Guide for Water Systems

Area-Wide Planning for Long-Term Sustainability

December 2004

Prepared by:
Environmental Finance Center
New Mexico Tech
In association with
New Mexico Rural Water Association
Rural Community Assistance Corporation
William Fleming, UNM

Content

1. INTRODUCTION

1.1. Why Should a Water Supply System(s) (WSS) Develop a Long-Term Plan?

Planning is a process an entity undertakes in order to understand its situation, needs, and challenges; identify possible outcomes to solve current needs/challenges and mitigate future needs/challenges; *choose* the outcome(s) it wants; and *choose* its action(s) in order to achieve the outcome(s). Long-term (also called long-range) planning horizons can be 30-, 40-, 50-years, or other increments. The further in the future an entity plans, the more it will mitigate or avoid its future challenges. However, the further in the future an entity plans the more unpredictable, unclear, and uncertain its situation and needs will be. Typical long-term planning horizons are 30- to 40-years. If demographic or other relevant data projections are available or can be generated with reliable results (discussed in Section 4.), a 40-year planning horizon is reasonable.

A WSS(s) should prepare a long-term plan to:

- Ensure a viable water supply,
- Identify an action plan to secure the quantity and quality of water required for the planning horizon,
- Ensure compliance with statutory requirements, and
- To prepare well-justified request(s) for State funding for capital improvement projects.

The planning process helps WSSs to determine the water demand over the planning horizon, identify opportunities for cooperation within a defined geographical area, to develop strategies to balance water demand and supply, and if, necessary, to identify alternative and/or additional sources. It is essential that WSS(s) incorporate stakeholders and the public into this process. It is critically important that communities address water planning in this proactive, community-driven process so that wise choices can be made regarding the water future of the area.

The long-term plan should:

- Analyze the water demand over the planning horizon,
- Quantify the wet water supply and its projected availability,
- Determine the water quality,
- Detail the current condition of the distribution system,
- Determine potential problems and identify strategies that the community will use to balance water demand and supply, demand reduction and supply augmentation (if needed.)

The plan should examine all of the options available to the community and, through policy choices guided by public input, select those options that best meet the goals of the community. The plan should also examine the implementation requirements of the selected options.

1.2. The Need for Collaboration in Planning

Water resources are used by entities that receive their supply from the same source, such as an aquifer, stream, river, or reservoir. Water does not respect political boundaries; it flows from community to community within an aquifer or watershed. If a community wants a solid plan for the future, it is necessary for water users in the area to come together to try to solve the issues collectively. Otherwise, actions taken by one community may counteract actions taken by another community. For example, if two communities have wells in the same aquifer and one community chooses to reduce demand through conservation, while the other community chooses to increase use by reducing water rates for large water users, the net result will be no water resource savings, even though conservation programs were initiated. If communities who use the same resources do not plan together, any one or all of the long-term plans may be undermined.

Communities may also choose to plan together to prepare for drought situations, water shortages from inadequate supplies, and to implement water conservation programs. Individual water systems can link together to better manage the water supply, to better respond and mitigate the effects of drought, and for emergency purposes. Communities may choose to combine and/or lease their water rights.

The process of working in a collaborative fashion to plan for the future can be at whatever level the communities are comfortable with. Communities do not have to agree to give up any autonomy or to physically interconnect unless that is what they choose to do. The extent of collaboration can be identified as part of the planning process, with complete public input.

Similarly, communities may also involve water users other than public water supply systems in the planning process. Homeowners with individual domestic wells, and self-supplied commercial and industrial establishments, and irrigation farmers should be included in the planning process so that the complete picture of water supply and demand in the project area is understood.

1.3. Document Organization and Contents

This document is designed to guide the reader through the steps of developing a long-term plan for an individual or a regional collaboration of water systems. It describes in detail the major activities of water planning, which are:

- Public involvement and the collaborative process (Section 2.),
- Defining the issues (Sections 3. and 4.),
- Developing strategies and solutions (Section 5.),
- Selecting a plan to meet the needs of the region (Section 6.), and
- Implementing the plan (Section 7.)

At the end of this document (Section 8.) is a list of resources available to assist the reader in developing a long-term plan.

Inclusive, collaborative public involvement is an essential and critical component of the entire planning process. Figure 1-1 shows the overall planning process and the need for convergence between the public process and the technical components of the plan. The points of convergence occur at the end of each major step. The public should agree with the definition of the issues, which is the outcome of the examination of the sustainability of the existing resources. The next point of convergence occurs when alternatives are being considered. The public should be made fully aware of the various options and the ramifications of accepting or rejecting the options. The final point of convergence occurs when the plan is to be adopted and implemented. The public should accept the final plan and agree with the implementation plan. It is critical that the public support the plan to help ensure its success.

1.4. Coordination with Other Water Plans

There are other water plans that identify goals and needs for the State of New Mexico. The most important are the Regional Water Plans and the State Water Plan. Generally, these plans are broad and encompass large regions of the State. Although it will be far more tailored to a small area's situation and needs, the local water resources plan must be consistent with the Regional Water Plan and the State Water Plan.

1.5. Definition of Public Water Supply Systems

Public Water Supply System: Includes community water systems and/or water utilities, publicly or privately owned, incorporated or unincorporated, that serve 15 or more service connections or 25 or more people for at least 60 days in a calendar year and rely upon surface and/or groundwater diversions other than wells permitted by the Office of the State Engineer under Section 72-12-1 NMSA 1978, and which consist of common collection, treatment, storage, and distribution facilities operated for the delivery of water to multiple service connections. Examples of such systems include municipalities that serve residential, commercial, and industrial water users; prisons, residential and mixed use subdivisions; and mobile home parks. Water used for the irrigation of self-supplied athletic fields, golf courses and parks or to maintain the water level in ponds and lakes owned and operated by a municipality or water utility is also included in this category. The purpose of this criterion is to capture all water uses, which are debited against the water rights of public water suppliers.

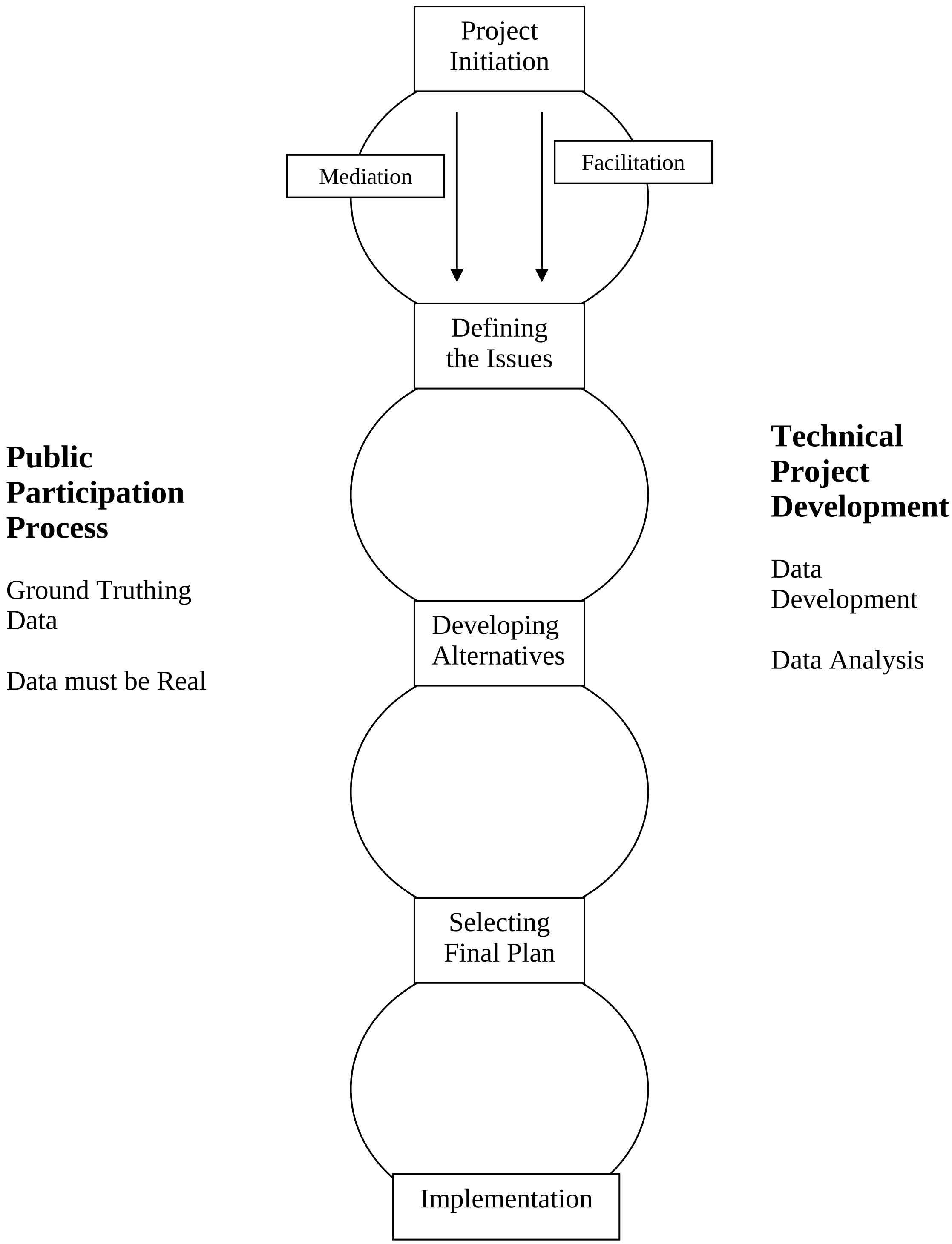


Figure 1-1: Interaction Between Public Process and the Technical Project Development Process

2. PUBLIC PARTICIPATION PROCESS

2.1. The Need for Public Participation

Water resources are utilized by many individual users and community water systems. The more water users in an area collaborate on how those resources are to be utilized, the more the effects of droughts or diminishing water supplies can be mitigated. Where possible, locally interconnected or area-wide water systems should be encouraged to achieve economy of scale and commitment to the area-wide plan. This approach requires collaboration among the water users that rely on a common water resource.

The best way to develop an effective water resource plan that is fully implemented is by involving the public in the process. Public participation is important to ensure that water resource planning considers the needs of the users and that they will agree with the approach to address future demand.

2.2. The Collaborative Public Participation Process

Whether one community is participating in long-term water planning or several communities are trying to work together, understanding the collaborative public participation process is essential. The advantages of having a collaborative process include:

- Working with interested stakeholders often results in the identification of more possible solutions than were originally considered. This is especially true in times of drought where new ideas about sharing and protecting the water resource must be considered.
- By including multiple points of view up front in the process, the agreements reached will be more equitable and will potentially meet more of the area's needs.
- The process creates greater satisfaction for all of the parties and promotes a foundation for future problem solving. If this process is not used and if differences are not adequately resolved, the result may be litigation. Litigation will drain human and financial resources and may exacerbate problems during times of drought.

The collaborative public participation process is described below. It involves a parallel process of eliciting public support, interest, and concerns while developing data, describing the current situation, and identifying strategies to address future demand and supply concerns.

2.2.1. Phase One

Phase One consists of developing a shared intent to work together and defining the issues associated with long-term water planning. The following should be accomplished in Phase One.

(A) The process must include an effort to identify, invite, and elicit concerns and issues from all possible participants. Budget time early in the process to identify stakeholders. Publish announcements regarding the long-term planning activity, information on the first meeting, an anticipated frequency of meetings, and an anticipated time line for the planning process. Inform stakeholders as to how they will know about future meetings. Keep a written record of meeting attendees, which can be a simple sign-in sheet.

(B) The participants need to reach a shared purpose of coming together (to develop a long-term water resource plan for the area). This step is important whether there is a large group or small group of participants and is essential to the collaborative process.

(C) The participants must establish a "fair" process and mutually agreeable agenda for working together.

(D) The participants must develop a clear statement of the issues involved in the long-term plan. This can be accomplished through public meetings; questionnaires; public outreach; one-on-one meetings with specific stakeholders, such as water system managers, users and operators; and presentations.

(E) To conduct the activities in this phase, the project planners should:

(1) Include professional facilitators that offer a neutral process to elicit concerns and issues.

(2) Offer mediation as part of the public meeting process to resolve any conflicts that arise.

(F) At the end of Phase One, it is extremely important to have consensus on the issues that should be addressed in the long-term plan.

2.2.2. Phase Two

Phase Two consists of examining the data that describes the ability of the water resource(s) to meet current and future demand.

(A) Background data regarding the project should be gathered by and shared with the public. This type of information includes, but is not limited to, the following:

(1) Project boundaries,
(2) Water system background information,
(3) Description of wastewater disposal systems,
(4) Current and projected water demands for public water systems,
(5) Current and projected water demands for other water uses such as irrigation, livestock watering, etc.,
(6) Water rights,
(7) Available water supply and its sustainability, and
(8) Comparison of supply with demand.

(B) All participants need to examine the data and discuss its accuracy and validity. The available data does not always reflect the real situation accurately. The public can act as a "ground truth" resource for the data and can discuss and debate its validity.

(C) If differences in the data exist, the public meetings can be used to discuss the differences and what actions may be required to resolve them. Differences may occur if one set of data is compared to what the public perceives as valid and accurate and the data does not match this concept. Differences can be reconciled and explored in this phase by understanding each stakeholder's true interests, and uncovering potential common ground among stakeholders or stakeholder groups.

(D) At the end of Phase Two, it is important to reach agreement on the trends shown by the data. This will allow a strong foundation upon which to build solutions. In addition, the stakeholders must agree on the project area definition, the reliability and acceptability of the data, and the interests that the long-term plan must satisfy.

2.2.3. Phase Three

Phase Three consists of developing alternative solutions and reaching agreement on how common water resources can be jointly protected and utilized. Constructive problem solving is an important step in the collaborative process. The parties educate one another about their needs and concerns, search for common interests and work together to reach solutions. In order for this phase to be successful, solutions must be generated that addresses the issues that were discussed and agreed to in Phases One and Two.

(A) The project planners must provide information to the public regarding the potential options that can be used to address the issues in the long-term plan.
(B) Options must be presented in the context of what it means to the water system users, other stakeholders, and area residents if the option is adopted.
(C) The project planners must select the preferred options based on input from the public.
(D) At the end of Phase Three, it is important that all participants agree on the options that can be used to address the issues.

2.2.4. Phase Four

Phase Four consists of testing the fairness and durability of the selected option(s) by:

(A) Helping the parties understand the consequences and implications of the long-term plan.
(B) Ensuring that there is a shared understanding of what the elements in the long-term plan mean and that the overall water plan will satisfy the articulated interests of each person.
(C) "Reality testing" the solution for workability, implementation, and durability.
(D) Plans that have been developed through a collaborative public participation process will have a solid constituency and be characterized by the following:
    (1) Developed with the participation of all concerned individuals and groups.
    (2) Are realistic. It is important to make sure that the long-term plan can work and that there is a process to explore uncertainties or possible unforeseen circumstances if they arise during the future.
    (3) Satisfy the interests of all parties to the best mutual resolution.
    (4) Include provisions to resolve future differences among stakeholders.
    (5) Are expressed clearly and presented in understandable terms.
    (6) Are periodically reviewed and updated with a public process.

2.3. Public Participation and the Legislative Process

It is important that elected officials at the local and state levels are included in the long-term planning process. The elected officials should become involved in the public participation process and they need to be made aware of project priorities and funding concerns.

3. DEFINING THE CURRENT WATER RESOURCE SITUATION

This part of the long-term plan should include defining the project area, and gathering background information, as described below.

3.1. Establishing the Project Area

The first step is to define the "project area." The project area needs to define its appropriate surface water basin, ground water basin, and administrative boundaries. The project area should include all of the water systems that have agreed to work together.

As stated in Section 1. the agreement to work together is for planning purposes only. Water systems may decide to retain their independence and autonomy. The planning process will allow the opportunity to explore available options in terms of demand reduction and/or supply augmentation and allow the water systems to determine how they can work together.

3.2. Mapping the Project Area

It is essential that a map of the project area be prepared that shows the following information. The map may be prepared using a Geographic Information System (GIS) or it may be hand drawn. Base GIS data is available on-line from the Regional Geographic Information System (RGIS) web site. The link to this site is provided in Section 8. The information may be presented all on one map or on several different maps.

Required information on the map includes:

(A) Project area boundaries
(B) Surface waters (streams, rivers, lakes, reservoirs, wetlands)
(C) Wells (public water supply, domestic, irrigation, industrial, commercial)
(D) Water supply system(s) service areas
(E) Surface water points of diversions intakes or diversions and storage tanks
(F) Land use (residential, agricultural, commercial, industrial, open, federal)
(G) Ditches or Acequias
(H) Political boundaries (cities, counties)
(I) Watershed or drainage area boundaries
(J) Wastewater facilities with discharge locations as applicable

3.3. Gathering Background Information

Once the project area has been established, the next step is to obtain background data on public water supplies, other water uses, wastewater uses and land use and zoning practices. The type of information suggested is listed below. All the background data should be summarized in a tabular or report format for inclusion in the long-term plan. Appendix A contains a spreadsheet that may be used to assist in gathering and compiling the recommended data.

3.3.1. Water Supply System Information

The following information should be collected for each system within the project area.

(A) General Background Information
- (1) Designated service area,
- (2) Number of current connections,
- (3) Total number of committed connections,
- (4) Source of supply (ground water, surface water),
- (5) Type of ownership (municipal, co-op, mutual domestic, water & sanitation district, private, etc.),
- (6) Status of system metering (how many customers metered, how often meters read),
- (7) Un-metered uses,
- (8) Water budget,
- (9) Age of system components (pipes, wells, storage tanks, buildings, etc.),
- (10) General condition of components (excellent, good, fair, poor),
- (11) Fire protection capabilities.

(B) Water Quality Information
- (1) Most recent three-year compliance cycle sampling results,
- (2) Compliance history with New Mexico Environment Department (NMED),
- (3) Bacteriological quality monitoring results for previous three years.

(C) Current Water Demand Analysis: A detailed water demand analysis (also referred to as a water system audit) should be prepared to examine how much water enters the system and where and how it leaves the system. Water system audits help identify current use categories (also called customer classes), determine current water use rates according to customer class, and provide data needed to reduce water losses, reduce revenue losses, and forecast future demand. This information can be used to target conservation efforts and system improvements where they are most needed. A set of sequential tables that can be used for preparing a complete water demand analysis are provided in Section 6 (Tables 6-1 to 6-4) of the New Mexico Office of the State Engineer's ***Water Conservation Guide for Public Utilities*** which can be accessed online at http://www.ose.state.nm.us/water-info/conservation/pdf-manuals/nm-water-manual.pdf. The water demand analysis should include, but is not limited to the following:
- (1) Last five years or more of monthly and annual surface and groundwater production (diversions) including imports and exports to other water utilities,
- (2) Last five years or more of monthly and annual water deliveries by customer class and unaccounted-for-water losses expressed in volumetric units and as a percent of total water production,
- (3) Population served and water use in gallons per capita per day for residential use and the aggregate use by all customer classes,
- (4) Comparison of indoor and outdoor water use for single-family homes in winter months vs. summer months to identify opportunities to reduce indoor or outdoor water use by implementing appropriate water conservation measures,

(5) Identification of connections/sites that use more than 10,000 gallons per day (gpd) or more, and their actual use in gpd and gallons per year (gpy).

(D) Funding History

(1) List any funds the water system has received from state or federal sources to make water system upgrades, improvements, or expansions in the previous five years,

(2) List any funds that are currently pending.

(E) Financial Information

(1) Current rate structure and any existing rate ordinances,

(2) Current budget,

(3) Current Local Government Division Infrastructure Capital Improvement Plan (ICIP).

(A) Reports

(A) Most recent NMED sanitary survey,

(B) Articles of incorporation,

(C) Most recent Consumer Confidence Report (CCR),

(D) Ordinances,

(E) Bylaws,

(F) NMED source water assessment,

(G) Any existing source water protection plan,

(H) Well records,

(I) Aquifer tests,

(J) List of consultant reports.

3.3.2. Information Regarding Water Uses Other Than Public Water Supplies

Information should be gathered on all water uses within the project area other then public water supply systems. These other uses have an impact on the water resources of the area and should be considered during the planning process. The type of data needed is listed below.

(A) Private Wells

(1) Number of private wells used for domestic or combined domestic/agricultural purposes:

(a) Actual water use obtain from meter records or OSE, or

(b) An estimate of use,

(2) Number of private wells used only for irrigation purposes:

(a) Actual water usage obtain from meter records or OSE, or

(b) An estimate of use,

(3) Number of private wells used for commercial purposes:

(a) Actual water usage obtain from meter records or OSE, or

(b) An estimate of use,

(4) Number of private wells used for industrial purposes:

(a) Actual water usage obtain from meter records or OSE, or

(b) An estimate of use.

(B) Acequias/Ditches/Conservancy Districts/Irrigation Ditches

    (1) Place of Use (declared, permitted, licensed, or adjudicated area that may be irrigated),
    (2) Source of water,
    (3) Type of conveyance,
    (4) Irrigated acreage,
    (5) Amount of water used,
    (6) Contractors/parciantes,
    (7) Management structure.
(C) Other Water Uses
    (1) Describe any other water uses including type of use, source of water, and actual water use or an estimate of water used.

3.3.3. Wastewater Treatment and Disposal

During the planning process, it is necessary to not only understand the water delivery systems, but the wastewater treatment and disposal practices within the project area. The information recommended includes, but is not limited to the following:

(A) Wastewater Treatment Facilities
    (1) Type of treatment facility (activated sludge, rotating biological contactor (RBC), extended aeration, lagoon, etc.),
    (2) Average daily flow,
    (3) Peak daily flow,
    (4) Type of discharge,
    (5) National Pollutant Discharge Elimination System (NPDES) permit number and provisions, if applicable (include a copy of the permit),
    (6) Total Maximum Daily Load (TMDL) issues with the treatment facility, if applicable,
    (7) Compliance history (with NMED or EPA).
(B) Septic Systems
    (1) Number of connections using septic systems.
(C) Other Wastewater Disposal Practices
    (1) Describe any other wastewater disposal practices used within the project area that are not described above.

3.3.4. Ordinances, Land Use and Zoning

Some cities and counties have enacted land use and zoning regulations to control land use activities in an area. In addition, a city, county, or water system may have ordinances or guidelines that regulate water use or wastewater reuse. If any of these regulations are in place within the project area, these activities should be described in the long-term plan.

(A) Ordinances
    (1) Provide a copy of any ordinance related to water use in the project area. Ordinances can be related to water conservation, landscaping, wastewater reuse, greywater use, rainwater capture (harvesting), or any other water related issue.

Describe when the ordinance was passed, how it is enforced, and the impact it has had.

(B) Land Use
  (1) Describe any land use ordinances or regulations that apply within the project area,
  (2) Include a description of the area for which the land use regulations apply and how they are applied,
  (3) Provide a breakdown in terms of percent of land area that is in each land classification (residential, agricultural, industrial, commercial, floodplain, public, conservation easement, vacant, etc.)

(C) Zoning
  (1) Describe any zoning regulations in the project area,
  (2) Include a description of the area for which the zoning regulations apply,
  (3) Provide a breakdown in terms of percent of land area that is in each land classification (residential, agricultural, industrial, commercial, floodplain, public, conservation easement, etc.)

3.3.5. Other Plans

(A) Locate any existing Drought Contingency Plans relevant to the area,
(B) Locate existing "Regional Water Plan" relevant to the area, http://www.ose.state.nm.us/water-info/NMWaterPlanning/RegionalPlans.html.
(C) Locate any existing Asset Management Plan (also called Infrastructure Management Plan) for each of the WSSs,
(D) Locate water supply or water infrastructure-related portions of any existing Emergency Response Plan,
(E) Locate any existing Watershed Management Plan,
(F) Locate any existing Water Quality Management Plan.

3.4. Supply Adequacy and Reliability

It is essential to understand the source(s) of the water used in the area and its/their adequacy and reliability. Earlier in this section, information was gathered regarding the sources of water used by the water supply systems and by other water users. In addition, information was gathered regarding the locations of the points of diversion (wells, and/or surface intakes). This information, together with the procedures illustrated below, will be used to make an estimate of the adequacy and reliability of the ground and surface water source(s).

The first step is to estimate the supply potential for ***each*** public water system separately. Further on in the planning process, there are opportunities to examine the potential for water systems to join together in some capacity.

To generate a water availability assessment, the following information should be included on groundwater and surface water sources:

(A) For groundwater supplies, if available:

(1) Description of aquifer and well characteristics in the project area, including but not limited to:
   (a) Geologic cross-sections,
   (b) Thickness of water bearing formations and type of material,
   (c) Storage coefficient (S),
   (d) Transmissivity (T),
   (e) Response to climatic conditions,
   (f) Response to wells of other ownership,
   (g) Well yield problems,
   (h) Water quality,
   (i) For each well: date drilled, casing size, total well depth, water level when the well drilled, current water level, dynamic drawdown, estimated rate of long-term water level decline, yield at time of drilling, current well yield, perforated interval, thickness of water bearing formation, name of aquifer, specific capacity, and status of well (in use, unequipped, backup supply),
   (j) Potential for well deepening, replacement wells, or the drilling of new wells. Description of other potential sources of groundwater supply.

(2) History, based on the period of record available, of annual water levels and yields (gpm) of water utility wells that reflects the impact of withdrawals on the water supply and the sustainability of the water source.

(3) The <u>available water column</u> may be calculated by subtracting the lowest practical pumping level from the static water level and reducing this value by at least 20% as a margin of safety to account for seasonal fluctuations, drought, peak production requirements, and reduction of well efficiency over time. The <u>lowest practical pumping level</u> may be calculated by any of the following methods as appropriate.
   (a) By using the lowest water level reached during a recent on-site aquifer pump test,
   (b) By setting the water level at the top of the uppermost screened interval,
   (c) In wells completed in fractured rock aquifers, the lowest pumping water level may be above the top of the fractured zone,
   (d) In wells completed in alluvial aquifers, the lowest pumping water level may be defined by a maximum allowable drawdown equal to 70% of the initial water column defined as the difference between the static water level and the bottom of the well.

(4) Productive life of the wells may be obtained by dividing the available water column by the average annual rate of decline. The integrity of the well casing and water quality contamination may also dictate the productive life and should be taken into consideration.

(5) In areas in which water rights are not fully utilized it may be necessary to compute the productive life of the well based on an estimate of long-term water level declines using an appropriate groundwater model. Estimates of future of water level decline should be made assuming all water rights in the region are fully exercised. The model estimates should be used in lieu of observed water level declines if the model estimates are more conservative.

(B) For surface water supplies, if available:
  (1) Description of the drainage basin, streamflow characteristics (ephemeral, perennial), watershed management practices, and water quality,
  (2) Location and description of upstream diversions,
  (3) Location and description of surface water gaging stations,
  (4) Historical record of monthly and annual streamflows and discharges from springs (if used as a source of supply); provide maximum, average, median and minimum flows,
  (5) Average daily streamflow,
  (6) Relationship between precipitation and runoff,
  (7) Relationship between stream gages,
  (8) Relationship between a gage and the point of diversion,
  (9) Description of reservoirs used to store surface water including the normal annual yield and the firm annual yield in acre-feet, and any problems or constraints that affect the operation of the reservoir,
  (10) Level of contamination or fire hazard vulnerability with respect to watershed (low, medium, high),
  (11) Assessing available surface water supply can be handled in several ways. One way is to assess realistic scenarios representing patterns of wet, average, and dry years based on the most appropriate gaging records. Wet may be defined as greater than 20% of the median (middle value). Average is within 20% of the median. Dry is less than 20% of the median. For the period of record, assess the frequency of occurrence for each of these patterns. This analysis is intended to begin to identify triggers for drought management activities. It will also be useful for generating supply/demand graphs in Section 4.

3.5. Water Quality

Water quality is an important factor in the overall characterization of the water resource. Water quality has an impact on determining which water resources are available for different types of activities, such as indoor domestic use, agriculture, industrial facilities and the quality can impact the ways in which the resources are used. The components of water quality include: the quality of water used for drinking water supplies, the quality of water used for other purposes besides public drinking water supplies, and the types of activities, land use, and facilities that exist in the project area that can impact the quality of the water resources.

3.5.1. Water Quality for Public Drinking Water Systems

The quality of a water system's source determines that system's need for water treatment, which can have a major impact on the cost of water production or the ability to use a particular resource for additional drinking water supplies. The water quality considerations vary for surface water and groundwater and between shallow aquifers and deep aquifers. These considerations are important in selecting and managing supply alternatives. For example, surface water sources are more susceptible to bacteriological, viral and protozoa contamination, while groundwater supplies are more susceptible to arsenic and radiological contamination.

The Safe Drinking Water Act (SDWA) sets standards for the allowable quantity of contaminant in the drinking water supply, called the Maximum Contaminant Level or MCL. Under SDWA, the EPA regulates 87 different contaminants and sets either MCLs or requires specific treatment techniques to be used to ensure that the level of the contaminant is safe. In addition to these primary contaminants, which can cause health effects, EPA sets recommended levels of secondary contaminants. These secondary contaminants do not cause adverse health effects, but could affect taste, odor, and appearance. There are 15 secondary contaminants, such as iron and manganese. The full text of the Safe Drinking Water Act, along with other information, can be found on EPA's web site http://www.epa.gov/safewater/sdwa/sdwa.html.

In New Mexico, drinking water regulation is delegated from the EPA to NMED. NMED is required to adopt all provisions of SDWA and to enforce the primary contaminant requirements. Through a water system-funded program (the Conservation Fee Fund), NMED collects money from water systems to pay for the required monthly, quarterly, annual, and triennial samples; the frequency of sample collection depends on the type of system, population served, and the contaminant of concern. Therefore, every system should have water quality results for all required parameters for their current water source(s).

To characterize the quality of the water resources, the following information should be obtained for each water system:

(A) Water Quality Analytical Results: Every public water system should have copies of the water quality analysis for the previous 5 to 10 years. Each system should develop a table showing the water quality results for the previous 3 years for bacteriological contamination and for the last two rounds of triennial sampling for chemical and radiological contamination. Contaminants that are not detected in the supply do not need to be listed in the table. In addition, the results of testing for secondary contaminants should also be listed on a separate table.

(B) Source Water Assessments: NMED has performed source water assessments on all water systems in the State to determine the potential for contamination to enter the water source. A description of the findings of the source water assessment should be included in the long-term plan.

(C) New Regulations: There are new regulations that will impact water systems. Some of these regulations were only recently enacted while others are expected to be in effect soon. The most important of these regulations are:

  (1) The Groundwater Rule currently being developed by EPA will regulate groundwater systems and may require disinfection at water supplies under certain circumstances. Other provisions will not be known until EPA issues the draft rule.

  (2) The Arsenic Rule will require water supplies to have no more than 10 ppb of Arsenic in the water and will go into effect on January 1, 2006.

  (3) The Disinfectants and Disinfection By-Product Rule (DBPR) for smaller surface water systems and all groundwater systems went into effect on January 1, 2004. This rule sets limits on the amount of chlorine residual that may be maintained in the distribution system and requires testing of trihalomethanes and haloacetic acids at each water system.

(4) The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is intended to improve the control of microbial pathogens while minimizing the risks to public health of disinfectants and disinfection by products.

3.5.2. Quality of Other Water Resources

The project area may include water resources, either surface or groundwater, that are not currently used for drinking water supply. The water quality of these resources should be characterized to aid in planning for future water use in the project area. There may or may not be quantitative water quality data for water resources that are not used for public drinking water supplies. If the water is used by agricultural, industrial, or commercial customer, these entities may have records of water quality information. If no data is available on the water quality, it may only be possible to do a qualitative review of the water quality. The qualitative assessment can be based on known aquifer characteristics, the existence of watershed properties that may affect quality, data from similar aquifers, upstream data, knowledge of facilities or land use practices that can affect water quality, or anecdotal data from people familiar with the water resource.

The quality of the other water resources may be impacted by wastewater disposal practices or the existence of abandoned wells. If the wastewater is routed through treatment systems that have surface water discharges, the surface water resources may be impacted by these discharges. If wastewater is routed through treatment systems that have groundwater discharges or if septic systems are used, groundwater resources may be impacted. In Section 3.3., wastewater practices in the area were characterized. This information can be used to aid in the qualitative evaluation of the water resources.

If there are abandoned wells in the area, particularly ones that have not been properly sealed or closed, there is the opportunity for groundwater contamination. Abandoned wells can act as conduits for pollution down to the groundwater.

There are other activities within a project area that can impact water quality resources. Facilities that are within a recharge area of a well or that are near a surface water source have the potential to cause water quality concerns. Some of these facilities may be included in the NMED source water assessments. Other facilities or potential sources of contamination may be discovered through visual observations of the project area or through knowledge of land use practices.

(A) Water Quality Report: A short report should be prepared describing the quality of the water resources that are not used for public drinking water supplies. Included in this report should be a description of any conditions that may make the water resources vulnerable (e.g., septic tanks, storage tanks, abandoned wells, etc.) to contamination.

3.6. Description of the Water Rights

3.6.1 Introduction

It is essential that the long-term water plan contain accurate information regarding

- The amount of water that the water system is currently authorized to divert from a stream or reservoir, and/or pump from one or more wells (the technical term for these sources is "points of diversion"),
- The number and location of the point(s) of diversion,
- The purpose(s) that the water can be used for, and
- The area where the water can be used (also known as "place of use" or "service area").

This information will be used to determine if the water system

- Has sufficient water rights to cover existing and projected demand, and
- If the statutory requirements set forth in § 72-1-9 NMSA 1978 are met.

3.6.2 Collection of the documents

Water supply systems should have, in their files, copies of all their water right documents. They can include one or more of the following:

- Declarations of ownership of surface waters, and/or underground waters,
- Permits (to appropriate the groundwaters or surface waters, to transfer water rights, to change location of well(s), to deepen well(s), to drill supplemental well(s),
- Licenses,
- Leases,
- Adjudication orders, and
- Changes of ownership of water rights.

Obtaining the complete documentation may require research into files at the State Engineer Office (OSE), who has the duty of administering the appropriation, transfer, and distribution of water in areas under State jurisdiction. Wells and surface water reports are also available for download from the WATERS database on the New Mexico State Engineer web site. However, please keep in mind that the database was in the process of being populated in 2004, and therefore the records might not be complete and accurate.

3.6.2 Review of the documents

The long-term Water Plan should contain the history of the acquisition of water and water rights, and copies of all the essential documents. The history is compiled by reviewing the documents starting from the oldest to the most recent one. The intent of this review is to provide a context for the current water and water right situation. This context will also help the OSE staff to evaluate the plan in accordance with the aforementioned section of the New Mexico Statutes.

3.6.3 Description of pending applications

The long-term water plan should also contain a list of the applications that are currently in the review process with the OSE. These can include applications for permits to transfer water rights, lease water rights, deepen wells, drill supplemental wells, change location of wells, and enlarge the service area. A statement should be provided regarding the status of these applications (protested or not).

3.6.4 Conclusions

A statement should be provided that summarizes the water rights that the WSS is authorized to exercise, the applications pending with the OSE, which statutory requirements are to be satisfied and how the WSS plans to meet these requirements.

4. FUTURE WATER DEMAND AND DEFINING POTENTIAL ISSUES

After establishing the current and future situation with respect to water supply, the next step is to estimate future demand for the long-term planning horizon at current user rates and define the potential issues related to meeting that future demand.

4.1. Determination of Future Water Demand

The current water use in the project area was discussed in Section 3.3. and included use by the water supply system and other users. The future water demand requires identifying WSS needs and all other demands within the project area.

4.1.1. Future Demand for Water Supply Systems

The future water demand must be estimated for each WSS in the project area individually. To calculate this amount the WSS must look at growth rates for the community; projected future commercial, institutional, and industrial customers; unaccounted losses based on reasonable estimates; and any other uses not already included in one of the categories. In this case, however, the demand being considered is only related to the WSS. Other non-WSS demands will be considered in the next sections.

As a first step, the system should look at growth in domestic or residential uses.

(A) For systems that have kept good records on the increase in the number of residential customers, the system can examine these records over time to calculate a growth rate. It is important to look at whether the growth rate has been consistent over time or if it has varied from year to year.

Table 4-1. Water System Population Projections						
A	**B**	**C**	**D**	**E**	**F**	**G**
Population Served by System in Current Year	Population Served by System 5 Years Prior to Current Year	Change in Population During 5 Year Period (Column A – Column B)	Growth Rate for 5 Year Period (Divide Column C by 5)	Population Served by System 10 Years Prior to Current Year	Change in Population During 10 Year Period (Column A – Column E)	Growth Rate for10 Year Period (Divide Column F by 10)

The values in Columns D and G may be positive, meaning the population has increased or they may be negative, meaning the population has decreased over the time period. The values in Columns D and G should also be compared to see if the growth rate has changed significantly between the two time periods. If the 10-year growth rate is higher than the 5-year growth rate, population growth has slowed down. If the 10-year growth rate is lower than the 5-year growth rate, population growth has increased. The system should use the information about the growth rate for 5 and 10 years as a starting point toward estimating future growth. These growth rates and changes in population on the system level can be compared to other population and growth estimates as discussed below.

(B) After determining the growth rate using the system-specific information as described in (A) above, examine other sources of population projections to determine if it is reasonable. For example, population projection information is available from the U.S. Census Bureau, the county, the applicable Council of Government (COG) office, or the Bureau of Business and Economic Research (BBER) at the University of New Mexico, which manages New Mexico census data and provides population projections based on census tracts. Once these sources are examined, a determination can be made as to whether the estimates from the system specific information seem reasonable or whether they need to be adjusted upwards or downwards. In using any of the projected growth rates, whether from the census, from counties, COGs, or BBER, the planners must decide if the reality of growth that has been experienced in the area matches what the projections indicate. For example, if the projections indicate a growth rate of 30% and community leaders know there is no reason to believe this type of growth rate will actually occur, then it should be adjusted to what makes sense for the community. In other words, all growth projections should be given a “reality check” to make sure they really are appropriate for the community.

(C) Any existing households within or near the boundaries of the present water system that may want to hook on to the system sometime within the long-term planning horizon should be considered as part of the future demand, if not already accounted for.

(D) Thus far the projections have considered the growth that will occur in the residential sector. Once this type of growth is determined, the system needs to estimate whether it will see growth in other types of uses, such as commercial, industrial, institutional, golf courses, or other. For example, if it is known that the area is to receive a school or a prison in the next 10 years, the water use for that facility must be considered. Information regarding future growth in these sectors may be obtained through construction permit requests, consultation with the county or local COG, discussions with the New Mexico Economic Development Department, or predictions in economic growth from BBER. Again, it is important for the planners to examine the projections to determine if they truly match reality for the area and to ensure that they are not under or over estimating the growth that may occur in these sectors.

(E) Once the growth rate in all types of customers is determined, the next step is to calculate the projected water use over the long-term planning period. If the system is currently metered and has a clear idea of how much water is used, on average, by residential customers – either by household or individual – use this value to project the future flow. This can be done by multiplying the number of additional households by the household average use or by multiplying the number of additional people by the per capita average use. If the WSS has conservation measures in place, which lowered the per capita residential use, then this amount should be used in the projections. If the system is currently unmetered, an estimate of per household or per capita use may be obtained by looking at similar type systems in the area, or by looking at engineering estimates of household use. In an estimate of household use, residential landscape irrigation should be a consideration if it is a practice in the community.

(F) For the non-residential uses, estimates of future flow may be based on information from specific companies, if the additional customers are known, or may be based on engineering estimates of use from these types of facilities.

(G) Determination of Unaccounted-for-Water (UAW) Losses. Water losses should be quantified for each individual water supply system in the project area. Although some methods described below focus on finished water delivery pipes, water losses can also come from storage tanks, especially underground tanks (counted in UAW) and in raw water delivery systems (not counted in UAW, but should be a consideration in available water supply and conservation measures). Losses that are greater than 10% need to be addressed as stated in Section 5. of this document.

(1) Metered approaches to determine UAW: The approaches described below use "water balance" to determine UAW. Results from these approaches can be further refined by using additional UAW detection methods.

(a) Perform System Water Audit: If the system has individual meters for each connection, meter records can be reviewed to determine how much water has been sold to customers. That amount of water can then be compared to the amount of water pumped (or diverted from surface water) to determine the unaccounted for water loss. The calculation for the percent of unaccounted for water follows.

gallons pumped – gallons sold = gallons unaccounted for

*(gallons unaccounted for) / (gallons pumped) * 100 = % of unaccounted for water*

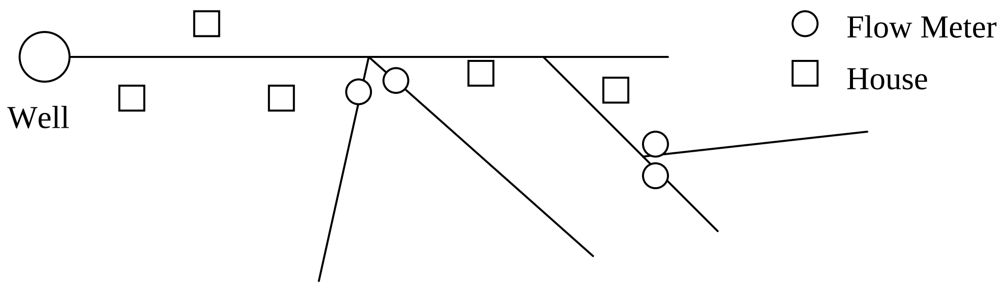
(b) Metering Portions of the System: If the system has a meter at the point(s)-of-diversion, but does not have meters at all individual connections, the system can install meters (either temporary or permanent) to monitor the system. In this case, the calculation below is used.

gallons pumped – gallons metered = gallons unaccounted for

*(gallons unaccounted for) / (gallons pumped) * 100 = % of unaccounted for water*

In this example, the flow must be sufficiently measured such that all water sold is measured at least once. If it is not possible to meter all known uses, an estimate for water use should be made. As an example, a piping network is shown in Case 1. below.

Case 1: Submetering of the entire system



In this case, there are five houses that would not be included in the submetering of the system. Therefore the equation would become the following:

gallons pumped – gallons metered – estimated use by 5 houses = gallons unaccounted for

*(gallons unaccounted for) / (gallons pumped) * 100 = % of unaccounted for water*

(c) Minimum Night Flow Leakage: This method determines the flow rate at a specified time at night, which will typically be the minimum flow during a 24-hour period and the flow that is the least likely to fluctuate. The data set is a subset of full Water System Audit data. Calculations are the same as in (a) above, where gallons pumped or sold are only those measured during the specified time period at night.

(d) Zero-Consumption Measurement: This method is applied to metered sections of a network that can be isolated without a disruption to service. It is accurate only for the tested sections, but can also serve as an indicator for similar portions of the system. Unmetered outlet paths are closed and the supply pressure is maintained through a metered inlet path. Inlet flow and the sum of all metered outlet flows are compared to quantify leakage.

inlet gallons – (outlet 1 gallons + outlet 2 gallons + outlet 3 gallons + outlet 4 gallons + etc.) = gallons unaccounted for

*(gallons unaccounted for) / (inlet gallons) * 100 = % of unaccounted for water*

(2) Hydrostatic Testing: Similar to the test performed when new pipe is installed, a section of pipe is isolated, water pressure higher than normal (within design limits) is applied, and pressure downstream is measured. A loss of pressure indicates a loss of water. During this method, customer connections must be isolated to avoid overpressurization, and pipe repair crews must be present to respond to ruptures that can happen as a result of increased water pressure. Results from the tested section can be assumed similar for portions of the system with similar attributes.

(3) Leak Detection Survey: There are various methods of performing leak detection surveys that result in an estimate of the percentage of water that is lost from the system. Pipe type, location and configuration, as well as the limitations of the leak detection method must be known for best results. The most common type of leak detection survey (acoustic) uses trained personnel and listening devices to hear vibrations that result from water under pressure escaping a hole or crack. Listening devices (detectors) are attached to exposed or accessible portions of the system such as valves, meters, and hydrants, and possibly services or the pipe itself. Computer correlation can be used with acoustic detectors to refine the estimate of underground leak location by calculating where the sound is coming from relative to two detectors that straddle the leak. Other leak detection technology include infrared thermography to find differences in temperature between dry soil and wet soil in the vicinity of the leak, chemical leak location that detects non-water chemicals such as fluoride (for fluoridated water) or selected gases (for empty pipe), and mechanical leak detection where a series of holes is drilled in the ground along the pipe and the hole with the highest level of water is presumed closest to the leak. When applied to the entire system, Leak Detection Surveys can be used as part of comprehensive infrastructure/asset management.

(4) Unaccounted For Water that is Not Actually a Water Leak: There may be water that is not accounted for in the metering but which is not actually water leak. It represents unmeasured water. These types of unaccounted uses are listed below.

  (a) Construction Water Usage: If the project area is undergoing significant development or construction, there may be construction companies using water from hydrants for their projects. If this water use is not metered, it will show up in a system audit as unaccounted loss. This water must be accounted for if it is a large flow because it is not a water leak, it is water not billed. To determine this amount, a temporary meter can be installed at the connection or an estimate can be made.

(b) Water Use by Illegal Connections: Some systems will have illegal connections. The water used by these connections will show up as an unaccounted loss. Efforts should be made to quantify this loss and correct it.

(c) Fire Flow: In case of fires, the water use is often not metered. A water system can coordinate with the local fire departments for an estimate of the use.

(d) Inaccurate Meters: Inaccurate meters can also cause water to be used but uncounted.

To account for these uses, the following equation should be used.

Gallons unaccounted for based on meter records or estimates – construction losses – illegal connections – fire flow –meter inaccuracy = gallons unaccounted for

*(gallons unaccounted for) / (gallons pumped) * 100 = % of unaccounted for water*

(H) Once the UAW estimates have been made, a table similar to the one below should be completed for each water system in the project area using the following assumptions and calculations.

(1) The table will shorten or extend according to the planning horizon selected by the collaborative group.

(2) "5 Years Prior" is the total volume of WSS water produced five years ago.

(3) Figures in the table beyond the current year are calculated using the local demographic and population figures and growth rates obtained in Section 4.1.1. and the Current Water Demand Analysis obtained in Section 3.3.1. The general format of equations will be as follows, where some factors can be borrowed (such as) if they have already been calculated during the Current Water Demand Analysis:

Current water use rate by consumer class may have been calculated during Current Water Demand Analysis. If not, it can be calculated as follows:

current volume of water used by customer class (metered or estimate adjusted for UAW) / number of current units in customer class (population, households, employment, industries, etc.) = current water use rate by customer class

Number of projected units in customer class in selected years may be available from the sources named in Section 4.1.1. If not, it can be calculated as follows:

*number of current units in customer class + [customer class growth rate per year * selected number of years (10, 20, 30, 40, etc.)] = number of projected units in customer class in selected year*

If 10-year growth rates are available, the previous equation can be adjusted by using the growth rate per 10 years * selected number of 10-year increments (1, 2, 3, 4, etc.). If growth rates are available that vary over time (such as with exponential growth or external limits to growth), calculate the increments sequentially, building on each result step-wise.

To fill in the table below, calculate future projected volume of water demand:

*water use rate by consumer class * number of projected units in customer class in selected year = estimated future water demand volume in selected year*

If estimates adjusted for UAW were used in calculating current water use rate by customer class, add 10% to estimated future water demand in selected year to account for future UAW (multiply figure by 1.1).

Table 4-2. Estimated Future Water Demand for Public Water Systems (current use rates)

Category	Water Use in Acre-Feet					
	5 Years Prior	Current Year	10 Years Beyond Current Year	20 Years Beyond Current Year	30 Years Beyond Current Year	40 Years Beyond Current Year
Residential						
Commercial						
Institutional						
Industrial						
Public Irrig (Parks etc)						
Unaccounted for Water						
Totals						

4.1.2. Future Demand for Water Uses Other Than Water Supply Systems

The procedures described above were used to estimate future water demand for all of the water supply systems. The project area may also include water demands from other sectors, such as non-potable irrigation supplies, private wells, and systems not classified as public water supplies (i.e., less than 15 connections and 25 customers.) Because these demands impact the overall availability of the water resource, it is important to understand, to the extent possible, these demands.

(A) The WSS should contact the OSE to ascertain what information is readily available on water use in the project area. This data may include the OSE's 5-year water use report, database information, institutional knowledge or other information pertinent to the project area.

(B) To determine the demand from domestic wells, the water system could conduct a survey to determine usage or could estimate the usage based on an assumed water usage per household multiplied by the number of houses that are not served by known water systems in the project area.

(C) There may be private commercial enterprises or institutional establishments (school districts, universities, prisons, governmental complexes) that use their own water rights. To determine usage of these types of facilities, a survey may be conducted.

(D) Determination of water use for irrigation that is not associated with the WSSs may be very difficult. Possibly, this information may be obtained from the owner/operator of the supply system (such as an irrigation district or Acequias association).

Once the future water demand for non-public water supply systems are estimated, a table such as the one below should be completed. Calculations for future demand will parallel those for Table 4-2. by using the relevant demographic and population figures and growth rates.

Table 4-3. Estimated Future Demand for Water Uses That Are Not Public Water Supplies

	Water Use in Acre-Feet					
Category	5 Years Prior	Current Year	10 Years Beyond Current Year	20 Years Beyond Current Year	30 Years Beyond Current Year	40 Years Beyond Current Year
Residential						
Commercial						
Institutional						
Industrial						
Irrigated Ag						
Livestock						
Totals						

The information from the water supply systems and the non-public water supply uses will provide a complete picture of projected water demand in the project area.

4.2. Defining the Potential Issues

Once the future demand (Section 4.1.) and the available water supply (Section 3.4.) have been estimated, the next step is to define the potential issues regarding whether the available supply can meet the future demand. One method that can be used to determine if there are any issues is to develop Supply and Demand Tables and Graphs for **each** system. These tables and graphs represent the future situation to visually indicate how much of a gap there may be between the amount of water that can be supplied and the amount of water that is needed over the planning horizon.

4.2.1. Supply/Demand Tables

For each system, a table showing Supply and Demand for the long-term planning horizon should be developed. The initial table should reflect the current situation, without adding any new water conservation measures to reduce demand. In Section 5, options for reducing demand are discussed. Additional tables can be created that show how the situation may change with the adoption of various demand management strategies.

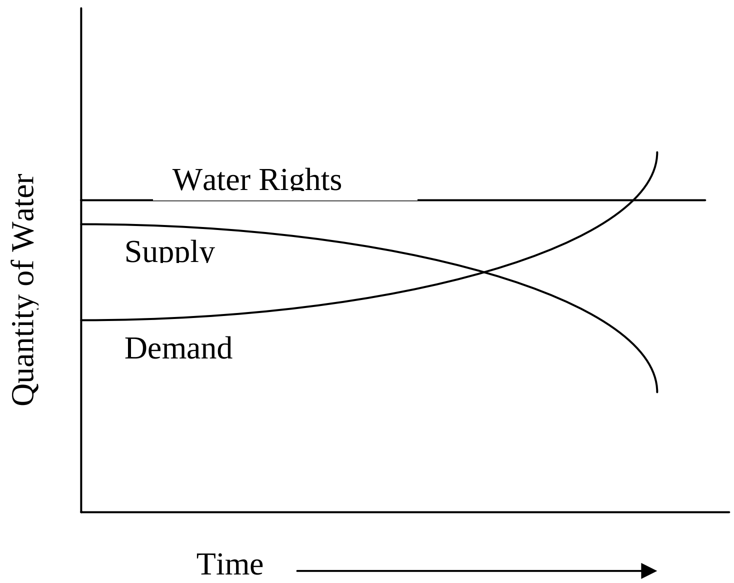
A table similar to the one shown below should be created for each system by adding the information from Tables 4-2. and 4-3. and filling in information collected in Section 3. Following the creation of the tables for each individual system, a table can be created that shows the aggregate situation for the entire project area. This table can include all of the water systems as well as the non-public water supply uses. If reliable data are available, tables and graphs can also be generated for potable and non-potable water use as a tool to determine current efficiencies, shortcomings, or future opportunities for the most efficient use (or reuse, if applicable) of water supplies.

Table 4-4. Total Estimated Projected Demand for Water System

	Water Use in Acre-Feet					
Category	5 Years Prior	Current Year	10 Years Beyond Current Year	20 Years Beyond Current Year	30 Years Beyond Current Year	40 Years Beyond Current Year
Residential						
Commercial						
Institutional						
Industrial						
Public Irrig						
UAW						
Totals						
UAW in %						
Water Rights						
Water Right Surplus or Shortage						
Wet Water (Supply)						
Wet Water Surplus or Shortage						

4.2.2. Supply/Demand Graphs

Once a table is made that shows the current and future situation with respect to water rights, supply, and demand, a graph can be created that shows this information visually. This first graph needs to show the actual situation in terms of supply, rights, and demand, not what the system hopes to do in the future. As discussed above, options for addressing demand management are discussed in the next section.



Graph of Water Supply and Demand

Similar to the tables, one graph should be created for each system and then a graph summarizing the project area should be created. Graphs can also be created to look at scenarios for cooperative agreements.

4.2.3. Supply/Demand Results

In developing the baseline tables and graphs for each water supply system and the project area, it is important to remember that it is not possible to predict with complete certainty what will happen to the supply or how the demand will change over the planning horizon. One approach to address this uncertainly is to make a series of graphs that depict various scenarios. For example, one graph may depict the scenario if there is a sustained drought. Another graph may depict the scenario if there is low growth in the project area, while another may depict the situation if there is a higher growth rate. Each scenario illustrates the gap, if there is one, between water demand and supply and between supply needs and water rights. These graphs do not yet include demand management or supply augmentation scenarios.

The tables and graphs can be used to present information to the public on the need to reduce demand, the need to increase supplies, the need for regionalization, or any combination. The tables and graphs can help the public and elected officials understand the situation and help all parties come to a mutually agreed upon definition of the issues. The project cannot move forward properly if the stakeholders, project planners, and elected officials are not in agreement on the underlying premise.

4.2.4. Map of Future Growth Areas

Once the growth within the project area has been determined, a map or series of maps showing these areas should be created. It should include changes in land use and locations of projected uses.

5. STRATEGIES TO ADDRESS DEMAND MANAGEMENT AND FUTURE SUPPLY

Once the future demand has been estimated and compared to existing water rights and wet water supply, it is necessary to determine what options are available to balance supply and demand. These strategies may include reducing the water user's demand, appropriate preparation for drought conditions, and to seek additional water supplies if needed. The collaborative group should first reduce water user demand before seeking additional supplies. A drought management plan should be prepared for inevitable drought years. The types of strategies that should be used are discussed in the following sections. Flow charts showing the process are included at the end of this section.

5.1. Supply Side (or System Efficiency) Strategies

System efficiency strategies include any activities that are taken to reduce water needs within the water system's pumping and distribution infrastructure.

5.1.1 Unaccounted-for-Water Losses

Many systems have large "unaccounted for" water losses. As discussed in Section 4.1.1., these losses may occur because there are leaks in the system, water metering at the source or houses is not accurate or there may be illegal connections to the system. Some systems may have losses that account for 30% or more of the diversion. An acceptable unaccounted loss is less than 10% of the diversion. If addressed properly, this type of water loss can be significantly reduced and may, in some cases, prevent a water system from having to obtain additional supplies. WSSs that have unaccounted for loss greater than 10% should prepare a plan to reduce their losses to 10%. This plan should include a schedule and budget to investigate loss sources, and a preliminary schedule and budget to take corrective actions, where these activities can overlap if some loss sources are already known. To maintain a system at or below 10% losses, it is useful to prepare a long-term infrastructure/asset management plan.

5.1.2. Demand Management Strategies and Goals

There are several strategies that systems can use to reduce water demand by water users through a variety of water conservation measures and practices. Some strategies address indoor uses, others address outdoor water uses, or both; some can be implemented as local regulations, while others can be achieved through a public education campaign alone. They can involve economic incentives for customers to conserve either by providing rebates for water-efficient plumbing fixtures and appliances or by increasing the cost of water as the amount of water use increases (conservation pricing). Some measures are appropriate for ongoing, long-term water conservation programs; others are more suited for implementation as water use restrictions during droughts.

There are many resources available to assist systems in designing water conservation programs:

- OSE Water Conservation Guidelines for Public Water Supply Systems
- OSE Water Conservation Guidelines for Commercial and Industrial Facilities
- OSE Water Conservation Guidelines for Large Turf Areas
- OSE Guidelines for drought contingency plans
- OSE – A Water Conservation Guide for Public Utilities www.ose.state.nm.us/water-infor/conservation/pdf-manuals/nm-water-mnaul.pdf
- OSE – A Water Conservation Guide for Commercial, Intuitional and Industrial Water Users www.ose.state.nm.us/water-info/conservation/pdf-manuals/cii-users-guide.pdf
- OSE – Analysis of Potential Water Conservation Incentives for New Mexico
- OSE – Water Conservation and Quantification of Water Demands in Subdivisions
- EPA – Water Conservation Plan Guidelines (www.epa.gov/owm/water-efficency/weconguid.htm.

In addition to these resources, there are plans from other New Mexico cities, such as Santa Fe, Albuquerque, and Rio Rancho, and plans from other western cities such as San Antonio, Tucson, Denver, and Boulder that can serve as examples. A list of resources, some of which are accessible through the Web, has been included in the resource section.

Each system in the project area should set conservation goals. The collaborative group may decide to develop one conservation plan for the entire area, especially if a decision is made to form one regional water entity.

(A) Setting Goals: The first step is to set goals (targeted water demand reduction) and devise one or more strategies to meet these goals. Once the goals are decided upon, describe the basis for the development of the goals and a time frame for achieving the goals. The plan should consider what actions will be taken by the system(s) if the goals are not met.

Potential goals might include the following:

(1) Percent reduction in per capita water use and targeted per capita use. Goals for per capita water use at residential service connections may be determined using the procedure described in Office of the State Engineer Technical Report 48 entitled ***Water Conservation and Quantification of Water Demands in Subdivisions***, online at http://www.ose.state.nm.us/publications/tech_rpts/rpt-48/rpt-48-toc.html. This procedure includes a basic water requirement for indoor domestic use (which may be adjusted to reflect improvements in the water use efficiency of plumbing fixtures and appliances) plus water requirements for evaporative cooling, water softening, and landscape irrigation based upon local climatic conditions and water quality;

(2) Percent reduction in total annual use and targeted limits in total volume (acre-feet) of water used. While end-use water conservation measures may reduce the

amount of water used at an individual service connection, the number of connections and population served may continue to rise, increasing the aggregate demand on the water supply and the rate at which nonrenewable sources are depleted.

(3) Eliminating, downsizing, or postponing the need for capital projects;
(4) Improving the utilization and extending the life of existing facilities;
(5) Educating customers about the value of water;
(6) Protecting and preserving environmental resources;
(7) Improving reliability and margins of safe and dependable yields;
(8) Avoiding new source development and costs.

(B) Existing Water Conservation Measures: The water system should provide a description of water conservation measures that have already been implemented including how each conservation measure was implemented, the methods used to evaluate the effectiveness of each measure, and an estimate of existing water use savings and the effect of such savings on the ability to further reduce demands. The existing conservation measures' ability to meet the goals set in the previous step (5.1.2. (A)) should be discussed. If the current measures will meet the goals, no new conservation measures may be required. If they will not, then additional measures may be required.

(C) New Water Conservation Measures: If the existing water conservation measures will not meet the goals set or if the system did not have a water conservation program, new or additional water conservation measures should be implemented to meet the goals. The collaborative group (or WSSs individually) should describe the new water conservation measures that are scheduled for implementation including how each will be implemented, the methods that will be used to evaluate the effectiveness of each measure, and estimated water use savings. Recommended conservation measures, include, but are not limited to, the following.

(1) Requirements in new construction, remodels, and expansions for water-efficient plumbing fixtures (e.g. toilets, urinals, showerheads, and faucets) and appliances (e.g. dish washers, clothes washers, water softeners, and air conditioners),
(2) Low-water-use landscaping and efficient irrigation systems. Training of landscape maintenance personnel to encourage efficient irrigation,
(3) Water-efficient commercial and industrial water-use processes,
(4) Water reuse systems for both potable and non-potable water,
(5) Dissemination of information regarding water-use efficiency measures, including public education programs, demonstration of water-saving techniques, and in-school education programs for children,
(6) Water rate structures designed to encourage water-use efficiency and reuse in a fiscally responsible manner. Rate structures may include uniform commodity rates, increasing block rates, and seasonal rates (e.g. summer surcharges). A water bill that separates water and sewer charges, shows rates for each block of water, and shows historical water use information is useful so customers can make informed choices and monitor effects of their own conservation measures,
(7) Incentives to implement water-use efficiency measures for existing devices and developed property, such as rebates to encourage the installation of low-flow

plumbing fixtures and appliances, and rebates to convert to low-water-use (xeriscape) landscapes,

(8) Metering, which should include:
   (a) All points of diversion used by the WSS, if not already metered,
   (b) Installation of meters at all import or export points, customer service connections, and public landscape irrigation sites including self-supplied athletic fields, golf courses, parks, and greenbelts,
   (c) When systems are metered, a rate structure can usually be implemented that provides incentives to reduce use, and
   (d) A program for meter testing, repair, and replacement. Customers using more than 10,000 gpd should be a high priority for meter calibration,

(9) Pressure reduction in the distribution system and at service connections to reduce waste,

(10) Irrigation management information system (IMIS) to determine when to irrigate and how much water to apply at public landscape irrigation sites such as golf courses, athletic fields, parks, greenbelts, schools, and civic centers,

(11) Water waste ordinances.

(D) Water Conservation Plan Implementation and Enforcement: All water conservation plans should include a means of implementation and enforcement, which may be evidenced by:

(1) Copies of rules, regulations, resolutions, or ordinances that provide proof that the water conservation plan has been officially adopted by the WSS(s) or applicable governmental bodies,

(2) A description of the authority by which the water supplier or applicable governmental bodies will implement and enforce the conservation plan.

(E) Record Keeping and Progress Report: A progress report should be submitted to the State Engineer every three years. These reports should include:

(1) A process evaluation to measure the effectiveness of program implementation methods. Process evaluation can provide important information that can be used to modify and improve the program. A process evaluation report should include at minimum:
   (a) Program incentives, customer contact modes, number of contacts with target population, number of devices installed, number of landscapes converted to xeriscape, number of services performed, customer satisfaction,
   (b) Program costs including administration, equipment purchases, printing, mailing, office supplies, labor, and publicity,
   (c) Evaluation of adequacy of data tracking,
   (d) Identification of problems which have occurred and how these problems have been or will be resolved, and

(2) An impact evaluation to measure the changes in water use that are clearly attributable to the conservation program.

5.2. Drought Contingency Strategies

The following is adapted from ***A Water Conservation Guide for Public Utilities***, published by the New Mexico Office of the State Engineer, March 2001, pp. 134–138. EPA also maintains drought resources under its Water Use Efficiency Program http://www.epa.gov/OW-OWM.html/water-efficiency/drouhome.htm.

5.2.1. Planning for Drought

Recurring drought is a natural part of New Mexico's arid climate. Drought, which is defined as prolonged period of below-normal rainfall, can have a widespread impact on communities—especially if those communities have not prepared for periods of drought. A water supply system that has adequate supplies during normal years may not have adequate supplies as a result of droughts.

If the area does not already have a drought contingency plan, the following procedure may be used to develop a plan to mitigate the negative effects of drought. If a plan already exists, it may need to be updated, as appropriate, to agree with elements of the long-term water resource plan and/or water conservation plan.

5.2.2. Developing a Drought Action Plan

Preparations can be made so that the effect of water shortages caused by drought can be minimized.

- (A) Drought Task Force: Form a Drought Task Force and define its structure and membership. The responsibilities of the Drought Task Force must be clearly defined, and will typically include:
  - (1) Supervising and coordinating the development of the plan,
  - (2) Public education,
  - (3) Monitoring reservoir levels, groundwater levels, and precipitation to estimate water shortages,
  - (4) Assessing the impact of shortages on each customer class and the economic livelihood of the community,
  - (5) Coordinating the implementation of drought mitigation actions, and
  - (6) Monitoring compliance.
- (B) Drought History: Develop a drought history, which is a chronological history of droughts in the project area.
- (C) Identification of Supply Constraints: Identify constraints affecting ability to meet water demand. These will include limits on supply and limits on system capacity of each WSS.
  - (1) Limits on Supply: What are the limits on the area’s sources of water such as stream diversions, reservoir levels, aquifer yield, and water supply contracts? Refer to information gathered in Section 3. above to review the information relative to wet water supply.

(2) Limits on System Capacity: What are the limits on production, treatment, storage, and distribution capacity?
(3) Examination of Additional Supply Options: Determine if the available supply is the limiting factor in meeting demand during drought conditions. If it is, it is necessary to evaluate supply augmentation options. In the event that a WSS is close to exhausting its water supplies entirely, it will be necessary to plan for emergency supplies. These supplies can come from neighboring communities, ranches or other uses and typically require lease agreements and development of emergency infrastructure.

(D) Identify Necessary Infrastructure Improvements: If system capacity is the limiting factor in meeting demand, identify the critical system components that are vulnerable to failure or need to be enlarged or upgraded to meet the projected peak demand. Evaluate the feasibility of making infrastructure improvements and rank each option based on (1) feasibility of implementation and (2) effectiveness in increasing capacity.

When evaluating the effectiveness of a proposed change, the relationships between system components must be considered. For example, increasing pumping capacity at the source of supply will not increase the amount of water that can be delivered to customers if the treatment plant or distribution mains cannot handle the increased flow rate.

(E) Define Criteria that will Trigger Drought Responses: Define trigger criteria that will determine the level of response required based upon the severity of drought. Acceptable triggers include the Palmer Index, precipitation, reservoir/lake storage, streamflow, groundwater levels, soil moisture, or any combination of these parameters. Criteria for the phase out or a downgrade of the condition's severity should also be considered. The following are examples of trigger conditions that might be used for various levels of severity.

(1) Phase 1 Trigger: Water Shortage Advisory: Snow pack, precipitation, stream flows, and reservoir levels are only 70% of normal,
(2) Phase 2 Trigger: Water Shortage Watch
    (a) Water demand has reached or exceeded a specific percentage of the firm capacity of the system,
    (b) Reservoir or well levels are still high enough to provide an adequate supply, but the levels (specify level) are low enough to disrupt some other beneficial activity, such as recreation,
    (c) The water supply is still adequate, but the reservoir or well levels are low enough that there is a possibility that the supply situation may become critical if the drought or emergency continues. An example is if no more rain occurs for a reservoir that has a 4-month supply in storage, or a well that has dropped to a specified level,
(3) Phase 3 Trigger: Water Shortage Warning
    (a) Water demand has reached the predetermined limit of the system, beyond which the failure of a pump or some other piece of equipment could cause a serious disruption of service to part or all of the system. An example

might be that daily demand has exceeded 90% of the capacity of the system for three consecutive days,

(b) Reservoir levels, well levels, or stream flows have reached the second impact level, beyond which operational problems will occur,

(c) Water supply storage levels have declined to the second impact level, and

(4) Phase 4 Trigger: Water Shortage Emergency

(a) The imminent or actual failure of a major component of the system has occurred that will cause an immediate health or safety hazard,

(b) Water demand has reached or exceeded the third impact level. An example might be that demand exceeds the system's capacity on a regular basis, thereby presenting the imminent danger of a major system failure,

(c) Reservoir levels, well levels, or stream flows have declined to the third impact level. An example might be that reservoir levels (specify a level in feet above mean sea level) are so low that diversion or pumping equipment will not function properly,

(d) Water levels in the distribution storage reservoirs are too low to provide adequate fire protection.

(F) Specify Actions To Be Taken: Define the level of response and actions that will be taken in each phase. The following are examples of actions that might be taken for various levels of severity.

(1) Phase 1 Response: Voluntary Conservation

(a) Provide the public with information on current storage levels in reservoirs and stream flows and the long-range forecasts for precipitation. Alert water customers to the possibility of implementing mandatory conservation measures if drought conditions persist,

(b) Inform the public by mail and through the news media of ways they can and should try to reduce their water use,

(c) Inform the public daily whether they can or cannot water their landscapes,

(2) Phase 2 Response: Mandatory Conservation — Level 1

It is important that the water utility take a lead role in setting an example on efficient water use. Before the utility can expect cooperation from its customers, it must put its own house in order. The utility can demonstrate its intent to improve the efficiency of operations by pursuing any or all of the first three actions as follows.

(a) Reduce flushing of water mains, sewers, storm drains, and streets to the minimum necessary to maintain sanitary conditions,

(b) Reduce frequency and duration of irrigation at public landscape sites such as golf courses, athletic fields, parks, cemeteries, and greenbelts. Adopt irrigation schedules based on the results of water audits, if available,

(c) Impose a mandatory landscape-watering schedule such as alternate day sprinkling and restrictions on time of day for watering,

(d) Prohibit nonessential water uses such as ornamental fountains; pool filling; car, bus, and heavy equipment washing; washing and steam cleaning of building exteriors,

(3) Phase 3 Response: Mandatory Conservation—Level 2: In addition to the above:

(a) Implement a special pricing structure,

(b) Distribute water-saving plumbing fixture kits,
(c) Curtail irrigation at athletic fields, parks, cemeteries, and greenbelts,
(d) Curtail fairway irrigation at all public and private golf courses,
(e) Reduce watering of tees and greens to a minimum,
(f) Prohibit all outdoor water use,

(4) Phase 4 Response: Rationing
In addition to the above, limit the amount of water each customer can use and take legal action as needed to achieve compliance. For example, restrict residential water users to 45 gallons per capita per day and require a percentage reduction by commercial, institutional, and industrial users.

(G) Establish a Public Education Program: No drought plan will be successful without a comprehensive public education program. EPA states, “It has been repeatedly proven that the success of drought management depends most on the understanding and support of the users and the public.” Customers must understand why their cooperation is needed before they will sacrifice water uses. OSE and EPA both have some public education materials available for water conservation and drought management.

Customers must also be instructed in how to conserve. Often they are willing to cooperate but do not know how. The utility's credibility is crucial to the success of any drought program. Customers must believe that the utility is an authority on the drought situation and that the emergency action programs are necessary and effective. To maintain credibility, the utility must be consistent:
(1) Each spokesperson must report the same data or advice,
(2) Each education effort must be coordinated,
(3) Programs should proceed without major changes.

(H) Establish Implementation Procedures: Procedures for the implementation of the emergency action plan should define when and how customers, other utilities, and government agencies are informed that the emergency action plan is going into effect. Procedures may include:
(1) Automatic regulatory implementation provisions,
(2) Prearranged media notification or press release procedures,
(3) Direct notification procedures including mail or, if needed, telephone notification systems,
(4) Prearranged contract procedures to obtain emergency water supplies from other sources, if needed,
(5) Checklists or operating procedures, as necessary.

(I) Establish Procedures for Termination Notification: The termination of water restrictions procedure should define when and how customers and others are informed that the emergency has passed and the program is being shut down. The establishment of termination triggers and the decision to terminate must be based on sound judgment by appropriate municipality or utility authorities.

(J) Obtain Legal Authority: Obtain the required legal authority and regulatory permits for implementing the individual measures in the emergency action plan. It is generally advantageous to adopt an ordinance or regulation providing authorization to a designated official to begin immediate implementation of contingency measures when a trigger condition is reached.

Prepare (one) memorandum- (or more) memoranda-of-agreement (MOA), and contracts as needed, with all agencies that will be players in the implementation of the drought action plan so that the role of all participants is clearly understood. Because verbal agreements are easily forgotten or compromised by changes in priorities or personnel within an agency, agreements must be documented in writing to ensure that they will be honored in time of need.

5.3. Watershed Management

Watershed management focuses on strategies to increase the yield of supply from the recharge areas in a watershed. The yield from a watershed can be impacted by the type of vegetation and management practices that are used in the recharge area. Therefore, this is another option that the communities in the same watershed should consider.

5.4. Source Water Protection

Source water protection is a program in which systems undertake activities or best management practices to try to prevent contamination from entering the water supply. While this program by itself will not increase supply or decrease demand, it may protect the limited supplies that are available and help ensure that those supplies are available over the long term. There are many resources available to assist systems in developing a source water protection plan. NMED's Drinking Water Bureau may be consulted to learn more about this program.

5.5. Regional Solutions to Address Supply Needs

WSSs that are in close proximity have opportunities to address their supply needs on an area-wide basis. There are several options available, which are discussed below. The type of solution will depend on the systems' needs in terms of supply and water rights and the systems' willingness and ability to work together.

5.5.1. Cooperation to Address Drought Needs

If the WSSs will have difficulty meeting their supply needs during times of drought, they can agree on some type of cooperation to address the drought. For example, the WSSs may set up interlocal agreements (contracts) to interconnect or set up leasing agreements.

5.5.2. Physical Interconnection of Systems

Systems can choose to remain autonomous entities but agree to share supply or storage capabilities. In this case the systems can connect pipes from one system to another or use a common storage facility. It is also possible to have one system provide water to another system. This option is desirable when one or more water systems in the project area have greater supplies than needed while other systems have less water than they need. The supply/demand graphs of

Section 4.2. can assist in evaluating options. Important considerations under this scenario include:

(A) Legal issues,
(B) Sustainability of supplies,
(C) Cooperation between entities and agreements required,
(D) Rate structures.

5.5.3. Managerial Cooperation Between or Among Systems

If it is not possible to physically interconnect the systems or if systems choose not to, they may wish to have a managerial cooperation rather than a physical one. In this case, the systems may do planning together, share an operator, do billing jointly, have a joint rate structure, have a single water conservation program and drought management strategy, or have a single board with multiple systems. Managerial cooperation can be as sophisticated or as simple as the systems wish. The main goal with managerial cooperation would be to achieve a greater degree of control over the area's water resources than individual systems have themselves, and it may also minimize duplication of effort and related expenditure of financial resources.

5.5.4. Formation of Area-Wide Water System

One option available to the WSSs in the project area is to form an area-wide or collaborative water system. This system can replace the existing WSSs with a new entity. Considerations in forming a water system include:

(A) Metering and measuring of all diversions and uses: The regional entity needs to have a plan to meter or measure all diversions for the entire system,
(B) Integration of storage capacity: The regional entity needs to have a plan to integrate the storage capacity of the entire system and to manage the storage capacity for the benefit of all,
(C) Integration of operation utilizing SCADA systems to the maximum extent: If the systems adopt a SCADA system that allows automated control over facilities, the efficiency of the system may be increased,
(D) Identification of long-term water supply for the system: The collaborative entity must have a plan for the long-term supply for the entire system,
(E) Obtaining the necessary permit(s) from the State Engineer,
(F) Planning for future SDWA rule impacts: Depending on the quality of supplies and their compliance with upcoming SDWA rules, the collaborative system may choose to manage the supplies to reduce impacts. For example, one well may have high arsenic levels while another does not. The collaborative system may take the high arsenic well off-line or may blend supplies to meet the regulation.
(G) Equitable distribution of water supply throughout the system: When the collaborative system is formed, it is necessary to ensure that there is an equitable distribution of supply to all customers in the system. There should not be sections of the system that do not receive adequate supply,

(H) Conceptual design for conveyance system integration to optimize use of existing infrastructure and decrease need for infrastructure expansion: One of the goals of the collaborative system should be to maximize the use of the existing infrastructure that each system currently has. The collaborative system should not pursue obtaining additional infrastructure until it is sure that the existing systems cannot supply all the facilities needed, and

(I) New or Expanded Regulations: Subdivision, land use, and development regulations and guidelines for county or municipal adoption should link development to efficient water use (including draft land use and subdivision ordinances; building code revisions; reclaimed water, rainwater collection, water reuse, and related codes or guidelines; etc.). The collaborative system can pursue regulations and guidelines that ensure the efficient use of water resources in the area.

In addition to addressing water resources in a collaborative fashion, the **wastewater** systems located within the project area may also examine opportunities to collaborate or form some type of joint system or coalition to address wastewater needs in an environmentally beneficially manner.

5.6. Management and Governmental Structures

There are management and governmental structures to consider as part of a cooperative or area-wide collaborative water system. These considerations include:

(A) Collaborative Organizational Documents: If the WSSs decide to create a formal collaborative system, organizational documents will need to be developed. These documents may include articles of incorporation, bylaws, joint powers agreements, mutual aid agreements, memoranda of understanding, or other appropriate documents. The specific documents required will depend on the type of collaborative arrangement the systems want to form.

(B) Individual System Documents: Depending on the form of collaboration, some or all of the individual water systems may retain or lose their identities as separate water systems. If the systems retain a separate identity, they will need to have their own organizational documents, including articles of incorporation, bylaws and other organizational documents.

(C) Cost Sharing Agreements: If the systems join in some manner to form a new identity, they will need to develop a means to share costs equitably among all water systems and their respective customers. These costs include any capital costs required to build new facilities for the new entity or any of the individual water systems, as well as the routine operation and maintenance costs.

(D) Rate Setting Strategies: If the water systems retain their own separate identities, rates will need to be set or revised to include all of the strategies for demand management, drought management, and supply augmentation. Rates can be set using available computer programs or the system can contract with an outside professional to have the rate structure developed. One program that is free to water systems is called Show-Me Ratemaker. It was developed by Missouri's Department of Natural Resources and is available free on the internet (see Section 8.) Another option available in some cases is to work with one of the non-profit technical assistance providers, such as New Mexico Environmental Finance Center, Rural Community Assistance Corporation, and New Mexico Rural Water Association.

If the systems form a new entity that combines some or all of the systems, a rate structure will need to be developed for the new entity. In this case, the rate must include all of the expenses for all of the water systems in the new entity and should consider the cost sharing arrangements discussed in (C) above. The Show-Me Ratemaker or other software may be used to set the rate for the new entity, the entity can contract with a professional to develop the new rates or they may work with one of the non-profit technical assistance providers. Appendix B. has a table of preliminary information that must be collected in order to develop a rate.

(E) Financing Plan: A financing plan will need to be developed to identify funding sources for individual systems or the collaborative entity. The strategy should indicate the specific items that will need to be funded and the source of the funding. The plan should consider all funding that will need to be obtained during the long-term planning horizon. The plan should also consider how the system(s) will adjust rates to accommodate the future funding.

(F) Integrated Planning Documents: As part of the long-term planning process, systems had to consider conservation and drought management as individual systems and as a collective. The collaborative entity will need to have a complete set of planning and operational documents to describe how the system will operate in the future. If a collaborative entity is not formed, then these documents will need to be developed for each individual water system in the project area.

(1) Water conservation plan,
(2) Drought management plan,
(3) Watershed management plan,
(4) Emergency response plan,
(5) Best management practices,
(6) Infrastructure/Asset management plan,
(7) Operation and maintenance manual.

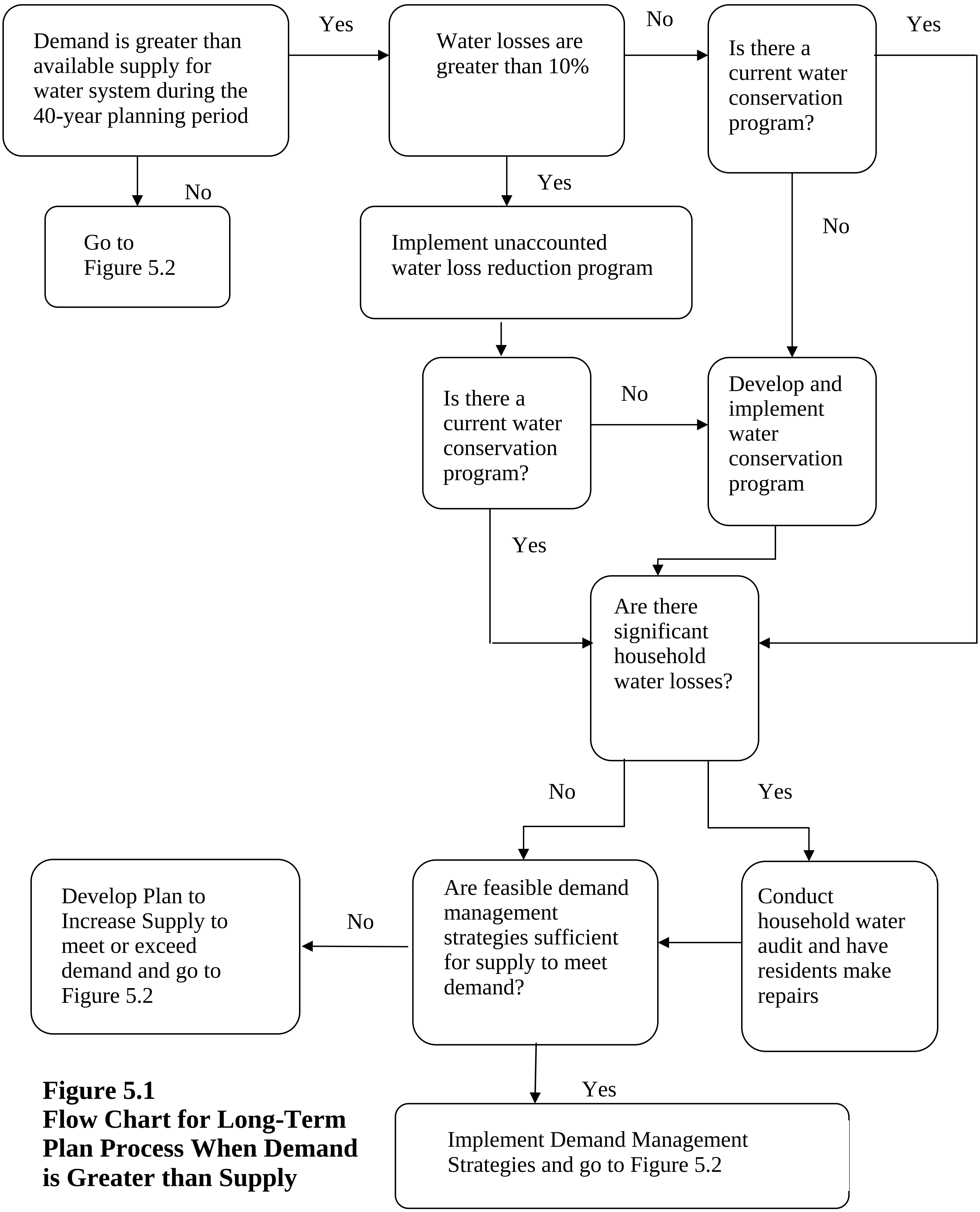


Figure 5.1
Flow Chart for Long-Term Plan Process When Demand is Greater than Supply

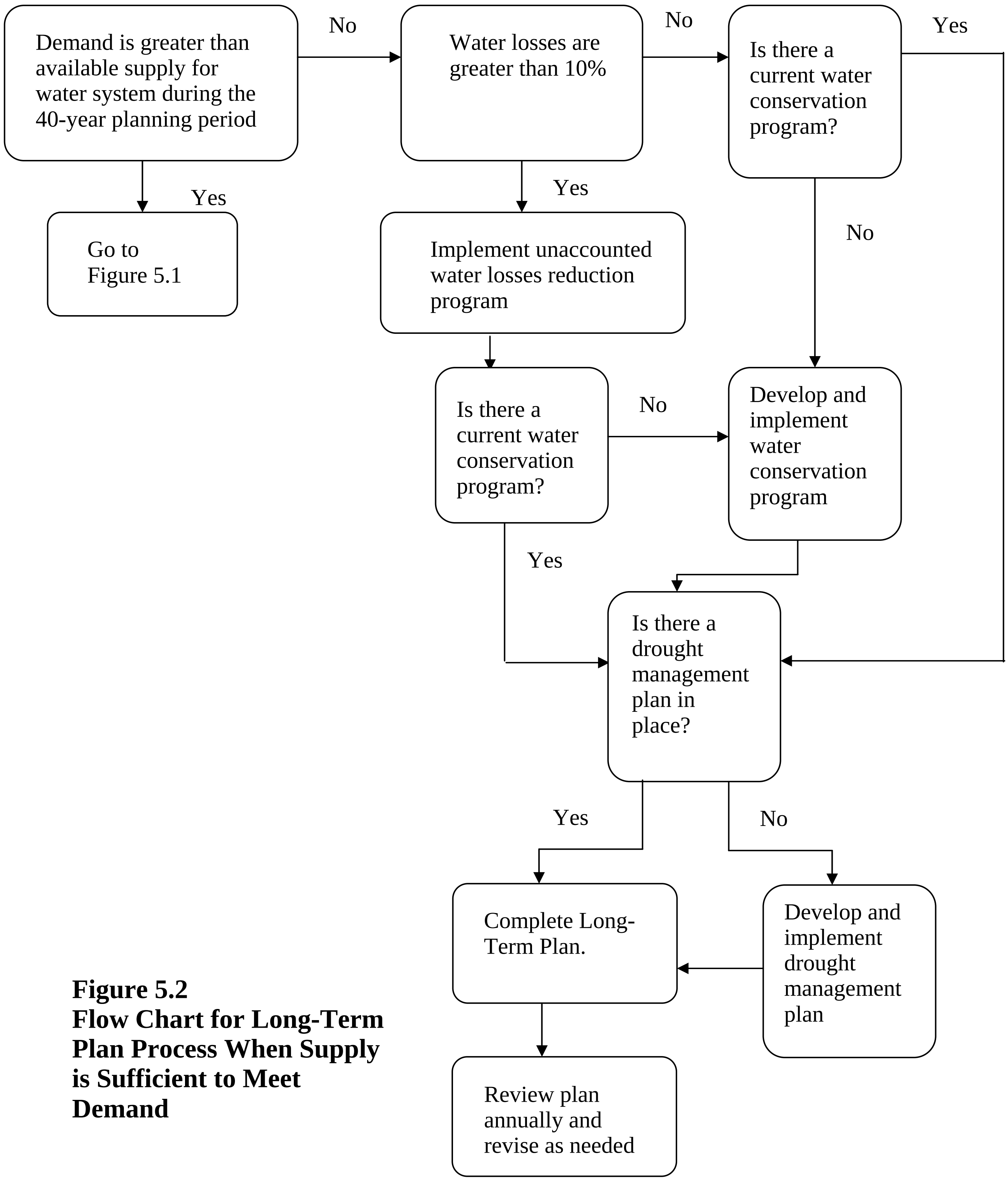


Figure 5.2
Flow Chart for Long-Term Plan Process When Supply is Sufficient to Meet Demand

6. SELECTED ALTERNATIVE

Based on the projected demand, identification of various alternatives, and the public involvement process, an overall plan to address the needs of the area can be developed. The plan should state the goals of each activity, the required implementation strategy, and the consequences or actions to be taken if the goals are not achieved. The plan should also include a funding strategy for any capital expense items.

6.1. Demand Management Activities

The first activities that should be discussed in the plan are those that will address demand management. These activities will reduce the overall use of water and may eliminate or reduce the need to seek additional supplies. The following information should be provided for this section.

(A) Activity (e.g., water conservation strategy),
(B) Goal/ Targeted reduction,
(C) Public involvement/public outreach needed to achieve goal,
(D) Method of enforcement, if applicable,
(E) Alternative action if goal is not met,
(F) Time frame/schedule,
(G) Cost of implementation,
(H) Source of funding, and
(I) Needed actions to achieve implementation (e.g., vote of the Board, passage of an ordinance).

At the end of this section there should be a summary indicating the total amount of water expected to be saved using demand reduction alternatives. If activities are scheduled to be phased in over time, summarize the total amount of water expected to be saved in 5- to 10-year increments.

6.2. Drought Contingency Plan

This section of the plan should describe the drought contingency plan that will be used by the WSS or collaborative water systems to meet the needs during drought conditions.

6.3. Water Supply Augmentation Activities

Water supply augmentation should only be undertaken if implementation of all feasible demand reduction and cooperative strategies will not achieve sufficient water savings to meet demand. If supply augmentation is deemed necessary for the area or any WSS in the area, new water supply alternatives should be discussed. The following information should be included about the new water supply alternatives.

(A) Recommended source of supply,

(B) Water rights requirements,
(C) Cost of obtaining additional supply and water rights,
(D) Source of funding,
(E) Time frame/schedule of activities in developing supply,
(F) Public involvement/public outreach associated with additional supply,
(G) Legal requirements to achieve new supply.

6.4. Supply and Demand Tables and Graphs

As described in Section 4, Supply and Demand tables and graphs should be developed and compared to the initial tables and graphs to show the effect of the demand management, cooperative, and supply augmentation activities. The graphs and tables should indicate the ability of the selected alternatives to meet the future needs.

7. IMPLEMENTATION OF SELECTED ALTERNATIVE

Once a set of strategies to balance water demand and supply are selected, the next step is to address the implementation of the strategies. Public outreach and involvement is a key component of successful implementation.

7.1. Implementation Plan

An implementation plan should be created to describe the activities that need to take place to achieve the goals. The components of the plan include, but are not limited to the following.

(A) Listing of the Goals of the Plan: In this portion of the plan, the goals that the project hopes to achieve in terms of demand management and increased supply over the planning horizon should be described.
(B) Description of Selected Strategies to Meet Future Needs: In this portion of the plan, the various strategies that will be used to meet the future needs should be fully discussed.
(C) Government or Organizational Changes Needed to Implement the Selected Alternatives: If the systems in the project area are forming some type of collaborative or area-wide water system, the plan must address the governmental or organizational changes that will be required to create the collaborative system. This section should include a description of who will complete the required activities and the time frame of completion.
(D) Water Rights: The implementation plan must address water right implications. Statutory requirements administrated by the OSE should be identified. Once identified, appropriate permit applications should be submitted to the OSE.
(E) Financial Plan: The financial plan to obtain the needed funding, including adjustments to rates, should be fully described. This funding can be phased to meet future needs as the plan is implemented.
(F) Actions if Goals Not Met: Some demand management activities fall outside the direct control of the water systems. Some of these activities require customers to change patterns of use that the system does not have direct control over. The implementation

plan should include a contingency plan to describe the actions that will be taken if the goals for the demand management and cooperative components of the long-term plan are not met. This section should also describe what actions will be taken if the drought management plan does not achieve its goals or if the supply alternatives do not meet projected needs.

(G) Schedule: The implementation plan should include a schedule indicating when particular components of the overall long-term plan are going to be implemented. The schedule should also include milestone dates for when particular goals are expected to be met.

(H) Regional Cooperation Requirements: In order for the long-term plan to meet the needs of the project area, regional cooperation will be required. This cooperation will include such items as the involvement of individuals in the project area who are not connected to any of the water systems, the involvement of other sectors of water use (agricultural, industrial, commercial), acceptance by local elected officials, and acceptance by the general public. The cooperative process and expectations for future cooperative process (at minimum to review and update the plan in the future) can be summarized in the implementation plan.

(I) Future Updates and Reviews: A long-term plan is necessarily predicting the future well beyond what is clearly known. Therefore, the plan must be reviewed periodically and updated and revised as necessary to meet changing conditions or changing needs. The review ideally should be done annually, but no less than every five years. Necessary capital expenditures within the current five-year period should be included in the community's Infrastructure Capital Improvement Program (ICIP) plan that is submitted to Local Government Division of the Department of Finance and Administration.

(J) Reporting Results: The water supply systems or collaborative water system (if the systems form a new entity) should develop a report on a regular basis to distribute to their customers and elected officials of the progress that has been made on achieving the goals of the long-term plan. The report could be delivered at an annual meeting of the water system or at a city council or county commission meeting. Copies of the report can be made available at public locations such as City Hall, libraries, recreation centers, etc.

7.2. Public Involvement in Implementation

The public involvement process was described in Section 2. The public must be included in decision-making prior to the development of an implementation plan. Continued public involvement during implementation and throughout the planning period should be described.

8. AVAILABLE RESOURCES

1. Office of State Engineer – Web Address:
http://www.seo.state.nm.us/ or http://www.ose.state.nm.us/

2. Office of the State Engineer "Technical Report 48: Water Conservation and Quantification of Water Demands in Subdivisions" – Available on the web at the following address:
http://www.ose.state.nm.us/publications/tech_rpts/rpt-48/rpt-48-toc.html

3. Office of the State Engineer "A Water Conservation Guide for Public Utilities" – Available on the web at the following address: http://www.ose.state.nm.us/water-info/conservation/pdf-manuals/nm-water-manual.pdf

4. State Water Plan - Available on the web at the following address:
http://www.seo.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf

5. Regional Water Plan Guidance Document – Available on the web at the following address:
http://www.seo.state.nm.us/doing-business/water-plan/rwp-handbook.html

6. Regional Water Plans – The regional water plans are available at the following web site:
http://www.seo.state.nm.us/water-info/NMWaterPlanning/RegionalPlans.html

7. Regional Geographic Information System – GIS base data available
http://rgis.unm.edu/

8. New Mexico Environment Department Drinking Water Bureau – Information on the NMED Drinking Water Program is available at the following web site:
http://www.nmenv.state.nm.us/dwb/dwbtop.html

9. EPA Water Conservation Plan Guidelines – Available on the web at:
http://www.epa.gov/owm/water-efficiency/wecongid.htm

10. The Bureau of Business and Economic Research at the University of New Mexico has data available on the web at:
http://www.unm.edu/~bber/

11. Texas State Energy Conservation Office – Suggested Water Efficiency Guidelines for Buildings and Offices – Available on the web at:
http://www.seco.cpa.state.tx.us/waterconservation.pdf

12. Kansas 1990 Municipal Water Conservation Guidelines – Available on the Web at:
http://www.kwo.org/Reports%20&%20Publications/conservation_guidelines.htm

13. Pennsylvania Guidelines For Designing A Water Conservation Program – Available on the Web at:
http://www.dep.state.pa.us/dep/subject/hotopics/drought/emergrules/wc_guide.htm

14. Virginia Department of Health, Water Conservation Information – Guidelines and other information available at the following web address: http://www.vdh.state.va.us/dw/wtr_conservation.asp

15. The Show-Me Ratemaker Program is available on the web through the following address: http://www.dnr.state.mo.us/oac/emiapps.htm. Additional information for water and sewer systems, such as ordinances and planning documents are also available at this address.

16. Smith, Lawrence A. et. al., "Evaluating Network Integrity," and "Location of Leaks and Breaks." *Options for Leak and Break Detection and Repair of Drinking Water Systems*. Battelle Press, Columbus OH, 2000. pp. 47-90.

17. New Mexico Rural Water Association – Web Address: http://www.nmrwa.org/

18. American Water Works Association – Web Address: http://www.awwa.org/. AWWA publishes standards, manuals, and resources – including topics such as leak detection and control, water conservation, water resources planning, and infrastructure management, among others. Bookstore online at: http://www.awwa.org/bookstore/. AWWA also manages a water and wastewater utility benchmarking program called QualServe; participation and selected system-specific result reports are free to utilities.

19. New Mexico Municipal League – Web Address: http://www.nmml.org/

20. Local Government Environmental Assistance Network toolbox online at: http://www.lgean.org/html/toolbox.cfm. The tools (interactive software or documents that require user input) are designed to help users perform operations and calculations necessary to fulfill environmental reporting requirements or guide the development of a helpful environmental program.

9. ACRONYMS AND ABBREVIATIONS

BBER	Bureau of Business and Economic Research
CCR	Consumer Confidence Report
CIP (ICIP)	Capital Improvements Plan/Program
COG	Council of Government
DBPR	Disinfection By-Product Rule
DW	Drinking Water
DWB	Drinking Water Bureau (NMED)
EPA	(United States) Environmental Protection Agency
GIS	Geographic Information System
GPM	Gallons Per Minute
GPCD	Gallons Per Capita per Day
GPD	Gallons Per Day
GW	Groundwater
ICIP (CIP)	Infrastructure Capital Improvement Plan/Program
IMIS	Irrigation Management Information System
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
MOA	Memorandum Of Agreement
NMED	New Mexico Environment Department
NMSA	New Mexico Statues Annotated
NPDES	National Pollutant Discharge Elimination System
OSE	Office of the State Engineer
PPB	Parts Per Billion
PPM	Parts Per Million

RBC	Rotating Biological Contactor (wastewater treatment)
RGIS	Regional Geographic Information System
S	Storage coefficient (groundwater)
SCADA	Supervisory Control and Data Acquisition
SDWA	(United States) Safe Drinking Water Act
SEO	State Engineer Office
T	Transmissivity (groundwater)
TMDL	Total Maximum Daily Load
UAW	Un-Accounted for Water
WATERS	Water Administration and Technical Engineering Resource System (OSE database)
WSS	Water Supply System
WQ	Water Quality
WW	Wastewater

Appendix A

APPENDIX A
BACKGROUND INFORMATION COLLECTION TEMPLATE

Date:				
Completed by:				
Water System Description				
Project Area				
County				
Name of Water System				
PWS ID #				
Contact Name				
Contact Address				
Contact Phone #				
Governance Structure (municipal, mutual domestic, co-op, etc.)				
Water System Category	Public	Private	State	Federal
Classification of Water System	CWS	NTNCWS	TNCWS	
(??)				
Certified Operators (Name and Certification Level)				

Service Area Description

Service Area	Current	1 year ago	5 years ago
# of Connections			
Estimated Service Population			
% Metered			
Average Monthly Household Use			
Per Capita Water Use			

Sources

Source Type	
# of Points of diversion	
Type of Sources (groundwater, surface water, etc.)	
Points of diversion that have been abandoned in the past (i.e., well that no longer produces, abandoned surface water diversion)	

Groundwater Sources

Wells	Well #1	Well #2	Well #3	Well #4	Well #5
Diameter of Casing					
Well Depth					
Pump Depth					
Pump Type					
Pump Capacity					
Screened Interval					
Aquifer Type					

Source Characteristics Over Time

Well #1	Current	1 Year Ago	5 Years Ago	10 Years Ago
Static Level				
Drawdown				
Production				
Specific Capacity (P/D)				
Recovery Time				
Metered (Yes or No)				
Metered Usage				
Well #2	Current	1 Year Ago	5 Years Ago	10 Years Ago
Static Level				
Drawdown				
Production				
Specific Capacity (P/D)				
Recovery Time				
Metered (Yes or No)				
Metered Usage				
Well #3	Current	1 Year Ago	5 Years Ago	10 Years Ago
Static Level				
Drawdown				
Production				
Specific Capacity (P/D)				
Recovery Time				
Metered (Yes or No)				
Metered Usage				
Well #4	Current	1 Year Ago	5 Years Ago	10 Years Ago
Static Level				
Drawdown				
Production				
Specific Capacity (P/D)				
Recovery Time				
Metered (Yes or No)				
Metered Usage				

Well #5	Current	1 Year Ago	5 Years Ago	10 Years Ago
Static Level				
Drawdown				
Production				
Specific Capacity (P/D)				
Recovery Time				
Metered (Yes or No)				
Metered Usage				

Additional Information for Wells: Attach copies of all well logs. Based on NMED source water assessment and water system knowledge, list potential sources of contamination (PSOCs) for each well. If available, attach the systems source water assessment as provided by NMED.

Surface Water Sources

Surface Water Collection	Current	1 Year Ago	5 Years Ago	10 Years Ago
Source:				
Flow				
Metered (Yes or No and %)				
Springs	Current	1 Year Ago	5 Years Ago	10 Years Ago
Spring:				
Flow				
Metered (Yes or No and %)				

Treatment

Treatment Type	Current	1 Year Ago	5 Years Ago	10 Years Ago
Describe all treatment processes used				
Treatment Plant Capacity				

Distribution

Transmission Pipes	
Pipe Type(s)	
Pipe Size(s)	
Approximate Age of each Type and Size	
Approximate Condition of Each Type and Size	

Distribution System Piping	
Pipe Type(s)	
Pipe Size(s)	
General Age of Each Type and Size	
General Condition of Each Type and Size	
Storage	
Storage Type	
Storage Capacity	
Age of Storage Facilities	
Condition	
Future Storage Capacity	

Supply and Demand

Supply and Demand	Current	1 year ago	5 years ago
Total Annual Water Demand			
Total Annual Water Diverted			
Average Day Demand			
Average Day Supply			
Maximum Day Demand			
Maximum Day Supply			
Summer Season			
Average Day Demand			
Average Day Supply			
Maximum Day Demand			
Maximum Day Supply			
Winter Season			
Average Day Demand			
Average Day Supply			
Maximum Day Demand			
Maximum Day Supply			

Estimated Water Losses

Water Loss	
Age of System	
Total Gallons Pumped annually	
Total Gallons Sold annually	
Unaccounted for Water (Gallons Pumped – Gallons Sold)	
Reasons for Loss (Leakage in pipe, illegal connections, fire flow, construction, etc.)	
Estimate of Unaccounted for Water due to Leakage or Pipe Breaks	
Other information related to water losses	

Water Uses

Domestic and Non Domestic Water Uses (Water Supplied by Water System Only)	% of total use	% Metered	Annual Use	1 yr ago	5 yrs ago
Domestic					
Fire Protection					
Commercial					
Industrial					

History of Federal and State Funding for Previous 5 Years

Source	Year 1	Year 2	Year 3	Year 4	Year 5

Water Board Members and History

Board Member	**History**

Wastewater Systems

Wastewater System Name	Type of System	Volume of WW Treated	Type of Discharge	NPDES Permit #

Additional Information: Attach copies of the following documents if applicable: NPDES permits, Discharge Monitoring Plan, TMDL requirements, history of violations, NMED system inspections.

Additional Water Users (Non-WSS Uses)

Type of Use	# of wells	Total Use
Residential Wells		
Irrigation Wells		
Industrial Wells		
Other uses (specify)		

Irrigation, conservancy, acequia	Acreage	# of users	Total cap.
Type of System			
contractor/parciantes			
Governance			
Water Rights			

Additional Information

Ordinances/Guidelines for Water and Land Use	Governs Water Use (Y or N)	Governs Land Use (Y or N)	Comments
Municipal			
Ordinances			
Guidelines			
County			
Ordinances			
Guidelines			
Other (Describe)			

Supplemental Plans	Existing	In-process	Last updated/ Due date
Drought Contingency Plan			
Regional Water Plan (State)			
Asset/Infrastructure Management Plan			
Emergency Response Plan			
Watershed Management Plan			
Water Quality Management Plan			
Water Quality Report (per water source)			
Source Water Protection Plan			

Appendix B

Water Rate Analysis Information

Name of System____

1	Attach a copy of current water rate structure.	
2	Total number of users (connections):	
3	Total water user revenue last full year:	
4	Total water expenses last full year: Operating General and Administrative Debt Service	
5	Average monthly use per connection:	
6	Total gallons of water *pumped* last year:	
7	Total gallons of water *sold* last year:	
8	Percentage of users with meters:	
9	Average age of meters:	
10	Describe meter replacement program:	