# Scoping Summary Report: Cedar Ridge Reservoir Permit Application EIS

**SWF-2010-00191**

**Final**
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***Prepared for:***
***U.S. Army Corps of Engineers, Fort Worth District, Regulatory Division***

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# Abbreviations and Acronyms

| | |
|---|---|
| 3PC | Third Party Contractor team |
| AFY | Acre-feet per year |
| Applicant | City of Abilene team |
| ARRP | Aquatic Resource Relocation Plan |
| BBEST | Basin and Bay Expert Science Team |
| BIO-WEST | BIO-WEST, Inc. |
| BRA | Brazos River Authority |
| CFR | Code of Federal Regulations |
| CWA | Clean Water Act |
| EIS | Environmental Impact Statement |
| EPA | U.S. Environmental Protection Agency |
| EPT | Ephemeroptera, Plecoptera, and Tricoptera |
| FBR | Friends of the Brazos River |
| FNI | Freese and Nichols, Inc. |
| HDR | HDR Engineering, Inc. |
| HEC-RAS | Hydrologic Engineering Center - River Analysis System |
| NEPA | National Environmental Policy Act |
| NOI | Notice of Availability |
| NWF | National Wildlife Federation |
| Project | Cedar Ridge Reservoir Project |
| ROD | Record of Decision |
| SC | Sierra Club |
| SH | State Highway |
| TCA | Texas Conservation Alliance |
| TCEQ | Texas Commission on Environmental Quality |
| TCPS | Texas Center for Policy Studies |
| TES | Threatened, Endangered, and Sensitive |
| THC | Texas Historical Commission |
| TPWD | Texas Parks and Wildlife Department |
| TWDB | Texas Water Development Board |
| TXRAM | Texas Rapid Assessment Methodology |
| USACE | U.S. Army Corps of Engineers, Fort Worth District |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| WAM | Water Availability Model |
| WTU | West Texas Utilities |
| WTWP | West Texas Water Partnership |

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# Chapter 1.0
# EIS and Proposed Project Overview

The U.S. Army Corps of Engineers, Fort Worth District (USACE) received an application for a permit under Section 404 of the Clean Water Act from the City of Abilene, Texas (Applicant) to construct a proposed water supply project, the Cedar Ridge Reservoir. The Cedar Ridge Reservoir Project (Project), if constructed, would be a non-federal project constructed, owned, and operated by the City of Abilene. The USACE has determined that issuing this permit may significantly impact the environment, and, therefore, requires the preparation of an Environmental Impact Statement (EIS).

The EIS would be prepared according to the USACE's procedures in the Code of Federal Regulations (CFR) at 33 CFR 230 and 325 Appendix B for implementing the National Environmental Policy Act (NEPA), as amended, 42 U.S C. 4332(2)(c), and consistent with the USACE's policy to facilitate public understanding and review of agency proposals, as well as to develop information, data, and analyses to be used in 404(b)(1) guidelines and public interest review analyses for the Project. The EIS is intended to provide an environmental evaluation focusing on the potential direct, indirect, and cumulative aquatic resource impacts, in addition to other relevant environmental and human resources, that could be affected by the reservoir. As part of the EIS and 404(b)(1) alternatives analysis process, a full range of and practicable alternatives, including the proposed Action and no action, would be evaluated. The use of a third-party contract arrangement will be used to develop the EIS funded by the City of Abilene, Texas.

The Applicant is proposing to construct and operate a new 227,127 acre-foot reservoir, with a proposed surface area of 6,635 acres at conservation pool and an additional 2,151 acres at the 100-year floodplain elevation, formed by an approximately 5,200-foot long earthen dam. The Project, as proposed by the Applicant, is intended to provide approximately 34,400 acre-feet of new reliable water supply to address additional water supply needs. Proposed impacts to waters of the United States at the project site include fill and inundation of 29-miles of the Clear Fork of the Brazos River and inundation of 43 miles of intermittent and ephemeral tributaries to the Clear Fork.

On February 20, 2014, the USACE sent a letter to the Applicant indicating that preparation of an EIS would be required on the proposed Project permit action using a third-party contractor (3PC) paid by the Applicant, but who is selected and supervised by the USACE. The USACE specifically requested an EIS to evaluate the following:

- extent of likely adverse impacts to Waters of the U.S.
- habitat loss
- land acquisition and relocations
- utility relocations

- cultural resource effects
- cumulative effects in the Brazos River watershed.

The USACE noted in its initial evaluation that Federal and State regulatory agencies expressed their perspectives during a pre-application meeting held by the Applicant at the proposed project site in August 2010 regarding potential effects and verbally indicated support for an EIS. Topics of interest expressed by these anticipated Cooperating Agencies in 2010 included the following:

- listed threatened and endangered species
- fish and wildlife
- aquatic life movements
- invasive species (golden algae)
- impacts to Waters of the U.S.
- water rights
- cultural resources
- salinization
- water conservation
- downstream impacts (including sediment transport and geomorphology)
- changes to water temperature and flow regimes (upstream and downstream of dam)
- water quality.

The proposed project would be located primarily in northwest Shackelford County on the Clear Fork of the Brazos River with small portions located in adjacent Haskell, Jones, and Throckmorton counties in West Central Texas. The southern limit of the proposed reservoir would be approximately 25 miles northeast of Abilene, TX, near the town of Lueders, TX. The conservation pool elevation of the reservoir would be located 0.4 river miles north and downstream from the State Highway (SH) 6 bridge over the Clear Fork near Lueders, TX. The downstream limit of the reservoir at the dam would be approximately 15 aerial miles north and downstream of the SH 6 Bridge.

As part of the proposed project, other facilities to be constructed include two spillways, a multi-level outlet works, a pump station, a 34-mile pipeline, roadways, and construction areas. The pump station and pipeline would affect areas that may be waters of the United States. Construction of the dam and associated nearby facilities would require 117 acres of land and the placement of approximately 16,000 cubic yards of fill material below the ordinary high water mark of the river and a small amount of fill in an ephemeral tributary. Temporary and

permanent construction of the pump station, pipeline, access roadways, laydown areas, and borrow areas could impact an estimated 1,100 acres of land.

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# Chapter 2.0
# Project Scoping Process

## 2.1 Purpose of Scoping

The purpose of scoping is to gather input from the public, federal, state, and local agencies, and tribes regarding the issues and alternatives to be considered in development of an EIS. Per the Council on Environmental Quality regulations implementing NEPA at 40 CFR 1501.7, "There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping." Furthermore, "scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement" (40 CFR 1508.25).

Information gained during the scoping process helps the lead federal agency to focus the scope of assessment in the EIS on areas of concern, including helping to identify significant issues to be analyzed in depth in the EIS. The process also helps to define and refine potential environmental issues, the range of alternatives considered, and mitigation measures to be considered in the NEPA analysis. Scoping is intended to provide meaningful public and agency involvement in the decision-making process, and input from scoping and throughout the NEPA process is essential in developing comprehensive and sound NEPA documents. Comments received during the public and agency input process further assist USACE in determining the resource factors that require greater focus and the methods to assess them as required with the 404(b)(1) guidelines and the public interest review.

## 2.2 Notifications

Notifications of the proposed project and the scoping process were provided to multiple recipients via several different methods, as follows:

- Letters were sent to the cooperating agencies inviting their participation in the project on February 14, 2018 (Appendix D)
- Letters were sent to tribes inviting their participation in the project on January 3, 2017 (Appendix E)
- A Notice of Intent (NOI) was published in the Federal Register on April 13, 2018 (Appendix A). The NOI was withdrawn on August 7, 2018 (Appendix Q; see further information below).
- A public notice (Appendix B) was mailed to all potentially affected property owners, public officials, and parties included on the USACE notification list on April 13, 2018.

- Newspaper advertisements were published in the Abilene Reporter-News newspaper on April 13-15, 2018 (Appendix C)

- Direct mail correspondence was sent to public officials on May 2, 2018 inviting their participation at the public scoping meeting (Appendix F)

In the days leading up to the public scoping meeting, an article was published in the Abilene Reporter-News titled "'Scoping' meeting for Cedar Ridge Reservoir planned Wednesday at Convention Center" (Appendix G). This article was not initiated by the USACE.

## 2.3 Scoping Meetings

A cooperating agency site visit was held on April 3, 2018, from 9 am to 6 pm at the proposed project site, including visits to the Clear Fork of the Brazos River and the Hendrick Ranch northeast of Lueders, Texas. A list of attendees is provided as Appendix H. The purpose of the meeting was to familiarize the cooperating agency staff with the environment and key features of the proposed project and reacquaint the agencies with the site. A previous cooperating agency meeting and site visit was held on August 23-25, 2010.

Cooperating agency and public scoping meetings were held on May 16, 2018, at the Abilene Convention Center, 1100 N 6th Street, Abilene, Texas. The cooperating agency meeting was held from 10am to 12pm, and the public meeting was held from 4pm to 8pm.

The cooperating agency scoping meeting included a project overview presentation by the USACE and the opportunity for agencies to share their draft comments following the project site visits and review of applicant-provided data.

The public scoping meeting was primarily an open house format with a series of exhibit boards displaying aspects of the proposed project (Appendix I). A formal USACE presentation of information was delivered that described the scope of the EIS process, applicant-provided project information, and opportunities and timing for public input.

Lists of cooperating agency attendees, public attendees, and elected official attendees are provided as Appendices J, K, and L respectively.

Photographs from the cooperating agency site visit and the cooperating agency and public scoping meetings are provided as Appendix M. The day after the public scoping meeting (on May 17, 2018), an article (not initiated by the USACE) was published in the Abilene Reporter-News titled "Opinions vary on reservoir project" (Appendix N).

## 2.4 Methods of Commenting

Scoping comments were requested via four different methods: (1) written public comment card filled out at the scoping meeting, (2) oral statement delivered to a court reporter present at the scoping meeting, (3) comments submitted via email to cedarridge@usace.army.mil, and (4) comment letters submitted via mail to USACE: Fred Land, Regulatory Project Manager USACE,

Fort Worth District, P.O. Box 17300, Fort Worth, TX, 76102. A sign language interpreter and a Spanish language interpreter were provided at the public scoping meeting to support communications assistance. Written statements for scoping were accepted until June 15, 2018. The 30-day comment period was communicated at both the cooperating agency and public scoping meetings.

The following question was suggested for consideration by the public and cooperating agencies in the scoping meeting materials: "What, in your mind, are the key issues we should spend time evaluating in the Draft EIS?" including these additional example questions:

- Are alternatives to the proposed project important?
- Are there other ways a reliable water supply can be secured?
- Should a water supply reservoir be constructed at all?
- Are there land use or transportation issues that might stand in the way of developing this proposed project?

## 2.5 Tribal Nation Coordination To-date

Letters were initially sent to Tribes inviting their participation in the project review January 3, 2017. A Tribal Nation site visit and scoping meeting was conducted on August 15, 2018. It was a Government-to-Government Meeting between the USACE and the Comanche Nation of Oklahoma (and the Apache Tribe of Oklahoma) regarding the permit application review for the Project. The meeting consisted of an invocation and opening remarks, introductions, and overview of the USACE action, discussion and listening with the Tribes, lunch, and a tour of select site locations in the area of the proposed reservoir. Materials related to the Tribal Nation scoping meeting are provided in Appendix O. At the meeting, USACE discussed an ongoing consultation process, including an open-door policy for communications and a request for comments from the Tribal Nations, and stated that further identification and evaluation of cultural resources is to be conducted. Comments received during the Tribal Nation scoping process will be incorporated into the ongoing scoping process.

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# Chapter 3.0
# Summary of Comments Received

During the public and agency comment period, 21 comment letters were received. This includes 10 comment letters from members of the public, 6 agency comment letters, and 5 comment letters from non-governmental organizations.

The 21 comment letters included 268 individual substantive comments, organized into 15 categories (see table below). Note that 39 of the comments have been categorized into more than one category, so that total count in the table does not match the total number of substantive comments received.

Substantive comments: (1) provide information about the Proposed Action, alternatives, methodologies, errors and omissions, and data and information sources; or (2) reasonably question the information provided, assumptions, alternatives, or methodology. Comments not considered substantive: (1) only state an opinion or preference; (2) address issues outside the scope of the NEPA analysis; or (3) address issues outside the project area or project.

Table 3-1. Tally of Public and Agency Scoping Comments Received, by Category

| **Category** | **Count** |
|---|---|
| NEPA Process/Procedure | 9 |
| Purpose and Need | 55 |
| Alternatives | 34 |
| Proposed Action | 2 |
| Mitigation | 21 |
| Biological Resources | 96 |
| Cultural Resources | 7 |
| Land Use | 1 |
| Recreation | 2 |
| Socioeconomics | 7 |
| Topography, Geology, Soils | 9 |
| Transportation | 1 |
| Visual Resources | 1 |
| Water Resources | 54 |
| Secondary and Cumulative Impacts | 13 |
| **Total** | **312** |

Key:
NEPA = National Environmental Policy Act

The comments address (in the form of requests, recommendations, suggestions, and/or concerns) a number of issues, summarized below. In (parentheses) after each comment is the source of that comment. In some cases, one or more similar comments from different sources were merged into one comment summary in the list below; in these cases, all contributing sources are listed. Comments from individual members of the public are not identified by name, but rather as (public). For some comments, additional supporting information is provided as a sub-bullet. A copy of all scoping comments received is presented as Appendix P.

## 3.1 NEPA Process/Procedure

- Provide mechanisms for public disclosure of the analysis and management decisions (U.S. Environmental Protection Agency (EPA) 404).

- Ensure that plans include required Texas Parks and Wildlife Department (TPWD) authorizations [RE: state-listed species; Texas Natural Diversity Database; aquatic species; sand and gravel program; harmful or potentially harmful to fish, shellfish, and aquatic plants] (TPWD).

- Recognize that written response to a TPWD recommendation or informational comment received by a state governmental agency on or after September 1, 2009 may be required by state law (see Texas Parks & Wildlife Code Section 12.0011) (TPWD).

## 3.2 Purpose and Need

- Revise the purpose and need statement to be broad enough to encompass an appropriate range of both “reasonable” and “practicable” alternatives to meet the basic (i.e., underlying) project purpose, including the proposed action and other water supply methods available, (e.g., temporary or permanent agreements for use of agricultural water rights, conjunctive use of groundwater and surface water supplies, alternative development of additional storage or reservoir re-operation, alternative storage sites within the basin such as an off-channel reservoir, purchase of other water rights that may be less damaging to aquatic resources, and blending raw water) (EPA 404, EPA NEPA).

- Determine Abilene's current daily water use and estimated future daily water use (public).

- Determine if past history of streamflow in the Clear Fork of the Brazos River supports a reservoir of this size (public).

  - This project will not provide adequate water for an extended drought. U.S. Geological Survey (USGS) gaging stations show less than 100,000 acre-feet of flow from 2000 to 2015 (15-year period).

- Use State Demographer information for water demand (EPA NEPA).

- Describe current community master planning build-out scenarios and boundaries and estimate demand for these scenarios (EPA NEPA).

- Provide similar community-type demand estimates or ranges for comparison purposes (EPA 404).

- Conduct an independent assessment of the projected needs for additional water based on the history of use by Abilene and any other entities that are proposed as users of water from the Reservoir (public, Texas Conservation Alliance (TCA), Texas Center for Policy Studies (TCPS)).

  - Get a more reliable demand projection for potable water use for City of Abilene. Region G plan projects Abilene demand of 28,403 acre-feet for all entities under contract in Abilene service area.

  - The need justification for the Cedar Ridge Reservoir has to be evaluated in terms of the needs that is the demands not met with current supplies or those that are likely to be available.

  - The legitimate projected demand for 2070 is slightly more than 30,000 acre-feet per year (AFY).

- Assess conservation measures. It is preferred that conservation be used as a tool to reduce demand at the project purpose stage. If not, document the basis for that decision. Another option would be to consider demand management as an alternative, alone or in combination with others. As a demand reducer, suggest analysis to quantify the role of conservation in reducing future supply needs and to identify implementation. Suggest documentation be provided if certain conservation measures are not practicable (EPA 404, EPA NEPA).

- Determine Abilene's current water supply and demand (public, TCA).

  - Another alternative would be to reduce the demand shown in the Region G 2016 water plan by removing 31,830 acre-feet: from projected demands, new power generation (10,000 acre-feet), 10,000 acre-feet for alliance members outside the Brazos River Basin which have restrictions by law, and 11,837 acre-feet permitted to City of Clyde (water stored in Lake Fort Phantom for power water circulation only.

  - Abilene's current water supply, conservatively calculated, totals more than 50,000 AFY, with a project being developed for an additional 11,000 to 20,000 AFY from Possum Kingdom Reservoir. Thus, Abilene's water supply for 2070 is between 60,000 and 70,00 AFY, plus anything it might get from O.H. Ivie or increased reuse.

- Assess the net impact of private stock tanks on Clear Fork water availability (public).

  - In the last ten-year drought, there were several nearby property owners who built nice sized stock tanks for livestock. These tanks capture flow and would fill up before runoff reaches the river.

- Reject evaluations of the need for Cedar Ridge Reservoir based on the inadequate methodologies employed in the state water planning process (TCA, TCPS).

- Reject project justification based on demands and needs for irrigation water, and conduct independent evaluation of need for irrigation water (TCPS).

- Determine the impact of potential future sales of water to other cities in the WTWP in project justification, as there are not yet identified demands associated with Cedar Ridge (Environment Texas, TCA).

- Verify that existing water supply is substantially higher than projected demand, and omits count of reuse/recycling of municipal wastewater, inappropriate use of treatment capacity as a measure of supply, and omits supplies from Possum Kingdom (Environment Texas).

- Determine whether virtually all of Abilene's raw-water demand is imaginary (TCA).

- Determine steam electric power generating water demand (TCA).

  - 11,837 AFY is listed for the City of Clyde for steam electric cooling water and 5,384 AFY for Nolan County steam electric. Yet no plants are proposed in Nolan County, Clyde, Callahan County where Clyde is located, or any other county in the region around Abilene. In 2015, Region G was projecting a steam electric demand in Nolan County of 23,916 AFY. In the early part of this decade, Tenaska had planned a power plant in Nolan County, but Tenaska announced in 2013 that it was shutting down those plans and no plant would be built. (Earlier than that, Tenaska had announced its plant would use dry cooling, so even if it had been built, this demand for cooling would not have materialized.)

- Verify whether reuse/recycling of municipal wastewater is omitted as a water supply (TCA).

  - Abilene has developed a municipal water reclamation facility at the Hamby Wastewater Treatment Plant that can produce 7 MGD (>7,800 AFY). This source of supply is not listed in Table 4.3-13 [of the *2016 Brazos G Regional Water Plan* (HDR Engineering, Inc. (HDR) and Freese and Nichols, Inc. (FNI), 2015)]

- Verify the selection of the two-year safe yield for Lake Fort Phantom Hill (TCA).

  - According to Section 3.2.3 of the 2017 state water plan (Texas Water Development Board (TWDB), 2017), the firm yield of Lake Fort Phantom Hill is 21,630 AFY in 2070, yet Table 4.3-13 (HDR & FNI, 2015) counts its supply from the lake as 10,000 AFY in 2020 and 8,960 AFY in 2070. Footnote 4 of Table 4.3-13 (HDR & FNI, 2015) states that this is based on a two-year safe yield less the one-year safe yield of the City of Clyde's water right. Shifting to the two-year safe yield discounts Abilene's firm water supply from Lake Fort Phantom Hill by more than 10,000 AFY in 2070.

- Verify undercounting supply from Hubbard Creek Reservoir (TCA).

  - In the case of Hubbard Creek Reservoir, Abilene has a contracted supply of 20,400 AFY. Since Hubbard Creek Reservoir has a firm yield in 2070 of 40,352 AFY in 2070 and a 2070 two-year safe yield of 26,317 AFY, there should be no reason why Abilene cannot take its full contract. Yet Table 4.3-13 (HDR & FNI, 2015) credits Abilene with only 18,817 in 2070.

- Verify whether supplies from Possum Kingdom were omitted (Environment Texas, TCA).

  - For some years, the City of Abilene has had an option to buy 20,000 AFY from Possum Kingdom Reservoir. For the past three or four years, Abilene has been working with West Central Texas Municipal Water District to develop a distribution pipeline and raw water treatment facility to begin using raw water from Possum Kingdom Lake. During times of significant drought, Abilene plans for the option to withdraw water from Possum Kingdom and deliver it to a raw water roughing facility located in Breckenridge. The roughing facility would significantly reduce the total dissolved solids of the raw water. This raw water could then be sent to Abilene through the existing raw water delivery system from Hubbard Creek Reservoir.

- Abilene's supplies from Hubbard Creek Reservoir and Lake Fort Phantom Hill for treated water are depicted on Table 4.3-13 (HDR & FNI, 2015) as relying on treatment capacity. Those numbers are not relevant when assessing the total water supply of Hubbard Creek Reservoir and Lake Fort Phantom Hill (TCA).

- Determine whether West Texas Water Partnership (WTWP) has demonstrated need for future water supply (Environment Texas, TCA).

  - Table 4.3-13 (HDR & FNI, 2015) attributes to Abilene 10,000 AFY of "demand" for the WTWP. According to the Texas Water Plan (TWDB, 2017), "the City of Abilene and the Cities of Midland and San Angelo (Region F) have formed the WTWP to identify and secure long-range water supplies for the three cities and the surrounding region. Results from ongoing studies will be reflected in future regional water plans." In short, the WTWP has not yet demonstrated any need for future water supply.

- Ascertain why Abilene did not purchase recently-available Ft. Phantom Lake water from Eagle Construction Company (public).

  - Eagle Construction Company of Eastland, Texas used to own 11,837 AFY of water, acquired with the purchase of the West Texas Utilities (WTU) steam powered generation plant located on Ft. Phantom Lake. The plant was mothballed and the facilities deconstructed. Eagle Construction also owned an additional 2,500 AFY of water, making a total of 14,337 AFY. This water was for sale, and the City of Abilene was made aware of this. This water has apparently since been sold to the City of Clyde. Why did Abilene not purchase this water from Eagle Construction?

- Clarify the initial large increase in water projected shortage from 2020 to 2030 (National Wildlife Federation (NWF)/Sierra Club (SC)).

  - Table 5.38.16 of the 2016 Region G Plan (HDR & FNI, 2015) projects that in 2020 Abilene will only have a shortage of 7,081 acre-feet per year. For reasons that should be further assessed in the EIS, the shortage jumps to 28,345 in 2030. After that initial large increase in demand, it increases very little each decade, from 28,345 to only 28,642 in 2070. The reason for the initial large increase in water shortage from 2020 to 2030 is not clear and should be included in the EIS.

- Verify why, presumably demand grows as the population grows, the conservation amount is projected to remain constant. In fact, Texas Water Development Board numbers show that gallons-per-capita-per-day figures throughout Texas cities have either generally declined or not increased at the rate that past water plans have assumed (NWF/SC).

- Provide additional information regarding how future climate conditions were derived for modeling purposes. Use a full range of future climate scenarios, including higher emission scenarios, when modeling future water supplies (EPA 404, NWF/SC, TPWD).

- Investigate whether any water transferred to alliances outside the Brazos River Basin greater than 3,000 acre-feet would be subject to a call by adjudicated water rights owners located in the Basin (public).

## 3.3 Alternatives

- Rely on Possum Kingdom Lake for additional supplies (public, TCA).

  - An obvious future water supply option is for Abilene simply to finalize its plans to bring water from Possum Kingdom and, if it ever needs additional supply, to contract for the additional 9,000 AFY it is currently negotiating for with BRA.

- Determine whether the proposed project is redundant to the infrastructure being developed to move water from Possum Kingdom to Abilene (public, TCA).

- Consider groundwater resources near Hawley (public).

- Expand recycling/ reuse (public, TPWD).

- Explore a suite of structural and non-structural options to meet the underlying project purpose (EPA 404, EPA NEPA).

- The water plan projects a 23.6 percent increase in population over the next 60 years. Verify impacts of increased water usage on return flows and additional supplies of this type (TCA).

- Investigate the impact of the Granbury Coalition appeal of the Texas Commission on Environmental Quality (TCEQ) decision to grant the Brazos River Authority Systems Operation permit in state court, potentially impacting the availability of water for the Cedar Ridge Reservoir (Friends of the Brazos River (FBR)).

- Determine the yield situation with O.H. Ivie (TCA).

  - Abilene has a contract for 10,900 AFY from O.H. Ivie Reservoir (16.54 percent share of the one-year safe yield). This water must be partially desalinated. There seems to be some question about the current yield of O.H. Ivie. Abilene is considering future sales of water to San Angelo under the WTWP. Since Abilene obviously has no need for its supply in O.H. Ivie, Abilene may at some point wish to sell its contract with O.H. Ivie to San Angelo. Allowing for a 15 percent loss for the reverse osmosis waste stream, Abilene's contract gives them a potential supply from O.H. Ivie of 9,265 AFY. Abilene's current supply from Ivie is depicted in the state water plan as being constrained by its treatment capacity. No credit is given in projecting future supplies for the fact that additional treatment capacity could be developed.

- Design screening criteria so that non-structural components are not eliminated solely based on their potentially smaller individual contributions to project purpose and need (EPA NEPA).

- Use current/existing environmental conditions as the baseline for comparison of impacts across alternatives, including the No Action Alternative (EPA 404).

- Consider water supplies that are currently allocated to livestock (TCPS).

- Treat Drought Contingency Plans as water supply strategies, and consider and evaluate them as alternatives to the Cedar Ridge Reservoir (Environment Texas, TCPS).

- Pipe water from the Clear Fork to Hubbard Creek Reservoir (Environment Texas, TCA).

  - Currently, Abilene has two pipelines from Hubbard Creek Reservoir that together have the potential to deliver more water than Abilene's current contract for water from the reservoir. In 2012, TCA commissioned Trungale Engineering and Science to do a cost study of the option of piping Clear Fork water to Hubbard Creek Reservoir for conveyance to Abilene. There has been at least one other study of this option in the past. The Trungale study indicates that this option could develop 2/3 the amount of water as Cedar Ridge Reservoir for roughly 1/6 the cost.

- Expand water conservation efforts (EPA 404, EPA NEPA, NWF/SC, TPWD).

- Consider off-channel reservoirs to minimize wildlife impacts. Construction of off-channel reservoirs can also help to minimize wildlife impacts if reservoirs are located to minimize inundation of sensitive habitats, and diversions are modified to avoid adverse impacts to environmental flows (TPWD).

- Include identification of appropriate mitigation for alternatives (EPA 404).

## 3.4 Mitigation

- Have the adaptive management plan include a specific anticipated range of management responses and actions (EPA 404).

- If the selected adaptive decision-making process includes monitoring, then both the Draft EIS and Record of Decision must include commitments for the funding and resources needed (EPA 404).

- Determine specific temporal milestones to meet rehabilitation standards (EPA 404).

- Ensure that mitigation details are consistent with the regulatory requirements under the 2008 Rule on Compensatory Mitigation for Losses to Aquatic Resources for Clean Water Act (CWA) Section 404(b)(1) related impacts (EPA 404).

- Identify a site protection instrument to be employed on all mitigation areas, preferably in the form of a Conservation Easement with a third-party easement holder identified (EPA 404).

- Develop a draft mitigation plan per U.S. Fish and Wildlife Service (USFWS) 2016 Mitigation Policy (USFWS).

- Consider including in mitigation plans upstream losses and potential downstream losses, including in-kind losses. The current mitigation site does not include in-kind losses. Please provide a mitigation plan to include the sum of losses to impacted streams types and the total linear feet of each type. Impacts to aquatic resources should be mitigated in-kind (EPA 404, TCEQ).

- Use an impact assessment methodology tied to resource function, capable of illustrating the functional lift provided by mitigation, with key mitigation goals tied to resource function, and with the capability of calculating credit and debits owed. Develop a tool for use on this project for both impact assessment and potentially mitigation crediting and debiting (EPA 404).

- Assess multiple in-kind mitigation strategies and approaches. Due to the high quality and associated functions of the impacted resources, it is anticipated that it will be challenging to identify enough compensatory mitigation opportunities to fully compensate for the losses (EPA 404).

- Develop a mitigation effectiveness monitoring plan and timeline, including baseline monitoring data as needed (EPA 404).

- Define adaptive management decision points based upon protecting the minimum desired environmental conditions (i.e., performance standard thresholds) that would trigger action (EPA 404).

- Develop a comprehensive long-term management plan to be employed in perpetuity after performance standards have been met and mitigation deemed successful (EPA 404).

- Mitigate for upland impacts, and address impacts to riparian area turkey roosts (TPWD).

- Do not use the reach directly downstream of the dam as mitigation for lotic habitat loss (TPWD).

  - This reach appears healthy and has no need for enhancement, nor is this the best relocation site for mussels collected in the reservoir footprint because of future reduced flows, reduced sediment transport, and scouring in the tailrace. However, mussels may be able to be moved farther downstream.

- Include restoration/ enhancement on the Double Mountain Fork of the Brazos, including management of salt cedar (*Tamarix ramosissima*), in the range of mitigation alternatives considered (TPWD).

- Identify short and long term financial assurances and funding sources, preferably in the form of non-wasting endowments for long-term mitigation financing (EPA 404).

- Adaptive Management is often proposed for use in cases where potentially significant project impacts are possible. Have the adaptive decision-making description include the methods by which it will be determined that a management change is needed for the

project, including quantitative and observational methods, and thresholds used to determine the need for change (EPA 404).

- Include an environmental flow mitigation pool (TPWD).

## 3.5 Biological Resources – General

- Characterize shifts in species composition, impacts to less tolerant species, and changes in community composition with respect to function between baseline and post-project environment (EPA 404).

- Assess impacts to physical habitat, including availability, heterogeneity, connectivity, and long-term habitat maintenance (EPA 404).

- Assess the project's potential to increase the spread of invasive species (EPA 404).

- Engage USFWS early to assure that proposed alternatives account for: (1) River restoration, flow and channel modifications, wetlands, and habitat fragmentation regarding species' habitat requirements; (2) Migratory Bird Treaty Act; (3) A management plan for surrounding land uses (e.g. pesticide, nutrient, weed, and recreation management) for new reservoir construction alternatives; and (4) Protection from invasive species (EPA 404).

- Develop a summary of the status and trends in the project area for threatened, endangered, and sensitive (TES) species and potential suitable habitat acreage (EPA 404).

## 3.6 Biological Resources – Environmental Flow Regime

- Conduct a comprehensive instream flow assessment given the scale and permanence of the proposed reservoir and its operations (TPWD).

- Establish an environmental flow regime downstream of the proposed reservoir for mussels and larval host fish (USFWS).

  - We recommend investigations be made to support the establishment of an environmental flow regime downstream of the proposed reservoir that would provide habitat conditions to meet the life history requirements for the Texas fawnsfoot and smooth pimpleback, as well as the fish that serve as intermediate larval hosts.

- Determine an environmental flow regime necessary to ensure the survivability of the smalleye and sharpnose shiner (NWF/SC, TPWD, USFWS).

  - The proposed reservoir has the potential for serious adverse impacts on the federally listed sharpnose shiner and smalleye shiner and those potential impacts must be fully evaluated, avoided or minimized to the maximum extent possible, and otherwise mitigated for. The EIS must fully address those issues.

  - According to the TCEQ guidelines, absent a specific request from the applicant, the flow standards at either the Brazos River near South Bend measurement point or the Clear Fork Brazos River at Lueders measurement point would control impoundment and diversion from the proposed reservoir. As discussed in the Basin and Bay Expert Science Team (BBEST) report (Brazos BBEST, 2012), adequate pulse flows play an important role in supporting fish species like the smalleye and sharpnose shiner and mussel species, but would not be adequately protected under the flow standards.

  - Operation of the reservoir could potentially affect up to 27 threatened, endangered, and rare species, including the recently listed federally endangered Smalleye Shiner (*Notropis buccula*) and Sharpnose Shiner (*Notropis oxyrhynchus*) (both species occur in the Brazos River upstream and downstream of the confluence with Clear Fork).

  - The EIS should consider potential effects on native prairie stream snakes, benthic macroinvertebrates, mussels, and fish assemblages (including two endangered shiners) due to alterations in hydrology, connectivity, sediment transport, water quality including salinity, and instream habitat (including critical habitat for shiners) in the Brazos River upstream and downstream of Possum Kingdom Lake as well as in the Clear Fork of the Brazos River.

  - We also recommend an evaluation of the proposed reservoir's impact to flows that support the smalleye and sharpnose shiner in occupied habitat within the Brazos River. This would include determining an environmental flow regime necessary to ensure the survivability of the shiners within their occupied range downstream of the project site.

- Consider releasing flows in amounts, frequencies, and durations designed to maximize aquatic biota and ecosystem function and health beyond that currently required by TCEQ permit to demonstrate attempted compliance with CWA Section 404(b)(1) (EPA 404).

  - Using release of flows in amounts, frequencies, and durations designed to maximize aquatic biota and ecosystem function and health and above and beyond what is currently required by TCEQ in the state water rights permit can be a valuable demonstration of attempted compliance with the CWA Section 404(b)(1) Guidelines goals of avoidance and of minimization of impacts, as primary and secondary goals, respectively.

- Compare pre- and post-project flows including each month’s low-flows as well as duration, peak flow, and frequency for high-flow pulses, small floods, and large floods (EPA NEPA).

  - The EPA recommends including analysis of the following: impacts to the flow regime, with an emphasis on the implications of these changes on channel complexity and morphology, sediment transport, aquatic habitat availability and the associated life history adaptations of species found in the area, which includes: presentation and comparison of pre- and post-project flows including the mean or median values for each month’s low-flows as well as the duration, peak flow, and frequency for high-flow pulses, small floods (between 2-year flood and 10-year flood), and large floods (equal to or greater than a 10-year flood).

- Assess multiple metrics that influence habitat such as loss of flushing flows, reduced floodplain connectivity, temperature, and changes to ecologically significant flows (EPA 404).

- Evaluate the anticipated diminishment of high-flow pulses significant for the reproduction of listed fish species (NWF/SC).

- Evaluate the increased duration of low-flow periods and potential for elevated water temperatures and depressed levels of dissolved oxygen (NWF/SC).

- Evaluate flow alterations for effects on fishes of the Brazos River including all species in the pelagic, broadcast-spawning cyprinid reproductive guild (TPWD).

## 3.7 Biological Resources – Aquatic Organisms and Waters of the U.S.

- Update mussel surveys using TPWD protocols (TPWD, USFWS).

  - TPWD has concerns about the sampling procedures that were used for mussels. Regarding mussels, transect survey methods are not sufficient to say that a species is not present. TPWD recommends a new mussel survey, following current protocols, be conducted to assess the current status of mussel populations in the Clear Fork and potentially in the Brazos River if salinity levels increase as expected. Surveys should be stratified by mesohabitat (riffle, run, pool, etc.) and reach with a minimum search time of two person-hours for each mesohabitat within each reach. If new species are found after the second person-hour, additional person-hours are necessary until no new species are encountered. At least two mesohabitat types per reach should be searched. This should be the minimum effort to determine what is or is not present at the site. The contractor performing the work can consult with TPWD and the interagency work-group to finalize the details of the survey protocols (particularly reach delineation). If state-listed species are found, the contractor must consult with TPWD and the interagency work group to determine the appropriate level of quantitative surveys to ensure state-listed species are removed from the reservoir footprint. Efforts should identify mesohabitats that have the majority of the state-listed species, and multiple pass depletion surveys should be conducted in those areas only. If freshwater drum (a mobile species which was present in the fish surveys) is assumed as a host fish, mussel populations may have expanded since the last significant drought.

  - We recommend updated surveys be conducted using Texas Parks and Wildlife Department's Freshwater Mussel Survey and Relocation Protocols.

- Analyze the direct, indirect, and cumulative impacts to all wetlands in the geographic scope, even if these wetlands are spatially removed from the construction footprint, including impacts from water diversion/transfers (EPA 404, EPA NEPA).

- Analyze alternatives with respect to the affected stream system(s) to account for alterations of streamflow quantity and quality and impacts to aquatic life (EPA 404).

- Assess impacts to fish and invertebrates using baseline data regarding functional species composition, diversity, evenness, abundance, and, for macroinvertebrates, percent Ephemeroptera, Plecoptera, and Tricoptera (%EPT), and some characterization of flow preference. The EPA's rapid bioassessment protocol, or a state-specific method, may be used to describe baseline habitat quality (EPA 404).

- Use a stream assessment methodology tied to function and preferably quantitative for all areas impacted by the project (performed in addition to the Texas Rapid Assessment Methodology (TXRAM) rapid assessment). Include parameters and functional categories such as: (1) Catchment hydrology, reach runoff (Hydrology); (2) Floodplain connectivity (Hydraulics); (3) Lateral stability, riparian vegetation, bed material characterization, bedform diversity, sinuosity (Geomorphology); (4) Organic carbon, temperature, bacteria, nitrogen/phosphorus (Physicochemical); and (5) Macroinvertebrates and fish (Biology) (EPA 404).

- Determine potential impacts to the Brazos water snake (NWF/SC, TPWD).

  - The EIS should consider potential effects on native prairie stream snakes, benthic macroinvertebrates, mussels, and fish assemblages (including two endangered shiners) due to alterations in hydrology, connectivity, sediment transport, water quality including salinity, and instream habitat (including critical habitat for shiners) in the Brazos River upstream and downstream of Possum Kingdom Lake as well as in the Clear Fork of the Brazos River.

  - The levels of this proposed reservoir are expected to fluctuate substantially and decrease habitat for the Brazos River Watersnake. This has been TPWD's experience with Concho Watersnake at O.H. Ivie Reservoir. Shoreline development could also impact any snake habitat generated by the reservoir.

- Collect more suitability data across a range of flow conditions for the state-listed threatened Brazos River Watersnake (TPWD).

  - More suitability data across a range of flow conditions should be collected for the state-listed threatened Brazos River Watersnake. The applicant previously used boulder habitat and red shiner (preferred diet) as key features. How will reservoir inundation alter snake habitat and affect Red Shiner abundance/availability? If the applicant proposes Brazos River Watersnake habitat mitigation at the new reservoir, it may not be reliable.

- Assess, avoid, and mitigate for project-specific and cumulative impacts of creating a barrier to fish hosts carrying glochidia to moving upstream from the Brazos main stem, providing the opportunity to re-establish mussel populations in Clear Fork reaches (NWF/SC).

  - Without the project in place, fish hosts carrying glochidia can move upstream from the Brazos main stem providing the opportunity to re-establish mussel populations in various reaches of the Clear Fork. Similar migrations would allow other species to become re-established. However, construction of the dam and reservoir likely would preclude that potential. The project-specific and cumulative impacts of creating such a barrier must be assessed and, to the extent not avoided, mitigated for.

- Use consistent assumptions in assessing flow and habitat impacts of the project. If project need is assessed assuming flow conditions more severe than those historically documented, project impacts on downstream flows and affected habitats must be as well (NWF/SC).

- Assess reduction in fish species richness upstream of the reservoir (TPWD).

  - A reduction in fish species richness upstream of the reservoir would be expected based upon TPWD's experiences with fish assemblages upstream of Lake Alan Henry in the nearby North Fork Double Mountain Fork Brazos River.

- Review underlying datasets (e.g., fish habitat utilization data), output, flow regime framework, and recommendations proposed by BIO-WEST, Inc. (BIO-WEST) (January 2016) recommendations for subsistence and base flows (TPWD).

  - BIO-WEST modeled aquatic habitat in the Clear Fork relating to the Project and presented methods, results, and recommendations for subsistence and base flows; the latest version of the document is dated January 2016 (BIO-WEST 2016; report not provided). TPWD staff reviewed this document and has concerns about certain aspects of the report and recommends a review of underlying datasets (e.g., fish habitat utilization data), output, flow regime framework, and recommendations proposed by BIO-WEST.

- Instream habitat assessments should not be limited to current biological communities due to impact from recent droughts and because of known downstream barriers to species pools for re-colonization in the Clear Fork if existing barriers were mitigated through removal or fish passage (TPWD).

- Determine how the proposed project might influence releases from Possum Kingdom Lake (for example, the longer Possum Kingdom is in drought results in lower inflows and lower water levels resulting in lower downstream releases for the Brazos River), and the associated impacts downstream of Possum Kingdom (e.g., impacts to fish and mussel habitat) (TPWD).

  - Flow releases into the Brazos River downstream of Possum Kingdom Lake would also be reduced as a result of lower water levels and inflows.

  - The EIS should address how the proposed project might influence releases from Possum Kingdom Lake (for example, the longer Possum Kingdom is in drought results in lower inflows and lower water levels resulting in lower downstream releases for the Brazos River). Lower downstream releases could affect fish and mussel (e.g., Texas Fawnsfoot) habitat in the Brazos River (i.e., downstream of Possum Kingdom).

- Determine potential impacts due to alterations in hydrology, connectivity, sediment transport, water quality including salinity, and instream habitat in the Brazos River upstream and downstream of Possum Kingdom Lake as well as in the Clear Fork of the Brazos River (TPWD).

- Include fish passage as part of any dam design (TPWD).

  - TPWD recommends that fish passage be considered as part of any dam design. Aquatic species that could potentially use a fish ladder/passage include but are not limited to: Brazos River Watersnake; minnows (such as Red Shiner, Ghost Shiner, Plains Minnow, Shoal Chub, and others); suckers (such as Smallmouth Buffalo, River Carpsucker, and others); catfishes (such as Channel Catfish, Flathead Catfish, and others); and other migratory taxa that may occur in the upper Brazos River watershed, now or in the future.

  - Barrier removal and fish passage concepts should be evaluated. Populations (e.g., fish and mussels) from lower portions of the Clear Fork and the Brazos River that are currently precluded from upstream movement could recolonize the Clear Fork up to the Cedar Ridge Reservoir Dam. Environmental requirements for these species should be considered in habitat and water quality assessments/modeling.

- Conduct temperature and dissolved oxygen monitoring to model effects of potentially altered flows on fish, invertebrate, and mussel assemblages downstream through and below Lake Possum Kingdom (TPWD).

- Assess the potential increase in the frequency and duration of golden algae blooms in the Clear Fork, Cedar Ridge Reservoir, Brazos River, Lake Possum Kingdom, downstream, and into Lake Whitney as a result of increased salinity, especially during years of drought, after reservoir construction (FBR).

  - The increase in salinity as a result of lower flows and especially lower flushing in the Clear Fork of the Brazos River will also impact environmental assets that remain downstream. FBR wants to emphasize the risk of increasing the toxic golden algae blooms in Possum Kingdom and downstream and into Lake Whitney. The Corps should require a significant evaluation of the risk that further reduction in flows and increases in salinity can increase the frequency and extent of golden algae.

- Relocate potentially impacted native aquatic resources during construction via a Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters and an Aquatic Resource Relocation Plan (ARRP) (TPWD).

  - If construction occurs during times when water is present in streams and dewatering activities or other harmful construction activities are involved (such as placement of temporary or permanent fills), then TPWD may recommend relocating potentially impacted native aquatic resources in conjunction with a Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters and an ARRP.

## 3.8 Biological Resources – Fauna and Avi-Fauna

- Evaluate impacts to golden eagles using USFWS protocols (USFWS).

  - We recommend an evaluation be made of the project area and adjacent areas for use by golden eagles. The Service's Interim Golden Eagle Inventory and Monitoring Protocols (2010) provides information that may be used to design eagle surveys. The evaluation should also include an assessment of potential impacts to eagles that may use the area.

- Perform appropriate ecological functional assessments on streams and wetlands to be impacted by the construction and operation of the reservoir, including areas affected by inundation, as well as areas downstream of the proposed dam affected by flow regime changes (TCEQ).

- Update the rapid stream and wetland assessment approach being used from TXRAM Version 1.0 to TXRAM Version 2.0 for assessment of impacted resources (EPA 404).

- Suggest design criteria, mitigation, and monitoring measures, in coordination with USFWS and TPWD, to ensure no negative impact habitat for migratory birds, bald eagles, or other species (EPA 404).

- Re-survey the bat surveys conducted in June 27-30, 2011 and May 21-23, 2012, which are out of date (TPWD).

- Survey (walking or driving transects) for state-threatened Texas Horned Lizards (TPWD).

## 3.9 Cultural Resources

- Determine impacts to Native American sites (public).

- Present a scope of work to determine extent of project area to be reassessed and to determine appropriate field methods. This reassessment may be conducted under Texas Antiquities Code #5959, which was just extended for 10 years by the Antiquities Advisory Board (Texas Historical Commission (THC)).

- Record with TARL and assess 12 archeological sites identified during Phase 1a (THC).

- Expand geoarcheological assessment into a standalone chapter, including a summary of success rates for finding deeply buried sites in the various deposits and recommendations for targeting deposits that are particularly productive archeologically (THC).

- Recognize that any proposed alternative may contain archeological and historic cultural resources through a minimum of a detailed study of the landforms projected to be impacted. A synthesis of known cultural materials, including a geoarcheological assessment of possible deeply buried resources, and an evaluation of known site densities should be compiled prior to survey (THC).

- Engage a professional archeologist to survey viable alternatives (THC).

## 3.10 Recreation

- Independently evaluate recreational value, particularly based on anticipated varying lake levels and frequent extended periods of low water elevations (Environment Texas, TCA).

  - An attempt has been made by promoters of Cedar Ridge Reservoir to portray it as a potential recreational asset. If built, Cedar Ridge will be full a very small percentage of the time and less than half full for significant periods. A look at numerous other west Texas lakes calls into question the value Cedar Ridge is likely to have for recreation. This should be assessed with an independent eye.

## 3.11 Socioeconomics

- Provide clarification regarding financing: private financing involved, public-private partnerships (public).

- Include added costs from a "municipal damage" payment owed resulting from elevated salinity levels in Possum Kingdom (TCA).

  - In the "Economic Appendix" to the Wichita River Basin Project Reevaluation, Red River Chloride Control Project, April 2003, the USACE calculated a "new municipal damage coefficient" of $0.16 per 1000 gallons per 100 parts per million of total dissolved solids (in 2001 dollars). Using this figure, if the construction of Cedar Ridge raised the salinity in Possum Kingdom by 100 ppm, and if the full yield of Possum Kingdom (approximately 200 mgd) were used as water supply, then the implied "municipal damage" would be more than $11 million per year, which when adjusted to current dollars, would increase the annual cost of Cedar Ridge by more than 50 percent. Building Cedar Ridge would unquestionably increase the salinity of Possum Kingdom Reservoir, and therefore the economic losses due to this increase. These losses should be compared to the putative gains of constructing Cedar Ridge.

- Determine cost per acre-foot for uses such as recreation, domestic, livestock and agriculture (NWF/SC).

  - The annual cost for a one-year safe yield from the proposed reservoir, yielding only 26,575 acre-feet per year, is going to be $1,031 per acre-foot. For uses such as recreation, domestic, livestock and agriculture, this cost is simply too high and there are various alternatives that would cost much less.

- Determine transmission costs, particularly for distant potential future customers (NWF/SC).

  - The EIS should include its own review of what is included in the cost estimate in terms of transmission costs, particularly for the far-away entities to which Abilene may eventually sell water.

  - The citizens of Abilene will end up paying higher water rates to pay for the Cedar Ridge Reservoir, even though they will not be benefiting from the reservoir. The EIS should address the fact that there will be transmission costs when the City of Abilene sells water to other municipalities.

  - For example, the Region G Plan already anticipates selling to the City of Sweetwater, necessitating 40 miles of 6-inch-diameter transmission pipeline, a pump station and a storage tank. Abilene is selling this water at an estimated $100 per

acre-foot, while sharing the costs of the project (a $13,036,000-price tag) with the City of Sweetwater. If Abilene is indeed short of water for its municipal use, then selling water to another city, and splitting the costs of transmission, should be scrutinized closely in the EIS.

- Determine affordability for customer municipalities (NWF/SC).
  - It should be ascertained whether Cedar Ridge water would really be affordable to the buying municipality. Otherwise, the residents of the City of Abilene will be responsible for very large loans for a reservoir that does not serve its own "shortage."

## 3.12 Topography, Geology, Soils

- Assess impacts to stream morphology and sediment transport, changes in stream flow, or changes in land use, including bedload for the Clear Fork in the project area and downstream; how might dam operation impact downstream transport of sediments (fines to cobbles) crucial for aquatic life habitat, entrapment, and maintenance of existing downstream dams (EPA 404).

- Consult Texas Instream Flow Program documents for geomorphic assessments and modeling (TPWD).

## 3.13 Transportation

- Determine property owner impacts regarding river crossings, accessibility, and travel time due to the proposed reservoir (public).

## 3.14 Water Resources

- Assess salinity increases due to evaporation and impacts due to changes in sediment transport downstream of the reservoir, and potential changes in water quality in Possum Kingdom Lake (Environment Texas, FBR, NWF/SC, TCA, TCEQ, TPWD).
  - Because much of the inflow to Possum Kingdom Reservoir is from sources that contain higher concentrations of dissolved solids than normal drinking water standards, reducing the inflow from the fresher Clear Fork of the Brazos River would have a qualitative as well as quantitative impact on Possum Kingdom.
  - Because the proposed reservoir would result in the impoundment, diversion, and evaporation of large quantities of water from the Clear Fork Brazos River, the loss of that flow into the Brazos River main stem will contribute to water quality challenges that also must be assessed.
  - The applicant should calculate the amount of freshwater impounded and evaporated by the project and how that loss of freshwater would affect the Clear Fork, Brazos main stem, and Lake Possum Kingdom salinity, including Lake Possum Kingdom State Park drinking water, which comes directly from an intake on the lake.

- Assess salinity and other water quality impacts in Cedar Ridge Reservoir during times of drought (Environment Texas).

- Determine the impact of Cedar Ridge on Possum Kingdom, and assess the loss of inflow being evaluated at 5,000 AFY (TCA).

  - As part of negotiations for the City of Abilene's agreeing not to contest the Brazos River Authority's (BRA) system operations permit application, BRA made an agreement that the loss of inflow to Possum Kingdom Reservoir from construction of Cedar Ridge Reservoir would be evaluated at 5,000 AFY. As a Trungale Engineering and Science calculation shows, 5,000 AFY is an arbitrary and inaccurate figure for the impact of Cedar Ridge on Possum Kingdom.

- Assess the loss of yield in Possum Kingdom from Cedar Ridge consumptive use or by water users whose return flows do not flow into the Brazos River (TCA).

  - If Cedar Ridge were built and its yield used consumptively (for example, to cool a power plant) or by water users whose return flows do not flow into the Brazos River, the inflows to Possum Kingdom Reservoir during a critical drought period would be reduced by at least 35,000 AFY, suggesting that the loss of yield in Possum Kingdom Reservoir would be similar to the yield of the proposed Cedar Ridge Reservoir.

- Assess whether the net effect of building Cedar Ridge Reservoir would be to simply move Possum Kingdom yield upstream, with no net gain in water supply (TCA).

  - The net effect of building Cedar Ridge Reservoir is likely simply moving some of the yield of Possum Kingdom upstream, with no net gain in water supply in the upper Brazos basin. Given that Abilene is currently developing infrastructure to move water from Possum Kingdom to Abilene, money spent on Cedar Ridge appears to be a pure loss.

- Assess whether decreased water quality (including temperature, salinity, and algae) could impact cities downstream that rely on Brazos water for their drinking-water supply, including exacerbation of those conditions by climate change (NWF/SC).

- Model hydrologic impacts in the Clear Fork, Possum Kingdom Lake, and the Brazos River upstream, as well as downstream, of Possum Kingdom (TPWD).

- Evaluate Lake Possum Kingdom salinity, including Lake Possum Kingdom State Park drinking water, which comes directly from an intake on the lake (TPWD).

- Analyze potential changes to water quality within and downstream of any new or expanded reservoirs (TCEQ).

- Determine average annual loss to evaporation (FBR, NWF/SC, public, TCA).

  - At the request of TCA, Trungale Engineering and Science did a study in 2013 of the evaporative losses that would result from building Cedar Ridge Reservoir. Using the TCEQ-approved water availability model (WAM), Trungale calculated the average

annual loss to evaporation that would occur if Cedar Ridge Reservoir existed at more than 16,000 AFY.

  - The reservoir site, located approximately 40 miles north of Abilene, will be subject to tremendous evaporative losses. These climatological factors should be taken into account in a comprehensive evaluation of the potential Cedar Ridge Reservoir water-supply yield, and disruption of downstream river flows with the most recent drought.

- Examine net evaporation and downstream river flows under projected future climate conditions (NWF/SC).

  - The steps outlined above [regarding Loss of water to evaporation and disruption of downstream river flows under the future climate] should be repeated in light of the potential for climate change to seriously exacerbate weather extremes in the region of the Cedar Ridge Reservoir.

- Determine how Cedar Ridge Reservoir will affect the operation of Lake Fort Phantom Hill (public).

  - How will this affected the operation of Fort Phantom Hill Lake…Can it cause the river to dry up on my property or cause flooding?

- Clearly describe the operations plan, including when Cedar Ridge Reservoir would be used versus Fort Phantom Hill Reservoir (TPWD).

  - The operations plan should be clearly described. Information should be provided regarding when water from Cedar Ridge Reservoir would be used, versus water from Fort Phantom Hill Reservoir. Depending on the operations plan, there may be environmental impacts upstream of the reservoir, such as to Fort Phantom Hill Reservoir (currently used for municipal water use and recreation) and elsewhere along the Clear Fork of the Brazos River.

- Since climate change has been indicated as a needs driver for this project, determine the effects of climate change on the resource, including analysis, calculations, assumptions, and justifications (EPA 404).

- Determine whether historical data (e.g., data 5 years or older) is currently representative and include justification. Because much of the data for this project was collected in 2010, a particularly wet year of record, and 2011 and 2012, drought years of record, suggest supplementing baseline data with more current efforts to ensure that the extent of system variation, condition, and function is captured (EPA 404).

- Analyze, such as via the Hydrologic Engineering Center's River Analysis System (HEC-RAS), how different potential operating plans may be helpful for understanding downstream impacts in determining the extent of the affected environment (EPA 404).

- If there are existing diversions or reasonably foreseeable future diversions from sources affected by this project, quantify cumulative total diversions as the proportion of average monthly (or daily) streamflow diverted (EPA 404).

- Seepage of water from streams can be a primary source of groundwater recharge. Downstream flow controls and reductions could reduce recharge through bed and banks occurring in losing segments. Determine the impacts of downstream flow reductions to groundwater budgets, and to riparian ecosystems dependent on these shallow groundwater resources (EPA 404).

- Ensure that the model or other analysis method selected captures the variability and dynamics of growing season nutrient cycling, algal blooms, and reductions in dissolved oxygen (EPA 404).

- Use a Level 3 analysis under the USACE Hydrologic Modeling Guidelines (EPA 404).

- At a minimum, analyze wet, average, and dry years at a daily time-step (EPA 404).

- Algal blooms and nutrient cycle dynamics significantly change within hours in any growing season day. Use a high frequency timestep to predict any project-related impacts (e.g., algal blooms are in a < 12-hour timestep) (EPA 404).

- Determine how much, if any, would be added to water supply in the upper Brazos basin (Environment Texas).

- Assess the sufficiency of the Brazos G mini-WAM covering 1940-2008, given recent drought and the recently updated WAM for the entire Brazos River (NWF/SC).

  - According to the 2016 Regional Water Plan (HDR & FNI, 2015) the water supply yield of the Cedar Ridge Reservoir was evaluated with a Brazos G mini-WAM covering 1940-2008. This may be an insufficiently rigorous evaluation of the likely water-supply yield given that: (a) the recent drought, including 2009-2014, may have been more severe than that captured in the 2016 Regional Plan evaluation; (b) the WAM for the entire Brazos River basin has been recently updated.

- Develop a watershed conservation plan to guide improved stewardship of the watersheds and water resources in the Abilene area (TPWD).

- Use RiverWare software for hydrologic modeling, due to flexibility, transparency, and ability to provide a daily timestep, critical for assessing existing hydrology, determining hydrological impacts, and evaluating proposed future conditions (TPWD).

## 3.15 Secondary and Cumulative Impacts

- Identify the relationship of other water diversion and water management projects to this project to assess impacts. Provide site-specific characterization and disclosure of past diversion impacts, including incremental impacts from all historical operations (EPA NEPA).

  - Cumulative impacts of all water development and water transfer projects that will affect the aquatic resources are important to examine. In determining whether a project may have a significant effect on the environment, analyze the direct and indirect effects of all alternatives, in combination with past, present, and reasonably

foreseeable future activities. We suggest analyzing impacts according to watersheds rather than political boundaries. If there are other water diversion and water management projects that will have a relationship with this project, we recommend that the Draft EIS identify those relationships to aid in the disclosure of any cumulative, indirect, or direct impacts to the affected environment. In the Draft EIS, we recommend site-specific characterization and disclosure of past diversion impacts, including incremental impacts from all historical operations, affecting aquatic ecosystems, including streams, associated wetlands, and aquatic habitats.

- Study exhaustively the cumulative impacts from existing reservoirs in the Brazos River Basin (TCA).

  - Existing reservoirs have already caused dramatic changes in the hydrology, aquatic biology, and the riparian ecosystems of the Brazos River Basin. Historically the review of cumulative impacts has not been given the emphasis that project-specific impacts receive. TCA requests an exhaustive study of cumulative impacts and that the decision about the 404 permit reflect that study.

- Determine the cumulative impacts of adding this proposed impoundment on shiner species (NWF/SC).

  - The shiner species apparently has been extirpated from much of its natural habitat as a result of previously constructed dams and ongoing water diversions. The cumulative impacts of adding this proposed impoundment must be addressed.

- Assess the adequacy of flows, including pulse flows, expected downstream of the proposed reservoir. TCEQ standards are not likely to protect aquatic resources, nor do the adopted flow standards include a measurement point within the Clear Fork of the Brazos River downstream of the proposed reservoir; the next measurement is on the main stem Brazos River near South Bend (NWF/SC).

  - Accordingly, the EIS must include an assessment of the adequacy of flows, including an evaluation of pulse flows, expected downstream of the proposed reservoir for supporting sound ecologic conditions. There is no reasonable basis for an assumption that compliance with the TCEQ environmental-flow standards will protect the aquatic resources of the area. In particular, the adopted flow standards do not include protection for levels of pulse flows needed to maintain ecological health of the system. In addition, the adopted flow standards do not include a measurement point within the Clear Fork of the Brazos River downstream of the proposed reservoir where adequacy of flows could be determined if the reservoir were built. Instead, the next downstream measurement point in the flow standards is on the main stem of the Brazos River near South Bend.

- Recognize that flow standards cannot be relied upon to protect flows in the Clear Fork of the Brazos River. The very-low-flow requirements at the measurement point could be met solely with flows originating from the main stem of the Brazos upstream (NWF/SC).

  - TCEQ does not determine compliance except at the measurement points listed in the standards, unless the permit applicant specifically requests it, the flow standards cannot be relied upon to protect flows in the Clear Fork of the Brazos River. The very-low-flow requirements in the standards at the South Bend measurement point

could be met solely with flows originating from the main stem of the Brazos upstream of the measurement point. As a result, the standards do not ensure any reasonable level of flow protection in the Clear Fork below the proposed reservoir site.

- Recognize that the characterization of site-specific conditions upstream or within the reservoir site is not a reasonable substitute for characterization of flow protections needed to maintain a sound ecological environment downstream of the proposed reservoir (NWF/SC).

- Assess cumulative impacts of flow alteration in the Brazos Basin (NWF/SC).

- Assess cumulative impacts of habitat loss and functional impairment (NWF/SC).

  - As noted above, reservoir construction in the Brazos River basin has greatly altered the hydrologic regime. It also has resulted in the loss of large amounts of riparian habitat and stream habitat and has greatly impaired habitat function. The proposed reservoir will add to the loss and impairment of those habitat types, as well as terrestrial wildlife habitat. The cumulative impacts of habitat loss and functional impairment in the area must be assessed.

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## 4.1 NOI Withdrawal and Reissuance

The NOI for the Cedar Ridge Reservoir EIS was withdrawn on August 7, 2018 (Appendix Q). The Federal Register provided the following Supplementary Information:

> *"On March 20, 2018, the Office of Management and Budget (OMB) and the Council on Environmental Quality (CEQ) issued an OMB/CEQ Memorandum for Heads of Federal Departments and Agencies titled ''One Federal Decision Framework for the Environmental Review and Authorization Process for Major Infrastructure Projects under Executive Order [E.O.] 13807.'' Additionally, twelve federal agencies, including Department of the Army, signed a Memorandum of Understanding (MOU) as an appendix to the OMB/CEQ Memorandum. The MOU is titled ''Memorandum of Understanding Implementing One Federal Decision Under Executive Order 13807'' and was effective on April 10, 2018. E.O. 13807 sets a goal for agencies of reducing the time for completing environmental reviews and authorization decisions to an agency average of not more than two years from publication of a NOI to prepare an EIS. The MOU set forth activities to be accomplished before the issuance of an NOI, including project prescoping, the development of a permitting timetable, and the development of project Purpose and Need. Because the Cedar Ridge Reservoir planning had not reached these milestones prior to publication of the NOI, the NOI is being withdrawn until such time that these milestones are complete."*

## 4.2 EIS Process

USACE will use the scoping comments to define and more closely refine potential environmental issues, inform the range of alternatives, and identify mitigation measures, all of which would be considered in the EIS and related analyses. Once the NOI is reissued, a Draft EIS will be prepared that incorporates information received from the public, agencies, and tribes during the scoping process.

Once the Draft EIS is completed, USACE will issue a Notice of Availability (NOA) for publication in the Federal Register, and the document would be distributed for public review and comment. A public hearing is planned during the Draft EIS review and public comment period. During the public comment period, input is requested on key issues and the adequacy of the Draft EIS. Comments received on the Draft EIS during the public review and comment period would be considered by USACE in preparing the Final EIS. Once the Final EIS is completed, USACE would issue an NOA for the Federal Register, and the document would be distributed for public review.

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After the Final EIS is distributed, the USACE would prepare a Record of Decision (ROD) taking into account the results of the EIS, any public and agency comments, and other considerations in the Administrative Record. The ROD is the decision document which includes all required findings and determinations relative to the 404(b)(1) guidelines and public interest review and the final decision whether to issue a permit, issue a permit with conditions, or to not issue a permit.

# Chapter 5.0
# **References**

Brazos River Basin and Bay Expert Science Team, 2012. *Environmental Flow Regime Recommendations Report*. Final Submission to the Brazos River Basin and Bay Area Stakeholder Committee, Environmental Flows Advisory Group, and the Texas Commission on Environmental Quality. March 1.

HDR Engineering, Inc. and Freese and Nichols, Inc., 2015. *2016 Brazos G Regional Water Plan*. December.

Texas Water Development Board, 2017. *2017 State Water Plan – Water for Texas.*