that each Region report the level of implementation of previously recommended WMSs meeting needs. The content of this newly required section in the plans shall be largely supported by data summaries based on information provided by RWPGs through DB17 during the previous planning cycle.

RWPG members are strongly encouraged to directly participate in eliciting and gathering responses regarding implementation of projects that are associated with category of entities that they represent on the RWPG.

11.1.1 Implementation Survey Process

Information needed to report on implementation of the previous RWP shall be collected through a survey tool provided by TWDB. The survey shall be conducted through an online service at TWDB, similar to the survey instrument to be provided under Section 9.0 of this guidance document. The implementation survey instrument shall be provided to the regional water planning consultants prior to the IPP submission. As in the process of reporting on Financing under Section 9.0 of this guidance document, TWDB will provide a survey instrument and the RWPGs and their technical consultants shall be ultimately responsible for contacting the project sponsors and filling in the data.

Reports may be created from that data and shall be used by the RWPGs in preparing that section of their IPP and final RWP.

An additional data collection/verification step will be included in DB17 asking if recommended WMSs were formerly included in DB12.

Additional methods that RWPGs may consider using to identify projects that may potentially have been implemented may include:

1. Tracking changes since the last plan including:
    - Changes in existing WUG or WWP supplies (e.g., water provider reporting a previously recommended WMS as an existing supply in the 2016 RWP)
    - Identify WMSs that are not recommended in latest plan, possibly due to implementation.
2. Use TWDB funding records to identify projects (WIF, State Participation, DWSRF, EDAP etc.)
3. Conservation implementation reports submitted to TWDB (i.e., conservation volumes are higher from previous report)

11.1.2 Survey Content and Data Format

Appendix 1.0, Table C includes the data categories that will be included in the survey. The table headers represent questions that would be asked. The pre-defined answer options to each of the questions are listed below each header. For those questions without pre-defined answer options, the table is blank.

TWDB will also pre-populate some of the fields in the survey using data from DB12. Those fields of Table C are in grey.

Because of the large number of strategies that have been recommended in the plans, and the reasonable expectation that the majority of them will not have been implemented, default answers for each of the survey questions will be set so that no edits will be required for the majority of the projects. Those default options listed in Table C are underlined. For example, under the question 'What level of Implementation has the project achieved?' the answer 'not implemented' will be set as a default to minimize the effort required.

11.2 Comparison to Previous Regional Water Plan

The RWP shall include a brief summary that shows how the 2016 RWP differs from the previous RWP. Comparisons shall include summary tables and other graphics, as appropriate, that concisely convey the changes between plans. The RWP shall provide comparisons of the two RWPs regarding:

1. Water demand projections;
2. Drought of record and the hydrologic and modeling assumptions on which the plans are based;
3. Water availability at the sources;
4. Existing water supplies of WUGs;
5. WUG and WWP needs;
6. Recommended and alternative WMSs; and
7. Any other aspects of the plans that the RWPG chooses to compare.

The comparison shall include a brief explanation of the underlying reasons for the changes that occurred regarding each of the above categories.

12.0 Deliverables

12.1 Written Reports

RWPGs must prepare and submit a Technical Memorandum, an Initially Prepared Plan (IPP), and an adopted RWP.

12.1.1 Technical Memorandum

To be considered administratively complete, the **Technical Memorandum** shall include[34]:

A. the *TWDB DB17 Population Projection and Water Demand* reports (presenting population and water demand projections by WUG, county, and river basin).
B. the *TWDB DB17 Water Availability* report (presenting water availability by source).
C. the *TWDB DB17 Existing Water Supplies* report (presenting existing water supplies by WUG, county, and river basin).
D. the *TWDB DB17 Identified Water Need* report (presenting identified water needs by WUG, county, and river basin).

[34] Draft examples of some of these tables are shown in Appendix 1.0.

E. the *TWDB DB17 Source Water Balance* report **with the condition that the total has to be zero or greater than zero** (except for those sources that are thereby revealed in IPPs as potentially overallocated and create potential interregional conflicts); and
F. a single tabular list of all potentially feasible WMSs identified by the RWPG to date.
G. information regarding the versions and dates of all WAM models and runs used in determining surface water availability.

12.1.2 Contents of Regional Water Plan Documents

The chapters and subchapters of the RWP shall be organized in accordance with 30 TAC §357.22(b). Table 1 of this guidance document provides the outline with chapter numbers that shall be followed by each RWP. RWPGs shall update, rewrite, replace, reorganize and/or augment, as appropriate, any content from the 2011 RWPs that is used in developing the 2016 RWP to include new information and analyses conducted as part of the current planning cycle and in response to changed conditions and in accordance with new planning rules, Contract scope of work, and updated guidance documents.

INITIALLY PREPARED PLAN AND ADOPTED REGIONAL WATER PLAN:

To be considered administratively complete, both **the Initially Prepared Plans** (IPPs) and **adopted RWPs** shall include:

1) an executive summary documenting key findings and recommendations that a) does not exceed 30 pages and b) includes the *TWDB DB17* ***Recommended Water Management Strategy - Summary***[35] report presenting a summary table with all recommended WMSs including the strategy names, total yield of the WMS[36] for all decades, total capital costs, and the estimated unit water costs in the initial and last planning decade of implementation;
2) a technical report containing chapters in accordance with TAC §357.22(b) presenting the work and results of each planning task summarized in this document and according to the planning rules;
3) a single tabular list of all potentially feasible WMSs identified by the RWPG; and
~~3~~4) a set of GIS compatible data constituting a geodatabase of the locations of every recommended WMS that has a capital cost (e.g., with representative locations of both intakes and delivery points of proposed pipelines). This may include approximate locations and simplified representations as necessary and should be delivered as a self-contained package with metadata (e.g., as an ESRI Map Package).

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To be considered administratively complete, both the **Initially Prepared Plans** (IPPs) and **adopted RWPs** shall also include, without modification, the following reports[37] listed in Table 2:

[35] Should also be included in Chapter 4.
[36] See *Guidelines for Regional Water Planning Data Deliverables*
[37] ~~Draft examples of a portion of these tables are shown in Appendix 1.0~~Subject to agency resources and changes.

Table 2 – Required Regional Water Planning Application (DB17) Reports

Number	DB17 Report Name[A]	Summary of Report Content	31 TAC rule met by report	Technical Memo	Minimum Location in IPP and RWP[B]			Entities Included		'Entity' Level	
					Executive Summary	Chapter Body	Hard Copy Appendix	WWPs	WUGs	County-Basin Splits	Full Entities
1	Population Projections	population projections by WUG, county, and river basin.	357.31(a)	x			x		x	x	
2	Water Demands	population and water demand projections by WWP and WUG, county, and river basin to include separate information on water supply commitments to other entities.	357.31(a)	x			x	x	x	x	x
2	Population Projection and Water Demand - Summary	population and water demand projections by WUG category.		x	x						
3	Water Availability	water availability by source and location.	357.32(a)(1);(g)	x			x			x	
4	Existing Water Supplies	existing water supplies by WUG, county, and river basin.	357.32(a)(1);(g)	x			x	x	x	x	
5	Existing Water Supplies - Summary	existing water supplies by WUG category by decade.		x	x						
6	Categories of water use for WWPs considering counties and basins	WWP water demands by county and basin.	357.31(b)				x			x	
7	Identified Water Needs/Surpluses	identified water needs and or surpluses by WUG and WWP, county, and river basin.	357.33(b);(d)	x			x	x	x	x	x

8	Identified Water Need - Summary	identified water needs by WUG category by decade.		x	x						
9	Second-Tier Identified Water Need	identified water needs by: WWP; and WUG, county, and river basin after implementation of conservation and direct reuse strategies.	357.33(e)				x	x	x		
10	Second-Tier Identified Water Need - Summary	identified water needs by WUG category and decade after implementation of conservation and direct reuse strategies.			x						
11	Source Water Balance report	presenting total water use from each source. Must show no over allocation of source availability (except for those sources that are thereby revealed in IPPs as potentially overallocated and thereby creating potential interregional conflicts).		x	x					x	
12	Unmet Needs	report presenting all unmet needs by WUG.	357.40(c)			x		x	x	x	x
13	Unmet Needs-Summary	presenting all unmet needs by category and decade including a list enumerating each municipal WUG, if any, with unmet needs.			x						
14	Recommended Water Management Strategy WUG	presenting a table with all recommended water management strategies for each WUG; including the strategy names, total yield of the WMS for all decades and total capital costs.	357.35(g)(1)				x		x		x
15	Recommended Water Management Strategy WWP	presenting a table with all recommended water management strategies to be implemented by each WWP; including the strategy names, total yield of the WMS for all decades and total capital costs.	357.35(g)(1)			x		x			
16	Recommended Water Management Strategy - Roll-Up Summary	presenting a rolled-up table with all recommended water management strategies for each WUG; including the strategy names, total yield of the WMS for all decades and total capital costs; Similar to Appx A.2 of the 2012 State Water Plan.			x	x	x				

17	Recommended Water Management Strategy User Summary	presenting project type, water source, Seller, and WUG users for each recommended WMS.					x		x		x
18	Alternative Water Management Strategy - Summary	presenting a table with all included alternative water management strategies presenting the same data as in the recommended water management strategy summary report.	357.35(g)(3)		x						
19	Management Supply Factor	for each WUG and WWP as described in Section 5.2 of this document.	357.35(g)(2)				x	x	x		x
20	Recommended Water Management Strategy – Project Water Association (WMS-tier analysis)	WMS-tier analysis) report presenting how WMSs relate to each other.					x				
21	Potentially Impacted Population	presenting populations that could benefit from each recommended WMS.					x				x
22	Summary of WMS Users by WMS	presenting the WMS Projects and the associated Sources and WUGs;					x	x	x		x
23	Summary of WMS Users by Source	presenting Sources used by WMSs and associated WUGs by source.					x	x	x	x	
24	Summary of WMSs Implementation	based on data collected by RWPGs.	357.45(a)			x					

Note A: Availability subject to agency resources

Note B: Reports shall be included in the plan accordingly but may be included earlier in the plan documents if preferred. Reports shall not be included later in the document than indicated.

Additional documentation in the RWP shall include, but not be limited to:

~~4)~~5) links to model water conservation plans pursuant to [TWC §11.1271];

~~5)~~6) Region-specific model drought contingency plans developed by RWPG per TAC §357.42(j) and in accordance with [TWC §11.1272];

~~6)~~7) water loss audit summary;

~~7)~~8) Table of drought triggers and response developed by the RWPG per Section 7.4;[38]

~~8)~~9) WUG emergency water supply screening Table per Section 7.5:[39]

~~9)~~10) electronic appendices with WAM and GAM input files per Section 12.2.1

~~10)~~11) summaries of written and oral comments from the public during the RWP adoption process with responses by RWPG explaining how plans were revised or why changes were not warranted;[40]

~~11)~~12) copies of written agency comments on the IPP with responses by the RWPG explaining how RWP was revised or why changes were no warranted;[41]

~~12)~~13) any other appendices deemed appropriate by RWPGs; and

~~13)~~14) if sufficient agency resources are available during this cycle, TWDB may provide a schematic map of each region's recommended WMSs for illustrative purposes. The map will be developed based on the data provided by the RWPG through DB17. If provided by TWDB, RWPGs will be required to review and confirm the map contents and include a fold-out, 11x17 color version of this map as part of the final, adopted RWPs.

A RWP that is missing any one of the required elements shall be considered administratively incomplete and shall not be reviewed until missing content is provided to TWDB. Amendments to adopted and approved RWPs shall contain these same elements to the extent that they apply to the scope of the RWP amendment.

12.1.3 Rounding of Numbers in the Regional Water Plan

Only whole numbers shall be presented in the RWPs and DB17.

Cumulative rounding errors shall not exceed 1.0 in any single number presented or in any total presented in the plan, for example, when multiple values, each with an underlying error, are presented within a table.

Individual and cumulative data values in reports produced from DB17 shall supersede all other data presented in RWPs for purposes of state water plan~~RWP~~ development.

12.2 Regional Water Planning Data Provision and Data Reporting

12.2.1 Electronic Appendices

Each draft RWP (IPP) and final, adopted RWP shall include the following electronic appendices that will only be included in the PDF version of the RWP (hard copies of the plans do not need to include these):

i. Print out (within the PDF) of the full WAM input files used in developing the surface water availabilities used in the development of the RWP – to include a cover page with the date(s) of the model run(s).

[38] May be incorporated into DB17 if sufficient TWDB resources are available.
[39] May be incorporated into DB17 if sufficient TWDB resources are available.
[40] Included in adopted RWP only
[41] Included in adopted RWP only

ii. Print out (within the PDF) of the full GAM input files used in developing any non-MAG groundwater availabilities used in the RWP - to include a cover page with the date(s) of the model run(s).

12.2.2 Regional Water Planning Application (DB17)

The TWDB Regional Water Planning Application (DB17) shall become more integral in this fourth regional water planning cycle by synthesizing regions' data and providing summary reports that shall be incorporated into each IPP and RWP.

RWPGs shall complete and submit via the DB17 interface all data generated or updated during the current cycle of planning to TWDB in accordance with TWDB specifications *prior to* submitting Technical Memorandums and IPPs. **Deadlines for the entry of categories of data (e.g. existing water supplies) by RWPGs are to be determined by TWDB as part of the contract documentation. These deadlines are necessary to allow sufficient time for TWDB to vet data and to then generate the TWDB DB17 reports that shall be included in RWPG deliverable reports.** Data shall be entered through the TWDB's Regional Water Planning Data Web Interface at:
http://www.twdb.state.tx.us/apps/apm/default.aspx
Specifications regarding data requirements, format, calculation, and composition are available on TWDB's website. [42]

Data entered by RWPGs into DB17 and RWPs shall be rounded to the nearest whole number to avoid cumulative data errors. In any and all instances where numbers in the RWP text and tables do not match DB17, the data in DB17 shall take precedence for the purpose of summarizing RWPs and preparation of the state water plan.

In compliance with Texas Administrative Code Chapters 206 and 213 (related to Accessibility and Usability of State Web Sites), the digital copy of the final report shall comply with the requirements and standards specified in statute.

13.0 Developing the Scope of Work for Task 4D

This section describes, in general, the process by which RWPGs shall develop and submit Scopes of Work (SOW) in order to obtain EA 'notice-to-proceed' authorization to expend funds associated with Task 4D. Each of the 16 regional water planning contracts includes a 'notice-to-proceed' requirement for Task 4D that will include a funding allocation but no associated written SOW.

Before RWPGs may proceed on Task 4D work they shall first provide a proposed SOW for the budget that has been allocated to the RWPG under the Contract.

The process to obtain a 'notice-to-proceed' is as follows:

- RWPGs shall develop and approve its proposed 4D SOW in the format shown in Appendix 1.0, Table D. The SOW will include a description of how the associated Task 4D funds would specifically be spent, based on a work description.

[42] See *Guidelines for Regional Water Planning Data Deliverables*

- **As part of the SOW submittal, the RWPG shall report the date that the RWPG provided its overall method for identifying potentially feasible WMSs to the public for comment and approved the method.**
- The proposed SOW and an associated budget breakdown shall be presented in logical increments that allows TWDB staff to evaluate the SOW and associated work effort.
- TWDB will then review the SOW and associated budget breakdown. TWDB staff may request that the SOW subtasks and associated budgets be further broken down and or clarified.
- Once sufficient information is provided to TWDB staff on the proposed SOW, the final SOW and budget will be negotiated, as appropriate.
- If approved by the EA, TWDB will issue a written notice-to-proceed for the final SOW and associated share of the 4D funds and amend the approved final SOW into the existing Contract. Unless adequate justification is provided, some 4D funds may not receive a notice-to-proceed.

RWPGs may submit proposed SOWs and budget breakdowns for Task 4D in multiple stages which would require more than one TWDB review and more than one Contract amendment.

There are no guarantees that all funds allocated to a RWPG shall be expended. All budgets and expenditures under Task 4D must be eligible and justified in an approved SOW (for notice-to-proceed) and documented adequately before reimbursement.

APPENDIX 1.0

Table A – Template for Drought Triggers and Action Recommendations

SOURCE NAME	TYPE (sw/gw)	Factor to be considered	SPECIFIC TRIGGERS						SPECIFIC ACTIONS					
			SOURCE MANAGER			USERS (e.g. WUGs)			SOURCE MANAGER			USERS (e.g. WUGs)		
			tbd	'severe'	'critical/ emergency'	tbd	'severe'	'critical/ emergency'	tbd	'severe'	'critical/ emergency'	tbd	'severe'	'critical/ emergency'

Table B – Template for Screening Potential Emergency Supplies

Entity				Potential Emergency Water Supply Source(s)										Implementation Requirements				
Water User Group Name	County	2020 Population	2020 Demand (AF/year)	Release from upstream reservoir	curtailment of upstream/downstream water rights	local groundwater well	brackish groundwater limited treatment	brackish groundwater desalination	emergency interconnect	other named local supply	trucked-in water	*(other)*	*(other)*	Type of infrastructure required	Entity providing supply	Other local entities required to participate/ coordinate	Emergency agreements/ arrangements already in place?	other

Table C - Data Categories and Potential Responses Collected by Survey

Region*	County*	Entity(ies)*	DB12 WMS Name*	Source(s)*	Project Type (DB12)*	Project Description	Project Type	Infrastructure Type
A	ANDERSON				Aquifer Storage and Recovery		Conjunctive Water Use	Pipeline
B	ANDREWS				Brush Control		Conservation - Municipal	Canal
C	ANGELINA				Conservation		Conservation - Irrigation	Water Treatment Plant
D	ARANSAS				Drought Management		Conservation - Other	Impoundment
E	ARCHER				Existing Sources/Expanded Use		Desalination - Seawater	Wells
H	ARMSTRONG				New Surface or Groundwater		Desalination - Brackish GW	Other
I	ATASCOSA				Reuse		Other - Aquifer Storage and Recovery	No Infrastructure
J	AUSTIN				Weather Modification		Other - Brush Control	
K	BAILEY						Other - Drought Management	
L	BANDERA						Other - Precipitation/Rainfall Harvesting	
M	BASTROP						Other - Weather Modification	
N	BAYLOR						Reuse - Direct	
O	BEE						Reuse - Indirect	
P	BELL						SW/GW - Diversions or Conveyance from Existing Surface Water Supply	
	BEXAR						SW/GW - New Contracts or Water Rights	
	BLANCO						SW/GW - New Reservoir	
	BORDEN						SW/GW - New Wells	
	BOSQUE						SW/GW - Other Groundwater	
	BOWIE						SW/GW - Other Surface Water	
	BRAZORIA						Conjunctive Use	
	BRAZOS							
	BREWSTER							

*Fields pre-populated by TWDB from DB12

Table C - Data Categories and Potential Responses Collected by Survey (cont.)

At what level of Implementation is the project?	If not, why?	Initial Volume of water provided (acft/yr)	Funds Expended to Date ($)	Project Cost** ($)	Year the Project is Online?	Is this a phased project?	(Phased) Ultimate Volume (acft/yr)	(Phased)Ultimate Project Cost ($)	Year project reaches maximum capacity?	What is the project funding source(s)?	Included in 2016 Plan
Not Implemented	Too soon				2011	Yes			2011	Self (Cash)	Yes
	Financing				2012	No			2012	Local	No
Sponsor has Taken Official Action to Initiate Project	Permit constraints				2013				2013	County	
Feasibility Study Ongoing	Environ. obstacles				2014				2014	TWDB	
Permit Application Submitted/Pending	Other				2015				2015		
					2016				2016	State - Other	
Acquisition and Design Phase									2017		
									2018	Federal - EPA	
Under Construction									2019		
									2020	Federal - USDA	
Currently Operating									2025		
									2030	Federal - Other	
All Phases Fully Implemented									2035	Other	
									2040		
									2050		
									2060		
									2070		

** Should include development and construction costs

Table D - Task 4D Scope of Work Submission Content

Region	Overall TWDB Task Number	SubTask # / WMS evaluation number	SubTask / WMS(s) Name	SubTask Scope of Work Write-up	Deliverable	SubTask Budget	WUG(s) &/OR WWP Entities Potentially Served by WMS(s)	Addressing a changed condition from previous cycle?	When was this WMS identified by RWPG as a potentially feasible WMS?	Was WMS evaluated in any previous Regional Water Planning Cycles?	Is evaluation a limited update to previous technical evaluation information?
X	4D	1				$ -					
X	4D	2				$ -					
X	4D	3				$ -					
X	4D	4				$ -					
X	4D	5				$ -					
X	4D	6				$ -					
X	4D	ETC.				$ -					
					TOTAL BUDGET	$ -					

Table E – Example Template for Presenting Water Management Strategies Considered and Evaluated

Every WUG Entity with an Identified Need		**WMSs REQUIRED TO BE CONSIDERED BY STATUTE**											**Additional**									
Water User Group Name	maximum need 2010-2060 (af/yr)_	conservation	drought management	reuse	reallocation/management of existing supplies	voluntary transfers	conjunctive use	acquisition of available supplies	development of new supplies	development of regional water supply or regional management of water supply facilities	voluntary transfer of water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)	emergency transfer of water under Section 11.139	system optimization, subordination, leases, enhancement of yield, improvement of water quality	new SW	*new GW*	*Brush control; precipitation enhancement*	*desalination*	*aquifer storage and recovery*	*cancellation of water rights*	*rainwater harvesting*	*other*	*other*
City A	*20,000*	PF	nPF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF		
City B	*5,500*	PF	PF	PF	nPF	PF	nPF	PF	PF	nPF	PF	nPF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF		

nPF = considered but determined 'not potentially feasible' (may include WMSs that were initially identified as potentially feasible)

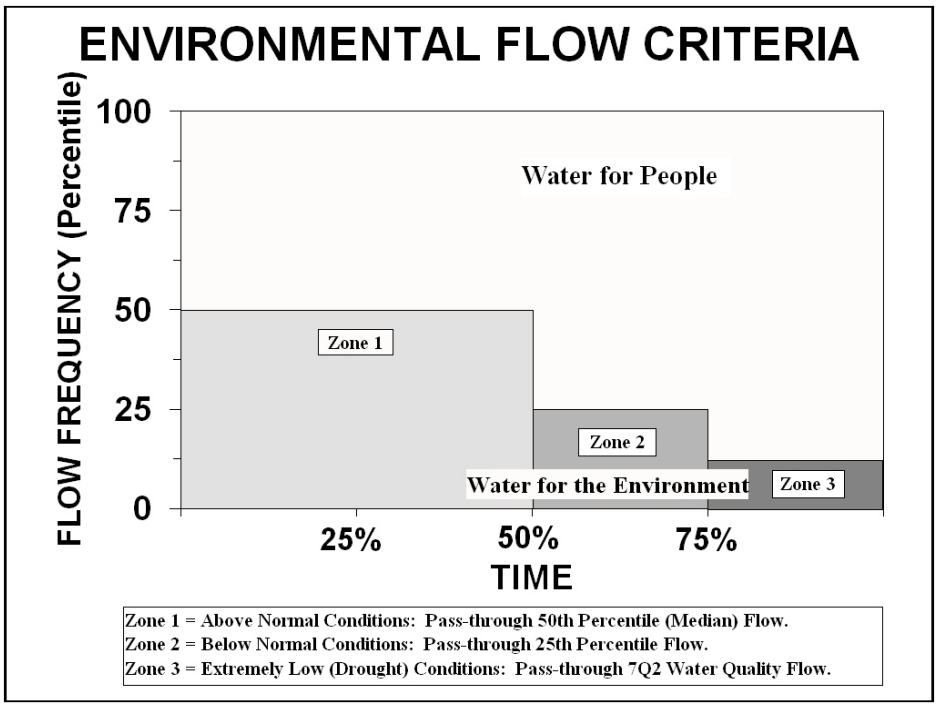
PF = considered 'potentially feasible' and therefore evaluated
(all WMS evaluations shall be presented in the regional water plan including for WMSs considered potentially feasible but not recommended)

APPENDIX 2.0

Consensus Criteria for Environmental Flow Needs

State and regional water planning guidelines require use of TCEQ environmental flow standards or site-specific studies where available. If such studies are not available, then water planners should use the 1997 Consensus Criteria for Environmental Flow Needs (CCEFN) on all new surface water development WMSs requiring permit authorization. It applies to both instream flow and freshwater inflow needs. The criteria were developed through extensive collaboration among scientists and engineers from the State's natural resource agencies (i.e., TWDB, TPWD, and TCEQ), as well as academics, engineering consultants, and informed members of the public. Specifically, the criteria are composed of multi-stage rules for environmentally safe operation of impoundments and diversions during above normal conditions, below normal conditions, and the emergency conditions we call "drought" (Figure 1).

Figure 1. Environmental Flow Criteria



The primary goal of the CCEFN is to provide an indication during the planning process of the amount of water that may be available through the permitting process. They also provide balance by sharing the adverse impacts of drought so that neither human nor environmental needs unacceptably prevail over the other at all times. However, it should be recognized that the state and federal permitting processes may require different environmental flow constraints based on the results of intensive field studies or other permitting considerations.

The CCEFN is commonly referred to as a "desktop" technique because it is based on a statistical analysis of hydrological records for a potential water development site. No fieldwork is required, but the results may not be as precise or reliable as those derived from field studies. It should be noted that intensive field study and modeling assessment of the actual flow needs for environmental maintenance are generally required during the State and Federal permitting process. However, the CCEFN is considered adequate and appropriate for planning purposes. All new water resource developments are required to consider the ecological flow needs of riverine and estuarine fisheries, wildlife habitats, and water quality requirements.

Criteria for the Planning Process

Application of the CCEFN, as described below for different types of water development projects, provides for a priority to human needs during dry and drought conditions, while sharing of the adverse impacts of drought with the environment. The environmental flows specified below are representative of what may be required in the regulatory process. For planning purposes, the environmental pass-through requirements for all zones will be added to those for downstream water rights. The protection of downstream water rights will be accomplished by using the full recorded amount of the existing water rights in the WAM.

New Project On-Channel Reservoirs

As illustrated in Figure 2, the conservation storage of a new on-channel water supply reservoir would be divided into three zones for water management purposes as follows:

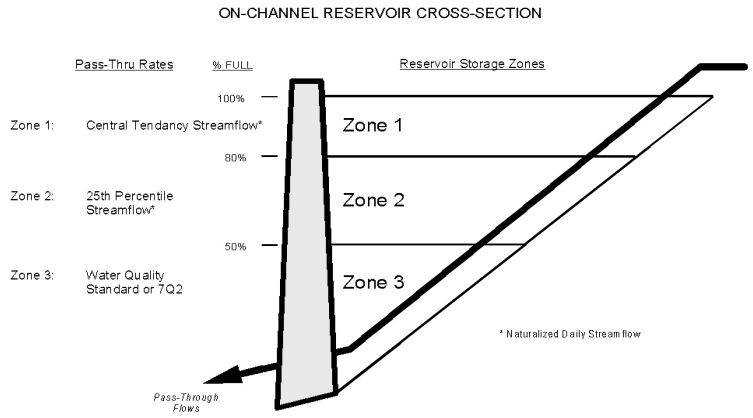
Zone 1
In Zone 1 of the reservoir, when the reservoir water level is greater than 80 percent of storage capacity, inflows will be passed up to the monthly medians that are calculated with naturalized daily streamflow estimates.[43]

Zone 2
As dry conditions develop and the reservoir water level declines into Zone 2 between 50 and 80 percent storage capacity, inflows passed would be reduced to an amount up to the monthly 25th percentile flow values that are calculated with naturalized daily streamflow estimates.

Zone 3
As more severe drought conditions develop and the reservoir level declines into Zone 3 below 50 percent storage capacity, environmental pass-throughs would be further reduced to an amount up to the established water quality standard for the downstream segment. In lieu of any established water quality standard, the 7Q2 low flow value, as published in the TCEQ's Water Quality Standards, would be used as the default criterion for Zone 3 pass-throughs. If in Zones 1 and 2, the value necessary to maintain downstream water quality is higher than the medians or 25th percentiles, then the value necessary to maintain downstream water quality will be used instead of the other target flow values.

[43] Naturalized streamflow is the estimated amount of water that would have been present in a watercourse with no direct manmade impacts in the watershed. It is calculated by taking values of historically measured streamflow, adding amounts of estimated man-made losses from the upstream watershed caused by diversion and lake evaporation, then subtracting amounts of transfers.

Figure 2. On-Channel Reservoir Cross-Section



In all zones, it is the State's intent that flows passed for instream purposes would also reflect the needs of the associated bay and estuary system. Therefore, instream flows are not to be considered available for impoundment before they reach the receiving bay and estuary. In addition to passage of environmental flows, adequate flows will be passed through for protection of downstream water rights. In all zones, water that can be captured by reservoirs in excess of the environmental provisions is available for water supply storage, and no water will be released from storage to meet environmental targets when inflows are below these limits.

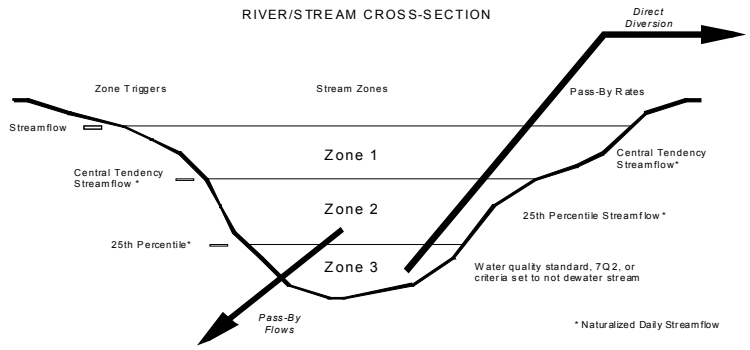
New Project Direct Diversions

As illustrated in Figure 3, the CCEFN for direct diversions from a river or stream that are recommended in the Regional Water Plan would be based on streamflow conditions just upstream of the diversion point, and would also be divided into three zones as follows:

Zone 1
Zone 1 occurs when actual streamflow is greater than monthly medians calculated with naturalized daily streamflow estimates. When streamflow is within Zone 1, minimum flows passed will be the monthly medians that are calculated with naturalized daily streamflow estimates.

Zone 2
Zone 2 occurs when actual streamflow is less than or equal to medians, but greater than monthly 25th percentile values. When streamflow is within Zone 2, minimum flows passed will be the monthly 25th percentile values that are calculated with naturalized daily streamflow estimates.

Figure 3. River/Stream Cross-Section



Zone 3
Zone 3 occurs when actual streamflow is less than or equal to monthly 25th percentile values. When streamflow is within Zone 3, minimum flows passed will be the larger of: (1) the value necessary to maintain downstream water quality or (2) a continuous flow threshold to be determined by the water agencies (e.g., 10th percentile flow) that will not allow the diversion, by itself, to dry up the stream.

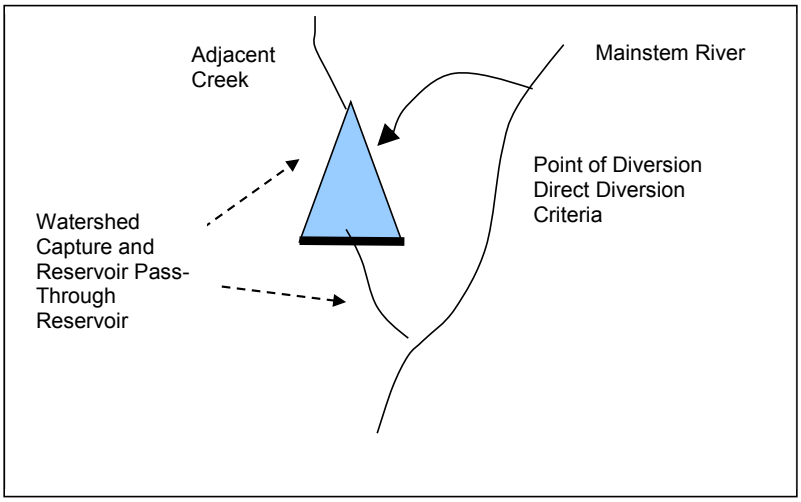
For perennial river/stream segments where a water quality standard has been established for a stream segment, that value will be used as the pass-by target. Where such a standard has not yet been established, the default planning criterion is the 7Q2 value as published in the TCEQ's Water Quality Standards. For Zones 1 and 2, if the value necessary to maintain downstream water quality is higher than the medians or 25th percentiles, this value necessary to maintain downstream water quality will be used instead of the other values.

All Zones
The trigger values above are calculated with naturalized daily streamflow estimates. In addition to passage of environmental flows, adequate flows will be passed through for protection of downstream water rights. The above stepping procedure does not have smooth transition between zones, leaving brief periods when the instantaneous diversion rate is zero.

New Direct Diversions into Large Off-Channel Storage

In those cases where a large water supply project would divert its water from a river or stream into off-channel storage, a combination of the direct diversion and reservoir criteria would apply (Figure 4). The direct diversion criteria will govern the ability to divert water into the off-channel project. The reservoir criteria will address the ability of the reservoir to capture water from its own watershed, as well as define the reservoir's multi-stage operations that pass-through environmental flows, and flows for protection of downstream water rights.

Figure 4. Direct Diversions into Large Off-Channel Storage



Bay and Estuary Conditions

As a planning place-holder value, the Zone 1 reservoir pass-throughs or direct diversion pass-bys described previously will also provide freshwater inflow to the bays and estuaries. However where inflow values adequate to meet the beneficial inflow needs as described in Texas Water Code §11.147 have been determined, those recommended inflow volumes will be used for projects within 200 river miles of the coast, commencing from the mouth of the river, as the basis for calculating the relative contributions of fresh water from the associated rivers and coastal basins during times of Zone 1 conditions. No other special provisions would be made for estuarine maintenance under Zone 2 or 3 conditions for either new reservoirs or large direct diversions except that the instream flows are not to be considered available for impoundment or diversion before they reach the receiving bay and estuary. Freshwater inflow needs analyzed by the water agencies may be determined by TPWD until that agency and the TCEQ jointly make a determination in accordance with Texas Water Code §11.1491.

The target flows in Zone 1 of the reservoir operating procedure should be established to provide the beneficial flows as defined in §11.147(a) of the Texas Water Code (i.e., the "salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent").

In practical terms, that means it is not necessarily MinQ or MaxQ produced by the optimization model, but a point along that curve between these values that provides some margin of safety (comfort) in providing sufficient flows in Zone 1 to maintain average historic productivity on the fisheries. The state recommended freshwater inflow target is one that has been validated by comparing the seasonal distribution of estuarine salinity regimes with the patterns of abundance and distribution of selected estuarine-dependent plants and animals.

Bay and estuary pass-through requirements for a new water development project will be based on a pro-rata share of that location's contribution of flow to the estuary in question. Once the target amount of water reaches an estuary during a month, no additional flows need to be provided for purposes of estuarine maintenance during that month. For the remainder of the month, environmental flows revert to the instream criteria.

Results of Inflow and Instream Studies – Use of State Determinations

When the results of freshwater inflow or instream flow studies are available, those criteria will be used in the planning process rather than any generic rule such as the CCEFN. When established criteria are available and agreed to by TPWD and TCEQ, bay and estuary inflow requirements would be apportioned to each new project identified in the Regional Water Plan according to its proportional share (based on contribution hydrology), and as provided for by TCEQ. Where possible, this process seeks to restore seasonal flow patterns and minimize cumulative impacts from water development projects.