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Ten Steps to Address a Rural Water Shortage

Prepared for the 85th Arizona Town Hall on Arizona's Water Future: Challenges and Opportunities

STEP 1 DEFINE THE PROBLEM

Arizona's opportunities to enhance water supplies in rural areas are more constrained than in other states, yet needs are expanding rapidly. A thorough understanding of the nature and cause of an existing or potential water shortage is an important first step toward solving the problem.

When considering future water needs, population forecasts along with per capita residential consumption and projected non-residential sector uses such as commercial, industry and government needs should be taken into account. Peak demand drives the infrastructure needs (i.e. pipe size) and is a key consideration in system planning. The mix of users, i.e. commercial, industrial and residential, can dramatically alter the water utilization volume and patterns. For example, commercial and industrial users tend to have a greater demand for water through the middle of the day whereas demand for households is in the morning and evening hours.

Water shortages are caused by demand in excess of supply and can be addressed by enhancing supplies, reducing demand or a combined approach. Whether the problem is seasonal, drought-related or a long-term imbalance between demand and supply, the nature of the shortage affects the selection of solutions.

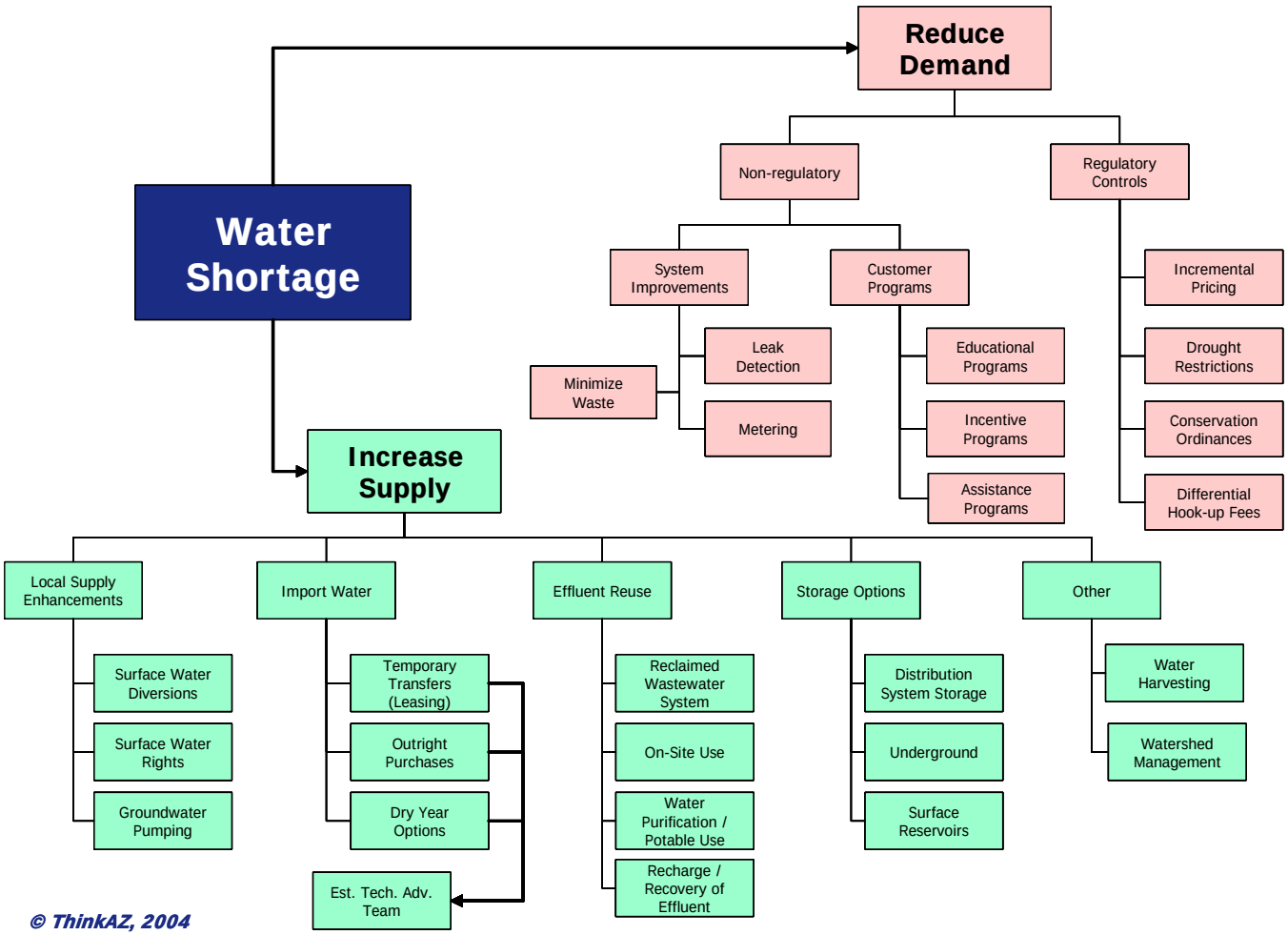
Short-term water shortages are less costly and easier to address. For example, a temporary water shortage that is caused by a drought, equipment failure, poor water quality or the need to meet peak demands on a seasonal basis could be addressed through conservation, system improvements, water hauling or temporary acquisition of a new water supply.

On the other hand, overcoming water shortages that result from population growth is more costly and requires long-term planning and long-term solutions (i.e. new facilities and additional water rights). Increasing populations in many areas of the state, combined with increasing demand for water for recreation, scenic values and fish and wildlife habitat, have resulted in the need for additional water.

STEP 2 IDENTIFY & ANALYZE THE OPTIONS

Numerous options are available to address a water shortage and the paths are not necessarily mutually exclusive. Solutions for dealing with a supply shortage can be used in conjunction with conservation to achieve the best results.

Response Options to a Water Shortage



Reduce Demand

Demand reduction can be accomplished through system improvements, new customer programs aimed at encouraging conservation or through new regulatory controls.

Water conservation efforts aimed at reducing the residential, industrial and agricultural consumption of water have been implemented in the state's five Active Management Areas (AMAs). Outside of AMAs, conservation has been mandated by some local jurisdictions. In others, there are voluntary and/or educational programs. Efforts range from publicizing water conservation tips to restricting the hours that water can be used for watering lawns, washing cars, etc., to outright prohibitions of certain uses of water.

Many demand reduction programs have been implemented on a voluntary basis by local governments or water companies. When voluntary conservation is not effective, some local governments have implemented incentive and regulatory programs.

System Improvements:

- Leak Detection/Repair: Leaks in the water treatment and delivery systems are detected and repaired. For example, lining or piping canals controls seepage and results in an increase in the amount of water available for end users.
- Minimize Waste: Improvements are made to the treatment and delivery systems to minimize water loss. Reducing the pressure in the system is one means of limiting water loss.
- Metering: Meters are installed for all users, and customers are charged for water based on utilization.

Customer Programs:

- Educational Programs: Initiate programs to educate the public on wise water usage. The programs could include information about low-flow plumbing fixtures, proper utilization of xeriscape and lawn watering guides.
- Incentive Programs: Develop programs to offset the cost of water-saving devices for customers. Reimbursement for low flow plumbing fixtures is one example.
- Assistance Programs: Provide homeowner assistance with water-saving measures. Such assistance can include help with landscape designs to incorporate low water use vegetation.

Regulatory Controls:

- Incremental Pricing: Conservation ordinances using a tiered approach to encourage lower water use.
- Drought Restrictions: Typical drought restrictions include limiting the hours that water can be used for domestic irrigation, car washing or other outdoor activities.
- Conservation Ordinances: Local conservation ordinances have been established to limit the quantity of water used for specific purposes. As an example, there are ordinances that restrict the square footage of grass that is permitted in new developments (e.g. golf courses, municipal easements and the common areas of residential communities), the types of landscaping and the use of outdoor misting systems.
- Differential Hook-up Fees: The fees charged to hook-up a home to water service can be reduced in exchange for an agreement to incorporate water-saving measures into the home's design (e.g. limit turf, install low-flow fixtures, etc.).

Increase Supply

Water is a finite resource with significant social and economic value. Pumping groundwater or transferring surface water typically affects another party. After a community identifies a source for water, it should consider the risk of harm to other parties. Similarly, a community must consider the risk of liability due to damage caused by pumping or transferring a water supply shared by another community. There are many cases being litigated that claim one party's use of water has adversely affected another party's access to water or created some form of environmental damage.

Water Markets

Most western states have water banks or markets, although they have been created for different purposes. They include storing water for the future, temporary transfers during drought, leases to support stream flows, improved reservoir management or promoting conjunctive use of surface and groundwater. Water banks can coordinate negotiations between parties, reduce transaction costs and/or match buyers and sellers. For example, Colorado has now authorized the establishment of water banks for stored water in each water division in the state.* Colorado's Pilot Water Banking Program on the Arkansas River demonstrates an efficient means for buyers and sellers to engage in short-term water transactions. The program facilitates leases between farmers and municipalities, reducing the time to complete transactions from up to 18 months to less than two months. Arizona's water bank focuses on storing Colorado River water underground for use in the future during shortage years.

**Source: Colorado Foundation for Water Education, "Headwaters" Vol. 1, No. 1, Denver, CO, Fall 2003.*

Supplementing water supplies can be accomplished through a number of means including effluent reuse, importation of water and local enhancements to obtain more water.

Local Supply Enhancements:

- Surface Water Diversions: An application to divert surface water can be filed with the Arizona Department of Water Resources (ADWR). However, most surface waters in Arizona are fully appropriated, and the likelihood of success is low.
- Enhance Surface Water Rights: An application to enhance existing surface water rights can be submitted to ADWR.
- Groundwater Pumping: ADWR regulates the construction of groundwater wells in Arizona. The Department requires a Notice of Intention to Drill (NOI) be filed for all wells outside AMAs. An application for a Drilling Permit is required for non-exempt wells inside AMAs.[1]

Effluent Reuse:

- Reclaimed Wastewater System: Reclaimed water is highly treated wastewater that can be utilized for turf and landscape irrigation (golf courses, parks and playgrounds) and is also suitable for some industrial uses. Using reclaimed water can reduce the amount of potable water used for irrigation.
- On-site Use: Gray water is wastewater collected separately from sewage flow that originates from a clothes washer, bathtub, shower or sink but not from the kitchen sink, dishwasher or toilet.[2] Utilizing gray water can decrease the amount of potable water used for irrigation. The use of gray water is restricted to the property from which it originated.
- Water Purification/Potable Use: Impaired water can be purified to increase its utility. Reclaimed water that is treated to potable standards and used directly as potable water can provide a ready supplement to existing supplies, but its use is uncommon.
- Recharge and Recovery of Effluent: Effluent is discharged water that is mixed with waste material. Effluent can be used to recharge aquifers thereby reducing the risk of subsidence, maintaining local water tables and enhancing groundwater supplies.

Import Water:

- Temporary Transfers: A temporary water transfer involves paying for the use of water rights on a temporary basis. This type of transaction typically occurs when farmers opt to fallow their land and lease their water rights to a nearby community. Temporary water transfers have been used to address short-term water needs. In some states water markets have emerged that facilitate this process and are typically run by a local governing body.

Water Transfer

A recent attempt by the Cibola Valley Irrigation Drainage District to sell or lease 24,000 acre feet of Colorado River water to out-of-state buyers was blocked by the Arizona Department of Water Resources because the laws that govern the allocation and use of Colorado River water prohibit interstate sale.

Source: Arizona Water Resource, Arizona Interstate Water Transfers Issue Again on Table. Retrieved from http://ag.arizona.edu/AZWATER/awr/jan95/azint.html on July 28, 2003

- Outright Purchase: Because most groundwater rights in Arizona are not easily separated from the land, a permanent water transfer generally involves the purchase and retirement of agricultural land for its water rights (known as Irrigation Grandfathered Rights – IGFR) to be used by non-agricultural interests.
- Dry Year Options: Can be utilized when a community has an adequate water supply in most years, but is confronted with a water shortage in the driest years. Dry year options

generally require a community (or other water user) to pay a flat sum of money for the option to purchase water when it is needed. When the option is exercised, the community pays an additional charge for the actual water usage (generally by the acre foot). Water used for agricultural purposes is the typical source.

Storage Options:

- Distribution System Storage: Increasing storage within the system enhances the ability to meet peak demand.
- Underground Storage: The availability of groundwater aquifers for storage depends entirely on the local hydrology and should be fully explored before a community attempts it.
- Surface Reservoirs: Most surface reservoirs in Arizona are man-made, and opportunities for new reservoir construction are limited by geographic conditions as well as regulatory requirements.

Other:

- Water Harvesting: Capturing water on a property for reuse can create a new supply of water while decreasing demand for potable water.
- Watershed Management: Decreasing the number of trees and brush in a watershed will increase the amount of water available for other uses.

STEP 3 ANALYZE ALTERNATIVE OPTIONS

Once the available options have been identified and described, the options should be evaluated in the context of community goals and objectives. Can the water supply needs be met primarily through conservation or reuse options, or will new water supplies need to be developed? Will a combination of options provide the most reliable and lowest cost approach? Will imported supplies be needed, and if so, are there potential sources of such supplies?

The options should be evaluated using objective criteria that relate to community goals. Such criteria could include cost (both capital and operations, over the short and long-term); limiting environmental impacts; likelihood of producing a long-term, reliable water supply; etc. The options should also be evaluated in the context of multiple future scenarios related to economic development and population growth. It may be appropriate to seek community input on the goals and criteria for evaluation, as well as developing alternative future scenarios for evaluation.

STEP 4 ESTABLISH TECHNICAL ADVISORY TEAM

If a decision is made to further investigate importing water as a component of the community water supply plan, a technical advisory team is recommended to further assess the institutional, legal and economic considerations that must be identified and addressed. A technical advisory team should consist of experts that have a thorough understanding of the institutional, legal and economic constraints involved with water transfers. The role of the technical advisory team is to identify impediments to importing water and evaluate feasibility at a concept level.

If a community decides to establish a technical advisory team, candidates should be analyzed based on technical expertise as well as knowledge of the community. If local resources are not available, partnership opportunities – with universities or other technical groups – for oversight may be an option. Alternatively, a consultant or staff from local or county

jurisdictions could be loaned to make up or oversee the technical advisory team.

Depending on the source of the water a community is considering for transfer, there will be different implications to be carefully considered before a final decision is made.

STEP 5 CONCEPT-LEVEL FEASIBILITY

Establishing concept-level feasibility requires the identification of institutional and legal considerations as well as economic costs.

Institutional and legal considerations should include identification of regulatory constraints at the local, state and federal level that would need to be addressed in order to construct water infrastructure and an understanding of the legal limitations on the transfer of water.

Institutional Constraints

Water and wastewater treatment plants require a number of regulatory permits and must conform to a variety of design, construction and operating codes at the local level. Facilities must also conform to other local codes including: building, electrical and plumbing codes which can vary among local governments. Additionally, Arizona counties maintain regulatory oversight of construction within floodplains and local environmental ordinances.

State and Counties: The Arizona Corporation Commission maintains regulatory authority over the rates charged by private water and sewer companies. The Department of Environmental Quality (ADEQ) regulates water quality. Other relevant state statutes include the following:

- Aquifer Protection Permit (APP) Program: A permit is generally required if water is being discharged to groundwater. The ADEQ administers the state's APP program.
- Environmental Ordinances: Local environmental ordinances can vary from county to county.
- Floodplains: New construction in a floodplain must apply accepted flood-proofing and flood protection to include elevating structures above the base flood level rather than filling in land. County flood control districts have the responsibility of administering and enforcing the floodplain provisions – there are generally multiple local flood control limitations.

ESA Application to Water Projects that Cross Federal Land

Any projects that are federally funded, or any projects that cross federal lands must involve the FWS to ensure the protection of listed species.

The FWS also has authority to restrict activities on private and state lands that may jeopardize a listed species or their habitat. According to a 1993 study by the Association for Biodiversity Information and The Nature Conservancy, half of all listed species have at least 80% of their habitat on private lands. Habitat Conservation Plans under Section 10 of the ESA allows states, local governments and private landowners to develop land supporting listed species provided they undertake agreed-upon conservation measures. The principle underlying Section 10 is that some individuals of a listed species or portions of their habitat may be expendable over the short-term as long as enough protection is provided to ensure the long-term recovery of the species.

- Groundwater Under the Influence of Surface Water Disinfection Requirements: ADEQ determines whether water recovered from CAP recharge projects is considered "groundwater under the influence of surface water." Water that is so designated must be treated according to the drinking water rules that apply to surface water, while groundwater need not be treated unless it fails to meet the primary drinking water standards.[3]
- State Historic Preservation Act: Requires an archeological survey wherever the land surface will be excavated and/or inundated for a water storage project. The Director of

the Arizona State Museums must be notified if archaeological or paleontological items are found on state, county or municipal lands.

- Surface Water Quality Standards (SWQS): Prescribe water quality standards for end-users. The standards are set by the EPA and enforced by ADEQ. They apply to both drinking water and effluent.

Federal: While the activities involved with building new water infrastructure take place within state borders, there are a number of federal requirements that can affect a project. When transmission lines cross federal lands there are a whole host of federal requirements that must be met including:

- Endangered Species Act: Passed in 1973, the ESA requires all federal agencies to protect endangered species and preserve their habitats. The ESA requires every federal agency to insure that "any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of the (listed) species or result in the destruction or adverse modification of habitat of such species."[4]
- National Environmental Policy Act (NEPA): NEPA is a procedural mandate intended to inform all federal agencies and the public of the environmental consequences of a federal project.[5] NEPA requires all federal agencies to consider the environmental consequences of major federal actions they undertake. If a federal agency is participating in a local project and their role is deemed a major federal action, they will be required to conduct a NEPA review. Depending on the level of environmental impact, a NEPA review can take anywhere from two months to two years to complete.
- National Historic Preservation Act: Directs federal agencies to take historic preservation into account when planning their initiatives and actions. Any federal action that may affect cultural resources that are, or could be, listed on the National Register requires consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Officer.
- Native American Graves Protection and Repatriation Act: Regulates how the excavation of Native American human remains on federal or tribal lands must be handled and clarifies the right of ownership of Indian human remains and artifacts found on such lands.
- The Wild and Scenic Rivers Act: The Wild and Scenic Rivers Act of 1968 was adopted to protect specific rivers in the U.S. noted for their remarkable beauty. These selected rivers and their immediate environment are preserved in a free-flowing condition, with-out dams or other construction. The Verde Reach is the only river in Arizona that has received a Wild and Scenic River designation.

ESA Application to Projects Involving the Acquisition, Transfer or Storage of Water Affecting a Listed Species or its Habitat

The ESA applies to the construction of any new water projects built or funded by the federal government or that impact a listed species or its habitat. Recent federal court rulings suggest that the ESA also applies to existing projects operated by the federal government that divert water from a stream reach that includes critical habitat. In Rio Grande v. Keys, the 10th Circuit Court held that the Bureau of Reclamation has discretion to reduce deliveries of water under pre-existing contracts in order to comply with the ESA. Further, the City of Albuquerque must give up its San Juan-Chama River water to protect the endangered silvery minnow. The court's ruling injects uncertainty into the delivery of water under established contract rights in favor of the obligations prescribed by the ESA.

In American Rivers v. U.S. Army Corps of Engineers, the district court ruled that the Corps has "discretion" in its operation of the Missouri River system and is therefore compelled to exercise that discretion for the recovery as well as the protection of the species. Under Judge Kessler's opinion, the obligation goes beyond mere prevention of decline in population and includes the obligation not only to avoid a take, but to plan for and support recovery. If upheld on appeal, this case will be cited in other jurisdictions to require a federal agency to do more than simply prevent the decline of a listed species under the ESA, but to implement actions and/or programs to recover such species.

Legal Constraints

There are significant legal limitations on the transfer of surface water and groundwater in Arizona.

The transfer of **groundwater** is governed by the Arizona Groundwater Transportation Act. Generally speaking, the transfer of groundwater from one hydrologic basin to another is prohibited.[6] There are exceptions for certain agreements that were in existence before the groundwater transportation prohibitions were enacted by the legislature – the exceptions are specified in statute.[7] Groundwater may, however, be moved between the sub-basins within a groundwater basin.[8] An exception has also been created to allow trucking of groundwater between basin boundaries in a drought – a permit must first be obtained from ADWR.[9]

In Arizona, laws governing **surface water** are distinct from those governing groundwater and effluent. Surface waters are subject to the "doctrine of prior appropriation." This means that the first person to put surface water to reasonable and beneficial use acquires a senior right to the water. In the event of drought, any subsequent right-holders will have water available only after the senior right-holders' needs have been met.

Economic Costs

A thorough accounting of costs should be undertaken before a decision is made to pursue a project and should include the following:

Transaction Costs: Commonly referred to as the cost of doing business – a more technical definition is costs associated with negotiating, monitoring and enforcing a contract. Transaction costs are incurred in searching for water supplies, ascertaining the characteristics of water rights, negotiating price and other terms of transfer and obtaining legal approval for the proposed change in the water use.[10]

Infrastructure Costs: The volume of water that is being transported, as well as the distance and elevation it is being transported, contribute to the size of the pipeline or canal and the number of pumps needed in a system. The pipeline in a transmission and distribution network is generally the most costly component of the system. If pipe size is underestimated, a community could be forced to incur the cost of installing additional capacity in the future. On the other hand, if the demand is overestimated because a community did not grow at the expected rate, it could be difficult to generate sufficient revenue to pay for the project.

Rights-of-Way: Water lines can be installed in utility easements or land can be purchased to secure a designated right-of-way. If a water provider is unable to secure rights-of-way through these means, condemnation could be an option and depends on whether the project is sponsored by a jurisdiction and whether legal challenges can be overcome. Condemnation is not the preferred method of securing a right-of-way because of the legal uncertainties as well as the public relations challenges and related transaction costs.

Regulatory compliance: Meeting regulatory requirements has proven to be rather costly. As an example, the cost of meeting the new standards for drinking water quality has been onerous for small water providers. As regulatory requirements become more stringent, a water provider should anticipate added costs.

Operation and Maintenance: Operation and maintenance (O&M) costs can vary widely among water supply projects. A March 2001 study by the Morrison Institute reports O&M costs for various projects that range from $46 per

acre foot to $521 per acre foot.[11] There are a number of factors that influence O&M costs for a water project including materials, condition of the soil, character of the water and the energy required for pumping the water. As equipment in a water system ages, providers should expect to spend more on O&M.

Cost of Water: The cost of water rights transactions has varied over the last two decades. One of the most publicized water farm purchases was made by the City of Phoenix in 1986 when they bought 14,000 acres of land in McMullen Valley for $30.5 million. Ultimately, the water rights from the land cost the city $1,017 per acre foot. Another, more recent purchase of water rights was made by the Town of Prescott Valley; they paid $1,500 per acre foot to purchase water rights from the Humboldt Unified School District.[12] It is widely anticipated that the market will set the price for water transfers in the future, and the only thing that is generally agreed upon is the price will increase.

Water Treatment: The cost of treating water to meet regulatory standards depends on the use of the water, the type of contaminants and the volume of water involved. Some treatment options, such as blending are less costly than other options.

Third Party Impacts: There are multiple means by which the transfer of water from one community to another can adversely impact the areas where the water originates. For example, when water is transferred from an agricultural use and farmland is no longer cultivated, the adjacent farms and commercial businesses that provide service to the farmland could be adversely impacted.

Tax Revenue: The loss of tax revenue from land that is purchased by municipalities for water rights is another consideration. Since municipally owned property is tax-exempt, water farm acreage bought by municipalities is removed from the county tax rolls.[13] If a community loses substantial plots of land to water farming, the loss of future tax revenues and bonding capacity could be substantial. Further, when land ceases to be farmed, there is a loss of the accompanying farm jobs, employment opportunities and other economic activity in a community. There are cases where in lieu taxes are paid by municipalities to make up for lost tax revenue.

Environmental Impact: The environmental issues that arise when farmland is fallowed include soil erosion from blowing dust, and tumbleweed growth. Other environmental impacts may result from the removal of surface water and groundwater from its area of origin as well as from the related construction.

Development Opportunities: A more obvious issue that results from transferring water rights is that land without water rights may have limited development value. Consequently, when water rights are transferred from a piece of land, the future use of the land may become more uncertain.

Other Water Rights Holders: Water rights holders that are not a party to the transfer could be adversely impacted by a diminished water supply or by the loss of flexibility in utilizing water.[14]

STEP 6 Financial Feasibility

When considering financing options for a water project, the capacity for a community to service debt and a realistic projection of the useful life of the project are necessary initial steps. Communities generally incur long-term debt to cover the cost of capital.

Most of the funds that water systems use for both capital and operation and maintenance costs come from user fees.[15] The cost of financing, and the annual payments due, depends on three factors: the amount of debt financed, the interest rate, and the term of the loan. Then, the amount that each user pays for the infrastructure depends on the number of users in the system and how the debt is distributed among those users.

Ability to repay debt is the primary factor that drives whether an infrastructure project is financially feasible. In many cases, growth projections are used to determine how debt will be distributed. The jeopardy in depending on growth to finance debt is that if the population growth does not materialize, it could be difficult to service the debt.

There are multiple means available to finance water infrastructure, primary among them are: 1) bank loans, 2) bonding, 3) federal grants, 4) special taxing districts, 5) state assistance and 6) privatization.

1) Bank Loans: Communities can obtain conventional financing to build a water infrastructure project.

2) Bonding: Communities often use bonds to finance a water project when significant investment is required to construct the infrastructure. A community's ability to bond depends on the assessed value of taxable property in the community.

3) Federal Grants: The U.S. Department of Agriculture offers a Rural Development Grant Program and the Colonias Grant to fund water and wastewater projects across the country. The amount of funding is not sufficient to fund a large infrastructure project, but could help defray costs for smaller communities.

Special Taxing Districts: In some cases, special taxing districts have been initiated to construct water projects. Title 48 of Arizona Revised Statutes defines the requirements associated with special taxing districts. The special taxing districts pertaining to water resources include: domestic water improvement districts, multi-jurisdictional and irrigation districts. Each special taxing district serves a particular purpose and is supported by a variety of revenue sources that may include the assessment and collection of taxes, grants, loans or user charges from their members.

Special Taxing Districts

Domestic Water Improvement District – county improvement districts can be formed to construct, improve or purchase a water delivery system. (ARS §48-910)

Multi-jurisdictional Water Facilities District – is a tax-levying public improvement district and municipal corporation of two or more water providers responsible for providing water to member counties and by contract to its customers for municipal and agricultural purposes. (ARS §48-5902, Subsection A)

Irrigation Districts - are municipal corporations that provide water for agricultural use including farms, private property owners, and municipal government. Irrigation districts can also purchase or acquire water rights. (ARS §48-3473, Subsection B)

State Assistance: There are two agencies in the government of the State of Arizona that offer financial assistance for water infrastructure projects; WIFA and GADA. Utilizing WIFA or GADA for financing can save a community money by reducing transaction costs and by reducing the cost of long-term debt. WIFA and GADA are able to issue bonds for infrastructure projects and can often obtain a more favorable bond rating than a small community.

Water Infrastructure Finance Authority of Arizona (WIFA): WIFA is a state agency that is authorized to finance the construction, rehabilitation and/or improvement of drinking water, wastewater, wastewater reclamation and other water quality facilities/projects. WIFA is

funded through the Environmental Protection Agency and has the ability to fund projects, issue bonds and subsidize the interest on loans. To be eligible for financial assistance from WIFA, an applicant must obtain the appropriate debt authority. There are three ways to obtain debt approval in Arizona: election, petition or approval by the Arizona Corporation Commission – not all of the options are available to every community. Eligible WIFA projects must be on either the Clean Water Revolving Fund or Drinking Water Revolving Fund project priority list.[16]

Greater Arizona Development Authority (GADA): The GADA is administered through the Arizona Department of Commerce and provides low-cost financing to cities, towns, counties, tribal governments and special districts. In all cases, GADA requires that bonds be secured with a dedicated revenue stream, and in some cases, a debt service reserve fund. Political subdivisions must obtain voter approval of the loan agreement and pledge state-shared revenues to the loan. Both WIFA and GADA require Native American communities to pledge assets not subject to sovereign immunity.[17] In addition, GADA offers technical assistance to communities to draft a scope of work identifying the dollar amount, deliverables and time frame for each task.[18]

Privatization: There are multiple options and varying degrees of privatization opportunities a community can opt to privatize the design, construction and operation of a water facility or any single component.

STEP 7 SCOPING

The purpose of this step is threefold – first to develop an inventory of resources, second to identify project winners and losers and third to begin getting feedback from the community.

Inventory: An inventory should include natural and human resources, financial resources, existing infrastructure and existing governing structures that can be utilized to generate revenue. Human resources should include any opportunities for partnerships including participation from federal and tribal governments.

Federal Participation: The federal government has some agencies that offer technical assistance including the Bureau of Reclamation and the U.S. Geological Survey (USGS). Opportunities to collaborate with agencies could help to offset the costs to small communities.

Federal Partnerships

Bureau of Reclamation: The Lower Colorado Region of the BOR provides technical assistance to state, local and tribal communities.

U.S. Geological Survey (USGS): Provides hydrological information to achieve the best use and management of water supplies.

State Water Resources Research Institute: A partnership with USGS to provide grants for improving water resource management.

Environmental Protection Agency: Gives funds to the states to assist in building and improving infrastructure. WIFA administers the funds.

Tribal Partnerships: There are multiple examples of tribal partnerships that have resulted in water transactions in Arizona that benefit both the tribe and nearby communities. The following tribes have entered into long-term leases of CAP water through their settlement of claims to local water supplies: Ak Chin Indian Community, Salt River-Pima Maricopa Indian Community, Fort McDowell Indian Community, San Carlos Apache Tribe, Yavapai-Prescott Indian Tribe and the Gila River Indian Community.

Other partnerships could be formed with local organizations for technical assistance or oversight. Organizations like the Arizona

League of Cities and Towns, county councils of government and the Arizona Department of Environmental Quality could have access to (or in-house) technicians available to offer assistance.

Identify Winners and Losers: **W**ater transfers will inevitably involve perceived winners and losers. As discussed in Step 4, the third party impacts of transferring water must be thoroughly understood and mitigated to the extent possible. The type of water transfer that is utilized has different implications on the community where the water originated. For example, short-term transfers and dry year options allow a community to transfer water without permanently altering the future development opportunities of the source community. However, the outright purchase of water rights has a long-term impact on the affected community that should be thoroughly understood by all parties involved in the transaction.

It is imperative to the success of the project that input from affected parties, particularly those in the area of origin, be sought early in the process. Identifying their concerns early will provide more opportunity to design solutions that are acceptable to them; a "win-win" approach. It may also prevent the development of inaccurate perceptions about impacts. Compensation to the area of origin generally relates to the amount of water involved, the length of time that the water is to be used and the value of the water to the parties. Generally, compensation for loss of the resource and for potential impacts on third parties is recommended in the case of permanent transfers.

Feedback: Getting feedback from the community should occur early and often. An open dialogue with community members and stakeholders will enable decision-makers to solve problems and develop collaborative solutions. If an important stakeholder or interest group is left out of discussions, this may work to impede the progress of the project. Public participation can be accomplished through a number of avenues, and there is no single approach that works in every community. Depending on the level of controversy associated with a proposed water project, the community may want to include a process for resolving disputes and developing collaborative solutions to issues raised by community members. It is important for each community to design a public participation plan that is well suited to the level of interest in the community.

STEP 8 PLANNING

The purpose of this step is to guide the physical development of the project.

- Consultant Selection: proposals are solicited and a consultant is selected for engineering and legal services, if necessary.
- Financial Plans: potential funding sources are identified and preliminary financial arrangements are made.
- Routing: an infrastructure route, optional routes are selected.
- Operation and Maintenance: initiate planning for the facility's operation and maintenance.
- Engineering: engineering cost estimates are secured.
  - Contract Negotiations: preliminary contract negotiations will provide a general sense of the willingness to negotiate among water rights holders, and affected parties are initiated.
  - Contingencies: contingency plans for routing and financing are considered.
  - Regulations: identify needed regulatory permits or obstacles to be overcome.
  - Design infrastructure.
  - Award construction contracts.

At the end of the planning phase, an infrastructure plan, financing for the plan and alternatives to the plan should be completed.

STEP 9 PUBLIC INPUT / FINAL PLAN

If there has been good communication throughout the process and information has been continuously shared with the public, there will likely be a good level of knowledge about the project in the community.

The public input phase should be focused on providing information to the public about the final plan, the cost of construction, the funding options and the expected benefits. The public input process should be treated as an opportunity to understand what local residents expect from the project and answer the public's questions.

The plan can be finalized after public input is taken into account and adjustments are made to the plan to meet the needs of the community at large. At this point, the plan is fine-tuned and a final plan is developed. The construction schedule should also be finalized. Phasing decisions can be made at this point.

- Identify and implement legal and regulatory changes.
- Apply for permits.
- Finalize financing arrangements.
- Finalize contracts for water project.

Smooth execution of this step depends on clear and continuous communication with the community, regulatory agencies and affected third parties.

STEP 10 IMPLEMENTATION

Once a plan has been finalized, it is important to remain vigilant in overseeing the implementation to ensure that the plan is completed in a timely manner. In that regard, selecting the right project manager is perhaps one of the most important aspects of implementation. The project manager should have a clear understanding of the project stakeholders as well as a clearly defined set of expectations.

Key components of an implementation plan include:

- Criteria for Success: align stakeholders to ensure that expectations are consistent.
- Regular Progress Reviews: the expectation duration of the project will dictate the optimal number of progress reviews. However, reporting progress at key project milestones should be expected.
- Communication: develop an efficient communication system that allows frequent status updates to be delivered to the stakeholders and a mechanism for the community (and other affected parties) to provide feedback.

ENDNOTES:

[1] Arizona Revised Statutes, Title 45, Chapter 2, Article 4, Section 454.

[2] Arizona Administrative Code, §18, Chapter 9, Article 7.

[3] Malcolm Pirne, Sahurity-Green Valley Area: Central Arizona Project Water Use Feasibility Analysis and Delivery System Optimization Study. (1998, September).

[4] United States Code, Title 16, Chapter 35, Section 1531.

[5] United States Code, Title 42, Chapter 55, Section 4321.

[6] Arizona Revised Statutes, Title 45, Chapter 2, Article 8.1.

[7] Arizona Revised Statutes, Title 45, Chapter 2, Article 8.1, Sections 552 through 555.

[8] Arizona Revised Statutes, Title 45, Chapter 2, Article 8, Section 544(A).

[9] State of Arizona Laws 2003, 46th Legislature, Chapter 248.

[10] National Research Council. Water Transfers in the West. National Academy Press (1992).

[11] Morrison Institute for Public Policy. Growth on the Coconino Plateau: Potential Impacts of a Water Pipeline for the Region. (2001, March).

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