Chapter 5A

Identification of Potentially Feasible Water Management Strategies

This Chapter reviews the types of water management strategies (WMS) considered for the East Texas Regional Water Planning Area (ETRWPA) and the approach for identifying potentially feasible water management strategies for water user groups (WUG) and wholesale water providers (WWP) with a water need, as identified in Chapter 4. In addition, evaluation criteria are considered, and the viability of each WMS type is assessed. Once a list of potentially feasible strategies has been identified, the most feasible strategies are recommended for implementation. An alternative strategy may also be identified as potentially feasible in the event a recommended strategy becomes unfeasible.

The recommended and alternative water management strategies identified for individual WUGs and WWPs are presented in Chapter 5B. Chapter 5C discusses the conservation strategies and the application of each strategy to meet ETRWPA needs. WMSs to meet potential future demands that are not presently approved by the Texas Water Development Board are not included in this chapter.

Identification of a supply source as a potentially feasible strategy depends on the availability of the source, the accessibility of the source to the WUG or WWP developing the WMS, and the feasibility of developing a strategy from the source of supply. It should be noted that there can be potentially feasible strategies that are not identified as recommended or alternative WMS for an entity.

The types of WMSs considered in this chapter include water conservation, water reuse, expanded use of existing supplies, new supply development, and drought management. A comprehensive list of the potentially feasible strategy types identified is included below.

- Water conservation
    - Water Loss Control
- Water reuse
    - Expanded use of existing supplies
    - Management of existing supplies
    - Conjunctive use of groundwater and surface water
    - Acquisition of available existing supplies
    - Development of regional water supply or regional management of water supply facilities
    - Voluntary redistribution of water resources (regional water banks, sales, leases, options, subordination agreements, and financing agreements)
    - Emergency transfer of water under Texas Administrative Code §11.139
    - System optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality

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  - Interbasin transfers
- New supply development
  - Surface water resources
  - Groundwater resources
  - Brush control; precipitation enhancement
  - Aquifer storage and recovery
  - Cancellation of water rights
  - Desalination of marine seawater or brackish groundwater
  - Rainwater harvesting
- Drought Management
  - Demand management

Drought management measures are not generally a reliable source of additional supplies to meet growing demands. For this reason, the East Texas Regional Water Planning Group (ETRWPG) does not use drought management measures as potentially feasible WMSs for regional water planning. Chapter 7 includes an analysis and summary of drought response data, activities, and drought management recommendations in the ETRWPA.

While several strategy types were considered by the ETRWPA, not all were determined as viable options for addressing water needs in the region. The few subcategories within each strategy type that were determined as potentially feasible strategies for entities within the ETRWPA include: 1) water conservation 2) water reuse 3) expanded use of existing supplies (groundwater supplies, local supplies, and voluntary redistribution) and 4) new supply development (surface water resources: new reservoirs).

The sections below include a detailed discussion of each one of these four strategy types and the specific application of these strategies to WUGs and WWPs in the ETRWPA. Each strategy type is evaluated using screening criteria identified in Texas Administrative Code Title 31 Chapter 357.34. These criteria include the net quantity, reliability, cost, environmental factors, impacts to agricultural resources, threats to natural resources, and impacts on key parameters of water quality. The screening criteria also consider issues associated with interbasin transfers and socio-economic impacts associated with voluntary redistribution of supplies, where applicable. A detailed list of the screening criteria used for selecting these strategies is included in Appendix 5A-A.

5A.1 Water Conservation

Water conservation is defined as methods and practices that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses. A detailed evaluation of conservation water management practices, trends, plans, and strategies in the ETRWPA is included in Chapter 5C in section 5C.3; this section also includes discussions on WUGs with water needs that do not have recommended WMSs.

Water Conservation Environmental Issues. No substantial environmental impacts are anticipated, as water conservation is typically not a capital-intensive alternative associated with direct physical impacts to

the natural environment. A summary of the few environmental issues that might arise for this strategy type are presented in Table 5A.1.

Table 5A.1 Potential Environmental Issues Associated with Water Conservation

Environmental Issue	Evaluation Result
Implementation Measures	• Requires voluntary participation from the public. • Issue can be minimized by enhanced public and school education. • May include water conservation pricing, and enhanced water loss control programs.
Environmental Water Needs/Instream Flows	• No substantial impact identified, assuming relatively low reduction in diversions and return flows • Substantial water conservation could result in low to moderate positive impacts, as more stream flow would be available for environmental water needs and instream flows.
Bays and Estuaries	• No substantial impact identified (see Environmental Water Needs/Instream Flows, above).
Fish and Wildlife Habitat	• No substantial impact identified(see Environmental Water Needs/Instream Flows, above). • Possible low to moderate positive impact to aquatic and riparian habitats with substantial reductions as more stream flow would be available to these habitats.
Cultural Resources	• No substantial impact anticipated.
Threatened and Endangered Species	• No substantial impact identified(see Environmental Water Needs/Instream Flows, above). • Possible low to moderate positive impact to aquatic and riparian threatened and endangered species (where they occur) with substantial diversion reductions.

Water Conservation Cost Considerations. Typical unit costs were used to develop opinions of probable cost for each recommended water conservation strategy. Other costs, such as the cost of hiring a water conservation coordinator, were not considered. The school and public education and enhanced water control program strategies create direct costs for the water user groups for which these strategies are recommended.

Water Conservation Implementation Issues. Water conservation as a water supply option has been compared to the plan development criteria, as shown in Table 5A.2. Based on the table, it is evident that water conservation meets the evaluation criteria.

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Table 5A.2 Comparison of Water Conservation to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	 1. Limited 2. Variable, dependent on public acceptance 3. Reasonable
B. Environmental Factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	 1. None or low impact 2. No apparent negative impact 3. None 4. None or low impact
C. Impact on Other State Water Resources	No apparent negative impacts on state water resources; no effect on navigation
D. Threats to Agriculture and Natural Resources	None
E. Equitable Comparison of Strategies Deemed Feasible	Option is considered to meet municipal and industrial water needs
F. Requirements for Interbasin Transfers	Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	Not applicable

5A.2 Water Reuse

Water reuse utilizes treated wastewater effluent as either a replacement for a potable water supply (direct reuse) or utilizes treated wastewater that has been returned to a water supply resource for non-potable reuse or additional treatment at a later time for potable or non-potable purposes (indirect reuse).

Currently, there is one recommended reuse strategy defined for the ETRWPA in the 2021 Plan, a transmission system transferring City of Center's return flows from the wastewater treatment plant to Lake Center. Water reuse is most feasible for larger municipal water users or industrial users that have access to a source of municipal effluent. In the ETRWPA, small quantities of wastewater are currently being reused where it is economically viable. The ETRWPG identified only a few additional reuse opportunities within the region because the generators of the wastewater effluent were not generally interested in developing this type of project due to the lack of need or to excessive cost compared to other alternatives.

Water reuse is considered as a potentially feasible strategy in the 2021 Plan for Athens Municipal Water Authority (AMWA). Athens MWA has received a reuse permit that allows the City of Athens to discharge its wastewater effluent to Lake Athens, the City and the AMWA have decided not to pursue this strategy at this time due to the cost. However, AMWA is pursuing entering into a contract with the Athens Fish Hatchery to return water that is passed through its facility back to Lake Athens. Currently, the hatchery does return this water as part of its operations, but it is under no contractual obligation to do so. Therefore, the volume of water from the hatchery is not considered a water supply for the purposes of regional water planning.

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5A.3 Expanded Use of Existing Supplies

Expanded use of existing supplies includes additional use from existing groundwater and local sources and voluntary redistribution of water resources. Most of the potentially feasible strategies for the ETRWPA are associated with the expanded use of existing supplies. The introduction to this chapter includes a comprehensive list of sub-categories identified within the expanded use of existing supplies strategy type. However, not all subcategories were deemed viable as potentially feasible strategy types for ETRWPA. The few subcategories within this strategy type determined as potentially feasible strategies for entities within the ETRWPA are: 1) expanded use of groundwater supplies, 2) expanded use of local supplies, and 3) voluntary redistribution. Subsections 5A.3.1 – 5A.3.3 include a detailed discussion on each one of the subcategories.

As a water-rich region, the water needs experienced by WUGs and WWPs within the region can generally be addressed by expanding the usage from the existing sources of supplies (both groundwater and surface water), adding or updating infrastructure to access an existing source of supply, and voluntary redistribution of the existing supplies. Table 5A.3 below includes a region-wide summary of undeveloped freshwater supplies that can be utilized for potential WMSs. The undeveloped supplies shown in the table below do not include brackish run-of-river rights granted to users in ETRWPA. It is understood demands associated (primarily manufacturing users) with the use of brackish run-of-river rights are not included in the manufacturing demands approved by Texas Water Development Board for the ETRWPA. Therefore, it is assumed brackish run-of-river rights are not available for identifying potential strategies for meeting needs in ETRWPA.

Table 5A.3 Summary of Unallocated Supplies in ETRWPA

Source of Supply	2020	2070
Groundwater Supplies		
Carrizo Wilcox Aquifer	202,248	202,248
Gulf Coast Aquifer	211,627	211,627
Queen City Aquifer	91,509	91,509
Yegua-Jackson Aquifer	29,980	29,597
Other Aquifer	9,612	9,612
Sparta Aquifer	3,682	3,682
Surface Water Supplies		
Lakes/Reservoirs	2,654,204	2,613,499
Fresh Run-of-River	588,603	594,258
Total Supplies	**3,791,465**	**3,756,032**

5A.3.1 Expanded Use of Groundwater

Groundwater is a viable and cost-effective supply source for the ETRWPA. Approximately 60 percent of WUGs with an identified need during the planning period are expected to continue using groundwater as a source of new supplies. The supplies established in Chapter 3 were used to evaluate the ability to meet demands for the ETRWPA. Counties that are near capacity in utilizing the available groundwater resources, according to the Texas Water Development Board's Modeled Available Groundwater projections, are Angelina, Cherokee, Nacogdoches, Orange, Shelby, and Smith. An evaluation of the expanded use of groundwater is presented by aquifer and county in Table 5A.4.

Table 5A.4 Water User Groups with Water Management Strategies Utilizing Groundwater Supplies

	Entities with Projected Additional Groundwater Demand			
County	Carrizo Wilcox Aquifer	Gulf Coast Aquifer	Queen City Aquifer	Yegua-Jackson Aquifer
Cherokee	Alto Rural WSC			
	Rusk			
Henderson	Athens MWA			
	Moore Station WSC			
	Mining			
	Chandler			
Houston				Livestock
				TDCJ Eastham Unit
Jasper				Livestock
Nacogdoches	D&M WSC			
	Livestock			
Panola	Livestock			
Rusk	Jacobs WSC			
	Livestock			
Smith	Bullard			
	Crystal Systems Inc.			
	Lindale			
	Manufacturing			
	Overton			
	Manufacturing			
	Wright City WSC			
	Whitehouse			

Expanded Use of Groundwater Environmental Issues

Under the Joint Planning effort for groundwater, the groundwater conservation districts determine the appropriate protective level through the adoption of the Desired Future Conditions. The desired future conditions are incorporated into regional planning through the Modeled Available Groundwater values. There are no recommended strategies that exceed the Modeled Available Groundwater value, thus providing the necessary environmental and water supply protections desired by the groundwater conservation districts. Other environmental considerations with expanded groundwater use are associated with increased transmission capacities. It is assumed new pipelines can be routed to minimize impacts to the environment.

Table 5A.5 Potential Environmental issues Associated with Increased Use of Groundwater

Environmental Issue	Evaluation Result
Implementation Measures	• Local impact from development of well fields, storage facilities, pump stations and pipelines.
Environmental Water Needs/Instream Flows	• Potential increase in return flows to streams from increased water use. • Potential decrease in groundwater-surface water nexus, which could reduce base flows.
Bays and Estuaries	• No substantial impact identified.
Fish and Wildlife Habitat	• No substantial impact identified.
Cultural Resources	• No substantial impact anticipated.
Threatened and Endangered Species	• No substantial impact identified.

Expanded Use of Groundwater Cost Considerations

Cost considerations are affected by the distance from development of wells to the need for the water. Facilities requiring capital investment include wells, pipelines, pump stations, and storage. Some water from wells may require minor treatment.

Expanded Use of Groundwater Implementation Issues

This water supply option has been compared to the plan development criteria, and Table 5A.6 shows how this option meets each criterion.

5A.3.2 Expanded Local Supplies

Expansion of existing local supplies involves the development of supplies currently being used near the source of demand, usually Other Aquifer groundwater or local supplies (supply ponds). Currently, no strategies are developed for this supply type.

Expanded Local Supplies Environmental Issues

The expansion of local supplies is very limited in volume and geographic area. Impacts of this WMS on the environment are expected to be negligible.

Expanded Local Supplies Cost Consideration

Costs will vary with each project. This strategy involves development of additional stock ponds for livestock and costs are generally low.

Expanded Local Supplies Implementation Issues

Implementation issues associated with expansion of local supplies are not anticipated.

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Table 5A. 6 Comparison of Expanded Use of Groundwater to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient to meet needs (except Smith County) 2. High reliability 3. Moderate
B. Environmental Factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Low impact 2. Low impact 3. Low impact 4. Negligible impact
C. Impact on Other State Water Resources	No apparent negative impacts; no effect on navigation
D. Threats to Agriculture and Natural Resources	None
E. Equitable Comparison of Strategies Deemed Feasible	Option considered to meet demands of all user groups except Steam-Electric
F. Requirements for Interbasin Transfers	None
G. Third Party Social and Economic Impacts from Voluntary Redistribution	It is assumed that expanded groundwater development is between a willing buyer and seller, therefore, there are no apparent impacts

5A.3.3 Voluntary Redistribution

For purposes of this Plan, "voluntary redistribution" is defined as an entity in possession of water rights or water purchase contracts freely selling, leasing, giving, or otherwise providing water to another entity. Typically, the entity providing the water has determined it does not need the water for meeting its own demand for the duration of the transfer. The transfer of water could be for a set period of years or a permanent transfer. Voluntary redistribution is essentially a water purchase.

Voluntary redistribution has many benefits over other supply options because it can be much easier than implementing a new reservoir project, it typically costs less than large capital projects, and it avoids implementation issues of new reservoir projects such as environmental and local impacts. Most importantly, redistribution of water makes use of existing resources and provides a more immediate source of water.

Entities that have the potential to meet demands through voluntary redistribution, either by having available supplies or currently providing needs through voluntary redistribution and having the ability to obtain new supplies were identified. It should be noted the ETRWPA region is a water rich region. The water needs for the WUGs and WWPs in the region primarily exist due to infrastructure limitations or due to lack of water supply availability for the WUG with the need. There are other WWPs and WUGs in the region with excess supplies that can be used to address the water needs in the region. Due to this, voluntary redistribution is an important strategy type used for identifying WMSs for the ETRWPA. It is important to remember redistribution of water is voluntary. No group or individual is required to participate. Therefore, other strategies should be identified for groups relying on redistribution where the supply would place a burden on the distributor. A discussion of entities considered as potential suppliers of voluntary redistribution is provided in Table 5A.7 below. The amounts shown in this table represent the minimum

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amount of supply available, during the planning period, for voluntary redistribution after all other obligations based on current contracts are met.

Table 5A.7 List of Needs Met by Voluntary Redistribution

Water Provider	Supply Available for Voluntary Redistribution* (ac-ft/yr)	Entity with Need
City of Lufkin (Lake Kurth, Sam Rayburn)	8,713	Manufacturing (Angelina)
		Mining (Angelina)
Lower Neches Valley Authority	761,573	Manufacturing (Jefferson)
		Steam-Electric (Jefferson)
		County Other (Jefferson)
		Beaumont (Jefferson)
Nacogdoches	6,966	
Sabine River Authority of Texas	999,279	Mining (Newton)
		Irrigation (Orange)
		Steam-Electric (Rusk)
		Livestock (San Augustine)
City of Tyler	7,278	Chandler (Henderson)
		Manufacturing (Smith)
		Bullard (Smith)
		Crystal Systems Inc (Smith)
		R-P-M WSC (Smith)
		Mining (Smith)

*Value equal to minimum supply available over the planning period beginning in 2020 and ending in 2070.

Voluntary Redistribution Environmental Issues

No significant environmental impacts are anticipated, as available water resources identified for this option are supplied through existing reservoirs or groundwater sources. A summary of the few environmental issues that might arise for this alternative are presented in Table 5A.8.

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Table 5A.8 Potential Environmental Impacts Associated with Voluntary Redistribution

Environmental Issues	Evaluation Result
Implementation Measures	• Terms of contract addressed on a case by case basis. • Potential construction of treatment and distribution infrastructure.
Environmental Water Needs/Instream Flows	• No substantial impact identified. • Increased use of a surface water source can potentially reduce instream flows, but this was considered during the permitting of the existing source.
Bays and Estuaries	• Large quantities of additional water diverted from ETRWPA reservoirs could reduce current flows to bays and estuaries. • No substantial impact identified since this strategy assumes use of currently permitted water.
Fish and Wildlife Habitat	• Impact dependent on location and size of project. Impacts associated with infrastructure to transport the water could be avoided.
Cultural Resources	• Impacts would be associated with infrastructure to transport the water but can generally be avoided.
Threatened and Endangered Species	• Impacts would be associated with infrastructure to transport the water but can generally be avoided.

Voluntary Redistribution Cost Considerations

Potential costs of purchasing and using water available from voluntary redistribution are listed below:

Cost of raw water;

Treatment costs;

Conveyance costs; and/or

Additional costs required by water supplier.

Voluntary Redistribution Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 5A.9. An issue facing redistribution is proper compensation for the entity or individual that owns the water right or contract for water. If an entity has arranged through contracts to have more water than they currently need or may need in the study period, they should be compensated for the expense and upkeep of any facilities already in place.

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Table 5A.9 Comparison of Voluntary Redistribution to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Significant quantity available in parts of the Region 2. High Reliability 3. Low to moderate
B. Environmental Factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Minimal impact identified 2. Low impact in areas of construction 3. Possible low impact 4. Possible low impact
C. Impact on Other State Water Resources	No apparent negative impacts, no effect on navigation
D. Threats to Agriculture and Natural Resources	No impact identified
E. Equitable Comparison of Strategies Deemed Feasible	Considered to meet the needs of all user groups
F. Requirements for Interbasin Transfers	Considered on a case-by-case basis. Only required for surface water sales to users outside of the basin of the source
G. Third Party Social and Economic Impacts from Voluntary Redistribution	Beneficial because it provides water for economic growth

The following issues should be considered when negotiating a voluntary redistribution agreement:

- Quantity of water to be redistributed;
- Location of excess water supply;
- Location of buyer with water need;
- Necessary water treatment and distribution facilities;
- Determination of fair market value;
- Consideration of how existing contracts will affect the sale or lease;
- Length of agreement;
- Expiration dates of agreement;
- Drought contingencies;
- Protections needed by entity providing water;
- Protections needed by entity needing water;
- Enforcement of protections, and
- Other conditions specific to buyer and seller.

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5A.4 New Supply Development

New reservoirs are a type of surface water resource strategy and are the only new supply development strategies evaluated for the ETRWPA.

5A.4.1 New Reservoirs

Major water providers in the ETRWPA have performed numerous studies on locations of reservoir sites. The ETRWPA possesses many features attractive to reservoir construction. The process of implementing a new reservoir is a multi-decade task of identifying, evaluating, and resolving environmental impacts associated with the reservoir as well as evaluating the economic feasibility of the project. These studies are beyond the scope of regional water planning. The process of implementation can go beyond the 50-year planning cycle in the current water planning process. The consideration of reservoir projects in the ETRWPA is based on information provided by major water providers located in the ETRWPA demonstrates their ability and willingness to serve needs in the 50-year planning cycle. For proposed reservoirs, justification and environmental impacts analyses are the responsibility of the sponsoring water provider. Information available through other studies was used to evaluate these projects for the region.

The ETRWPA has a long history of water supply planning by means of reservoir development. Numerous sites have been identified as being hydrologically and topographically ideal for reservoir development. For a site to be considered for reservoir development, it needs to be recommended by the planning group as a unique reservoir site. Two sites in the ETRWPA are currently designated as unique reservoir sites: Lake Columbia and Lake Fastrill. Lake Fastrill was designated by the 79th Legislature through 2007 Texas Legislature Senate Bill 3. Lake Columbia received its unique designation by the State Legislature, Senate Bill 1362. Lake Columbia is currently being pursued for development. The ETRWPG recommends both Lake Columbia and Lake Fastrill retain their status of unique reservoir sites. Chapter 8 provides additional discussion of unique reservoir sites.

Several reservoir sites in the ETRWPA have long been discussed as potential sources of water. The ETRWPG recognizes reservoirs can have major impacts on the environment and protection of the environment is already afforded through a process that is more thorough than the regional water planning effort. Other sites have been considered for water supply development in the past and may be considered again for future supplies. The potential reservoirs initially considered for water supply are presented below in Table 5A.10. Chapter 8 features a brief description of each of the potential reservoir sites.

In the ETRWPA, there are two sponsors of these reservoir projects shown to have needs: ANRA and UNRMWA. The LNVA and SRA, the other reservoir sponsors, are shown to have surplus water available for voluntary redistribution. Each of these water providers may choose to develop a new reservoir in the future if water demands on the provider change or if the reliability of its current supplies is impacted by drought. For this plan, the two most feasible new reservoirs are Lake Columbia and the Neches Off-Channel Reservoir (Fastrill Replacement Project).

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Table 5A.10 Potential Reservoirs for Designation as Unique Reservoir Sites

Major Water Provider	Reservoir Site
Angelina Neches River Authority	Lake Columbia (Unique Site)
Lower Neches Valley Authority	Rockland Reservoir
Sabine River Authority	Big Cow Creek
	Bon Weir
	Carthage Reservoir
	Kilgore Reservoir
	Rabbit Creek
	State Hwy. 322, Stage I
	State Hwy. 322, Stage II
	Stateline
	Socagee
Upper Neches River Municipal Water Authority	Neches Off-Channel Reservoir (Fastrill Replacement Project)

The Lake Columbia footprint is located predominantly in Cherokee County but extends into the southern portion of Smith County. The reservoir would be formed by construction of a dam on Mud Creek approximately 2.5 miles downstream of U.S. Highway 79 crossing. The dam is expected to impound water approximately 14 miles upstream with an estimated surface of 10,133 acres. The firm yield for the reservoir site is 75,700 ac-ft with a total storage volume at normal pool elevation of 315 feet, msl or 195,500 ac-ft. This project is sponsored by Angelina and Neches River Authority.

Needs that would potentially be met by the development of Lake Columbia are provided in Table 5A.11. In addition, Lake Columbia is a recommended strategy for all participants in the project. Some participants intend to replace existing groundwater supplies with water from Lake Columbia. These users may or may not show a need in the 2021 Plan.

The Neches Off-Channel Reservoir Project is located in the Neches River Basin and is sponsored by the Upper Neches River Municipal Water Authority and the City of Dallas. This strategy would include the construction of an off-channel storage reservoir, which would be located on a tributary of the Neches River in Anderson County downstream of Lake Palestine and upstream of the Weches Dam Site. The evaluation of this strategy is discussed in more detail in the 2021 Region C Water Plan.

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Table 5A.11 List of Participants for the Lake Columbia Project

Entities Participating in Lake Columbia Project	Contracted Amount (ac-ft/yr)
Currently Contracted Participants	
Mining (Angelina)	474
New Summerfield	2,565
North Cherokee Water Supply Corporation (WSC)	4,275
Rusk	4,275
Rusk Rural WSC	855
Mining (Cherokee)	238
Mining (Nacogdoches)	5,475
Jackson WSC	855
Jacksonville	4,275
Mining (San Augustine)	2,102
Alto	428
County Other (Cherokee, Nacogdoches & Smith)	5,131
Nacogdoches	8,551
Arp	428
Troup	4,275
New London	855
Whitehouse	8,551
Potential Participants	
City of Dallas	
TOTAL	45,319

Water demands that would be satisfied by the development of the Neches Off-Channel Reservoir Project are indicated in Table 5A.12.

Table 5A.12 Demands Supplied by Lake Fastrill Replacement Project

Entity	Projected Demand (ac-ft per year)
UNRMWA	
City of Dallas*	47,250
TOTAL	**47,250**

* Alternative Strategy

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New Reservoirs Environmental Issues

Environmental impacts associated with the development of a new reservoir can be significant. Evaluation of such impacts is generally beyond the scope of water planning. Table 5A.13 provides a basic evaluation of issues. Environmental impacts for off-channel reservoirs may be less than on-channel reservoirs due to the flexibility in locating these facilities.

Table 5A.13 Environmental Issues Associated with Development of New Reservoirs

Environmental Issues	Evaluation Result
Implementation Measures	• Dam and reservoir impact large area (10,000 acres). • Requires land acquisition for reservoir and mitigation.
Environmental Water Needs/Instream Flows	• Probable moderate to high impact. • Mitigated through the permitting process.
Bays and Estuaries	• Possible cumulative impact to limited areas of coastal marsh.
Fish and Wildlife Habitat	• Possible high to moderate impact to riverine species and moderate impacts to terrestrial species. • Possible moderate impact on State-listed species. • Beneficial impacts to aquatic generalist and lentic species
Cultural Resources	• Probable moderate impact.
Threatened and Endangered Species	• Possible moderate to low impact pending identification of such species in the project area.

New Reservoirs Cost Consideration

As with any major reservoir project, the project costs are large. The annualized estimate of cost will include the construction of the dam, land acquisition, resolution of conflicts, environmental permitting and mitigation, and technical services.

New Reservoirs Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 5A.14. While the construction of new reservoirs is shown to have moderate to high impacts for some categories, these impacts will be adequately mitigated for during the permitting process.

Appendix 5A-B includes a table of WMSs required to be considered and evaluated by statute for every WUG with an identified need and a summary of the potentially feasible and non-feasible strategies.

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Table 5A.14 Comparison of Development of New Reservoirs to Plan Development Criteria

Impact Category	Comment(s)
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient to meet needs 2. High reliability (Moderate reliability for river diversion) 3. Reasonable to High
B. Environmental Factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Moderate impact 2. High impact 3. High impact 4. Low to moderate impact
C. Impact on Other State Water Resources	Moderate impacts on state water resources (available water); low to moderate effect on navigation
D. Threats to Agriculture and Natural Resources	Moderate to high impact on bottomland hardwoods and habitat in reservoir area
E. Equitable Comparison of Strategies Deemed Feasible	Option is considered to meet water needs
F. Requirements for Interbasin Transfers	Potential interbasin transfer to Trinity Basin
G. Third Party Social and Economic Impacts from New Reservoirs	Varies: Potential for positive economic impacts

5A.4.2 Aquifer Storage and Recovery (ASR)

Aquifer storage and recovery (ASR) involves storing water in aquifers and retrieving this water when needed. The water to be stored can be introduced through enhanced recharge or more commonly injected through a well into the aquifer. If an injection well is used, Texas law requires that the water not degrade the quality of the receiving aquifer. Source water for ASR can include excess surface water, treated wastewater, or groundwater from another aquifer.

There are several technical considerations to determine the feasibility and applicability of ASR, specifically:

- ASR requires suitable geological conditions for implementation. Since geologic conditions vary by location, studies must be performed to determine what specific locations would be suitable for ASR.
- Raw surface water and wastewater reuse most likely will require pretreatment prior to injection.
- Operation of an ASR system could significantly impact the amount of water that is retrievable.

Recent legislation passed by the 86th Texas Legislature, and signed by the Governor on June 10, 2019, requires the regional water plans to consider ASR and provide a specific assessment of this strategy if the region has significant needs. The definition of significant need is deferred to each region. The ETRWPG defined the threshold for significant needs to be 5,000 acre-feet per year. There are seven entities that meet this significant need threshold: the Angelina & Neches River Authority (ANRA), Angelina Nacogdoches Water Control and Improvement District (AN WCID) #1, Athens Municipal Water Authority (MWA), City of Beaumont, City of Lufkin, Upper Neches River Municipal Water Authority (UNRMWA), and Jefferson County Manufacturing.

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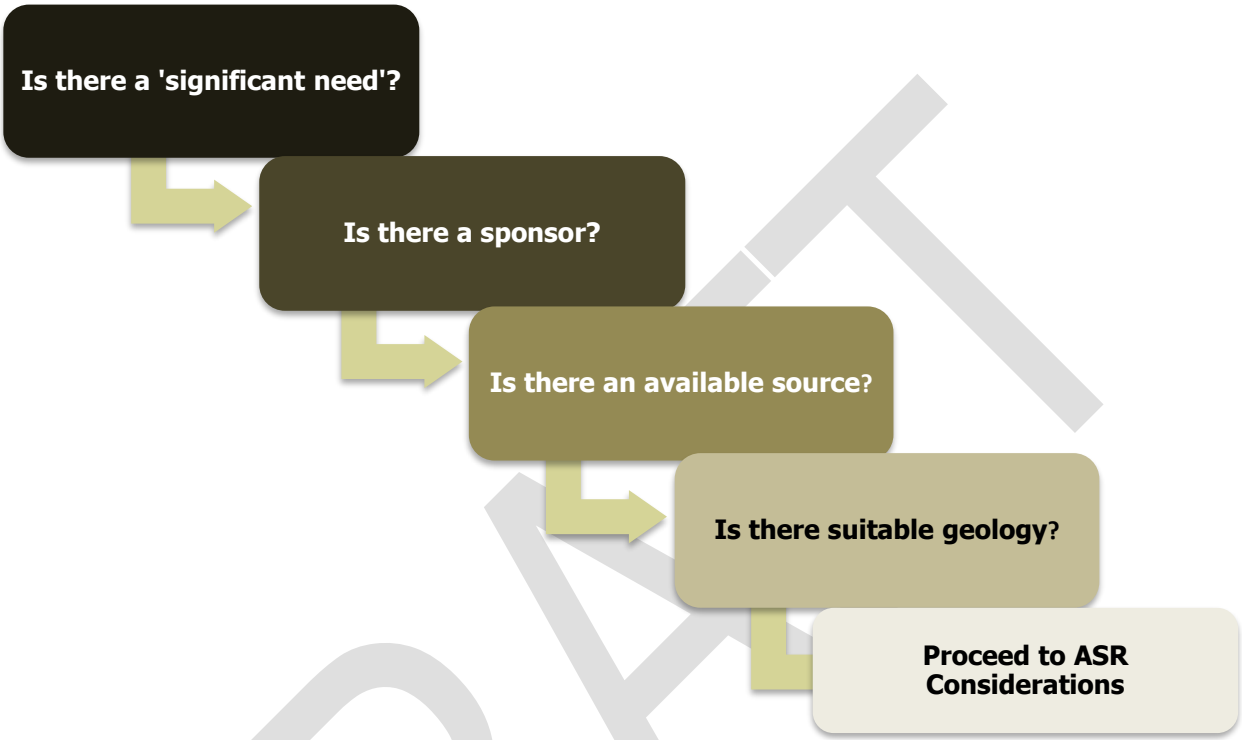
Before assessing the multitude of technical considerations required for ASR, Region I developed a set of criteria to screen out the feasibility and applicability of ASR to the entities identified with significant needs. Figure 5A.1 illustrates this screening process.

Table 5A.1 Aquifer Storage and Recovery Screening Criteria



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